The Relationship between Transdiagnostic Constructs and Insomnia in Students

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Abstract

Background and Objective: Insomnia is a universal phenomenon that many people experience and is characterized by difficulty in sleep initiation, maintaining sleep, waking up early in the morning, and inability to return to sleep. Due to its high prevalence and the effect of insomnia on the mental and physical performance of individuals, especially students, the present study aimed to investigate the relationship between transdiagnostic structures and insomnia disorder in students.

Materials and Methods: This was a cross-sectional study. Population of this study was 400 medical students of Zanjan University of Medical Sciences and Zanjan University, Zanjan, Iran, who were selected by non-random sampling method. Research tools included demographic characteristics questionnaire, Insomnia Severity Index (ISI), 12-question Intolerance of Uncertainty Scale (IUS), Difficulties in Emotion Regulation Scale (DERS), Anxiety Sensitivity Index-Third Edition (ASI-3), and Repetitive Thinking Questionnaire (RTQ). Research data were analyzed using LISREL software.

Results: The average age of students was 21.54 years. Transdiagnostic constructs explained a total of 9% of insomnia disorders in students. Insomnia disorders in women were significantly higher than in men; moreover, in the single group was higher than in the married group.

Conclusion: Transdiagnostic constructs can predict insomnia in students.

Keywords: Insomnia; Transdiagnostic; Emotion regulation; Students

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Introduction

The most common sleep disorder is insomnia. Its prevalence is 10-35 percent in general population and 50% in adult population. The predominant complaint is difficulty initiating or maintaining sleep, or non-restorative sleep (1). Researchers have shown that people with insomnia report higher fatigue, irritability, anxiety, depression, accidents, absenteeism, and lower quality of life (QOL) in the general population (2). Studies have reported a different prevalence of sleep problems among students. A study by Hicks et al. on the students of medical sciences showed that the prevalence of sleep problems was 71% (3). Nojomi et al. studied the sleep pattern of students and residents and showed that the workload was related to insomnia and poor sleep, so that the full-time students and residents had higher scores in insomnia and variety of sleep disorders (4). Landrigan et al. also showed that by intervening in the insomnia of interns and residents, the errors of these individuals could be reduced by up to 35.9% (5). Patients with chronic insomnia experienced more depressed and anxious moods during the day than those who slept well and had higher arousal levels (6). Numerous studies have shown that the cognitive and emotional components play an essential role in the onset and persistence of insomnia.

One of the most recent models in the field of pathology of mental disorders is transdiagnostic factors that have also been considered by researchers in the field of sleep problems (7). Transdiagnostic models of psychopathology try to

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identify multiple underlying processes as well as various vulnerabilities and comorbid disorders (8, 9). Emotion regulation is a transdiagnostic process that affects a wide range of psychopathologies. The emotional disorder is a maladaptive way of responding to emotions, that includes unacceptable responses and difficulty in controlling behaviors in the situation of emotional distress (10). Other studies also suggest that there is a relationship between difficulty in regulating emotion and insomnia (11). Negative repetitive thoughts are a transdiagnostic factor among emotional disorders (12). It is a style of thinking about problems and negative experiences with three key characteristics: it is repetitive and somewhat annoying, and it is difficult to get rid of it (13). Worry and rumination are two types of repetitive thoughts that lead to sleep disorders (14). Anxiety sensitivity is another construct that has been considered by researchers in the field of transdiagnostic structures related to insomnia. Anxiety sensitivity was first noted by Reiss and McLen (1). Anxiety sensitivity is a stable tendency variable that indicates a desire to interpret the physical, psychological, and social consequences of anxiety as distressing and dangerous issues (16).

Ramsawh et al. report in a study that most anxiety disorders are relatively related to decreased sleep quality (17). Intolerance of uncertainty is a construct that is often characterized in association with worry and generalized anxiety disorder (GAD) (18). People with low uncertainty tolerance believe that uncertainty is associated with negative consequences, irresponsibility, and other problems (19).

Despite the need to study the various dimensions of insomnia, as far as we know, no study has modeled it in the context of the transdiagnostic perspective so far. Therefore, in the present study, to provide a new evidence-based model on transdiagnostic constructs, we conducted a modeling study. Our conceptual model (prototype) is shown in figure 1.

Materials and Methods

Study design: The present study was a cross-sectional design. The project was approved in the meeting of the Ethics Committee of Zanjan University of Medical Sciences, Zanjan, Iran, on February 19, 2019 (code: ZUMS.REC.IR1397.364).

Subjects: Participants in this study included all students of Zanjan University of Medical Sciences and Zanjan University (n = 19200) in the 2018-2019 academic year. According to the Cochran formula for sample size determination, a sample size of 376 people was estimated. Therefore, this study sample was 400 students of Zanjan University of Medical Sciences and Zanjan University who were selected by non-random (voluntary participation) sampling method, including dormitories, university faculties, study halls, and libraries. After selecting the sample and satisfying them to cooperate in the research, they were evaluated with research tools including demographic characteristics questionnaire, Insomnia Severity Index (ISI) (people who got a score higher than 8 in this questionnaire were selected), Difficulties in Emotion Regulation Scale (DERS), 12-item Intolerance of Uncertainty Scale (IUS-12), Anxiety Sensitivity Index-Third Edition (ASI-3), and 10-item Repetitive Thinking Questionnaire (RTQ-10). It should be noted that in all stages of the research, the researcher was present with the subjects and answered their questions and ambiguities. Inclusion criteria of the participants were: age of 18 to 40 years, being a student, willingness to cooperate, and obtaining a score higher than the cut-off point (8) in ISI, and the exclusion criteria was failure to answer the questions of all questionnaires. Table 1 illustrates sociodemographic characteristics of the sample.
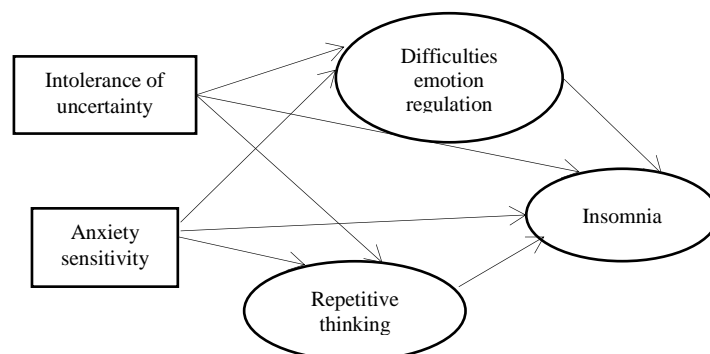

Figure 1. Initial model

Table 1. Sociodemographic characteristics of the study population

Age (year)	Gender		Total
	Men	Women	
17-20	75	73	148
21-24	90	117	207
25-28	14	25	39
29-33	1	5	6
Total	180	220	400

The mean ± standard deviation (SD) of students' age was 21.54 ± 2.41 years.

Study tools

1. Researcher-made demographic questionnaire: It included age, sex, field of study, college, degree, marital status, and type of residence.

2. ISI questionnaire: The ISI is a 7-item self-report questionnaire which assesses the nature, severity, and impact of insomnia (20). It assesses the insomnia during the last month and the dimensions evaluated are: sleep maintenance, severity of sleep, onset and early morning awakening problems, interference of sleep, sleep dissatisfaction, noticeability of sleep problems by others, difficulties with daytime functioning, and distress caused by the sleep difficulties. A total score ranges from 0 to 28 and it is interpreted as follows: absence of insomnia (0-7), sub-threshold insomnia (8-14), moderate insomnia (15-21), and severe insomnia (22-28) (20).

The psychometric properties of ISI questionnaire was studied by Morin et al. in general and clinical population samples with Cronbach's alpha of 0.90 and 0.91, respectively (20), and was studied in Iran with Cronbach's alpha of 82% and 87% in the two groups of insomniacs and healthy individuals, respectively (21).

In Yazdi et al. research, after two weeks, the intraclass correlation coefficient (ICC) was above 0.7. The correlations between ISI, Epworth Sleepiness Scale (ESS), General Health Questionnaire (GHQ), and Pittsburg Sleep Quality Index (PSQI) were high. Moreover, the scores obtained from the ISI items in patients with insomnia had close correlation with corresponding polysomnographic (PSG) variables. The Iranian version of the ISI is a valuable, reliable, and first-line questionnaire for insomnia research and clinical work (21).

3. DERS: DERS was developed in 2004 by Gratz and Roemer with 36 items to measure emotional disorder and emotional self-regulation strategies. For this scale, Cronbach's alpha coefficient of 0.93 and two-week retest reliability of 0.85 was reported (10). The reliability of the Persian version was obtained through internal consistency and split-half coefficients of 0.86 and 0.80, respectively, by Asgari et al. (22).

4. IUS-12: The IUS-12 has been designed by Carleton et al. It was developed to measure the tolerance of people in unreliable situations indicating uncertainty. They reported high internal reliability for this tool (Cronbach's alpha of 0.91) (23).

5. ASI-3: The ASI was introduced by Reiss et al. (24), but was not able to show the dimensions of anxiety sensitivity and, therefore, Taylor and Cox (1998) revised the index (25). In the study of Norr et al., Cronbach's alpha was 0.88 (26). and in the study of Schmidt et al., the internal consistency of cognitive worries (α: 0.94), social worries (α: 0.88), and physical worries (α: 0.89) has been reported (27). The validity of this questionnaire in the Iranian sample was calculated based on internal consistency and retest reliability, and validity coefficients obtained were 93% and 95%, respectively. The correlation between the subscales ranged from 40% to 68% (28).

6. RTQ-10: The 10-item RTQ was developed by Mcevoy et al. in order to prepare a short transdiagnostic scale of negative automatic thoughts and was evaluated in student and non-clinical samples. RTQ-10 contains ten items which were extracted from the 27-item sub-scale of the RTQ-31, which has the highest load factor. RTQ-10 has excellent internal consistency in the student group (α = 0.94 and the primary internal correlation of 0.59) and the clinical group (α = 0.92 and the main internal correlation of 0.53) (29). The results of Akbari research in Iranian and non-clinical samples showed that the 10-item version of this questionnaire had good test reliability (76%) and high internal consistency (91%) (30).

Statistical analysis: Data analysis to predict insomnia was based on the variables shown in figure 1. Data were evaluated through path analysis. For this purpose, LISREL 8.8 software was used. The adequacy of the model was assessed through goodness-of-fit indices such as non-significant chi-square test, root mean square error of approximation (RMSEA) less than 0.05, and other fit indices. According to Viera, when the indicators are higher than 0.90, they are used as evidence for model acceptance (31).

Results

Descriptive statistics of variables are presented in table 2.

Table 2. Descriptive statistics of variables

Variables	Mean ± SD
Insomnia Severity Index	16.51 ± 6.11
Difficulties in emotion regulation	97.63 ± 18.76
Intolerance of uncertainty	29.27 ± 6.41
Repetitive thinking	30.22 ± 7.86
Anxiety sensitivity	39.72 ± 13.61

SD: Standard deviation

The hypothetical prototype model is shown in figure 1 that according to Barlow's pathology model, the variables of intolerance of uncertainty and anxiety sensitivity were the first-level variables that were used as external variables, the difficulties in emotion regulation and negative repetitive thinking were the second-level variables which were regarded as the internal independent variable, and the insomnia variable was included as a dependent variable in the initial model.

After the implementing of the model by LIS-REL, the proposed model shown in figure 2 was approved with good indicators. The intolerance of uncertainty, neither directly nor indirectly (by mediating difficulty in emotion regulation), could not predict the dependent variable (insomnia).

Thus, six subscales of difficulty in emotion regulation (non-acceptance of emotional responses, difficulty engaging in goal-directed behavior, impulse control difficulties, lack of emotional awareness, limited access to emotion regulation strategies, lack of emotional clarity) as predictors and insomnia variable as a criterion (dependent) variable were included in the regression analysis, the result of which is shown in table 3.

The variables with a significant beta coefficient were the variables of difficulty in controlling the impulse by the coefficient of 0.25 and the variable of lack of emotional awareness by 0.19. Thus, these two variables replaced the overall score of difficulty in emotion regulation in the original model.

As shown in figure 3, the path model has two types of effects: direct effect and indirect one. The direct effect coefficient of anxiety sensitivity is equal to 0.16. The indirect effect of anxiety sensitivity on insomnia is 0.11. The total effect of anxiety sensitivity is equal to 0.27, and its coefficient of determination is 29.7%. In other words, approximately, 7% of changes in insomnia are predictable through anxiety sensitivity. The indirect effect of intolerance of uncertainty on insomnia is 0.14, and its coefficient of determination is 1.96%. In other words, approximately, 2% of changes in insomnia are predicted through intolerance of uncertainty.

Table 4 shows that the chi-square for this index should be a significant level value greater than 0.05, which in this study is equal to 6.27. The RMSEA value should be less than 0.05, which in this study, is equal to 0.03 and indicates a good model fitting. Non-Normed Fit Index (NNFI) and Comparative Fit Index (CFI) acceptance range should be higher than 0.90, which in this study is equal to one. The values of Goodness of Fit Index (GFI) and Adjusted GFI (AGFI) (modified goodness of fit), which are related to the value of GFI and the acceptance range of both is above 0.90, are equal to 0.99 and 0.97 in the table. The goodness of fit also confirms the model and the standard coefficients of paths (relationships) have become significant.
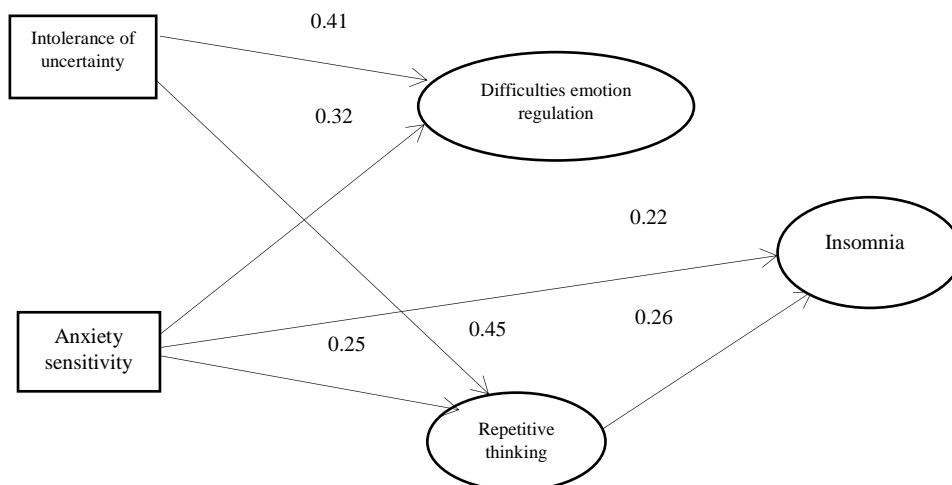

Figure 2. Resulted model

Table 3. Prediction of insomnia based on subscales of difficulty in emotion regulation through regression analysis

Variables	β	t-statistics	P-value
Non-acceptance of emotional responses	0.10	1.19	0.230
Difficulty engaging in goal-directed behavior	0.21	1.67	0.090
Impulse control difficulties	0.25	2.24	0.020
Lack of emotional awareness	0.19	-2.67	0.008
Limited access to emotion regulation strategies	0.05	0.58	0.560
Lack of emotional clarity	0.14	1.08	0.270

Table 4. Goodness indicators of the final model fit

		df	P-value
Chi-square	6.27		
RMSEA	0.03		
NNFI	1		
CFI	1	4	0.17
GFI	0.99		
AGFI	0.97		

RMSEA: Root mean square error of approximation; NNFI: Non-Normed Fit Index; CFI: Comparative Fit Index; GFI: Goodness of Fit Index; AGFI: Adjusted Goodness of Fit Index; Df: Degree of freedom

In total, approximately, 9% of the dependent variable variance, e.g., insomnia, was explained by the external variables including intolerance of uncertainty and anxiety sensitivity, and mediating variables, e.g., the variable of impulse control and the variable of lack of emotional awareness. Of this amount, 2.25% was related to the path of repetitive thoughts to insomnia.

Discussion

The present study aimed to investigate the relationship between transdiagnostic constructs of anxiety sensitivity, repetitive negative thinking (RNT), difficulty in emotion regulation, and intolerance of uncertainty with students' insomnia. In this regard, the variables of negative repetitive thinking and the variable of difficulty in regulating emotion as mediating variables, the variables of intolerance of uncertainty and anxiety sensitivity as independent variables, and insomnia as the dependent variable were evaluated in a conceptual model by structural equation modeling (SEM). The results showed that a total of 9% of the variance of the dependent variable was explained by the external and mediating variables. Independent variable of anxiety sensitivity had an effect on insomnia both directly and indirectly through the mediator of RNT, and intolerance of uncertainty through components of impulse control and lack of emotional awareness. A study by Weiner et al. examining the relationship between sleep problems and anxiety sensitivity suggests that anxiety sensitivity may play an important role in delaying sleep onset (32).

Bahrami et al. studied the quantity and quality of sleep and its causes and consequences in students living in the dormitory of Zanjan University of Medical Sciences and found that 80% of female students and 72% of male students had low sleep quality. The most common cause of sleep disorders in students was mental and intellectual occupation (53.8%). Moreover, about half of the students expressed the feeling of excessive drowsiness in the classroom due to sleep disorders (33).
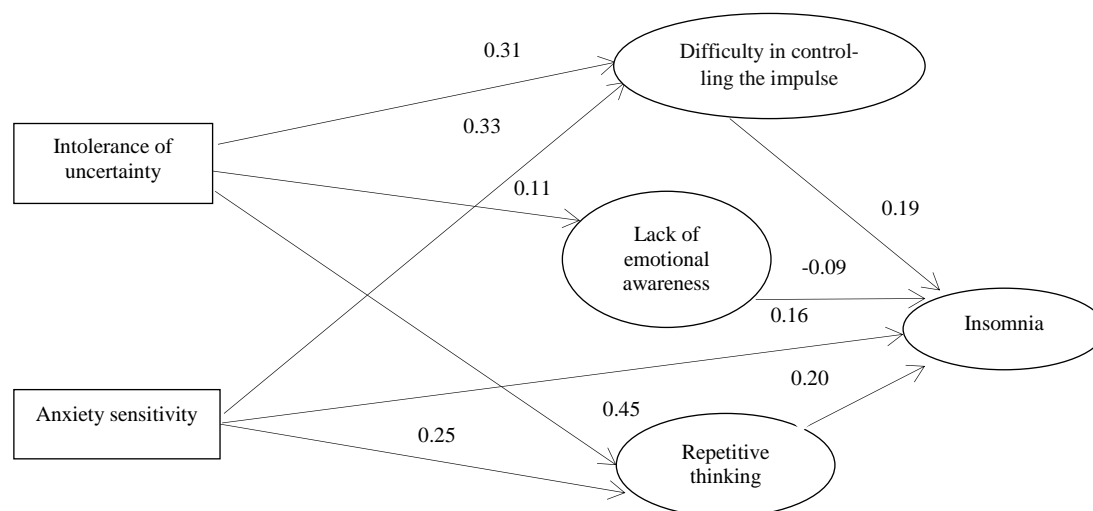
Figure 3. Final modified model

The results of Hasler et al. (34) and Kenney et al. (35) have indicated that poor sleep quality has correlation with impaired cognitive regulation and high-risk behaviors. Considering the results of present study and the literature review, it can be said that anxiety sensitivity may be a risk factor for additional vulnerability to sleep-related problems among individuals. In addition, results show that anxiety sensitivity can predict sleep disorders. Besides, components of emotion regulation disorder, impulse control problems, and lack of emotional awareness were significantly able to predict sleep disorders. In general, these findings indicate that disorders in emotion regulation and anxiety sensitivity play an essential role in developing sleep disorders (36). The results of Noori and Farahmand Mehr showed that the anxiety sensitivity in the students could significantly predict sleep disorders. In general, this finding suggests that disorders in emotion regulation and anxiety sensitivity play an essential role in developing sleep disorders (37).

Badrian et al. showed that the problem of sleep initiation, continuing sleep, and waking up in sleep can be predicted by anxiety sensitivity, irritability, and repetitive thinking in patients with GAD. The results also showed that anxiety sensitivity was mostly associated with difficulty in initiating sleep, continuing sleep, and waking up (38). Anxiety sensitivity can also cause sleep-related problems by initiating a cycle of RNT. Regarding the role of repetitive thinking in insomnia, the results of the present study are inconsistent with the findings of Nota and Coles, who found that people who had low sleep quality , had a higher rate of mental rumination and negative cognitions compared to others (39). Research has also shown a direct relationship between RNT such as rumination and anxiety with sleep disorders and sleep quality. As a result of increased anxiety, worry, and anxiety sensitivity, the cycle of negative thinking is frequently and repetitively formed in the mind and repetitive thinking, which is mostly negative, in turn, aggravates the problems related to sleep and insomnia.

In support of this claim, the results of Carney et al. indicate that cognitive processes, especially the inability to interrupt or control repetitive thinking, are essential factors in maintaining insomnia (40). Nota and Coles studied the relationship between negative spontaneous thinking and sleep duration and time among 100 undergraduate students and showed that shorter sleep was associated with

thinking rumination and delayed sleep (39). People who preferred to delay their work and sleep reported more negative spontaneous thinking. The findings showed that negative spontaneous thinking might be exclusively related to the duration and timing of sleep (39). Repetitive thinking, like maladaptive beliefs about sleep, plays a role in insomnia and is considered a significant component of theoretical models of sleep disorders (41).

Our study results showed the relationship between the components of difficulty in emotion regulation and insomnia. Schmidt et al. concluded that difficulty in emotion regulating during the day was associated with sleep problems and these sleep problems disrupted the regulation of emotion during the day (42). Kirwan et al. examined emotion regulation as a mediator in the relationship between anxiety symptoms and the severity of insomnia symptoms in students. Symptoms of insomnia increased when people with difficulty in controlling emotion experienced high anxiety. Among people who did not have difficulty in emotion regulating, the severity of insomnia was not affected when the severity of anxiety changed. These results suggest that anxiety symptoms cause insomnia in students only if emotion regulation is inefficient (43). In a study, Mansouri et al. showed that the inhibition system predicted difficulty in emotion regulating in students, which predicts the severity of insomnia. The results also indicated a mediating role of difficulty in emotion regulation in the relationship between behavioral brain systems and subjects' severity of insomnia (44). The components of difficulty in impulse control and lack of emotional awareness also had mediation contribution among intolerance of uncertainty and insomnia variables.

The results of some studies show that intolerance of uncertainty is a transdiagnostic construct that exists in most emotional disorders, especially anxiety and depression disorders. Therefore, people with a low tolerance threshold for ambiguous and uncertain situations, when faced with these situations, become anxious and find it difficult to control them (45). Research evidence shows that intolerance of uncertainty can be considered as an underlying vulnerability to all emotional disorders. RNT also mediates the intolerance of uncertainty and insomnia variables. McGowan et al. found that the experience of daily anxiety predicted sleep disturbance (46). Among the studied components, the role of the anxiety sensitivity component was more prominent than other com-

ponents, because it affected insomnia both directly and indirectly through RNT.

Conclusion

The transdiagnostic constructs of intolerance of uncertainty and anxiety sensitivity through the components of RNT and difficulties in emotion regulation can predict students' insomnia. As a result, it can be said that people with insomnia are seriously faced with shortcomings and malfunctions in these transdiagnostic factors. Therefore, we hope that the results of the present study will be the beginning of more attention to this disorder and especially, the components and variables of research in the course of the disease and appropriate action in this regard. The study provides an empirical framework for researchers to evaluate and develop more accurate scientific and practical patterns and models for treating sleep disorders and increasing sleep quality in different groups. It is recommended that the study should be conducted separately in other communities, different age ranges, and genders to examine the relationship between research variables carefully. Measures should be considered and implemented, and special programs for transdiagnostic intervention in this field should be developed and made available to these people; and in future research, other variables related to insomnia should be examined.

Limitations: This research had limitations. The present study was a cross-sectional study that could not express causal relationships. Another limitation of the present study was that the participants were educated and university students and, therefore, were often in the same age range and on the other hand, included non-clinical individuals; Therefore, caution should be exercised in generalizing the results to other age groups and the clinical population. The third limitation of this study was the use of self-report tools, which is always associated with some bias. And the last was the implementation only in the city of Zanjan and caution should be observed in extending these results to other places, communities, and different age ranges.

Conflict of Interests

Authors have no conflict of interests.

Acknowledgments

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