

Relationships of Coping Styles and Psychological Distress Among Patients with Insomnia Disorder

Yinghui Li

Department of Psychosomatics and Psychiatry, ZhongDa Hospital School of Medicine, Southeast University, Nanjing, 210009, China

Xiaoyin Cong

Department of Clinical Psychology, Jiangsu Province Hospital, Nanjing, 210029, China

Suzhen Chen

Department of Psychosomatics and Psychiatry, ZhongDa Hospital School of Medicine, Southeast University, Nanjing, 210009, China

Yong Li (✉ nameleo@126.com)

Department of Clinical Psychology, Jiangsu Province Hospital, Nanjing, 210029, China

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Abstract

Background: Insomnia appears to be one of the most frequent sleep complaints in the general population. It has significant negative impact on daily functioning. However, there has been little research that described the effect of coping style in insomnia disorder.

Methods: The Simplified Coping Style Questionnaire (SCSQ) was used to evaluate 79 adult patients with insomnia disorder alongside 80 healthy controls. Additionally, sleep quality was assessed with the Pittsburgh Sleep Quality Index (PSQI), and Symptom Checklist-90-Revised (SCL-90R) was utilized to determine the status of depression, anxiety and other psychological symptoms.

Results: Positive coping style score was significantly lower, whereas negative coping style score and nine symptomatic dimensions of SCL-90R were significantly higher in insomnia patients than in controls. Positive coping style score was adversely related to PSQI score, obsessive-compulsive, depression, anxiety and phobic anxiety, whereas negative coping style score was positively related to PSQI score, somatization and interpersonal sensitivity. Further multiple stepwise regression analysis showed that PSQI total score was independently and positively correlated with negative coping style score.

Conclusions: Insomniacs use more negative coping styles and less positive ones. Positive coping is adversely associated with insomnia symptoms and psychological distress, whereas negative coping is positively related to those symptoms.

Background

Insomnia, which is described as difficulty initiating and maintaining sleep and/or early morning awakenings, appears to be the most common sleep disorder in the general population[1]. Approximately 10–30% of the population worldwide suffer from insomnia[2]. It has been shown that insomnia is associated with considerable deterioration of quality of life, higher prevalence of depressive disorder, cognitive impairment and higher risk of work absenteeism[3–5]. In addition, insomnia is generally associated with a variety of medical conditions, such as diabetes, heart disease, migraine and cancer[6–9], even higher risk of mortality[10]. Despite the high incidence and negative impact on the individual, insomnia remains an under-recognized condition[11].

The research of coping styles is valued in psychosomatic medicine. Coping style has been shown to be a stable psychological and behavioral strategy, positive or negative to overcome external and internal challenges[12]. Positive coping style tends to take direct and rational ways to solve problems, in contrast, negative coping style refers to dealing with problems by neglecting, avoidance and denial[13, 14]. Previous studies have demonstrated that negative coping style could increase the likelihood of suicidal ideation when confronted with stressful events, and positive coping style could alleviate depressed mood[13, 15]. Although we know that coping may play a mediating role in the pathogenesis of insomnia, However, to our knowledge, there has been little research that described the effect of coping style in insomnia disorder.

In the present study, we used an integrated questionnaire consisting of the Pittsburgh Sleep Quality Index (PSQI), the Symptom Checklist-90-Revised (SCL-90R), and Simplified Coping Style Questionnaire (SCSQ) to assess insomnia severity, psychological distress and coping style in patients meeting DSM-5 criteria for insomnia disorder. In this study, we aim to identify the associations of sleep disturbance or psychological distress with coping style in patients with insomnia disorder.

Methods

Participants and setting

Adult outpatients were recruited from the psychological departments of First Affiliated Hospital of Nanjing Medical University in Jiangsu province of China between May 2019 and December 2019. Eligible participants met Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) diagnostic criteria for chronic insomnia disorder [16]. Adult healthy volunteers were recruited from the Health Management Centre of this hospital as healthy controls. All patients and controls underwent detailed history taking. All subjects with the following conditions were excluded: (a) irregular sleeping patterns, (b) history of diagnosis of alcohol or substance abuse/dependence in the last 6 months, (c) use of antidepressants or antipsychotics, (d) pregnancy for women, (e) other mental disorders, (f) serious physical illness, (g) physical or psychological impairments that prevented from completing the questionnaires. The participants were assessed to determine their sleep quality, coping style, and psychological distress using interviewer-assisted and self-report methods.

Sociodemographics And Lifestyle Data

Demographic data (age, gender, marital status, body mass index (BMI), and education level) and lifestyle information (smoking and consumption of alcohol) were recorded in all patients and controls. Tobacco and alcohol use was divided into never/rare and regular use (more than once a week). In addition, the course of illness of patients was recorded.

Sleep Quality Assessment (psqi)

A Chinese version of the PSQI questionnaire was used to assess the patient's sleep quality. The PSQI questionnaire consisted of 19 self-rating items that can be categorized into seven components, including subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, used sleep medication, and daytime dysfunction. The score of each component score was rated from 0 to 3. The sum of these seven component scores provided a global PSQI score, which ranged from 0 to 21. Higher scores indicate poorer sleep. The Chinese Version of PSQI was translated and validated by Liu et al. [17]. In that study, the internal consistency Cronbach's α was 0.84, the split-half reliability was 0.87, and the 2-week test-retest reliability was 0.81.

Assessment Of Coping Styles

The Simplified Coping Style Questionnaire (SCSQ) is a 20-item self-report scale that measures individual coping style. The SCSQ was divided into two subscales: positive coping (12 items) and negative coping (8 items). Positive coping reflects the level of the active coping style, such as “solving problems by work, learning or other things” or “looking at the good side of things”. In contrast, negative coping reflects the level of passive coping style, such as “when facing problems, escaping troubles by drinking and smoking” or “relying others to solve problems”. Each item is scored on a four-point Likert scale (0 = never, 1 = seldom, 2 = often, 3 = always). Higher scores on each subscale reflect the level of the coping style. Cronbach's α for positive coping and negative coping were 0.89 and 0.78, respectively[18].

Evaluation Of Psychiatric Distress And Lifestyle Factors

Psychiatric distress was estimated using the Chinese version of SCL-90R[19]. The SCL-90R is a self-reporting, clinical symptom rating scale consisting of 90 items. Responses indicate symptoms associated with 9 symptom dimensions, which included somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism. Additionally, a global symptom score is calculated. The Chinese-version SCL-90R questionnaire with established reliability and validity is widely used in measuring psychological distress in Chinese clinical practice and research. In a recent study carried out in patients with alopecia areata, the internal consistency Cronbach's α was 0.98 and split-half coefficient was 0.95[20].

Data analysis

SPSS version 22.0 (SPSS, Inc., Chicago, IL, USA) statistical software was used for all data analyses. Measurement data are mean \pm standard deviation (SD). Various sociodemographic variables, coping style parameters and psychological factors between insomnia patients and healthy controls were assessed by independent sample *t* test. For categorical variables, the chi-square test was used for comparisons between the two groups. The correlations between variables were assessed by Spearman correlation analysis. To explore the independent influencing factors of sleep quality, multiple stepwise regression analysis was applied. A two-tailed *P* value < 0.05 was considered statistically significant.

Results

Sample characteristics

Of the 158 subjects eligible for inclusion, a total of 129 (81.6%) individuals agreed to participate in the study. However, 50 individuals did not complete the questionnaires because of low education level or desire to withdraw. Eventually, a total of 79 insomnia outpatients completed questionnaires, yielding a response rate of 50.0%. Meanwhile, 80 healthy controls were enrolled. The mean age of interviewees was

45.26 ± 9.71 years, ranging from 22 to 65 years. A total of 90(56.6%) adults were female. There were no significant differences between the two groups in terms of age, gender, marital status, BMI and level of education($P > 0.01$). Regular tobacco use and regular alcohol intake between the two groups was different($P < 0.01$). In the insomnia disorder group, the mean duration of symptoms was 20.92 ± 27.77, and the mean PSQI total score was 10.43 ± 3.19 (Table 1).

Table 1
Basic demographics of the study population

Characteristic	Insomnia(n = 79)	Controls (n = 80)	P
Age (year)	44.27 ± 10.22	46.24 ± 9.24	0.20
Gender Female (%)	46(58.3%)	44(55.0%)	0.68
BMI	23.88 ± 3.46	24.00 ± 3.13	0.82
Marital status			
Single/widower/divorced (%)	8(10.1%)	6(7.5%)	0.56
Married (%)	71(89.9%)	74(92.5%)	0.56
Years of education (year)	11.90 ± 2.73	12.09 ± 3.21	0.69
Regular tobacco use (%)	24 (30.4)	10 (12.5)	0.01
Regular alcohol intake (%)	23(29.1)	13(16.3)	0.06
Duration of symptoms (mo)	20.92 ± 27.77	-	-
PSQI total score	10.43 ± 3.19	-	-
Subjective sleep quality	1.87 ± 0.70	-	-
Sleep latency	2.42 ± 0.86	-	-
Sleep duration	1.44 ± 1.07	-	-
Habitual sleep efficiency	1.53 ± 1.34	-	-
Sleep disturbance	1.73 ± 0.57	-	-
Use of sleeping medications	0.66 ± 1.08	-	-
Daytime dysfunction	0.66 ± 0.68	-	-
BMI body mass index calculated as weight (kg)/height (m ²)			

Differences of SCL-90R scores in insomnia patients and healthy controls

To assess the associations of various psychological factors with sleep development, we compared the symptomatic dimensions as well as total SCL-90R scores between patients with insomnia disorder and

healthy controls. Somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, psychoticism, additional items and total score showed significantly higher levels in the insomnia group than in controls (all $P < 0.01$) (Table 2).

Table 2
SCL-90R scores in insomnia patients and healthy controls (mean \pm SD)

SCL-90R	Insomnia(n = 79)	Controls (n = 80)	t	P
Somatization	1.83 \pm 0.54	1.36 \pm 0.26	6.989	0.000
Obsessive-compulsive	2.15 \pm 0.62	1.45 \pm 0.32	8.991	0.000
Interpersonal sensitivity	1.84 \pm 0.57	1.29 \pm 0.26	7.875	0.000
Depression	1.85 \pm 0.60	1.26 \pm 1.93	8.296	0.000
Anxiety	1.82 \pm 0.64	1.27 \pm 0.21	7.293	0.000
Hostility	2.06 \pm 0.70	1.36 \pm 0.32	8.079	0.000
Phobic anxiety	1.44 \pm 0.61	1.07 \pm 0.15	5.071	0.000
Paranoid ideation	1.79 \pm 0.62	1.26 \pm 0.33	6.748	0.000
Psychoticism	1.66 \pm 0.50	1.22 \pm 0.23	7.076	0.000
Additional items	2.46 \pm 0.51	1.27 \pm 0.15	19.812	0.000
Total score	1.86 \pm 0.48	1.29 \pm 0.17	10.205	0.000

Differences of SCSQ scores in insomnia patients and healthy controls

To analyze the coping styles of insomniacs, we compared the coping styles between patients with insomnia disorder and healthy controls. The positive coping style score in the insomnia group (18.38 \pm 3.78) was significantly lower than that in the control group (21.84 \pm 4.05) ($P < 0.01$), however, the negative coping style score of the insomnia group (14.14 \pm 2.51) showed a significant higher level than the control group (10.78 \pm 3.06) ($P < 0.01$). Figure 1

Association Of Coping Styles, Sleep Disturbance And Psychological Distress

We next analyzed the relationship between sleep quality, psychological distress and coping styles. Correlation analyses showed that positive coping style score was adversely related to PSQI total score, sleep latency, use of sleeping medications, daytime dysfunction, SCL-90R total score, obsessive-compulsive, depression, anxiety, phobic anxiety and additional items ($P < 0.05$ or 0.01). However, negative coping style score was positively related to PSQI total score, sleep latency, Habitual sleep efficiency, somatization, interpersonal sensitivity and additional items ($P < 0.05$ or 0.01) (Table 3).

Table 3
Correlations of sleep quality, psychological distress and coping style in insomnia patients

	Positive coping style score		Negative coping style score	
	<i>r</i>	<i>P</i>	<i>r</i>	<i>P</i>
PSQI total score	-0.323**	0.004	0.346**	0.002
Subjective sleep quality	0.013	0.906	0.141	0.217
Sleep latency	-0.232*	0.040	0.295**	0.008
Sleep duration	-0.140	0.217	0.063	0.584
Habitual sleep efficiency	0.000	0.999	0.237*	0.035
Sleep disturbance	-0.137	0.229	0.151	0.183
Use of sleeping medications	-0.328**	0.003	0.055	0.628
Daytime dysfunction	-0.244*	0.030	0.009	0.935
SCL-90R total score	-0.247*	0.028	0.213	0.059
Somatization	-0.114	0.315	0.249*	0.027
Obsessive-compulsive	-0.251*	0.025	0.104	0.361
Interpersonal sensitivity	-0.202	0.074	0.241*	0.032
Depression	-0.252*	0.025	0.147	0.197
Anxiety	-0.226*	0.045	0.207	0.067
Hostility	-0.113	0.321	0.037	0.743
Phobic anxiety	-0.254*	0.024	0.054	0.636
Paranoid ideation	-0.128	0.262	0.138	0.225
Psychoticism	-0.152	0.182	0.205	0.069
Additional items	-0.358**	0.001	0.273*	0.015

Table 4
Multiple stepwise regression analysis showing the variables independently associated with sleep quality

	Standardized β	t	P
Additional items of SCL-90	0.856	15.962	0.000
Negative coping style score	0.113	2.099	0.039

Independent Influencing Factors Of Sleep Quality

Multiple stepwise regression analysis was used to investigate the independent influencing factors of sleep quality (PSQI total scores). The initial independent variables included gender, age, BMI, years of education, duration of symptoms, ten symptom dimensions of SCL-90, positive coping style and negative coping style. In insomnia patients, PSQI total score was independently and positively correlated with additional items of SCL-90 (standardized $\beta = 0.856$, $P < 0.01$) and negative coping style score (standardized $\beta = 0.113$, $P < 0.05$).

Discussion

This study found that all dimensions of SCL-90R in patients with insomnia disorder were higher than normal controls, such as somatization, obsessive-compulsive, depression, anxiety and hostility. Pallesen and his colleagues[21] using SCL-90R in elderly insomniacs showed higher scores of somatization, interpersonal sensitivity, obsessive-compulsive, depression, anxiety, hostility and phobic anxiety than good sleepers, which was in line with our study. These results demonstrated that all aspects of the psychology of insomniacs are adversely affected. Previous studies have shown that the risk of developing depression in the future was associated with insomnia at baseline, and insomnia treatment can prevent incidence of depression symptoms in those with insomnia[22–24]. This study showed a significant increase in depression scores of insomniacs, which indicate we should pay attention to the depression associated with insomnia and avoid the aggravation of depressive symptom.

In this study, positive coping style score was lower and negative coping style score was higher in insomnia group than in control group, indicating insomniacs are more likely to use negative coping styles, whereas less likely to use positive coping styles. Coping can be distinguished into emotion-focused coping, problem-focused coping, and avoidance-focused coping[25, 26]. Commonly, problem-focused coping is associated with better consequences and is therefore regarded as positive coping. However, emotion-focused coping and avoidance-focused coping are associated with poor outcomes and are conceived of as negative coping[26]. One prospective study showed that undergraduates who typically used a positive coping style to deal with stress had longer sleep, whereas those who used a negative coping style had shorter sleep[27]. Recently one Japanese study demonstrated that the negative coping styles "avoidance and suppression" were significantly correlated with current insomnia in patients with

type 2 diabetes mellitus[28]. This study found increased use of negative coping style in the insomnia population. Jarrin et al [29] showed that negative coping is associated with increased imaginary stress, which may be a possible pathogenesis of insomnia.

Previous studies on the relationship between insomnia and coping style have mostly been conducted in healthy population or patients with physical diseases[27, 28, 30, 31]. However, little is known about the association in insomnia disorder. A nationwide survey among general Japanese population revealed that distraction-based stress coping such as hobbies and optimistic thinking, was positively associated with sleep disturbance[32]. A cross-sectional study assessing 434 colorectal cancer patients found that positive coping predicted better sleep, whereas higher level of negative coping was related to greater severity in preoperative insomnia symptoms[30]. A prospective, transversal, multicenter study was conducted in 404 patients with digestive tract cancer showed that patients' psychological status suffered significant deterioration and the most commonly used coping style was avoidance after surgery[31]. In the present study, positive coping was adversely associated with insomnia symptoms, whereas negative coping was positively related to insomnia symptoms. In addition, the study also found the correlation between coping styles and psychological symptoms. Earlier studies have shown that coping styles mediate between stress and anxiety, depression, and sleep[26, 27, 33]. Furthermore, the item of negative coping style entered into the stepwise linear regression, suggesting that negative coping was one of predictive factors of sleep quality. It is important to pay attention to the negative coping style of insomniacs and find possible intervention strategies to improve coping processes.

There are several limitations in this study. For example, this study used self-administered questionnaires to measure sleep quality, coping styles and psychology distress. Objective inspection methods such as polysomnography to examine sleep are needed in future research. Besides, this was a cross-sectional study in which the relationship between coping styles, insomnia disorder and psychological distress could not be determined in terms of temporal trends and causal relationships. A future longitudinal study is needed to examine how coping styles influence sleep quality in patients with insomnia.

Conclusions

In conclusion, this study demonstrated that psychological distress is more obvious in patients with insomnia disorder than healthy controls. Insomniacs use more negative coping styles and less positive ones. Positive coping is adversely associated with insomnia symptoms and psychological distress, whereas negative coping is positively related to those symptoms. In insomnia disorder, negative coping has a certain predictive effect on sleep quality, therefore effective intervention strategies should be adopted to reduce negative coping styles and improve sleep quality.

Abbreviations

PSQI

Pittsburgh Sleep Quality Index; SCL-90R:Symptom Checklist-90-Revised; SCSQ:Simplified Coping Style Questionnaire; DSM-5:Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition; BMI:Body mass index; SD:Standard deviation.

Declarations

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Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Authors' contributions

YL conceived the study and the design, helped to draft and revise the manuscript. YHL participated in its design,conducted the statistical analyses and wrote the manuscript. XC, CS initiated and performed the whole survey, analysed the data and helped to interpret the findings and to write the paper. All authors have read and approved the final manuscript.

Ethics approval and consent to participate

This study was approved by the Ethics Committee of First Affiliated Hospital of Nanjing Medical University, and conducted according to the Declaration of Helsinki. Written informed consents were obtained from all participants.

Competing interests

The authors declare that they have no competing interests.

References

1. Li L, Wang YY, Wang SB, Zhang L, Li L, Xu DD, et al. Prevalence of sleep disturbances in Chinese university students: a comprehensive meta-analysis. *J Sleep Res.* 2018;27(3):e12648.
2. Bhaskar S, Hemavathy D, Prasad S. Prevalence of chronic insomnia in adult patients and its correlation with medical comorbidities. *J Family Med Prim Care.* 2016;5(4):780–4.
3. van Dijk DM, van Rhenen W, Murre J, Verwijk E. Cognitive functioning, sleep quality, and work performance in non-clinical burnout: The role of working memory. *PLoS One.* 2020;15(4):e0231906.

4. Wardle-Pinkston S, Slavish DC, Taylor DJ. Insomnia and cognitive performance: A systematic review and meta-analysis. *Sleep Med Rev.* 2019;48:101205.
5. Angehrn A, Teale Sapach M, Ricciardelli R, MacPhee RS, Anderson GS, Carleton RN. Sleep quality and mental disorder symptoms among Canadian public safety personnel. *Int J Environ Res Public Health.* 2020. 17(8).
6. Lin CL, Chien WC, Chung CH, Wu FL. Risk of type 2 diabetes in patients with insomnia: A population-based historical cohort study. *Diabetes Metab Res Rev.* 2018. 34(1).
7. Zheng B, Yu C, Lv J, et al. Insomnia symptoms and risk of cardiovascular diseases among 0.5 million adults: A 10-year cohort. *Neurology.* 2019;93(23):e2110-20.
8. Kim SK, Chong CD, Dumkrieger G, Ross K, Berisha V, Schwedt TJ. Clinical correlates of insomnia in patients with persistent post-traumatic headache compared with migraine. *J Headache Pain.* 2020;21(1):33.
9. Galiano-Castillo N, Arroyo-Morales M, Ariza-Garcia A, Fernández-Lao C, Fernández-Fernández AJ, Cantarero-Villanueva I. Factors that explain the cancer-related insomnia. *Breast J.* 2017;23(4):387–94.
10. Jiang B, He D, Guo Z, McClure MA, Gao Z. Insomnia disorder increases the risk of mortality: pooled analysis of annual cumulative time-to-event data. *Psychiatr Q.* 2020.
11. Araújo T, Jarrin DC, Leanza Y, Vallières A, Morin CM. Qualitative studies of insomnia: Current state of knowledge in the field. *Sleep Med Rev.* 2017;31:58–69.
12. Zhao X, Li J, Huang Y, Jin Q, Ma H, Wang Y, et al. Genetic variation of FYN contributes to the molecular mechanisms of coping styles in healthy Chinese-Han participants. *Psychiatr Genet.* 2013;23(5):214–6.
13. Lin J, Su Y, Lv X, Liu Q, Wang G, Wei J, et al. Perceived stressfulness mediates the effects of subjective social support and negative coping style on suicide risk in Chinese patients with major depressive disorder. *J Affect Disord.* 2020;265:32–8.
14. Jia H, Uphold CR, Wu S, Reid K, Findley K, Duncan PW. Health-related quality of life among men with HIV infection: effects of social support, coping, and depression. *AIDS Patient Care STDS.* 2004;18(10):594–603.
15. Wu W, Zhang Y, Goldsamt L, Yan F, Wang H, Li X. The mediating role of coping style: associations between intimate partner violence and suicide risks among Chinese wives of men who have sex with men. *J Interpers Violence.* 2018: 886260518814264.
16. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-5).* 5th editor. 2013, Washington, DC: American Psychiatric Publishing.
17. Liu X, Tang M, Hu L, Wang A. Reliability and validity of the Pittsburgh sleep quality index (Chinese) chin. *J Psychiatry.* 1996;29(2):103–7.
18. Xie Y. Reliability and validity of the Simplified Coping Style Questionnaire. *Chinese Journal of Clinical Psychology.* 1998;6:114–5.

19. Liu X, Tang M, Hu L, Wang A. Reliability and validity of the Pittsburgh sleep quality index (Chinese) chin. *J Psychiatry*. 1996;29(2):103–7.
20. Tan H, Lan XM, Yu NL, Yang XC. Reliability and validity assessment of the revised symptom checklist 90 for alopecia areata patients in China. *J Dermatol*. 2015;42(10):975–80.
21. Pallesen S, Nordhus IH, Kvale G, Havik OE, Nielsen GH, Johnsen BH, et al. Psychological characteristics of elderly insomniacs. *Scand J Psychol*. 2002;43(5):425–32.
22. Cheng P, Kalmbach DA, Tallent G, Joseph CL, Espie CA, Drake CL. Depression prevention via digital cognitive behavioral therapy for insomnia: a randomized controlled trial. *Sleep*. 2019. 42(10).
23. Nishitani N, Kawasaki Y, Sakakibara H. Insomnia affects future development of depression in workers: a 6-year cohort study. *Nagoya J Med Sci*. 2019;81(4):637–45.
24. Freeman D, Sheaves B, Goodwin GM, Yu LM, Nickless A, Harrison PJ, et al. The effects of improving sleep on mental health (OASIS): a randomised controlled trial with mediation analysis. *Lancet Psychiatry*. 2017;4(10):749–58.
25. Chen H, Xu J, Mao Y, Sun L, Sun Y, Zhou Y. Positive coping and resilience as mediators between negative symptoms and disability among patients with schizophrenia. *Front Psychiatry*. 2019;10:641.
26. Taylor SE, Stanton AL. Coping resources, coping processes, and mental health. *Annu Rev Clin Psychol*. 2007;3:377–401.
27. Sadeh A, Keinan G, Daon K. Effects of stress on sleep: the moderating role of coping style. *Health Psychol*. 2004;23(5):542–5.
28. Yoshida K, Otaka H, Murakami H, Nakayama H, Murabayashi M, Mizushiri S, et al. Association between insomnia and coping style in Japanese patients with type 2 diabetes mellitus. *Neuropsychiatr Dis Treat*. 2018;14:1803–9.
29. Jarrin DC, Chen IY, Ivers H, Morin CM. The role of vulnerability in stress-related insomnia, social support and coping styles on incidence and persistence of insomnia. *J Sleep Res*. 2014;23(6):681–8.
30. Sun GW, Yang YL, Yang XB, Wang YY, Cui XJ, Liu Y, et al. Preoperative insomnia and its association with psychological factors, pain and anxiety in Chinese colorectal cancer patients. *Support Care Cancer*. 2020;28(6):2911–9.
31. Calderón C, Jiménez-Fonseca P, Hernández R, Mar Muñoz MD, Mut M, Mangas-Izquierdo M, Vicente M, et al. Quality of life, coping, and psychological and physical symptoms after surgery for non-metastatic digestive tract cancer. *Surg Oncol*. 2019;31:26–32.
32. Otsuka Y, Kaneita Y, Itani O, Nakagome S, Jike M, Ohida T. Relationship between stress coping and sleep disorders among the general Japanese population: a nationwide representative survey. *Sleep Med*. 2017;37:38–45.
33. Nagase Y, Uchiyama M, Kaneita Y, Li L, Kaji T, Takahashi S, et al. Coping strategies and their correlates with depression in the Japanese general population. *Psychiatry Res*. 2009;168(1):57–66.

Figures

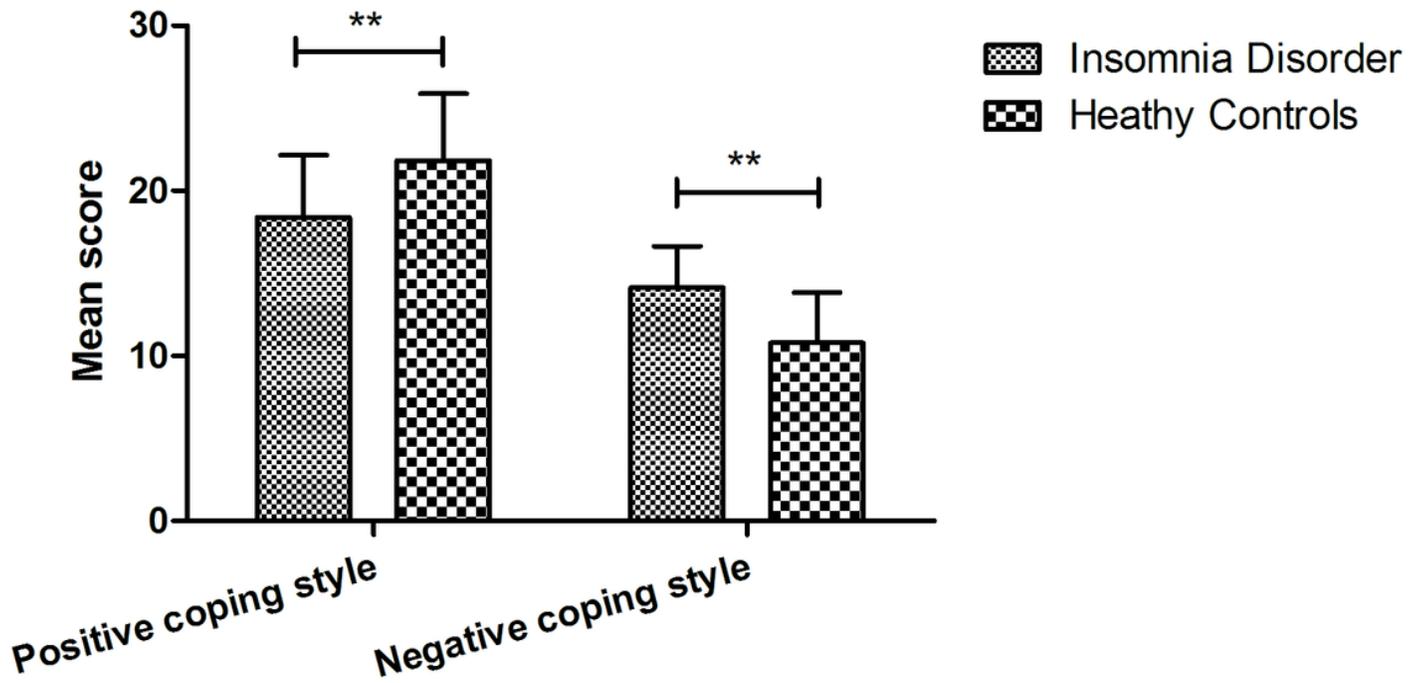


Figure 1

Comparison of SCSQ scores between insomnia disorder and healthy controls. $**P < 0.01$. T test showed that the positive coping style score in patients with insomnia disorder was significantly lower whereas the negative coping style score was higher than that in healthy controls (both $P < 0.01$).