An investigation of factors influencing disrupted sleep in university students

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Abstract

Introduction:
Sleep disruption is one of the psychosocial issues among college students which might adversely affect their lives. This study examines the role of individual and psychosocial factors and intensive scholastic schedule in disrupted sleep patterns among medical and paramedical sciences students.

Materials and Methods:
In this cross-sectional descriptive study on students of Semnan University of Medical Sciences, 143 males and 175 females were selected through convenience sampling. The subjects completed the Beck Anxiety Inventory, Multidimensional Acculturative Stress Scale, Global Sleep Assessment Questionnaire, Pittsburgh Sleep Symptom Questionnaire and Demographical characteristics Questionnaire. Data were analyzed using correlation and stepwise multiple regression.

Results:
There was a significantly positive relationship among anxiety, stress and intensive scholastic schedule with global sleep disruption and the severity of related symptoms (P<0.001). In addition, anxiety, stress and intensive scholastic schedule had a significant role in prediction of global sleep disruption and the severity of related symptoms (P<0.001). Age, grade, and gender do not have a significant role in prediction of global sleep disruption and the severity of related symptom (P>0.05).

Conclusion:
In order to decrease the effects of anxiety, stress and intensive scholastic schedule on sleep health of college students, it is suggested that college students should be supplied with psychological education on how to manage anxiety, stress and intensive scholastic schedule before the occurrence of their harmful outcomes in sleep health.

Keywords: Psychological Stresses, Anxiety, Sleep disorders, Students

Introduction
Sleep disruption is a condition accompanied by various physical, emotional and social side-effects such as a decline in the immune system function, changes in appetite, fatigue, possibility of increased incidence of psychological disorders and academic or job performance disorders (1-2). Studying period, laden with fluctuations, comprises a significant transition period in one’s life and encompasses new experiences that might harm sleep health (3). The risk of potential physical and psychological problems...
increases among students with the incidence of sleep disruption and the accumulation of sleep deficiency (3-4).

Various psychosocial factors including anxiety and stress, individual factors such as age, gender and education level and also an intensive scholastic schedule, work together to create sleep disorder and help it persist over time (3). A complicated and interactive relationship exists between psychosocial stresses and states of anxiety and the incidence of sleep disorder in such a way that anxiety and lack of control during stressful phases of life lead to students’ inability to change their conditions and therefore experience sleep disorder (5-6). Emotional reactions to stressful situations create anxiety and help it persist over time, the end result of which might be sleep disorder (6). In fact, the undesirable effect of anxiety on sleep patterns works through creating a vicious cycle recurring between stress and sleep disorder due to the effect of stress on sleep cycle changes, through increasing or decreasing sleep onset latency and the awakening threshold and persists through destroying the next phase of the sleep pattern (7). Anxiety due to an increased stimulation or excitation in the nervous system can also increase the risk of sleep disorder (8). In most cases, stress lays the ground for anxiety in and the interaction of these two emotions affects sleep (9).

Frequent routine stresses can accelerate the incidence of anxiety and its symptoms and thus create a variety of sleep disorders. Furthermore, sleep disorder is a symptom recurring with states of anxiety that adversely affects the trend of anxiety during the vicious cycles and ultimately intensifies the next sleep disorders (10).

Given the students’ various types of stress and anxiety, many of them are prone to sleep disorders of different kinds (11). Due to the high frequency of sleep disorders among students and their undesirable outcomes, identifying factors contributing to sleep disorders and preventing them is fundamental to improving students’ sleep health (4). Several studies have been conducted surveying these factors in other societies across the world. Lund et al. (3) discovered that the incidence of sleep disruption in students’ sleep-wake cycle is mostly a result of the change in their lifestyle and their encounter with new psychosocial stresses, intensive scholastic schedule and also the use of caffeine and alcohol. Furthermore, drug abuse, a heavy course load, intensive scholastic schedule and also accidents are important factors contributing to the emergence and persistence of sleep disorders among students (12-13). According to other studies, being female, intensive and heavy scholastic schedule and old age were all important determining factors leading to the disruption of students’ sleep pattern (4). According to Kim et al. (14), scholastic schedule alone greatly contributes to the incidence of sleep disruption; nevertheless, no coherent studies have been conducted in Iran about the psychosocial and demographic factors affecting students’ sleep disruptions. What is evident is that conducting such studies in Iran is of great importance and might lead to greater practical findings among students of the medical and paramedical fields who are faced with stress, anxiety and fatigue due to their intensive scholastic and research schedule. The present study partly reiterates the studies conducted by researchers such as Lund et al. (3), but its focus in particular is on the effect of intensive scholastic schedule, stress and anxiety on the sleep behavior of medical and paramedical students. The present study surveys anxiety and stress as the most prevalent and significant psychological symptoms associated with sleep disorder. Given that this study concentrates on primary sleep disruption and not on the secondary type, the role of psychological disorders such as depression and alexithymia is not examined here. The present study mainly focuses on the simultaneous effect of psychosocial factors, individual factors and intensive
scholastic schedule on the incidence of sleep disorders—an issue that was not surveyed as a whole in previous studies. The purpose of this study is thus to predict general sleep disturbances and the intensity of their symptoms among medical and paramedical students of Semnan University of Medical Sciences based on individual and psychosocial factors and the intensity of their scholastic schedule.

Materials and Methods
The present descriptive cross-sectional study was conducted on the statistical population of all students of Semnan University of Medical Sciences who studied in the fields of general medicine, PhD in physiology and biotechnology, MSc in physiology, anatomy, immunology, medical physics, nursing, physiotherapy and BSc in laboratory sciences, nursing, operating room, anesthesiology, radiology, information technology, physiotherapy, speech language pathology and occupational therapy. With a maximum incidence rate discovered in the primary studies, a confidence interval of 95% and a rate of prevalence estimation with an accuracy of 0.05 of the actual amount of sleep disruption and the existence of the three predictor factors, 310 samples were required; in order to increase the accuracy of sampling, account for the potential drop and incomplete tools, 325 students were selected through convenience sampling through visiting the relevant university departments. Seven people were excluded for incomplete defective questionnaires, participants in the study were reduced to 318 people (143 male and 175 female) in the age range of 18 to 43 years old with a mean age of 25.84. Inclusion criteria consisted of being a student during the study period, being physically and psychologically health, lacking disabilities, a desirable functionality in matters related to education and clinical internship and an inclination and informed consent on the part of the participants. Whether or not the participants enjoyed a state of physical and psychological health was confirmed by enquiring them about their lack of a record of serious psychological and medical disorders and also by investigating their visiting the university health center, the university counseling center or any off-campus counseling center during the preceding six months. The desirability of the students’ performance in educational matters and clinical internships was evaluated by surveying their academic standing based on their transcripts, lack of a conditional pass during preceding semesters and successful completion of the clinical internship. Exclusion criteria consisted of the presence of physical and psychological diseases aside from the psychological symptoms anxiety and stress in students during the preceding six months as well as during the study period, academic performance drop or unsuitable clinical internship and also attendance in sleep health improvement programs and courses during the study period. Tools used in conducting this study are as follows:

1. Beck Anxiety Inventory (BAI): With 21 items, this tool evaluates the intensity of anxiety on a 4-point Likert scale with 0 signifying mild and 3 signifying severe anxiety (15 and 16). The internal consistency of this inventory (Cronbach’s alpha) is between 0.92 and 0.94, its correlation with Hamilton Anxiety Rating Scale is 0.51 and also, based on the assessments of a clinical expert in Iran, it has convergent and distinction validity (15). The reliability coefficient of this scale was calculated at 0.83 using the posttest method on 112 cases with an interval of one month while its internal consistency coefficient (Cronbach’s alpha) was calculated at 0.92 (16).

2. Multidimensional Acculturative Stress Scale (MASS): This tool consists of 24 items for the five distinct factors of discrimination, threat to ethnic identity, and lack of opportunities for occupational
and financial mobility, homesickness and language barrier. Participants respond to the questionnaire on a 4-point Likert scale from 1 (signifying total disagreement) and 4 (signifying total agreement). Higher grades on this scale indicate higher levels of accumulated stress. The concurrent validity of this scale was confirmed by a general health and a psychological welfare questionnaire (17). Five experts confirmed the validity and content validity of the scale for the present study being conducted in Iran. Furthermore, the inter-rater reliability of this scale and the Holmes and Rahe Stress Scale was highly desirable in 30 cases (r=0.78 and p<0.001). The Cronbach’s alpha (for 318 people) and the pretest-posttest coefficient (for 30 people) were desirable over a four-week period and were calculated at 0.87 and 0.80, respectively.

3. Global Sleep Assessment Questionnaire (GSAQ): This questionnaire includes 11 items that calibrate sleep behavior on a 3-point scale from 0 (behavior patterns that never occur) to 2 (behavior patterns that occur all the time) (18). Higher points indicate patterns that always occur or that occur from time to time and represent a greater risk for experiencing sleep disorder (18). The stability of the pretest-posttest in this questionnaire ranges from 0.51 to 0.92 and its concurrent validity was desirable based on the evaluations made by a clinical expert (18). Based on the comments made by 5 experts, it has face and content validity in the present study. Furthermore, the inter-rater reliability of this questionnaire was highly desirable according to a clinical expert who evaluated all the 32 cases concurrently (r=0.76, p<0.001). Using Cronbach’s alpha (for 318 people) and the pretest-posttest coefficient method (for 30 people), the internal consistency of this tool in the present study was calculated at 0.89 and 0.84, respectively during a four-week period; these figures signify the desirable stability of this questionnaire for Iranian cases.

4. Pittsburgh Sleep Symptom Questionnaire (PSSQ): This tool has 13 items that assess the intensity of sleep symptoms during the preceding month (19). The questionnaire’s scoring method takes three criteria into consideration: the sleep symptom criterion, the duration criterion and the daytime impairment criterion. Higher scores for the responses signify sleep disorder (19). The face and content validity of the PSSQ is outstanding and its Cronbach’s alpha is 0.89 (19). The face and content validity of this tool as used in this study was confirmed by 5 experts. Its inter-rater reliability was desirable along with the concurrent use of a clinical expert’s assessment (r=0.80 and p<0.001). For this scale, Cronbach’s alpha (for 318 people) and the pretest-posttest coefficient (for 30 people) were calculated at 0.91 and 0.85, respectively over a four-week period.

5. Demographic information questionnaire: This tool is used for collecting personal information of the participants such as age, gender, their educational information such as degree level, field of study and scholastic schedule of their current semester alongside general health information such as the lack of diseases or special concerns. In this questionnaire, the intensity of the scholastic schedule is assessed based on certain variables, namely, number of class hours per day and per week, course load, clinical internship and practical courses and experiments in classes; based on these variables, participants are divided into two groups, one with an intensive scholastic schedule and one without. In line with educational standards and based on a background survey carried out on students, the indicator of intensive scholastic schedule in this study was considered to be, in the master’s level, having over 20 hours of classes per week and a course load exceeding 10 credits per semester; in the doctoral level, having over 10 hours of classes per week and a course load exceeding 5 credits per semester; and
finally a minimum of 2 full days of intensive internship in both levels.

This study observed ethical considerations such as confidentiality of participants’ information, the right to withdraw at any stage of the study and obtaining their written consent. Participants filled out the questionnaires anonymously and the tools were identified by a code. In the data analysis, stepwise multiple regression and correlation were used with PASW statistical software.

Results

Participants belonged to the age range of 18 to 43 with a mean age of 25.84. From among the 318 participants, 143 (%45) were male and 175 (55%) were female. In addition, 162 (50.9%) of them studied at bachelor’s degree while 118 (37.2%) studied at master’s and 38 (11.9%) at a general doctoral degree or a PhD. Furthermore, 162 (50.9%) did not have an intensive scholastic schedule while 156 (49.1%) had. The participants’ characteristics are presented in Table 1 based on the variables’ mean, standard deviation and correlation matrix. With respect to the assessment scale (quantitative and qualitative variables), Pearson correlation test was used for assessing the relationship between the discrete variables and two-point biserial correlation test for assessing the relationship between qualitative variables and quantitative variables.

Table 1: Mean, Standard Deviation and Pearson Correlation Matrix for the Studied Variables (N=318)

<table>
<thead>
<tr>
<th>Mean Average (Standard Deviation)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. General Sleep Disturbance</td>
<td>12.99 (7.50)</td>
<td>7.50 (4.20)</td>
<td>54.91 (21.52)</td>
<td>31.82 (18.91)</td>
<td>25.84 (4.51)</td>
</tr>
<tr>
<td>2. Intensity of Sleep Disturbance Symptoms</td>
<td>0.81**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Stress</td>
<td>0.65**</td>
<td>0.69**</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Anxiety</td>
<td>0.71**</td>
<td>0.68**</td>
<td>0.57**</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5. Age</td>
<td>0.10</td>
<td>0.12</td>
<td>0.12</td>
<td>0.08</td>
<td>1</td>
</tr>
</tbody>
</table>

* P<0.05  ** P<0.01

In the present study, the two-point string correlation between the intensity of scholastic schedule and general sleep disturbance and the intensity of sleep disruption symptoms were 0.47 and 0.45, respectively, both of which are statistically significant (P<0.01). In addition, the two-point string correlation of degree level and gender with general sleep disturbance was 0.13 and 0.06, respectively while only the correlation between degree level and intensity of sleep disturbance symptoms had a statistical significance (P<0.05). The Pearson correlation was not significant between age, sleep disturbance and anxiety, but it was significant between all the other variables (P<0.05 and P=0.01) (Table 1). Assessing multi-collinearity through the tolerance test, outliers, remaining diagrams and missing data, multiple regression could be used. The tolerance test for predicting general sleep disturbance and the intensity of sleep disruption symptoms in the three stages of analysis found the coefficient to be between 0.55 and 1.0 and between 0.56 and 1.0 respectively; signifying the lack of linearity and the consistency of the regression model. The VIF value for each variable in the three-stage analysis for general sleep disturbance and intensity of sleep disruption symptoms ranged 1.00-1.80 and 1.00-1.82, respectively. The Durbin-Watson value for predicting general sleep disturbance and intensity of sleep disruption symptoms were 1.99 and 2.07, respectively and therefore the residues’ correlation hypothesis is rejected. Furthermore, the correlation between the variables in the two analyses was below.
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0.9, signifying the lack of linearity between the variables. Findings of the study demonstrate that the variables can significantly predict general sleep disturbance by three steps (P<0.001).

In the first step, contribution of the anxiety variable to general sleep disturbance is significant (P<0.001 and F(1.316)=46.96) and this variable is able to predict 0.59 of the changes related to general sleep disturbance in the sample population (R2=0.598) as well as in the generalized population (Adj R2=0.597). The role of anxiety in benchmarking general sleep disturbance equaled 0.59. In the second step, contribution of anxiety and stress variables to general sleep disturbance was significant (P<0.001 and F(2.315)=33.49); these two variables are able to predict 0.68 and 0.67 of the changes related to general sleep disturbance in the sample population (R2=0.681) and also in the generalized population (Adj R2=0.678). In this step, the contribution of stress to benchmarking general sleep disturbance equals 0.083. In the third (final) step, the three variables of anxiety, stress and intensity of scholastic schedule contribute significantly to general sleep disturbance (P<0.001 and F(3.314)=25.71); these three variables are able to predict 0.70 of the changes related to general sleep disturbance in the sample population (R2=0.707) as well as in the generalized population (Adj R2=0.704). In this step, contribution of the intensity of scholastic schedule to benchmarking general sleep disturbance is equal to 0.027.

In this regression model, the three variables of age, degree level and gender did not have a significant contribution to predicting general sleep disturbance in the students (P>0.05).

As according to the predictor variables’ regression coefficients, the three variables of anxiety, stress and intensive scholastic schedule can significantly benchmark changes occurring to general sleep disturbance, a benchmarking that is achieved through the introduction of all three variables into the third stage. Among these variables, anxiety is more important than the rest. The statistical weight of anxiety (B=1.189), (t=11.635) and (P<0.001), of stress (B=1.118), (t=8.479) and (P<0.001) and of intensive scholastic schedule (B=2.749), (t=5.340) and (P<0.001), indicate that these variables can benchmark the changes occurring to general sleep disturbance of the sample population with 99% confidence rate, and if the sample population is generalized to the entire population, the weight (β) of anxiety, stress and intensive scholastic schedule in the incidence of general sleep disturbance will equal 0.477, 0.337 and 0.185 respectively (Table 2).

Table 2: Estimation of Regression Coefficients for the Predictor Variables of General Sleep Disturbance

<table>
<thead>
<tr>
<th>Step</th>
<th>Predictor Variables</th>
<th>B</th>
<th>β</th>
<th>T</th>
<th>P-value</th>
<th>Confidence Interval 95%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First</strong></td>
<td>Constant Value</td>
<td>3.829</td>
<td>6.168</td>
<td>0.001</td>
<td>4.259 - 2.199</td>
<td></td>
</tr>
<tr>
<td>Anxiety</td>
<td>1.307</td>
<td>0.773</td>
<td>21.679</td>
<td>0.001</td>
<td>3.010 - 1.201</td>
<td></td>
</tr>
<tr>
<td><strong>Second</strong></td>
<td>Constant Value</td>
<td>0.911</td>
<td>1.390</td>
<td>0.165</td>
<td>2.199 - 0.378</td>
<td></td>
</tr>
<tr>
<td>Anxiety</td>
<td>1.201</td>
<td>0.540</td>
<td>13.170</td>
<td>0.001</td>
<td>2.314 - 0.781</td>
<td></td>
</tr>
<tr>
<td>Stress</td>
<td>1.132</td>
<td>0.370</td>
<td>9.024</td>
<td>0.001</td>
<td>2.467 - 0.822</td>
<td></td>
</tr>
<tr>
<td><strong>Third</strong> (Final)</td>
<td>Constant Value</td>
<td>3.624</td>
<td>4.486</td>
<td>0.001</td>
<td>4.971 - 2.231</td>
<td></td>
</tr>
<tr>
<td>Anxiety</td>
<td>1.189</td>
<td>0.477</td>
<td>11.635</td>
<td>0.001</td>
<td>2.011 - 0.886</td>
<td></td>
</tr>
<tr>
<td>Stress</td>
<td>1.118</td>
<td>0.337</td>
<td>8.479</td>
<td>0.001</td>
<td>1.994 - 0.746</td>
<td></td>
</tr>
<tr>
<td>Intensive Scholastic Schedule</td>
<td>2.749</td>
<td>0.185</td>
<td>5.340</td>
<td>0.001</td>
<td>3.401 - 1.242</td>
<td></td>
</tr>
</tbody>
</table>
In determining the role each variable plays in predicting the intensity of sleep disruption symptoms, stress significantly contributes to these symptoms in the first step (P<0.001 and F(316.1)=41.47); this variable can predict 0.57 and 0.56 of the variance related to the intensity of sleep disruption symptoms in this study’s sample population (R2=0.570) and in the generalized population (Adj R2=0.569). The role of stress in benchmarking the intensity of sleep disruption symptoms is equal to 0.570. In the second step, stress and anxiety significantly contribute to the intensity of sleep disruption symptoms (P<0.001 and F(315.2)=35.14); these two variables can predict 0.69 and 0.68 of the variance related to the intensity of sleep disruption symptoms in the sample population (R2=0.691) and in the generalized population (Adj R2=0.689). In this step, the role of anxiety in benchmarking general sleep disturbance equals 0.445. In the third step, stress, anxiety and intensive scholastic schedule significantly contribute to the intensity of sleep disturbance symptoms (P<0.001 and F(3.314)=25.49); these three variables can predict 0.71 and 0.70 of the variance related to the intensity of sleep disturbance symptoms in the sample population (R2=0.711) and in the generalized population (Adj R2=0.708). In this step, the role of intensive scholastic schedule in benchmarking the intensity of sleep disruption symptoms is equal to 0.020. In this regression model, age, degree level and gender, did not significantly contribute to predicting the intensity of sleep disruption symptoms among the students (P>0.05).

As according to the regression coefficients of the predictor variables, stress, anxiety and intensive scholastic schedule can significantly benchmark the variance occurring to the intensity of sleep disruption symptoms, a benchmarking that is achieved through the introduction of all the three variables in the third step. From among these variables, stress is more important than the rest. The weight of stress (B=1.102), (t=11.259) and (P<0.001), of anxiety (B=1.123), (t=9.638) and (P<0.001) and of intensive scholastic schedule (B=1.348), (t=4.665) and (P<0.001), indicate that together, these variables can benchmark the variance occurring to the intensity of sleep disruption symptoms in the sample population with a confidence rate of 99%, and if the sample population is generalized to the entire population, the statistical weight (β) of stress, anxiety and the intensive scholastic schedule in intensifying the symptoms becomes 0.445, 0.393 and 0.171 respectively (Table 3).

### Table 3: Estimation of Regression Coefficients for the Predictor Variables of the Intensity of Sleep Disruption Symptoms

<table>
<thead>
<tr>
<th>Confidence Interval 95%</th>
<th>P-value</th>
<th>T</th>
<th>β</th>
<th>B</th>
<th>Predictor Variables</th>
<th>Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.235-1.571</td>
<td>0.158</td>
<td>1.414</td>
<td>0.601</td>
<td></td>
<td>Constant Value</td>
<td>First</td>
</tr>
<tr>
<td>0.133-1.873</td>
<td>0.001</td>
<td>20.481</td>
<td>0.755</td>
<td>1.148</td>
<td>Stress</td>
<td></td>
</tr>
<tr>
<td>0.231-1.453</td>
<td>0.041</td>
<td>2.055</td>
<td>0.742</td>
<td></td>
<td>Constant Value</td>
<td></td>
</tr>
<tr>
<td>0.281-1.926</td>
<td>0.001</td>
<td>13.737</td>
<td>0.481</td>
<td>1.332</td>
<td>Stress</td>
<td>Second</td>
</tr>
<tr>
<td>0.301-2.011</td>
<td>0.001</td>
<td>11.088</td>
<td>0.447</td>
<td>1.620</td>
<td>Anxiety</td>
<td></td>
</tr>
<tr>
<td>1.324-3.351</td>
<td>0.001</td>
<td>4.583</td>
<td>2.063</td>
<td></td>
<td>Constant Value</td>
<td></td>
</tr>
<tr>
<td>0.346-1.962</td>
<td>0.001</td>
<td>11.259</td>
<td>0.445</td>
<td>1.102</td>
<td>Stress</td>
<td></td>
</tr>
<tr>
<td>0.328-1.013</td>
<td>0.001</td>
<td>9.638</td>
<td>0.393</td>
<td>1.123</td>
<td>Anxiety</td>
<td></td>
</tr>
<tr>
<td>0.672-2.893</td>
<td>0.001</td>
<td>4.665</td>
<td>0.171</td>
<td>1.348</td>
<td>Intensive Scholastic Schedule</td>
<td>Third (Final)</td>
</tr>
</tbody>
</table>
Discussion

Based on the results of this study, stress, anxiety and intensive scholastic schedule are significant predictors of general sleep disturbance and the intensity of its symptoms among students of Semnan University of Medical Sciences. Both the General Sleep Disturbance Scale and Pittsburgh Sleep Quality Index indicate that anxiety, stress and intensive scholastic schedule negatively affect sleep patterns. In addition, results of this study demonstrated that anxiety and stress have the greatest contribution to general sleep disturbance and also to increasing sleep disturbance symptoms among students. These findings are in line with results of previous studies (22,20,3). A study conducted by Lund et al. suggested that 24% of sleep disturbance variance is predicted by stress and anxiety (3). Another study conducted by DeBonis et al. (21) revealed that 27.1% and 17.7% of general sleep disturbance variances and also the intensity of its symptoms can be predicted by stress and anxiety. Furthermore, a study conducted by Buckner et al. (8) revealed that high anxiety and tension are significant factors leading to the incidence and persistence of sleep disturbance.

Therefore, in line with previous studies, the present study showed that anxiety and stress have a significant role in predicting the incidence and persistence of general sleep disturbance and the intensity of its symptoms. As suggested, disrupted sleep is a strong symptom of anxiety disorder and the persistence and intensification of anxiety is accompanied by disrupted sleep and the intensification of its symptoms (10). According to Buckner et al. (8), disrupted sleep is a major consequence of states of anxiety that will persist if not monitored and treated and which falls into a vicious cycle due which in turn intensify anxiety and other psychological disorders. Student life is a naturally stressful process whereby students encounter intense symptoms of stress if they fail to fully adjust to it over time. These symptoms will become chronic if not resolved and sleep disturbance is the outcome.

In line with previous studies (14, 20), the present study also reveals the significant contribution of a heavily intensive scholastic schedule alongside high amounts of stress and anxiety to general sleep disturbance and the intensification of its symptoms. The intensity of scholastic schedule is accompanied by an increase in physical tension and psychological disorder, two states that pose problems to the sleep-wake cycle through physiological stimulation and therefore lays the ground for sleep disorder and the intensification of its symptoms. According to Gaultney (23), the sleep-wake cycle, academic planning and performance mutually influence each other and thus affect future health consequences. Furthermore, Carney et al. (24) demonstrated that the intensity of the students’ daily scholastic schedule intensifies their sleep disorders and makes it persist over time.

Based on the findings of this study, age, degree level and gender did not have a significant role in predicting the incidence of sleep disorder and the intensification of its symptoms. Some studies conducted suggest that these factors greatly affect students’ sleep disturbance (4, 24-25). A study conducted by Nojomi et al. demonstrated that a female gender type and a higher academic year greatly contribute to the general sleep disturbance of medical students and in fact determine their sleep pattern pathology (4). A study conducted by Bahammam et al. drew the conclusion that a female gender type and an older age greatly contribute to the incidence of sleep disorder and the intensification of its symptoms for the medical students’ academic performance (6). Certain results of this study were not in line with previous findings, as such is the variance in the sample population, the operational definition of sleep disturbance, the method...
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of assessing the variables, conducting the study and the statistical analyses and also the definition of an acceptable statistical level. Variance in the students’ level of knowledge on matters related to sleep, stress, anxiety and scholastic schedule in different studies and also other cultural and behavioral factors can explain the inconsistency of results. Previous studies had demonstrated that age has a contributing role in the incidence of sleep disruption and that sleep disorders increase with age (6). The relationship between age and sleep disruption is not significant in the present study, which can be explained by the limited age range of participants (i.e. that they are close to each other in age). In addition, the lack of a significant relationship between age, degree level and gender and general sleep disturbance and its symptoms demonstrates that attributing features, i.e. age and gender and the external factor of degree level are not the underlying factors contributing to anxiety, stress and intensive scholastic schedule and that anxiety, stress and intensive scholastic schedule contribute to the incidence and intensification of sleep disturbance independently of the abovementioned factors.

Results of this study should be interpreted based on its sample characteristics. Given the limited sample population of participants (students of Semnan University of Medical Sciences) who were also from a limited geographical region, the results might not reflect the conditions of other students; in other words, we cannot deduct sleep disturbance and sleep patterns of students from other regions of the country based on this particular study. It should be noted that the cross-sectional study of sleep disruption and its predictor factors over a short period of time by using self-report tools is considered a methodological limitation which affects generalization of the findings. Therefore, studying long-term sleep disruptions and its predictor factors comprises a major topic for future research. The present study does not survey other major psychological disorders such as clinical depression accompanied by secondary sleep disruption and disorder; we suggest that further studies be conducted with regard to these disorders. Future studies should be conducted on a larger population of participants and should focus on other demographic factors along with carrying a survey of the longitudinal pattern of changes occurring to sleep habits in the intervals of time between the school semesters. This study examined the direct relationship between variables while future studies should also concentrate on indirect relationship.

Conclusions
The final results of the study indicated that anxiety, stress and intensive scholastic schedule all significantly contribute to the students’ general sleep disturbance and the intensification of their sleep disruption symptoms. Interventions should be devised in order to reduce the students’ levels of anxiety and stress and also to improve their methods of arranging each semester’s scholastic schedule so as to promote their sleep health, impede subsequent physical and psychological damages and thus improve their academic and social function.

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Conflict of Interests
The authors declare no conflicts of interest in this study.
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