Rumination and Insomnia in Chinese Adolescents with Mood Disorders: The Mediating Role of Anxiety

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Abstract

Objective

Insomnia is the most common complaint in adolescents with mood disorders (MD). However, the psychopathological mechanisms associated with insomnia remain unclear. Therefore, we aimed to explore anxiety’s mediating role in the effect of rumination on insomnia in MD adolescents.

Methods

A total of 569 MD patients were recruited. Participants completed the Patient Health Questionnaire-9 (PHQ-9), 7-item Generalized Anxiety Disorder (GAD-7) scale, and Insomnia Severity Index (ISI) to self-assess their mood and insomnia symptoms. In addition, the 21-item Chinese version of the Ruminative Response Scale (RRS) was used to assess rumination specifically.

Results

The prevalence of insomnia in MD patients was 60.63%, with a higher prevalence in females (63.32%) vs. male patients (54.39%). MD patients with insomnia symptoms also scored higher on depression and anxiety symptom scales, as well as rumination, when compared to MD patients without insomnia. Depression-related rumination and anxiety were correlated with insomnia in MD patients. The AUCROC showed that the combination of depression-related rumination and anxiety could effectively distinguish patients with and without insomnia in MD adolescents. Furthermore, in adolescents with MD, depression-related rumination positively predicted anxiety and insomnia, and anxiety positively predicted insomnia. Finally, anxiety partially mediated the association between depression-related rumination and insomnia.

Conclusion

Our results suggest that depression-related rumination and anxiety are key risk factors for insomnia in adolescents with MD. Furthermore, anxiety can exacerbate the effects of depression-related rumination on insomnia, suggesting that clinical interventions to reduce depression-related rumination and anxiety may be a viable consideration for insomnia in adolescents with MD.

1. Introduction

Mood disorders (MD) make up the least understood and most common mental illnesses in public health [1]. In particular, the presence of MD in adolescents has been associated with many maladaptive features such as impaired social function, interpersonal relationships, and academic achievement, drug and alcohol usage, and an elevated suicide risk [1]. The main symptoms of MD include hopelessness, insomnia, weight gain, anhedonia, and social withdrawal [2]. Importantly, among adolescents with MD, insomnia is the most common complaint [2]. Insomnia rates in adolescents with depression have been reported to range between 33% and 51% [3]. For the onset, development, and maintenance of MD in adolescents, insomnia has been identified as an important risk factor [4]. Previous studies have shown
that a prior history of insomnia increases the risk of depression later in life, with an average risk approximately four times higher than that of individuals without a history of insomnia [5]. In addition, clinical studies have shown that insomnia in patients who have experienced a major depressive episode (MDE) increases the severity of depressive symptoms [6], further impairs social functioning [6], decreases treatment response [7], and increases the risk of suicide [8], when compared to individuals who have experienced an MDE without insomnia. In totality, this evidence suggests that insomnia is an important risk factor for depression. Therefore, it is imperative that we improve our understanding of the potential risk factors and mechanisms of insomnia to better treat and potentially prevent the development of MD [9].

Recently, a systematic review and meta-analysis by Clancy et al. [10] found an association between negative overthinking and insomnia. Negative overthinking is defined as a repetitive thought process that may lead to cognitive arousal, worry, and intrusive thinking [11]. In addition, negative overthinking includes persistent worrying about future events and continual focus on painful past experiences or current negative feelings (i.e., rumination) [12]. Several studies with non-clinical samples have found an association between negative overthinking, such as rumination, and insomnia [13, 14]. Rumination is a maladaptive response that may impair problem solving [15, 16], an especially necessary skill for adolescent-aged populations. Rumination also plays an important role in physiological arousal [11], which may lead to difficulty falling asleep, reduced sleep quality, and shorter total sleep duration [14].

In addition, worry is another common form of negative overthinking [10]. Worry can be defined as persistent thoughts about a negative event or consequence that has not yet occurred [17]. Importantly, worry is a major feature of anxiety [18]. Anxiety states can trigger selective attention and monitoring of internal and external sleep-related threats [19]. Subsequently, unpleasant intrusive thoughts and uncontrollable, excessive anxiety or worry can induce insomnia [20]. These relationships are exemplified by the fact that patients with anxiety and obsessive worry are more likely to have insomnia [20]. A study by Johnson et al. [4] found that prior anxiety was significantly associated with an increased risk of insomnia in a community sample of adolescents, however, prior insomnia was not significantly associated with the onset of anxiety disorders, suggesting that there may be a directionality to this relationship. Overall, these results imply that anxiety may be a significant risk factor for insomnia.

Although previous studies have explored the effects of rumination and anxiety on insomnia, few studies have specifically examined the mediating effects of anxiety on rumination and insomnia in adolescent populations with MD. Therefore, the main purpose of this study was to examine the direct association between rumination and insomnia, and the potential psychological mechanisms underlying the effects of rumination on insomnia, in Chinese adolescents with MD.

2. Methods

2.1. Participants and settings
A total of 569 MD patients (M/F = 171/398, ages 11 to 18 years) were recruited from the Pediatric and Adolescent Units of the Third People's Hospital, a psychiatric hospital in Ganzhou, Jiangxi Province, China. Data was collected between the dates of October 2019 to June 2022. Inclusion criteria were as follows: 1) ages 11-18 years old, Han Chinese ethnicity; 2) having an active depressive episode at the time of the study, with an existing diagnosis of MD according to the criteria specified in ICD-10, further confirmed by two experienced psychiatrists; and 3) more than 5 years of education, to ensure full understanding of all questionnaire items. Exclusion criteria included: 1) a history of serious physical illness 2) a diagnosis of other psychiatric disorders as defined by ICD-10 and 3) a diagnosis of substance use disorder or dependence, except for nicotine.

After a detailed explanation of the study protocol, all participants and their respective guardians signed a written informed consent form to participate in our study. The study protocol was approved by the Institutional Review Board (IRB) of Ganzhou Third People's Hospital. The study was conducted in full compliance with the rules of the Declaration of Helsinki, issued by the National Institutes of Health.

2.2. Socio-demographic information

Sociodemographic information, including age, gender, years of education, area of residence, only child status, and lifestyle (two-parent family, single-parent family, single immigrant, living with grandparents, other), was collected to assess the characteristics of adolescents with MD.

2.3 Depressive symptoms

The Patient Health Questionnaire-9 (PHQ-9) was used to assess self-reported depressive symptoms in the two weeks prior to our study [21-23]. The PHQ-9 is a validated and widely used 9-item self-reported scale for assessing depressive symptoms, including anhedonia, feelings of depression, difficulty sleeping, decreases in energy, changes in eating habits, feelings of guilt, difficulty concentrating, psychomotor changes, and suicidal thoughts [24-26]. Each item is scored on a frequency scale of 0-3, with total scores ranging from 0 to 27. Participants with higher PHQ-9 scores were considered to have more severe depressive symptoms [25, 27].

2.4. Anxiety symptoms

The 7-item Generalized Anxiety Disorder (GAD-7) scale was used to assess anxiety symptoms over the 2 weeks prior to our study. GAD-7 is a validated and widely used tool to assess the severity of anxiety symptoms, including feelings of nervousness or anxiety, inability to control or stop anxiety, worrying too much about different things, trouble relaxing, excessive restlessness, irritability, and feeling afraid that something awful might happen [28]. Each item is scored on a frequency scale of 0-3, with total scores ranging from 0 to 21. Participants with higher scores on GAD-7 were considered to have more severe anxiety symptoms [29].

2.5. Insomnia symptoms
The Insomnia Severity Index (ISI) [30] was used to assess the severity of insomnia symptoms over the 2 weeks prior to our study. The ISI is a self-reported 7-item questionnaire that uses a 5-point Likert scale to assess difficulty falling asleep, difficulty staying asleep, problems waking up too early, sleep pattern satisfaction, how noticeable sleep problems are to others in terms of impairing quality of life, distress over current sleep problems, and interference with daily functioning. Total ISI scores range from 0 to 21. According to our previous study [31], a total ISI score ≥8 was considered as a cut-off for screening for insomnia.

2.6. Rumination

We assessed rumination using a 21-item Chinese version of the Ruminative Response Scale (RRS) [32], which was derived from the original 22-item form developed by Nolen-Hoeksema and Morrow [33]. Item 14 was excluded because it was previously found to have a factor loading of -0.07 in Chinese adolescents. 21-item Chinese versions of the RRS have been validated and widely used in Chinese adolescents [32, 34-36]. The RRS scale contains three factors: depression-related rumination (11 items), brooding (5 items), and reflection (5 items). The form uses a 4-point Likert scale, ranging from 1 (almost never) to 4 (almost always). Total RRS scores range from 21 to 84, with higher score indicating higher levels of rumination.

2.7. Statistical analysis

The purpose of our current study was to explore the prevalence and risk factors associated with insomnia in adolescents with MD, and to examine whether anxiety mediates the relationship between rumination and insomnia. These research questions were analyzed in three steps. First, descriptive statistics were analyzed using an independent samples t-test for continuous variables and $\chi^2$ test for categorical variables. Bonferroni correction was then used to adjust for multiple tests. Second, univariate analysis between those with and without insomnia was used to examine risk factors of insomnia in MD patients. Variables with significant differences were then included in a binary logistic regression (Forward: Wald), with gender specified as a covariate. The area under the receiver operating characteristic (AUCROC) was then applied to explore the discriminatory power of significant variables in order to distinguish MD adolescents with and without insomnia. According to previous studies, consistency statistics between 0.7 and 0.8 were considered acceptable [37, 38]. Third, the mediating effect of anxiety was analyzed by applying the PROCESS macro of SPSS (Model 4). These models were applied with 5000 resamples using bootstrapping confidence intervals (CIs) to demonstrate whether the effects in PROCESS Model 4 were significant [39].

SPSS version 23.0 was used to analyze all data. Significance levels were set at a two-tailed p-value of $\alpha = 0.05$. Continuous variables are presented as mean ± standard deviation (M ± SD).

3. Results

3.1. Demographic and clinical characteristics
As shown in Table 1, the prevalence of insomnia among adolescents with MD was 60.63% (345/569), with significantly higher representation in females (63.32%, 252/398) compared to males (54.39%, 93/171), \( (x^2=3.99, p =0.046) \). With respect to other sociodemographic variables studied, there were no significant differences between insomnia and non-insomnia groups of MD adolescents.

Compared to the non-insomnia group, the insomnia group had significantly higher mean PHQ-9 score, RRS total score, RRS depression-related rumination score, RRS brooding score, RRS reflection score, GAD-7 score, and ISI score (all \( p <0.001 \) ) (Table 1). Furthermore, univariate analysis showed that the differences in PHQ-9 score, RRS total score, RRS depression-related rumination score, RRS brooding score, RRS reflection score, GAD-7 score, and ISI score remained significant between insomnia and non-insomnia groups even after controlling for gender as a covariate (all \( p < 0.001 \), all \( p_{\text{Bonferroni correction}} < 0.001 \)).

3.2. Factors associated with insomnia among MD adolescents

To examine risk factors for insomnia in adolescents with MD, variables that differed significantly during univariate analysis were included in a binary logistic regression (forward stepwise method: Wald) to identify risk factors for insomnia in adolescents with MD. As shown in Table 2, our results indicated that GAD-7 score (OR=1.322; 95% CI: 1.259-1.389) and RRS depression-related rumination score (OR=1.041; 95% CI: 1.013-1.069) were both independently associated with insomnia in adolescents with MD. Furthermore, the AUCROC was 0.86 for GAD-7 and 0.70 for RRS depression-related rumination. Finally, when GAD-7 and RRS depression-related rumination scores were combined, we found a higher cumulative AUC value of 0.87 that distinguished MD adolescents with and without insomnia (\( p <0.001 \), 95% CI= 0.84-0.90) (Figure 1).

3.3. Testing for mediating effects

To test for mediating effects, we used the Bootstrap method with Model 4 of SPSS Macro PROCESS, defining depression-related rumination score as the independent variable, ISI score as the dependent variable, and GAD-7 score as the mediator. The findings revealed that depression-related rumination positively predicted anxiety, as measured by GAD-7 \( (r = 0.247, p < 0.001) \). In addition, anxiety positively predicted insomnia, as measured by ISI \( (r = 0.071, p < 0.001) \). The remaining direct effect of depression-related rumination on insomnia remained positive \( (r = 0.052, p < 0.05) \). Altogether, these findings suggest that anxiety partially mediated the association between depression-related rumination and insomnia (direct effect = 0.052, SE = 0.025, 95% CI = [0.003, 0.102]; indirect effect = 0.191, SE = 0.029, 95% CI = [0.138, 0.251]) (see Figure 2, Table 3).

4. Discussion

To the best of our knowledge, this is the first clinical sample study to investigate the prevalence of insomnia and associated risk factors in adolescents with MD, specifically identifying the mediating role of anxiety in the relationship between depression-related rumination and insomnia. The main results of
this study were as follows: (1) the incidence of insomnia in adolescents with MD was 60.63%; (2) insomnia was more common in female than male adolescent patients with MD; (3) adolescents with insomnia had more severe symptoms of depression, anxiety, and rumination than adolescents without insomnia; (4) insomnia risk factors in MD adolescents were depression-related ruminative and anxiety; (5) the combination of GAD-7 score and depression-related rumination score effectively differentiated adolescent MD patients with and without insomnia; and (6) anxiety partially mediated the association between depression-related rumination and insomnia in adolescents with MD.

Our present study found that the incidence of insomnia in MD adolescents was 60.63%, which is much higher than previously reported in general adolescents. For example, Johnson et al. [40] found that the lifetime rate of insomnia was 11% among adolescents aged 13-16 years old in a US sample. Among middle and high school students in China, the prevalence of sleep disorders was found to be 17.42% [41]. However, a study of 23 mental health institutions in Hungary showed an insomnia prevalence of 53.5% in a clinical sample of children (ages 7.0 to 14.9 years old) with the major depressive disorder [3]. These findings suggest that insomnia is a moderately prevalent symptom in general adolescent populations, with meaningfully higher rates in those with MD. In our study, MD patients with insomnia also had more severe depressive symptoms when compared to MD patients without insomnia. In addition, our study found that the prevalence of insomnia was significantly higher in females than in males. This finding is consistent with previous studies showing that depressed females are more likely to have sleep disturbances than depressed males [3]. Regarding the potential causes of gender differences in insomnia in MD adolescents, biological factors, such as changes in circadian rhythm associated with puberty and the slowing of developmental-based "sleep drive," likely play a major role [42]. Sexual maturation has also been identified as a risk factor for insomnia, as it reflects sex-specific changes in the hormonal environment [43, 44]. Finally, studies have shown that when frustrated, females may be more prone than males to negative emotions, which can impair sleep quality [45].

In addition, we found that MD patients with insomnia had higher total, depression-related rumination, brooding, and reflection RRS scores, as well as anxiety levels when compared to MD patients without insomnia. Furthermore, logistic regression analysis revealed that depression-related rumination and anxiety were independently associated with insomnia, suggesting that these factors may play an essential role in the etiology of insomnia in adolescents with MD. Because depression-related rumination involves an excessive focus on depressive symptoms and the possible drivers and outcomes of mood, excessive rumination may lead to more persistent negative emotions and reduced constructive behavior [46], as well as heightened anxiety [47]. At the same time, rumination and anxiety may have a negative impact on sleep quality [48]. As evidence, in a previous study, Palagini et al. [49] reported that insomnia was positively associated with rumination and anxiety.

Importantly, we found that depression-related rumination positively predicted anxiety and insomnia, whereas anxiety positively predicted insomnia. Furthermore, anxiety partially mediated the relationship between depression-related rumination and insomnia, suggesting that depression-related rumination not only directly impairs sleep but may also indirectly impact sleep through anxiety. In terms of potential
mechanistic underpinnings, Harvey's cognitive model of insomnia [19] proposes that people with insomnia have repetitive, unhelpful thoughts over each 24-hour period. This may lead adolescents to focus on negative beliefs and attitudes about sleep and to ruminate on the consequences of insomnia, further impairing emotional regulation and leading to excessive physical, cognitive, and emotional arousal while prolonging insomnia symptoms [50, 51]. The model proposes that rumination and worry are the core negative cognitive activities that both trigger and maintain insomnia [51]. It is known that depression-related rumination is a maladaptive cognitive response that may exacerbate depressive symptoms and negative emotions, as well as reduce the implementation of constructive actions [34]. Depression-related rumination may increase overall emotional arousal and anxiety, which can also worsen sleep quality [18]. In addition, worry, or persistent thought about a negative event or consequence that has not yet occurred, is another important feature of anxiety [12]. A high tendency to ruminate and worry can reinforce pre-sleep anxiety, prolong the latency of sleep onset, and decrease sleep quality [52]. In our current study, AUCROC showed that anxiety was a valid factor in differentiating adolescents with MD with or without insomnia. These results suggest that anxiety may be an important indicator of insomnia following depression-related rumination in MD patients.

Although our findings are clear, several limitations should be noted. First, since the design is cross-sectional, a causal relationship could not be established in our study. As such, a prospective cohort study will be necessary to confirm any causal relationship. Second, the MD patients were recruited from a psychiatric hospital, and all were of Han Chinese descent. Therefore, future cross-population and cross-cultural studies are needed to generalize our findings to broader populations. Third, rumination, anxiety, and insomnia are all self-assessment questionnaires, which may lead to reporting bias, and our data should be further assessed with non-self-reported, structured assessment tools in future studies.

Overall, our clinical study showed that the incidence of insomnia was 60.63% among Chinese MD adolescents treated at a single psychiatric hospital. Among this cohort, the prevalence of insomnia was much higher in female patients than in male patients. In addition, MD adolescents with insomnia had higher levels of depression and anxiety, as well as rumination, than those without insomnia. Depression-related rumination and anxiety were identified as risk factors for insomnia in adolescents with MD. The effect of depression-related rumination on insomnia was mediated through anxiety, suggesting that anxiety may play an important role in the pathogenesis of insomnia in MD patients. A better understanding of the impact of rumination and anxiety on insomnia would enable clinicians to help adolescents with MD more effectively manage and treat their mental health conditions.

Declarations

Conflicts of interest

The authors declare no conflicts of interest.

Ethical Considerations
This study was approved by the ethics committee, the Third People's Hospital of Ganzhou City. Informed consent was obtained from each participant or guardian.

**Acknowledgments**

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**Author Contribution**

D.L., Y.D. and X.Z were designed the study. G. L., L.Q., H.D., and S.L. collected literatures and cleaned data. D.L did statistical analysis and wrote the manuscript. X.Z.reviewed and revised the manuscript.

**Data Availability Statement**

The datasets that support the findings of this study are not publicly available due to ongoing analyses for further publications, but are available from the corresponding author X.Z. upon reasonable request.

**References**


Tables

Table 1 Socio-demographics and clinical characteristics of MD Adolescents with or without insomnia
<table>
<thead>
<tr>
<th>Variable</th>
<th>Without insomnia group</th>
<th>With insomnia group</th>
<th>t/ X²</th>
<th>p-value</th>
</tr>
</thead>
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<tr>
<td>Age, years, M (SD)</td>
<td>15.33(1.97)</td>
<td>15.03(1.98)</td>
<td>1.777</td>
<td>0.076</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td>3.99</td>
<td>0.046</td>
</tr>
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<td>Male, n (%)</td>
<td>78/224 (34.82)</td>
<td>93/345 (26.96)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female, n (%)</td>
<td>146/224 (65.18)</td>
<td>252/345 (73.04)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Educational years, M (SD)</td>
<td>9.63(1.78)</td>
<td>9.34(1.95)</td>
<td>1.729</td>
<td>0.084</td>
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<td>Residence</td>
<td></td>
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<td>3.872</td>
<td>0.144</td>
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<td>Urban, n (%)</td>
<td>33/224 (14.73)</td>
<td>73/345 (21.16)</td>
<td></td>
<td></td>
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<tr>
<td>Town, n (%)</td>
<td>108/224 (48.21)</td>
<td>159/345 (46.09)</td>
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<td></td>
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<td>Rural, n (%)</td>
<td>83/224 (37.05)</td>
<td>113/345 (32.75)</td>
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<td>An only child</td>
<td></td>
<td></td>
<td>0.503</td>
<td>0.478</td>
</tr>
<tr>
<td>Yes, n (%)</td>
<td>29/224 (12.95)</td>
<td>52/345 (15.07)</td>
<td></td>
<td></td>
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<tr>
<td>No, n (%)</td>
<td>195/224 (87.05)</td>
<td>293/345 (84.93)</td>
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<tr>
<td>Living style</td>
<td></td>
<td></td>
<td>3.015</td>
<td>0.555</td>
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<tr>
<td>Two-parent families, n (%)</td>
<td>122/224 (54.46)</td>
<td>171/345 (49.57)</td>
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<tr>
<td>One parent migrated, n (%)</td>
<td>44/224 (19.64)</td>
<td>71/345 (20.58)</td>
<td></td>
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<tr>
<td>Living with grandparents, n (%)</td>
<td>37/224 (16.52)</td>
<td>59/345 (17.10)</td>
<td></td>
<td></td>
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<tr>
<td>Single-parent families, n (%)</td>
<td>16/224 (7.14)</td>
<td>28/345 (8.12)</td>
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<td>Others, n (%)</td>
<td>5/224 (2.23)</td>
<td>16/345 (4.64)</td>
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<td>PHQ-9, M (SD)</td>
<td>10.21(8.64)</td>
<td>15.74(6.93)</td>
<td>-8.634</td>
<td>&lt;0.001</td>
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<td>RRS, M (SD)</td>
<td>43.99(14.87)</td>
<td>52.62(15.63)</td>
<td>-6.561</td>
<td>&lt;0.001</td>
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<tr>
<td>Depression-related rumination, M (SD)</td>
<td>22.79(8.47)</td>
<td>28.68(9.04)</td>
<td>-7.787</td>
<td>&lt;0.001</td>
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<td>Brooding, M (SD)</td>
<td>10.96(4.13)</td>
<td>12.68(4.22)</td>
<td>-4.794</td>
<td>&lt;0.001</td>
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<td>Reflection, M (SD)</td>
<td>10.23(3.72)</td>
<td>11.26(4.07)</td>
<td>-3.030</td>
<td>&lt;0.001</td>
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<td>GAD-7, M (SD)</td>
<td>4.71(4.51)</td>
<td>12.43(5.21)</td>
<td>-18.16</td>
<td>&lt;0.001</td>
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<td>ISI, M (SD)</td>
<td>3.20(2.23)</td>
<td>15.13(5.03)</td>
<td>33.436</td>
<td>&lt;0.001</td>
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</table>
Table 2  Factors associated with insomnia in MD adolescents

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>p</th>
<th>OR</th>
<th>95% CI</th>
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<td></td>
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<td></td>
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<td></td>
<td></td>
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<tr>
<td>Depression-related rumination</td>
<td>0.040</td>
<td>0.014</td>
<td>8.266</td>
<td>0.004</td>
<td>1.041</td>
<td>1.013 1.069</td>
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<tr>
<td>GAD-7</td>
<td>0.279</td>
<td>0.025</td>
<td>125.632</td>
<td>&lt;0.001</td>
<td>1.322</td>
<td>1.259 1.389</td>
</tr>
<tr>
<td>Constant</td>
<td>-2.900</td>
<td>0.389</td>
<td>55.564</td>
<td>&lt;0.001</td>
<td>0.055</td>
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Table 3  Bootstrap test of the mediating effect of GAD-7 on depression-related rumination and ISI

<table>
<thead>
<tr>
<th>Effects</th>
<th>Effect value</th>
<th>S.E.</th>
<th>Z</th>
<th>P</th>
<th>95% CI</th>
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<tbody>
<tr>
<td>Total effect</td>
<td>0.243</td>
<td>0.031</td>
<td>7.892</td>
<td>&lt;0.001</td>
<td>0.183 0.304</td>
</tr>
<tr>
<td>Direct effect (Depression-related rumination -&gt; ISI)</td>
<td>0.052</td>
<td>0.025</td>
<td>2.089</td>
<td>0.037</td>
<td>0.003 0.102</td>
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<tr>
<td>Indirect effect (Depression-related rumination -&gt; GAD-7 -&gt; ISI)</td>
<td>0.191</td>
<td>0.029</td>
<td>–</td>
<td>–</td>
<td>0.138 0.251</td>
</tr>
</tbody>
</table>

Figures
Fig. 1 The discriminatory capacity of related factors for distinguishing between patients with and without insomnia in MD adolescents. The area under the curve of GAD-7 score, depression related rumination score, and the combination of two factors were 0.86, 0.70, and 0.87, respectively.

Figure 1

See image above for figure legend.
Figure 2

Model of the mediating effect of GAD-7 on depression-related rumination and ISI. \( *P<0.05, ***P<0.001 \).