The stigma of patients with chronic insomnia: a clinical study

Shuo He†, Xue-Jia Ke†, Yan Wu1, Xiao-Yi Kong1, Yun Wang1, Hui-Qin Sun1*, Deng-Zhi Xia3* and Gui-Hai Chen1*

Abstract

Background: The objective of this study was to explore the stigma and related influencing factors in individuals with chronic insomnia disorder (CID).

Methods: A total of 70 CID patients and 70 healthy controls (CON) were enrolled in the study. All subjects completed the assessments of sleep, emotion, and cognition. Their stigma and life quality were measured using the Chronic Stigma Scale and the 36-Item Short-Form Health Survey (SF-36).

Results: The ratio of individuals with stigma was significantly different between CID and CON groups (C² = 35.6, p < 0.001). Compared with the CON group, the CID group had higher scores for total stigma (U = 662.0, p < 0.001), internalized stigma (U = 593.0, p < 0.001), enacted stigma (U = 1568.0, p < 0.001), PSQI (U = 2485.0, p < 0.001) and HAMD-17 (U = 69.5, p < 0.001) as well as lower scores for MoCA-C (U = 3997.5, p < 0.001) and most items of SF-36. Partial correlation analysis showed that different items of the Chronic Stigma Scale were positively correlated with illness duration, PSQI and HAMD-17 scores, while negatively correlated with one or more items of the SF-36. Multivariate regression analysis showed that illness duration and the Mental Health domain of the SF-36 were independent risk factors for one or more items of stigma in CID patients.

Conclusion: Patients with CID have an increased risk of stigma. Moreover, illness duration and Mental Health may be primary factors related to stigma.

Keywords: Chronic insomnia disorder, Health status, Mental health, Quality of life, Stigma

Introduction

In the general population, insomnia is a common health problem, with 19% to 50% of adults having sleep complaints [1]. Roughly half of insomnia patients who fulfill the diagnostic for for insomnia disorder have a chronic course [2–6]. As a common accompanying symptom of insomnia, depression can aggravate the severity of insomnia, highlighting the importance of evaluating depression severity in insomnia patients [7, 8]. Additionally, long-term insomnia could lead to cognitive dysfunction that displays clinically significant impairment of performance [9]. Increased impaired work productivity, reduced quality of life, mental health problems, and socioemotional difficulties are also common in those with insomnia [10–13]. Accordingly, there is an urgent need to explore related influence factors of chronic insomnia disorder (CID), which would inform future attempts to alleviate or treat insomnia symptoms.

Stigma manifests as both prejudice of and rejection from society towards patients who suffer from a specific pathology [14]. A patient's internalization of such discrimination can have repercussions on their state of mind and quality of life [14]. It is possible to distinguish
between "enacted stigma", which consists of actual discrimination and rejection by society towards the patient, and “internalized stigma”, whereby the patient becomes aware of the discrimination and internalizes the negative impact of their disease [15]. Different degrees of stigma seriously affect physical health conditions, which can subsequently exacerbate mental health conditions and further harm an individual’s health [16]. Additionally, psychiatric disorders have been reported to accompany stigmatization, which results in increased psychological distress and decreased health-related quality of life [17].

Misperceptions of sleep disorders also perpetuate stigma and are labeled by others as antisocial, lazy, or faking [18, 19]. Additionally, people who have poorer global sleep quality and more daytime dysfunction are commonly accompanied with tired facial expressions and decreased perception of performance in the workplace [20, 21]. While such impaired functioning plays an important driver for help-seeking behavior [4], not all individuals seek professional treatment after suffering from insomnia [22]. On the one hand, the participants’ perception of insomnia as benign, trivial, or a problem one should be able to cope with alone [23]. Additionally, some of them are afraid their insomnia will be misunderstood or not taken seriously by friends or family members [23]. In research about understanding determinants of insomnia patients whose help-seeking behavior, stigma is thought to be one of common barriers to treatment seeking [23, 24]. Meanwhile, the most common reasons cited for delay centered around considerable social stigma patients felt about having sleeping problems [24]. Thus, while the exist of stigma influence the treatment of insomnia, there is limited research examining stigma in insomnia. Moreover, it is unclear whether CID has a distinct relationship with stigma.

This study aimed to better understand: 1) the risk of stigma in patients with CID and 2) related influencing factors of stigma in CID patients. Our study may contribute to the knowledge gap regarding chronic insomnia stigma and offer a better understanding of the experiences of individuals with sleep disorders who experience stigma.

**Methods**

**Subjects**

A total of 70 CID patients were recruited from the Clinic of Sleep and Memory Disorders in the Affiliated Chaohu Hospital of Anhui Medical University from September 2019 to June 2020. According to preliminary calculation, our sample sizes were accorded with $\alpha = 0.05$, $1 - \beta > 0.6$, $\text{OR} = 1.5$ by Power software. The flowchart of the study participants is presented in Fig. 1. To ensure the consistency of enrolled participants and whether they met the inclusion criteria, all participants received structured interview according to the Chinese version of Mini International Neuropsychiatry Interview 5.0 (Mini 5.0) by

![Fig. 1 Flowchart of the study participants](image-url)
Master’s and doctoral-level evaluators with background and training in psychiatry [25]. In addition to meeting the International Classification of Sleep Disorders, Third Edition (ICSD-3) diagnostic criteria for CID [26], inclusion criteria for patients were as follows: (1) aged between 18 and 75 years; (2) had at least 6 years of education without problems in comprehension; (3) not taking drugs that could potentially interfere with sleep, cognitive function or endocrine function in the 3 months prior to enrolment; and (4) voluntarily participating in the study after providing written informed consent. Exclusion criteria were as follows: (1) somatic comorbidity (including immunologic, endocrine, cardiovascular, neurologic, liver, kidney or organic brain disease); (2) history of substance abuse; (3) recent infection or inflammation (within 2 weeks of the start of the study); (4) taking drugs that could affect sleep, mood, immune function or cognition; and (5) pregnant or lactating women.

At physical examination centers of the same hospital, we also recruited 70 healthy controls (CON) based on similar background information to that of the experimental group (Pittsburgh Sleep Quality Index [PSQI] and 17-Item Hamilton Depression Rating Scale [HAMD-17] scores < 7 [27–30]; a score of ≥ 26 on the Chinese-Beijing Version of Montreal Cognitive Assessment [MoCA-C] [31]; and no insomnia or related medical history during the same period). The study was approved by the Affiliated Chaohu Hospital of Anhui Medical University Ethics Committee (approval no. 201805-kyxm-01).

General data collection
General information was collected using a questionnaire, which included sex, age, education level, illness duration, medical history and family medical history.

Evaluation of sleep quality
Sleep quality was assessed using the PSQI, which has seven components including subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, use of sleep medication and daytime dysfunction during the previous month, which are scored on a 4-point rating scale ranging from 0 (none) to 3 (≥ 3 times per week) [27]. In China, a score ≥ 7 has high diagnostic sensitivity and specificity for distinguishing patients with poor sleep from healthy subjects [29]. Total PSQI scores range from 0–21, with a higher score corresponding to poorer sleep quality [27].

Assessment of depression severity
Depression severity was assessed using the HAMD-17, which comprises 17 items relating to depressed mood, feelings of guilt and suicide, sleep, work and activities [30]. A score < 7 indicates a healthy state, whereas scores of 7–17, 18–24 and > 24 correspond to mild, moderate and severe depression, respectively.

Cognitive assessment
The MoCA-C is a widely used subjective cognitive screening tool with good reliability and validity for Chinese subjects [31]. It comprises eight dimensions: visual space and executive function, naming, attention, language, abstraction, short-term memory, delayed recall and orientation [32]. The maximum score is 30 points, and a score ≥ 26 indicates normal cognitive function [31].

Stigma evaluation
The Stigma Scale for Chronic Illness (SSCI) is a 24-item measure of stigma, which evaluates the degree of stigma of chronic neurological diseases and includes 13 internalized (e.g., “I felt embarrassed about my illness”, “Because of my illness, I felt different from others,” etc.) and 11 enacted items (e.g., “Because of my illness, people made fun of me”, “Because of my illness, I was treated unfairly by others”, “I lost friends by telling them that I have this illness,” etc.) [15]. Each item is rated using the following response format: 1 = never, 2 = rarely, 3 = sometimes, 4 = often and 5 = always. The total score ranges from 24 to 120 points and indicates the severity of stigma suffered by the patient. A score < 8 indicates a healthy state, whereas scores > 20 and > 35 correspond to mild and severe stigma, respectively [15]. Internal consistency (Cronbach’s alpha value = 0.951), and the Cronbach’s alpha of self-stigma and enacted stigma were 0.969 and 0.927.

Assessment of life quality
The Medical Outcomes Study (MOS) 36-Item Short-Form Health Survey (SF-36) measures health-related quality of life, functioning and well-being and has strong reliability and validity for use in both general and disease-specific populations [33]. All but one of the 36 items are used to score the eight SF-36 scales, which include: Physical Function, Physical Role, Body Pain, General Health, Vitality, Social Function, Emotional Role and Mental Health. It also contains an additional item of Health Transition, which is not part of any dimension and measures the declared evolution of health [34, 35]. Higher scores correspond to better health-related life quality [33]. The Cronbach’s alpha coefficients of internal consistency ranged from 0.72 to 0.88, which were satisfactory for group comparison.

Statistical analysis
SPSS version 20 for windows was used for statistical analyses. Continuous normally distributed data are presented as means ± standard deviations and were evaluated using
Student’s t-test to compare differences between groups and one-way analysis of variance to determine main effects. The least significant difference test was used for multiple comparisons. Non-normally distributed data are expressed as P50 (P25 and P75), and differences between groups were analysed using the rank-sum test for two independent samples with a completely randomized design (Mann–Whitney U). Categorical data were analysed using a chi-squared test. To control for the confounding factors and their influence on the variables, correlations between stigma scores and illness duration (controlling for sex, age and educational level), PSQI score (controlling for sex, age, educational level, illness duration and HAMD-17 score), HAMD-17 score (controlling for sex, age, educational level, illness duration and PSQI score), MoCA-C score (controlling for sex, age, educational level, illness duration and HAMD-17 score) and SF-36 score (controlling for sex, age, educational level, illness duration, PSQI score, HAMD-17 score and MoCA-C score) were assessed using partial correlation analysis. Multiple linear regression was used to explore the correlation between stigma and related influencing factors and identify the contribution of each related influencing factor to changes in stigma. Two-sided p values ≤ 0.05 were considered statistically significant.

Results

General characteristics of the study subjects
There were no significant differences in sex ratio (C² = 0.8, p = 0.4), age (U = 2235.0, p = 0.4), or educational level (U = 2840.0, p = 0.1) between the two groups (Table 1).

Sleep quality and depression severity
PSQI scores differed significantly between groups (U = 2485.0, p < 0.001), and the CID group had significantly higher scores than the control group. HAMD-17 scores differed significantly between groups (U = 69.5, p < 0.001); and the score of the CID group was almost six times higher than that of the health controls (Table 1).

Cognitive function
There were significant differences in MoCA-C scores between the two groups (U = 3997.5, p < 0.001). Patients with CID had significantly lower total MoCA-C scores (23.0 [20.0, 26.0]) than controls (26.0 [26.0, 28.0]; Table 1).

Stigma scores
The ratio of stigma was significantly different between the two groups (C² = 35.6, p < 0.001). For performance in stigma, significantly higher scores were observed in patients than controls for the items of total (U = 662.0, p < 0.001), internalized (U = 593.0, p < 0.001) and enacted (U = 1568.0, p < 0.001) stigma scores (Table 2).

Life quality levels
There were significant intergroup differences for the SF-36 items of Physical Role (U = 1560.5, p < 0.001), Body Pain (U = 1633.5, p < 0.001), General Health (U = 1194.0, p < 0.001), vitality (U = 1169.5, p < 0.001), Social Function (U = 1703.0, p = 0.001), Emotional Role (U = 1451.5, p < 0.001), Mental Health (U = 1147.0, p < 0.001) and Health Transition (U = 1341.0, p < 0.001; Table 2).

Correlations between stigma scores and illness duration and possible factors
In the CID group, partial correlation analysis showed that illness duration was positively correlated with total (r = 0.62, p < 0.001), internalized (r = 0.56, p < 0.001) and enacted stigma scores (r = 0.51, p < 0.001). For the correlations between stigma score and PSQI score

Table 1 Demographic characteristics, sleep quality, depression level and cognitive performance of the study subjects

| Variable                | Chronic insomnia disorder | Healthy controls | Statistic | P-value |
|-------------------------|---------------------------|------------------|-----------|---------|
| Number of cases         | 70                        | 70               |           |         |
| Male/female             | 21/49                     | 26/44            | C² = 0.80 | 0.4     |
| Age (year)              | 50.0 (43.0, 55.0)         | 47.0 (38.5, 54.0)| U = 2235.0| 0.4     |
| Education (year)        | 9.0 (6.0, 12.0)           | 9.0 (8.8, 15.0)  | U = 2840.0| 0.1     |
| Illness duration (year) | 6.0 (3.0, 13.5)           |                  |           |         |
| PSQI score              | 16.0 (14.0, 17.0)         | 4.0 (3.0, 5.0)   | U = 2485.0| <0.001  |
| HAMD-17 score           | 11.0 (7.8, 13.0)          | 2.0 (0.0, 3.0)   | U = 69.5  | <0.001  |
| MoCA-C score            | 23.0 (20.0, 26.0)         | 26.0 (26.0, 28.0)| U = 3997.5| <0.001  |

Normally distributed variables are shown as means ± standard deviations; non-normally distributed variables are shown as P50 (P25, P75).

Abbreviations: HAMD-17 17-item Hamilton Depression Rating Scale, MoCA-C Chinese-Beijing Version of Montreal Cognitive Assessment, PSQI Pittsburgh Sleep Quality Index
Table 2  Stigma and life quality of the study subjects

| Terms                        | Chronic insomnia disorder | Healthy controls | Statistic | P-value |
|------------------------------|----------------------------|------------------|-----------|---------|
| Stigma (n, %)                |                            |                  |           |         |
| Total                        | 57 (81.4)                  | 22 (31.4)        | C² = 35.6 | < 0.001 |
| Internalized                 | 34.5 (26.0, 42.3)          | 24.0 (24.0, 24.0)| U = 662.0 | < 0.001 |
| Enacted                      | 21.0 (14.0, 29.0)          | 13.0 (13.0, 13.0)| U = 593.0 | < 0.001 |
| SF-36 score                  |                            |                  |           |         |
| Physical Function            | 90.0 (85.0, 100.0)         | 95.0 (85.0, 100.0)| U = 2164.0| 0.2     |
| Physical Role                | 50.0 (25.0, 100.0)         | 100.0 (50.0, 100.0)| U = 1560.5| < 0.001 |
| Body Pain                    | 74.0 (62.0, 84.0)          | 84.0 (74.0, 100.0)| U = 1633.5| < 0.001 |
| General Health               | 52.1 ± 22.5                | 72.9 ± 18.8      | U = 1194.0| < 0.001 |
| Vitality                     | 55.0 (40.0, 75.0)          | 80.0 (70.0, 85.0)| U = 1169.5| < 0.001 |
| Social Function              | 77.8 (55.6, 100.0)         | 88.9 (77.8, 100.0)| U = 1703.0| 0.001   |
| Emotional Role               | 66.7 (0.0, 66.7)           | 100.0 (66.7, 100.0)| U = 1451.5| < 0.001 |
| Mental Health                | 48.0 (36.0, 72.0)          | 76.0 (67.0, 84.0)| U = 1147.0| < 0.001 |
| Health Transition            | 25.0 (25.0, 50.0)          | 50.0 (50.0, 50.0)| U = 1341.0| < 0.001 |

Normally distributed variables are shown as means ± standard deviations; non-normally distributed variables are shown as P50 (P25, P75)

Abbreviations: SF-36 Medical Outcome Study 36-Item Short-Form Health Survey, SSCI Stigma Scale for Chronic Illness

Multiple linear regression between stigma scores and related factors

For the regression analysis in the CID group, scores for the different items of stigma were defined as the dependent variable and those for all related factors were defined as independent variables based on the partial correlation analysis. Results revealed a significant linear regression, in which illness duration was independently positively correlated with total (β = 0.433, p < 0.001), internalized (β = 0.326, p < 0.001) and enacted (β = 0.441, p < 0.001) stigma scores. The SF-36 item of Mental Health was independently negatively correlated with total (β = −0.346, p = 0.007) and internalized (β = −0.377, p = 0.004) stigma scores (Table 4).

Table 3  Partial correlations among stigma scores and illness duration and scores of PSQI, HAMD-17, MoCA-C and SF-36 in patients with CID

| Variable                        | Stigma |             |             |             |
|---------------------------------|--------|-------------|-------------|-------------|
|                                 | Total  | Internalized| Enacted     |             |
| Illness duration (year)         | 0.62a  | 0.56a       | 0.51ab      |             |
| PSQI score (patient report)     | 0.30b  | 0.34a       | 0.10        |             |
| HAMD-17 score                   | 0.45a  | 0.48a       | 0.10        |             |
| MoCA-C score                    | −0.06  | −0.08       | 0.004       |             |
| SF-36 score                     | −0.09  | −0.10       | −0.02       |             |
| Physical Function               | −0.22  | −0.27b      | −0.02       |             |
| Physical Role                   | −0.05  | −0.17       | 0.18        |             |
| Body Pain                       | −0.08  | −0.14       | 0.03        |             |
| General Health                  | −0.27c | −0.33a      | −0.04       |             |
| Vitality                        | −0.14  | −0.15       | −0.06       |             |
| Social Function                 | −0.06  | −0.09       | 0.01        |             |
| Emotional Role                  | −0.41f | −0.45f      | −0.19       |             |
| Mental Health                   | 0.12   | 0.13        | 0.14        |             |
| Health Transition               |        |             |             |             |

Notes: *controlling for sex, age, and educational level; **controlling for sex, age, educational level, illness duration and HAMD-17; ***controlling for sex, age, educational level, illness duration and PSQI; †controlling for sex, age, educational level, illness duration, PSQI and HAMD-17; *controlling for sex, age, educational level, illness duration, PSQI, HAMD-17 and MoCA-C. *p < 0.05; *p < 0.01

Abbreviations: HAMD-17 17-item Hamilton Depression Rating Scale, PSQI Pittsburgh Sleep Quality Index, SF-36 Medical Outcome Study 36-Item Short-Form Health Survey, CID chronic insomnia disorder

Discussion

Patients with chronic insomnia are associated with greater depressive symptoms and cognitive impairment [36, 37]. Different levels of depression and cognitive impairment will further exacerbate insomnia [38, 39]. Stigma as a particularly burdensome personal and social
Table 4  Multiple linear regression between stigma and related influencing factors in patients with CID

| Variable            | Total Stigma | Internalized Stigma | Enacted Stigma |
|---------------------|--------------|---------------------|----------------|
|                     | Standardized $\beta$ | t | P | B (95% CI) | Standardized $\beta$ | t | P | B (95% CI) | Standardized $\beta$ | t | P | B (95% CI) |
| Illness duration (year) | 0.433 | 5.113 | < 0.001 | 0.357–0.816 | 0.326 | 3.760 | < 0.001 | 0.161–0.527 | 0.441 | 3.841 | 0.000 | 0.104–0.329 |
| PSQI score | 0.062 | 0.692 | 0.492 | −0.457–0.942 | 0.086 | 0.935 | 0.354 | −0.297–0.818 | 0.035 | 0.935 | 0.354 | −0.297–0.818 |
| HAMD-17 score | 0.127 | 1.325 | 0.190 | −0.192–0.946 | 0.146 | 1.492 | 0.141 | −0.115–0.792 | −0.048 | −0.366 | 0.716 | −0.330–0.228 |
| SF-36 score Physical Role | −0.128 | −1.484 | 0.143 | −0.079–0.012 | −0.149 | −1.690 | 0.096 | −0.067–0.006 | −0.050 | −0.429 | 0.669 | −0.027–0.018 |
| SF-36 score Vitality | 0.002 | 0.013 | 0.989 | −0.012–0.012 | −0.015 | −0.122 | 0.903 | −0.102–0.090 | 0.086 | 0.522 | 0.604 | −0.044–0.075 |
| SF-36 score Mental Health | −0.346 | −2.775 | 0.007 | −0.296–0.048 | −0.377 | −2.952 | 0.004 | −0.244–0.047 | −0.278 | −1.645 | 0.105 | −0.111–0.011 |

Abbreviations: HAMD-17 17-item Hamilton Depression Rating Scale, PSQI Pittsburgh Sleep Quality Index, SF-36 Medical Outcome Study 36-item Short-Form Health Survey, CID chronic insomnia disorder, CI confidence interval
The occurrence of stigma is related to several influencing factors, such as illness duration, life quality, mental health, etc. [52]. Additionally, with a prolonged disease course, patients under chronic disease conditions exhibit different levels of stigma [56–60]. In our study, both the partial correlation and multiple linear regression analyses showed that the longer the illness duration, the higher the stigma score, which is in line with previous studies [52]. To gain a comprehensive understanding of stigma changes, it would be meaningful to further observe these populations in future studies. Given that stigma is influenced not only by illness duration [61, 62], and identifying other influencing factors is necessary.

Life quality is a critical factor that promotes the progression of stigma [63]. As common comorbidity disease of chronic insomnia, individuals with serious mental illness die prematurely by decades, which is not driven by increased suicides or injuries but by poor physical health, which is influenced by stigma [64]. Our results showed that stigma scores were negatively correlated with most of the subitems of the SF-36, which suggested that stigma in CID patients is related to health quality. Interestingly, the multiple linear regression analysis showed that only the Mental Health item of the SF-36 was an independent risk factor of stigma, which further demonstrates the influence of Mental Health on stigma [16, 17]. In other words, mental illness severity should be considered a predictor of stigma among people with psychiatry disorders [65, 66]. This may be because psychiatric disorders, such as depression, affect the perception of the circumstances of daily life [67].

In individuals with psychiatric disorders, stigma may represent a potent stressor that disrupts sleep and impairs health and quality of life [68]. Furthermore, via the content and process of stigma, discrimination has a significant indirect effect on sleep disturbance in these individuals [53]. In the present study, the partial correlation analysis in the CID patients revealed that poor sleep quality and severe depression were positively correlated with different aspects of stigma, such as total and internalized stigma. However, these correlations were not observed in the subsequent multiple linear regression analysis. These results suggest that in CID patients, the effect of stigma on sleep quality and depression severity is mainly dependent on illness duration and life quality, especially mental health.

**Lower life quality in CID patients**

Life quality is a major outcome variable in the evaluation of alternative treatments for sleep disorders [69]. Poor-quality sleep can negatively affect an individual's subjective well-being and quality of life [70]. Particularly under pathological conditions, high quality of life positively affects sleep [71]. Consistent with previous research, we also found that CID patients had significantly lower scores than controls in most domains of the SF-36, which included Physical Role, Body Pain, General Health, Vitality, Social Function, Emotional Role, Mental Health and Health Transition, which suggests that CID negatively impacts quality of life [70, 71]. However, we did not find a significant difference in the item of Physical Function between the two groups. Even in the partial correlation analysis, the item of Physical Function did not correlate with any of the domains of stigma. Such a discrepancy may be attributed to several factors, such as ethnic origin, sex, comorbidities and differences in the severity of
insomnia [72–74]. Further studies are required to reach a definitive conclusion.

Limitations
The current study had several limitations. First, the findings that patients with chronic insomnia had poorer sleep quality, greater depressive symptoms and poorer quality of life have been consistently found in previous literature. Previous research has also found the finding on the correlation of stigma with depressive symptoms and illness duration. The study will be more interesting if it examines prospective predictors of the stigma or prospective outcomes associated with insomnia. Second, the measure used to measure stigma was a measure designed for neurologist disease/non-specific chronic illnesses, not specific to the experience of stigma related to insomnia. Given that the relationship between stigma and insomnia is still at the preliminary exploration stage, a specific evaluation measure to the experience of stigma related to insomnia is urgently needed if it could examine more insomnia-specific stigma. Third, the recruited insomnia subjects were all come from the hospital, which may lead to the potential bias of their stigma scores. Additionally, the level of stigma is affected by numerous other variables rather than the aspects that we listed only. Therefore, other influence factors ought to be considered in future research.

Conclusion
Patients with CID had an increased risk of stigma, suggesting that different levels of stigma underlie CID. Additionally, illness duration and Mental Health (an item in SF-36) were the main factors related to stigma. CID patients who have long illness duration or Mental Health problems ought to seek professional help timely. Caregivers should prioritize monitoring CID patients living with high levels of stigma and developing targeted interventions to eliminate the stigmatization of this group. In future, further studies are needed to validate whether successful treatment of insomnia can relieve stigma.

Abbreviations
BMI: Body mass index; CID: Chronic insomnia disorder; CON: Healthy controls; HAMD-17: 17-Item Hamilton Depression Rating Scale; HIV: Human immunodeficiency virus; ICSD-3: International Classification of Sleep Disorders, Third Edition; MoCA: Montreal Cognitive Assessment; MoCA-C: Chinese-Beijing Version of Montreal Cognitive Assessment; MOS: Medical outcomes study; MS: Multiple sclerosis; PSQI: Pittsburgh Sleep Quality Index; SF-36: Mos 36-Item Short-Form Health Survey; SGS: Stigma Scale for Chronic Illness.

Supplementary Information
The online version contains supplementary material available at https://doi.org/10.1186/s12888-022-04091-y.

Acknowledgements
We would like to thank all patients who participated in our study.

Authors’ contributions
Gui-Hai Chen, Deng-Zhi Xie and Hui-Qin Sun conceived, designed, and supervised the study. Shuo He and Xue-Jia Ke performed statistical analyses and drafted the manuscript. Yun Wang participated in project supervision. Yan Wu and Xiao-Yi Kong collected and organized the data. All authors read and approved the final manuscript.

Funding
This work was financially supported by the National Natural Science Foundation of China (grant no. 81671316) and Natural Science Foundation of Anhui Medical University (grant nos. 2020jj053). These funding sources had no role in the study design, analysis, data interpretation, or decision to submit the article for publication.

Availability of data and materials
The datasets are presented in the additional supporting files and are available from the corresponding author (doctorcqh@163.com) or the editor at any request.

Declarations
Ethics approval and consent to participate
All methods were performed in accordance with the Declaration of Helsinki and relevant regulations. This study was approved by the Affiliated Chaohu Hospital of Anhui Medical University Ethics Committee (approval no. 201805-kyxm-01). Patients provided their written informed consent prior to responding to the survey questions.

Consent for publication
Not applicable.

Competing interests
The authors declare that they have no competing interests.

Author details
1 Department of Neurology (Sleep Disorders), The Affiliated Chaohu Hospital of Anhui Medical University, Hefei 238000, Chaohu, China. 2 Department of Geriatrics, Hefei First People’s Hospital, Hefei 230092, China. 3 Department of Outpatient, The Affiliated Chaohu Hospital of Anhui Medical University, Hefei 238000, Chaohu, China.

Received: 10 December 2021 Accepted: 24 June 2022
Published online: 05 July 2022

References
1. Sutton EL. Insomnia. Ann Intern Med. 2021;174(3):ITC33–48. https://doi.org/10.7326/ITC202103160.
2. Walsh JK, Coulouvrat C, Hajak G, Lakomda MD, Perkhova M, Roth T, et al. Nighttime insomnia symptoms and perceived health in the America Insomnia Survey (AIS). Sleep. 2011;34(8):997–1011. https://doi.org/10.5665/SLEEP1150.
3. Abraham O, Pu J, Schleiden LJ, Albert SM. Factors contributing to poor satisfaction with sleep and healthcare seeking behavior in older adults. Sleep Health. 2017;3(1):43–8. https://doi.org/10.1016/j.sleh.2016.11.004.
4. Morin CM, LeBlanc M, Daley M, Greigoire JP, Mireette C. Epidemiology of insomnia: prevalence, self-help treatments, consultations, and determinants of help-seeking behaviors. Sleep Med. 2006;7(2):123–30. https://doi.org/10.1016/j.sleep.2005.08.008.
5. Ryden AM, Martin JL, Matsuwaka S, Fung CH, Dzierezwski JM, Song Y, et al. Insomnia disorder among older veterans: Results of a postal survey. J Clin Sleep Med. 2019;15(4):543–51. https://doi.org/10.5664/jcsm.7710.
6. Koopman ADMA, Beuken JW, Dijkstra T, Pouwer F, Bremmer MA, van Straten A, et al. Prevalence of insomnia (symptoms) in T2D and association with metabolic parameters and glycemic control: Meta-analysis. J Clin Endocrinol Metab. 2020;105(3):614–43. https://doi.org/10.1210/clinem/dg0655.
11. Espie CA, Kyle SD, Hames P, Cyhlaova E, Benzeval M. The daytime impact of DSM-5 insomnia disorder: comparative analysis of insomnia subtypes from the Great British Sleep Survey. J Clin Psychiatry. 2012;73(12):e1478–84. https://doi.org/10.4088/JCP.12m07954.

12. Pigeon WR, Bishop WM, Krueger KM. Insomnia as a precipitating factor in new onset mental illness: a systematic review of recent findings. Curr Psychiatry Rep. 2017;19(8):44. https://doi.org/10.1007/s11920-017-0802-x.

13. Howlett RDM, Lustig KA, MacDonald KJ, Cote KA. Hyperarousal is associated with socioemotional processing in individuals with insomnia symptoms and good sleepers. Brain Sci. 2020;10(2):112. https://doi.org/10.3390/brainsci10020112.

14. Martínez-Fernández A, Rueda Vega M, Quintas S, de Toledo Heras M, Díaz de Terán J, Latorre González G, et al. Psychosocial repercussion of migraine: is it a stigmatized disease? Neurol Sci. 2020;41(8):2207–13. https://doi.org/10.1007/s10072-020-04332-6.

15. Rao D, Choi SW, Victorson D, Bode R, Peterman A, Heinemann A, et al. Measuring stigma across neurological conditions: the development of the stigma scale for chronic illness (SSCI). Qual Life Res. 2009;18(5):585–95. https://doi.org/10.1007/s11136-009-9475-1.

16. Naushad N, Dunn LB, Muñoz RF, Leykin Y. Depression increases subjective symptoms and good sleepers. Brain Sci. 2020;10(2):112. https://doi.org/10.3390/brainsci10020112.

17. Hankir AK, Northall A, Zaman R. Stigma and mental health challenges in medical students. BMJ Case Reports. 2014;2014:bcr2014205226. https://doi.org/10.1136/bcr-2014-205226.

18. United States Food and Drug Administration. The Voice of the Patient. Available from: https://www.fda.gov/media/88736/download. doi.org/10.1136/jad.2011.015081.

19. Barker EC, Flygare J, Paruthi S, Sharkey KM. Living with narcolepsy: Current reports. Ann Acad Med Singapore. 2015. 26.

20. Fortier-Brochu E, Beaulieu-Bonneau S, Ivers H, Morin CM. Insomnia and daytime cognitive performance: a meta-analysis. Sleep Med Rev. 2012;16(1):83–94. https://doi.org/10.1016/j.smrv.2011.03.008.

21. Lovato N, Lack L, Wright H, Cant M, Humphreys J. Working memory experience of insomnia. Behav Sleep Med. 2005;3(2):73–86. https://doi.org/10.1519/JSR.2005.12010.

22. Carey TJ, Moul DE, Pilkonis P, Germain A, Buysse DJ. Focusing on the experience of insomnia. Behav Sleep Med. 2005;3(2):73–86. https://doi.org/10.1519/JSR.2005.12010.

23. Stinson K, Tang NK, Harvey AG. Barriers to treatment seeking in primary care. Curr Opin Psychiatry. 2013;26(4):224–32. https://doi.org/10.1097/YCO.0b013e3182646277.

24. Henry D, Rosenthal L, Dedrick D, Taylor D. Understanding patient responses to insomnia. J Sleep Res. 2013;22(3):251–7. https://doi.org/10.1111/jsr.12010.

25. Si TM, Shu L, Dang WM, Su YA, Zhang WH. Evaluation of the reliability and validation of the Beijing version of the Pittsburgh Sleep Quality Index as a screening tool for sleep dysfunction in clinical and non-clinical samples: a systematic review and meta-analysis. Sleep Med Rev. 2016;25:52–73. https://doi.org/10.1016/j.smrv.2015.01.009.

26. Harper KJ, Osborn CY, Mayberry LS. Patient-perceived family stigma of depression increases subjective symptoms and good sleepers. Brain Sci. 2020;10(2):112. https://doi.org/10.3390/brainsci10020112.

27. Carpenter JS, Andrykowski MA. Psychometric evaluation of the Pittsburgh sleep quality index. J Psychosom Res. 1998;45(1):5–13. https://doi.org/10.1016/s0022-3999(97)00298-5.

28. Mollayeva T, Thurairajah P, Burton K, Mollayeva S, Shaprio CM, Colanto‑nio A. The Pittsburgh sleep quality index as a screening tool for sleep dysfunction in clinical and non-clinical samples: a systematic review and meta-analysis. Sleep Med Rev. 2016;25:52–73. https://doi.org/10.1016/j.smrv.2015.01.009.

29. Carpenter JS, Andrykowski MA. Psychometric evaluation of the Pittsburgh sleep quality index. J Psychosom Res. 1998;45(1):5–13. https://doi.org/10.1016/s0022-3999(97)00298-5.
50. Livingston JD, Boyd JE. Correlates and consequences of internalized stigma for people living with mental illness: a systematic review and meta-analysis. Soc Sci Med. 2010;71(12):2150–61. https://doi.org/10.1016/j.socscimed.2010.09.030.

51. Brohan E, Gauci D, Sartorius N, Thornicroft G. GAMIAN-Europe Study Group. Self-stigma, empowerment and perceived discrimination among people with bipolar disorder or depression in 13 European countries: the GAMIAN-Europe study. J Affect Disord. 2011;129(1–3):56–63. https://doi.org/10.1016/j.jad.2010.09.001.

52. Coleman SJ, Stevelink SAM, Hatch SL, Denny JA, Greenberg N. Stigma-related barriers and facilitators to help seeking for mental health issues in the armed forces: a systematic review and thematic synthesis of qualitative literature. Psychol Med. 2017;47(11):1880–92. https://doi.org/10.1017/S0033291717000356.

53. Chan KKS, Fung WTY. The impact of experienced discrimination and self-stigma on sleep and health-related quality of life among individuals with mental disorders in Hong Kong. Qual Life Res. 2019;28(8):2171–82. https://doi.org/10.1007/s11136-019-02181-1.

54. Jackson DB, Testa A, Vaughn MG, Semenza DC. Police stops and sleep behaviors among at-risk youth. Sleep Health. 2020;6(4):435–41. https://doi.org/10.1016/j.sleh.2020.02.006.

55. Levenson JC, Thoma BC, Hamilton JL, Choukas-Bradley S, Salk RH. Sleep among gender minority adolescents. Sleep. 2021;44(3):zsaa185. https://doi.org/10.1093/sleep/zsaa185.

56. Tomiyama AJ, Carr D, Granberg EM, Major B, Robinson E, Sutin AR, et al. How and why weight stigma drives the obesity ‘epidemic’ and harms health. BMC Med. 2018;16(1):123. https://doi.org/10.1186/s12916-018-1116-5.

57. Lanfredi M, Macis A, Ferrari C, Rillosi L, Ughi EC, Fanetti A. Effects of education and social contact on mental health-related stigma among high-school students. Psychiatry Res. 2019;281:112581. https://doi.org/10.1016/j.pscychresns.2019.112581.

58. Gonzalez BD, Jacobsen PB. Depression in lung cancer patients: the role of perceived stigma. Psychooncology. 2012;21(3):239–46. https://doi.org/10.1002/pon.1882.

59. Kissane DW, Patel SG, Baser RE, Bell R, Farberov M, Ostrow J, et al. Preliminary evaluation of the reliability and validity of the Shame and Stigma Scale in head and neck cancer. Head Neck. 2013;35(2):172–83. https://doi.org/10.1002/hed.22943.

60. Spencer LA, Silverman AM, Cook JE. Adapting to multiple sclerosis stigma across the life span. Int J MS Care. 2019;21(5):227–34. https://doi.org/10.1002/hed.22943.

61. Johnco C, Rapée RM. Depression literacy and stigma influence how parents perceive and respond to adolescent depressive symptoms. J Affect Disord. 2018;241:359–67. https://doi.org/10.1016/j.jad.2018.08.062.

62. Yuan JM, Zhang JE, Zheng MC, Bu XQ. Stigma and its influencing factors among Chinese patients with stoma. Psychooncology. 2018;27(6):1565–71. https://doi.org/10.1002/pon.4695.

63. Hearn M, Whorwell PJ, Vasant DH. Stigma and irritable bowel syndrome: a taboo subject? Lancet Gastroenterol Hepatol. 2020;5(6):607–15. https://doi.org/10.1016/S2548-1253(19)30348-6.

64. Lancer T. The health crisis of mental health stigma. Lancet. 2016;387(10023):1027. https://doi.org/10.1016/S0140-6736(16)00687-5.

65. Mejia-Lancheros C, Lachaud J, O’Campo P, Wiens K, Nisenbaum R, Wang R, et al. Trajectories and mental health-related predictors of perceived discrimination and stigma among homeless adults with mental illness. PLoS ONE. 2020;15(2):e0229385. https://doi.org/10.1371/journal.pone.0229385 (Published 2020 Feb 27).

66. Szczesiuk D, Kobylko A, Wojciechowska I, Klapciński M, Rymaszewska J. Internalized stigma and its correlates among patients with severe mental illness. Neuropsychiatr Dis Treat. 2018;14:2599–608. https://doi.org/10.2147/NDT.S169051.

67. Kent L, Van Doorn G, Klein B. Time dilation and acceleration in depression. Acta Psychol (Amst). 2019;194:77–86. https://doi.org/10.1016/j.actpsy.2019.02.003.

68. Slopen N, Lewis TT, Williams DR. Discrimination and sleep: a systematic review. Sleep Med. 2016;18:88–95. https://doi.org/10.1016/j.sleep.2015.01.012.

69. Reimer MA, Flemons WW. Quality of life in sleep disorders. Sleep Med Rev. 2003;7(4):335–49. https://doi.org/10.1016/S1291-6191(02)00012-20.

70. Olff M, Wall M, Liu SM, Morin CM, Blanco C. Insomnia and impaired quality of life in the United States. J Clin Psychiatry. 2018;79(5):17m12020. https://doi.org/10.4088/JCP.17m12020.

71. Zhang Y, Cui C, Wang Y, Wang L. Effects of stigma, hope and social support on quality of life among Chinese patients diagnosed with oral cancer: a cross-sectional study. Health Qual Life Outcomes. 2020;18(1):112. https://doi.org/10.1186/s12955-020-01353-9.

72. Espie CA, Emsley R, Kyle SD, Gordon C, Drake CL, Sirirawudena AN, et al. Effect of digital cognitive behavioral therapy for insomnia on health, psychological well-being, and sleep-related quality of life: A randomized clinical trial. JAMA Psychiat. 2019;76(1):21–30. https://doi.org/10.1001/jamapsychiatry.2018.2745.

73. Pengo MF, Won CH, Bourjeily G. Sleep in Women Across the Life Span. Chest. 2018;154(1):196–206. https://doi.org/10.1016/j.chest.2018.04.005.

74. Morin CM, Belleville G, Bélanger L, Ivers H. The Insomnia Severity Index: psychometric indicators to detect insomnia cases and evaluate treatment response. Sleep. 2011;34(5):601–8. https://doi.org/10.1093/sleep/34.5.6011.012.

Publisher’s Note
Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.