

Cognitive Behavioural Therapy Versus Aerobic Exercise for Insomnia in Young Adults: A Narrative Review

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Abstract: Background: Insomnia is common sleep disorder affecting a significant proportion of young adults and is associated with impaired sleep quality, increased anxiety, and lower standard of living. Because they are non-pharmacological methods such as CBT-I and aerobic exercise are safe, efficient, and suggested as the initial course of treatment. Methods: Electronic database were used to find pertinent studies for a narrative review. Based on predetermined inclusion and exclusion criteria, a total of fifteen articles- including randomised controlled trails and pilot studies-were chosen. To assess the effects of both therapies on sleep metrics, anxiety levels, and quality of life, data were synthesised and analysed. Results: Aerobic exercise and CBT-I both showed remarkable increases in sleep quality. Wakefulness following sleep onset latency were all reduced by CBT-I. Through physiological processes, aerobic exercise was linked to longer sleep duration overall and better sleep patterns. Both treatments improved quality of life and decreased anxiety. However, aerobic exercise offered more extensive physical and psychological benefits, but CBT-I shown stronger results in addressing cognitive and behavioural elements of insomnia. Conclusion: The combined application of cognitive Behavioural Therapy and aerobic exercise demonstrates a significant synergistic effect in the management of insomnia. This integrated approach not in addition to enhancing the quality of sleep and lessening the intensity of insomnia, it also promotes mental health by reducing anxiety and elevating mood. The findings suggest that a multimodal intervention targeting both cognitive and physiological domains offers a more effective and sustainable strategy for improving overall health outcomes and quality of life in individuals with insomnia.

Keywords: Insomnia, Cognitive behavioural therapy, Aerobic exercises, sleep quality, anxiety, Quality of life

1. Introduction

People who suffer from insomnia frequently have Having trouble getting to sleep, staying asleep, waking up too early, or not feeling rejuvenated afterward sleeping. These sleep disorders frequently result in problems during the day, such as exhaustion, difficulty concentrating, agitation, and a lower standard of living. According to research, insomnia affects over 22% of the general population, and it can increase to almost 40% in those with various medical issues (1,2).

For general health, sleep is crucial. It is essential for boosting immunity, sustaining metabolism, controlling emotions, and bolstering cognitive and memory processes. Long-term sleep disruptions may raise the risk of mental health issues such sadness and anxiety, and have a detrimental impact on job and academic performance (3,4). Anxiety and insomnia are closely related because anxiety itself can increase the difficulty of falling asleep while insufficient sleep can exacerbate stress and concern (5).

Despite the fact Medications are frequently used to treat insomnia, but their use is widespread. long-term usage is restricted because of dangers like tolerance, dependence, and adverse consequences (6). As a result, non-pharmacological therapies are advised as the initial course of treatment. Cognitive Behavioural Therapy for Insomnia (CBT-I), which It is regarded as the most successful conventional therapy., is one of the most successful approaches (7). Through strategies like CBT-I uses techniques like stimulus control, sleep restriction, relaxation, and cognitive restructuring to help people alter harmful thoughts and sleep patterns (8).

Research has demonstrated that CBT-I considerably enhances sleep quality, shortens the time it takes to fall asleep, and reduces nighttime awakenings (9). By treating negative thought patterns and emotional discomfort, it also helps lower anxiety and enhance quality of life (10).

Aerobic exercise is another successful non-pharmacological strategy. Frequent exercise has been shown to lessen the symptoms of insomnia while increasing the length and quality of sleep (11). Exercise causes the body to release feel-good compounds like serotonin and endorphins. lowers stress hormones like cortisol, and helps balance the body's internal clock (12).

Aerobic exercise not only improves sleep but also lowers anxiety and improves general wellbeing (13). There are few studies that directly compare the effects of aerobic exercise with CBT-I, particularly in young adults, despite the fact that both are beneficial on their own. Thus, the purpose of this study is to assess how aerobic exercise and CBT-I affect young adults with insomnia in terms of their quality of life, anxiety, and sleep.

2. Methodology

In order to investigate the effects of aerobic exercise and Cognitive Behavioural Therapy for Insomnia (CBT-I) on sleep quality, anxiety levels, and general quality of life in young adults with insomnia, this study was conducted as a narrative review.

Volume 15 Issue 5, May 2026

Fully Refereed | Open Access | Double Blind Peer Reviewed Journal

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Study Selection- First, abstracts and titles were screened. Following that, full-text publications were thoroughly examined using predetermined inclusion and exclusion criteria. Fifteen studies in all were ultimately chosen for in-depth examination. These comprised pilot studies, observational studies, systematic reviews, and randomised controlled trials.

Data Extraction and Synthesis- The author, year, study design, sample size, type of intervention, outcome measures (such as PSQI, ISI, anxiety scales, and quality of life scales), and important findings were all gathered from each study. After that, this data was examined and contrasted to see how CBT-I and aerobic exercise affected outcomes related to insomnia.

Inclusion Criteria

- **Study Design:** Randomised controlled trials, quasi-experimental studies, systematic reviews, meta-analyses, pilot studies, and observational studies are examples of well-designed research.
- **Population:** Young adults between the ages of 18 and 30 made up the population. Studies with a broader age range were also considered if they explicitly presented findings pertaining to insomnia or young adults.
- **Condition:** Studies with individuals who had been diagnosed with insomnia or serious sleep issues (such as trouble falling or staying asleep or poor-quality sleep) were the only ones taken into consideration. CBT-I or aerobic activities such as walking, running, cycling, or swimming have to be part of the therapies.
- **Language:** Only English-language articles
- **Duration:** Studies published included during the previous ten to fifteen years to guarantee current data.

Exclusion Criteria: Case reports, conference abstracts, editorials, and non-peer-reviewed works were all excluded.

- **Population Restrictions:** Additionally, studies that just examined children or older persons without pertinent adult data were not included.
- **Intervention:** Studies that solely employed pharmaceuticals or complementary therapies, such as acupuncture or herbal remedies, without including CBT-I or physical activity, were excluded.
- **Condition:** Additionally, unless they explicitly reported insomnia outcomes, studies that focused on other sleep disorders (such as narcolepsy or sleep apnoea) were excluded.
- **Language Limitation:** Articles published in languages other than English.
- **Previous Literature** which highlighted the Effect of Cognitive Behavioural therapy versus aerobic exercise for insomnia in young adults

Effect of Cognitive Behavioural therapy in insomnia:

Stefan, S. G., et al., (2012). Numerous research has demonstrated the efficacy of CBT-I. In a study of 75 individuals with generalised anxiety disorder, discovered that several CBT-based strategies were equally successful in lowering symptoms and negative thought patterns. After reviewing 20 randomised controlled trials, Rossman (2019) found that CBT-I improved sleep efficiency and decreased the

amount of time spent awake at night. It was also discovered to be just as successful as medicine, but with longer-lasting advantages and no negative side effects.

Rossman J. et al., (2019). Although Cognitive Behavioural Therapy for Insomnia (CBT-I) is a highly successful treatment, its use is underutilised. There are definite advantages, according to research published in the American Journal of Lifestyle Medicine, which includes 20 randomised controlled studies on individuals with persistent insomnia. On average, CBT-I shortened the amount of time individuals spent awake after falling asleep by around 26 minutes and helped them fall asleep about 19 minutes faster. Additionally, it increased overall sleep duration by roughly 8 minutes and enhanced sleep efficiency by 10%.

CBT-I is equally effective as sleep aids in enhancing health-related quality of life. Additionally, it offers benefits like minimal side effects, a decreased risk of relapse, and gains that persist long after therapy is finished. Despite these advantages, CBT-I is currently underutilised, mostly due to a lack of qualified practitioners and the fact that many patients prefer to take sleep aids because they are more widely available and well-known.

Edinger J. D. et al., (2020) Revealed that both online and in-person CBT-I significantly improved sleep quality and decreased the severity of insomnia in a randomised experiment with 140 individuals. In a similar vein, Palermo et al. (2017) demonstrated that CBT-I enhanced sleep and psychological well-being in teenagers with various medical issues, and these benefits persisted long after the course of treatment. According to a different study by Morin et al. (2016), CBT-I was superior to medicine in the long run, resulting in improved sleep outcomes and a decreased risk of recurrence.^[3]

Palermo, T. M., et al. (2017) The utility of brief Cognitive Behavioural Therapy for Insomnia (CBT-I) in teenagers with other medical conditions such as anxiety, depression, chronic pain, or digestive disorders was investigated in a small pilot trial. Forty participants in the study had four one-on-one therapy sessions over a period of four to six weeks. For a week, a wrist device was used to monitor sleep patterns in addition to self-reports on daily routines, psychological health, and sleep quality. Both quality of life and mental health issues showed noticeable improvements following the treatment. At the three-month follow-up, these beneficial benefits were largely still evident. Further research with larger, controlled trials is required to validate the long-term advantages because this was a preliminary study without a comparison group. However, the results indicate that CBT-I may be a useful treatment for teenagers who suffer from insomnia in addition to other physical or mental health issues [4].

Edinger et al. (2015) In the American Academy of Sleep Medicine, a team of nine experts in sleep medicine and sleep psychology conducted a thorough evaluation. In order to evaluate the efficacy of behavioural and psychological therapy for individuals with chronic insomnia, they conducted a systematic review, meta-analysis, and GRADE evaluation. To find randomised controlled trials that

addressed behavioural and psychological therapies for the treatment of adult chronic insomnia problem, a comprehensive review was carried out. To ascertain if the therapies resulted in clinically significant changes in a variety of crucial and relevant outcomes, statistical analyses were carried out. Lastly, the Recommendations Grading [8].

Morin C. M. et al., (2016) A randomized clinical trial with n = 160 participants compared CBT-I with pharmacotherapy. Outcome measures included sleep diaries, polysomnography, ISI, and sleep efficiency. Results showed that CBT-I significantly reduced sleep latency and WASO, while improving sleep efficiency and total sleep time. Long-term follow-up indicated sustained improvements and lower relapse rates compared to medication.

Baron K. G. et al., (2018) Observed improvements in sleep quality and the intensity of insomnia after CBT-I, regardless of the degree of physical activity. Banno et al. (2018) found that CBT-I was better at improving sleep initiation and reducing mental overactivity when compared to aerobic exercise. Cheng et al. (2022) supported these findings by showing that CBT-I enhanced sleep more than simple sleep training.

Banno M. et al., (2018) An experimental study with n = 50 participants compared CBT-I and aerobic exercise interventions. Outcome measures included PSQI, sleep latency, WASO, and daytime functioning scales. CBT-I showed greater improvement in sleep initiation and cognitive arousal, while aerobic exercise resulted in better overall sleep quality and daytime performance.

Cheng P. et al., (2022) A randomized controlled trial with n = 90 participants compared CBT-I with sleep education. Outcome measures included ISI, PSQI, sleep latency, and WASO. CBT-I produced significantly greater improvements in all sleep parameters, highlighting the importance of cognitive and behavioural restructuring

Effect of Aerobic exercise in insomnia:

Baron et al., 2021 Examining the Bidirectional Effects of Exercise to Enhance Sleep in Insomnia Eleven women with insomnia (age M = 61.27, SD 4.15) who performed aerobic activity for 30 minutes three times a week were among the participants. At baseline and 16 weeks, self-reported sleep quality was evaluated. Wrist activity, workout logs, and sleep logs were all continually recorded. WASO, TST, SE, FI, and SOL Participants who had reduced total sleep time (TST) at the start tended to do less exercise the next day. This group's amount of sleep had a stronger correlation with their level of exercise the next day. Overall, the findings point to the possibility that increased physical activity could be facilitated by improved sleep. [5].

Al-Jiffri, O. H. et al., (2014) This study looked at the effects of exercise on immunity, sleep, and mental health in

individuals with chronic primary insomnia. Eighty sedentary individuals between the ages of thirty-five and fifty-six participated. They were split into two groups at random, with one group participating in an aerobic exercise program under supervision and the other group receiving no intervention. A number of metrics were evaluated both before and after six months, including immunological markers like T-cell counts and the CD4/CD8 ratio, mood and mental health scales (BDI, POMS, and self-esteem ratings), and sleep quality using polysomnography. There were no discernible differences in the control group. By the end of the research, however, the exercise group showed definite gains in immunological function, sleep, and psychological well-being. These results imply that for people with chronic primary insomnia, regular aerobic exercise may be a useful non-pharmacological strategy to improve sleep, mental health, and immunological function.

Shuai Liu et al., (2021) This study used a systematic review and meta-analysis to examine how exercise impacts adult insomnia and sleep quality. The researchers searched databases such as PubMed, Embase, and Web of Science while adhering to PRISMA principles. They included research on persons who participated in fitness regimens but had no serious medical issues. The PICOS framework served as a guide for the search. Self-reported measures such the Pittsburgh Sleep Quality Index (PSQI), Insomnia Severity Index (ISI), and Epworth Sleepiness Scale (ESS) were used to measure sleep outcomes. 22 randomised controlled trials were included in the study, and PSQI results were further analysed according to program duration, gender, age, and type of exercise. Overall, the results demonstrated that, in comparison to control groups, exercise considerably improved sleep outcomes. Participants reported decreased daytime sleepiness, less severe insomnia, and better-quality sleep. Additionally, the review indicated that exercise had a greater impact on people's perceptions of their sleep than it does on objective sleep measurements.

Schuch F. B. et al., (2018) The effects of aerobic exercise on sleep and mental health were investigated in a 47-person randomised controlled research. In addition to depression and anxiety measures, such as the Hamilton Anxiety Rating Scales (HAM-A), the researchers used sleep quality scores to assess results. The findings demonstrated a significant improvement in the quality of sleep as well as a decrease in anxiety and depressive symptoms. According to these results, exercise may indirectly enhance sleep by having a good impact on psychological health.

Youngstedt S. D. et al., (2023) An experimental study with n = 60 participants assessed aerobic exercise effects on sleep. Outcome measures included PSQI, actigraphy, and sleep diaries. The study reported better sleep efficiency, longer sleep duration overall, and decreased sleep latency, indicating enhanced circadian rhythm regulation.

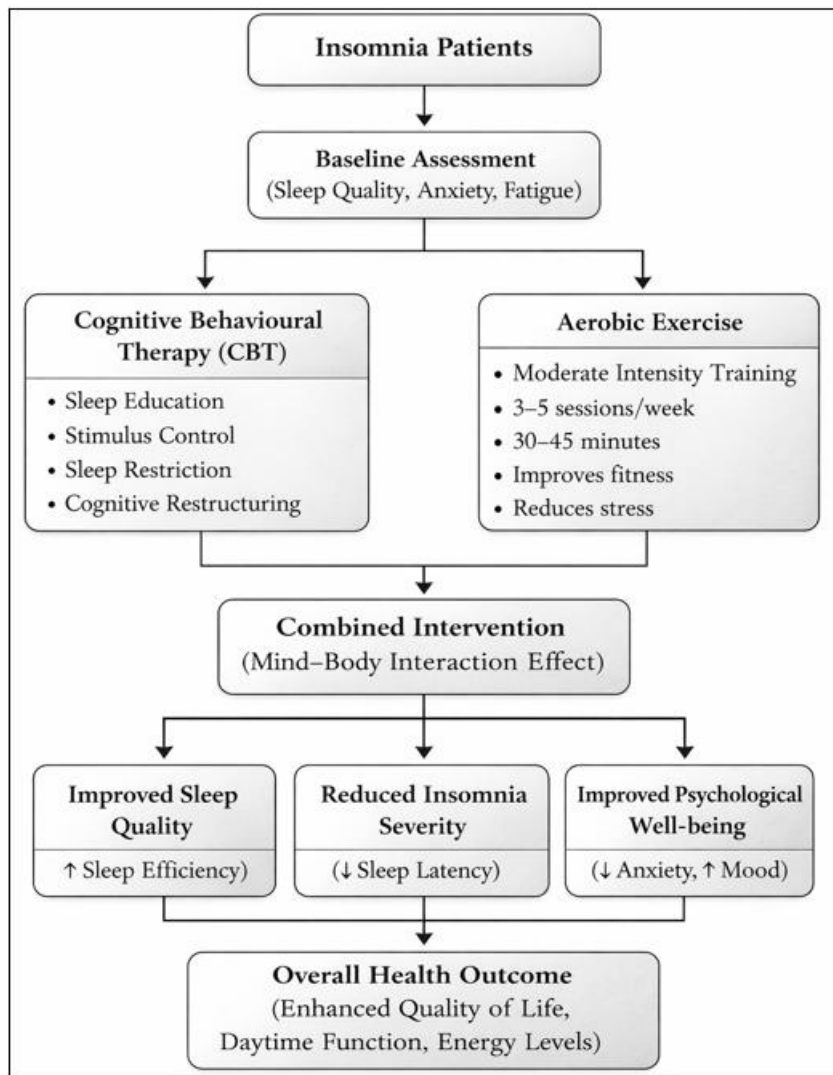


Figure: Conceptual framework illustrating the synergistic effects of Cognitive Behavioural Therapy and Aerobic Exercise (Mind Body Synergy) in improving sleep outcomes and overall well-being among insomnia patients.

3. Result

This narrative review encompassed a total of fifteen studies which satisfied the predefined inclusion and exclusion criteria. These included randomized controlled trials, pilot studies and systematic reviews on the effect of cognitive behavioural Therapy for insomnia (CBT-I) and aerobic exercise on sleep quality, anxiety and quality of life in insomnia patients. While the age groups were different in each study, several findings could be concluded in young adult's population.

The literature consistently demonstrates that both CBT-I and aerobic exercise result in substantial enhancements in sleep quality. In research assessing CBT-I, participants exhibited a decrease in sleep onset latency signifying an expedited ability to achieve sleep post-intervention. There was also a clear decrease in waking up after falling asleep, which meant fewer and shorter awakenings during the night. Sleep efficiency also got better, which means that sleep was better consolidated. Even though the total amount of sleep time only went up a little the people who took part said that their sleep quality had gotten a lot better, as measured by standardised tools like Pittsburgh Sleep Quality Index (PSQI) and the Insomnia Severity Index (ISI). These improvements were not

only immediate but also lasted over time, showing that they were effective in the long term. These improvements were not only immediate but they also lasted over time, showing that CBT-I works in the long term.

However, aerobic exercise interventions exhibited substantial beneficial impact on sleep parameters. People who did moderate-intensity aerobic exercise on a regular basis slept longer and fell asleep faster. There were also improvements in sleep efficiency, which means that sleep was more consistent overall. Exercise interventions also led to lower levels of insomnia and daytime sleepiness, as shown by higher scores on validated assessment scales. Numerous participants indicated that they experienced more profound, restorative sleep and felt more renewed upon awakening. Systemic reviews and meta-analysis provide additional evidence that exercise markedly enhances subjective sleep quality, despite some variability in objective sleep measures across studies.

Both CBT-I and aerobic exercise were found to be effective in lowering anxiety levels in people with insomnia. CBT-I had a very strong effect because it focused on changing thought and behaviours. Participants exhibited decreases in maladaptive thoughts excessive worry, and pre-sleep

cognitive arousal, all of which are factors contributing to insomnia. So, CBT-I not only helped people sleep better, but it also helped them control their emotion and made their generalised anxiety symptoms less severe. This shows how well it works to deal with two-way relationship between anxiety and insomnia.

Aerobic exercise also helped lower anxiety levels a lot, mostly by changing the way the body and brain work. Regular exercise was linked to lower levels of stress hormones, better balance in the autonomic nervous system and higher levels of endorphins and other neurotransmitters that make you feel better. These changes made people less tense, less stressed and less anxious overall. Multiple studies indicated calculable reduction in anxiety subsequent to regular engagement in moderate-intensity aerobic exercise programs.

Both interventions showed significant improvements in many areas of quality of life. CBT-I was linked to better mental health, better functioning during the day, and better cognitive performance. Participants indicated decreases in fatigue, irritability, and sleep-related dysfunctions, which facilitated enhanced academic and occupational performance. Aerobic exercise, on the other hand, had more social interaction. Exercise also helped people feel about themselves, more energetic, and happier with lives in general, especially those who had been inactive before.

When comparing the two treatments, it's clear that both CBT-I and aerobic exercise can help you sleep better, feel less anxious and live a better life. However, they work in different ways and have different effects. CBT-I seems to work better at tackling the cognitive and behavioural causes of insomnia, which leads to more focused and long-lasting improvement in sleep outcomes. Aerobic exercise, on the other hand has a more complete effect because it improves physical health, lowers physiology stress and boosts overall well-being.

In general, this review's result show that both cognitive behavioural therapy for insomnia and aerobic exercise are good ways to help people with insomnia without using drugs. CBT-I has better long-term effects on symptoms of insomnia, but aerobic exercise has other physical and mental health benefits. These findings suggest that both interventions may be beneficial in clinical practice, and a combined approach could yield optimal results in enhancing sleep quality, alleviating anxiety, and improving quality of life in young adults with insomnia.

4. Discussion

In order to improve sleep quality, lower anxiety, and improve quality of life in young adults with insomnia, this study compared the effects of aerobic exercise with Cognitive Behavioural Therapy for Insomnia (CBT-I). The results indicate that while both strategies are successful, they operate differently and provide somewhat distinct advantages.

The results of this review show that CBT-I helps people fall asleep faster, reduces the time they stay awake during the night, and improves overall sleep efficiency, supporting previous research findings of Rossman et al. [2]. These improvements can be attributed to its structured approach

targeting maladaptive thoughts and behaviours that perpetuate insomnia. CBT-I also provides long-term benefits and reduces relapse rates by addressing cognitive distortions, worry, and poor sleep habits. Furthermore, Palermo et al. [4] According to studies, CBT-I enhances mental health and general quality of life while also promoting better sleep.

CBT-I appears to have a strong impact on reducing anxiety due to its emphasis on cognitive restructuring. Given the bidirectional relationship between anxiety and insomnia, modifying negative thought patterns and reducing pre-sleep arousal can effectively break the cycle of sleep disturbance and psychological distress. This is supported by Stefan et al. [1], who found that cognitive-behavioural approaches significantly reduce dysfunctional thoughts and anxiety symptoms.

However, aerobic exercise also shows significant advantages in terms of lowering anxiety and enhancing sleep quality. Studies like Passos et al. [10] found that after moderate-intensity aerobic exercise, sleep onset latency decreased and total sleep length increased. By affecting circadian cycles, lowering stress hormone levels, and causing physical exhaustion, exercise helps regulate sleep. Exercise also encourages the release of endorphins, which are important for elevating mood and lowering anxiety.

Studies by Reid et al. [9] and Al-Jiffri et al. [6] further demonstrate that aerobic exercise significantly improves quality of life. Improvements in physical fitness, mood, and energy levels contribute to better daily functioning and overall health. Moreover, aerobic exercise is a cost-effective and accessible intervention, making it particularly suitable for young adult populations.

When comparing the two interventions, CBT-I appears to be more effective in addressing the underlying cognitive and behavioural factors responsible for insomnia, resulting in more sustained improvements. In contrast, aerobic exercise primarily influences physiological and emotional pathways, contributing to broader health benefits. CBT-I provides structured and targeted strategies, whereas aerobic exercise offers a more flexible and holistic approach to improving well-being.

However, certain limitations must be considered. The included studies varied in sample size, age groups, and intervention duration, which may affect comparability. Additionally, most studies focused on adult or older populations, with limited research specifically targeting young adults, indicating a gap in the literature.

Rather than viewing these interventions as mutually exclusive, a combined therapeutic approach may be more beneficial. Integrating CBT-I with regular aerobic exercise addresses both psychological and physiological components of insomnia, potentially leading to superior outcomes in sleep quality and anxiety management.

Despite the positive findings, this review has limitations. The relatively small number of studies (n=15) and variability in study designs limit generalizability. Furthermore, reliance on self-reported measures and differences in intervention

protocols make it difficult to determine the precise contribution of each treatment modality.

5. Conclusion

Aerobic exercise and Cognitive Behavioural Therapy for Insomnia (CBT-I) are safe, efficient, and non-pharmacological ways to treat insomnia in young people. By focusing on maladaptive beliefs and behaviours, CBT-I shows superior long-term efficacy, resulting in long-lasting changes in sleep quality, decreased sleep latency, and improved sleep efficiency. Because it treats cognitive arousal and emotional distress, it is especially helpful for people with anxiety-related insomnia. Conversely, Aerobic exercise enhances sleep through physiological mechanisms include circadian clock adjustment, stress hormone decrease, and mood enhancement through endorphin release. Additionally, it enhances one's general quality of life, energy levels, and physical health. Aerobic exercise has more comprehensive benefits, but CBT-I offers more focused psychological benefits. The results indicate that by targeting the psychological and physiological components of insomnia. When a combined strategy incorporating both therapies will be introduced to Insomniac patient in early Intervention protocol, it may produce the best results. Thus, combining CBT-I with regular aerobic exercise can be regarded as a successful tactic for boosting young people general well-being, lowering anxiety, and increasing sleep and also act as a best "Mind Body Interaction".

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