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Effect Of Acupuncture On Sleep Quality In Young Adults: A Narrative Review

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Abstract

Sleep disturbances are prevalent among young adults, primarily due to academic stress, irregular routines, and technology use. Conventional treatments like pharmacotherapy and cognitive behavioural therapy for insomnia (CBT-I) face limitations in safety, accessibility, and adherence. Acupuncture, a core modality in Traditional Chinese Medicine, has emerged as a safe and effective complementary approach. This narrative review synthesizes recent clinical and mechanistic evidence on acupuncture's efficacy in improving sleep quality among young adults. Findings from randomized controlled trials and meta-analyses indicate significant improvements in both subjective measures (PSQI, ISI) and objective sleep parameters (TST, SE, REM). Mechanisms include modulation of neurotransmitters (GABA, serotonin, melatonin), regulation of the hypothalamic-pituitary-adrenal axis, and restoration of autonomic balance. Commonly used acupoints such as HT7, SP6, GV20, and PC6 demonstrate consistent therapeutic benefits. Acupuncture is comparably effective to CBT-I and pharmacotherapy, with fewer adverse effects and sustained post-treatment benefits. Despite methodological limitations and limited age-specific data, current evidence supports acupuncture as a viable non-pharmacological intervention for improving sleep quality in young adults.

Keywords

Acupuncture; Sleep quality; Young adults; Insomnia; Traditional Chinese Medicine; Pittsburgh Sleep Quality Index; Non-pharmacological therapy; Neurotransmitter modulation; Autonomic balance; HPA axis.

1. Introduction

With over 70% of college students reporting insufficient sleep and almost 50% reporting daytime tiredness, sleep disruptions are a major public health concern among young adults. Academic stress, inconsistent timetables, technology use, and the developmental adjustment to independence are among the particular difficulties faced by young adults, especially those between the ages of 18 and 30, all of which can negatively impact sleep quality. Between 18.5% and 26.7% of college students suffer from insomnia, which has significant adverse effects on their general well-being, mental health, and academic performance.(Hershner & Chervin, 2014; Killgore, 2015a; Pandolfo, n.d.)

Pharmacotherapy and cognitive behavioral therapy for insomnia (CBT-I) are traditional methods of treating insomnia. Both benzodiazepines and non-benzodiazepines remain typically given, although they have a number of negative side effects, such as daytime drowsiness, fall risk, dependence potential, and worries about long-term cognitive repercussions. Despite being regarded as a first-line treatment, CBT-I has accessibility, pricing, and availability issues.(Garland et al., 2019; Zhao et al., 2024)

An effective non-pharmacological treatment for sleep disturbances is acupuncture, an age-old therapeutic approach with roots in Traditional Chinese Medicine. In order to give clinicians and researchers a thorough understanding of this complementary therapy method, this narrative review summarizes the most recent studies on the efficacy, safety, and mechanisms of acupuncture in enhancing young adults' sleep quality.

2. Pathophysiology of Sleep Disturbances in Young Adults

Young adults' sleep problems are caused by a variety of interrelated circumstances. During adolescence and early adulthood, the circadian rhythm naturally changes, making this population more susceptible to delayed sleep phase patterns. Normal sleep-wake cycles are further disrupted by environmental factors such as excessive screen time, caffeine consumption, inconsistent sleep regimens, and social obligations.(Hershner & Chervin, 2014; Wolfson & O'Malley, 2012)

Neurobiologically, insomnia involves dysregulation of multiple systems. Hyperactivity of the hypothalamic-pituitary-adrenal (HPA) axis raises cortisol levels, which sustain wakefulness and delay the start of sleep. The brain's capacity to start and sustain sleep is hampered by neurotransmitter imbalances, especially decreased levels of serotonin and gamma-aminobutyric acid (GABA). Furthermore, the hyperarousal state associated with chronic insomnia is sustained by excessive sympathetic nervous system activity.(W. Huang et al., 2011; Lee & Kim, 2023; Liu et al., 2019; Shergis et al., 2016; C. Wang et al., 2021)

3. Mechanisms of Acupuncture in Sleep Regulation

Acupuncture exerts its therapeutic effects on sleep through multiple interconnected mechanisms, supported by both clinical and preclinical evidence.

3.1. Neurotransmitter Modulation

Important neurotransmitters involved in sleep regulation are greatly impacted by acupuncture. According to clinical research, acupuncture stimulation raises GABA concentrations in cerebrospinal fluid, with results that are on par with or better than those of pharmaceutical treatments. Increasing GABA, the brain's main inhibitory neurotransmitter, encourages neuronal relaxation and makes it easier to fall asleep.(Guo et al., 2024; Shergis et al., 2016)

As a precursor to melatonin, serotonin (5-HT) is essential for controlling sleep-wake cycles. Acupuncture has been shown in numerous studies to increase serotonin levels in brain tissue and serum, especially in the hippocampus and hypothalamus. In addition to elevating mood, this rise in serotonin also increases the production of melatonin, which strengthens the regulation of the circadian cycle.(Guo et al., 2024; Lee & Kim, 2023)

Acupuncture has also been shown to boost pineal gland melatonin secretion; after five weeks of therapy, one study found a substantial increase in nocturnal urine melatonin. Melatonin upregulation enhances overall sleep architecture and speeds up the beginning of sleep.(Guo et al., 2024; Lee & Kim, 2023; Shergis et al., 2016)

3.2. Hypothalamic-Pituitary-Adrenal Axis Regulation

Chronic insomnia is characterized by activation of the HPA axis, which is efficiently modulated by acupuncture. Acupuncture has been shown to lower serum levels of cortisol, adrenocorticotropic hormone (ACTH), and corticotropin-releasing hormone (CRH). Acupuncture reduces the physiological hyperarousal that hinders the onset and maintenance of sleep by reducing the production of stress hormones.(Liu et al., 2019; C. Wang et al., 2020; S. J. Wang et al., 2014)

3.3. Autonomic Nervous System Balance

Acupuncture facilitates the physiological transition to sleep by increasing parasympathetic activation and decreasing sympathetic hyperactivity. Studies on heart rate variability show that acupuncture, especially when certain spots like auricular Shenmen are stimulated, increases high-frequency components representing parasympathetic activity. In addition to lowering blood pressure and heart rate, this autonomic rebalance triggers the relaxation response required to start sleep.(Haker et al., 2000; W. Huang et al., 2011)

The significance of careful point selection is shown by recognized point-specific effects, where some acupoints selectively activate parasympathetic pathways while others exhibit mixed or sympathetic effects.(W. Huang et al., 2011)

3.4. Sleep Architecture Enhancement

Acupuncture has a positive impact on objective sleep parameters as determined by polysomnography (PSG) in addition to subjective improvements. When compared to sham acupuncture or waitlist controls, meta-analyses show that acupuncture enhances total sleep duration (TST), sleep efficiency (SE), and decreases waking after sleep onset (WASO) and sleep onset latency (SOL).(Zhao et al., 2021)

In terms of sleep architecture, acupuncture raises the percentage of REM sleep, lowers the percentage of N1 (light sleep), and increases the percentage of N3 (slow-wave sleep). These modifications target both the quantity and quality of sleep, reflecting deeper, more restorative sleep.(Fang et al., 2021; C. Wang et al., 2021; Zhao et al., 2024)

3.5. Commonly Used Acupuncture Points for Sleep Disorders

Systematic analyses of clinical trials reveal consistent patterns in acupoint selection for insomnia treatment. The most frequently utilized points include:

HT7 (Shenmen/Spirit Gate): Located on the wrist crease, HT7 calms the mind (shen), reduces anxiety, and promotes sleep. It is considered the primary point for heart-related insomnia and is recommended in virtually all systematic reviews.(Lu et al., 2024)

SP6 (Sanyinjiao/Three Yin Intersection): Located four finger-widths above the inner ankle, SP6 harmonizes multiple organ systems and is particularly effective for stress-related insomnia. Clinical studies demonstrate its synergistic effect when combined with HT7.(Qiao et al., 2023; Wu et al., 2020)

GV20 (Baihui/Hundred Convergences): Located at the vertex of the head, GV20 calms the spirit, clears the mind, and enhances cognitive function. It features prominently in protocols targeting both insomnia and associated anxiety.(Lu et al., 2024)

PC6 (Neiguan/Inner Gate): Located on the inner forearm, PC6 regulates heart function, calms the mind, and is frequently combined with HT7 in clinical protocols.

EX-HN3 (Yintang): An extra point located between the eyebrows, Yintang calms the mind and reduces stress-related insomnia.

ST36 (Zusanli): Located on the lower leg, ST36 tonifies qi and blood, supporting overall vitality and sleep regulation.(Lu et al., 2024)

Association rule mining analyses suggest that optimal therapeutic effects are achieved through specific point combinations, particularly (EX-HN3, EX-HN16, GV20) combined with (HT7, KI1, PC6).

4. Clinical Evidence: Efficacy of Acupuncture for Sleep Quality

4.1. Subjective Sleep Quality Outcomes

The effectiveness of acupuncture in enhancing subjective sleep quality is strongly supported by numerous systematic reviews and meta-analyses. A comprehensive systematic review of 30 randomized controlled trials (RCTs) involving 2,363 participants demonstrated that acupuncture significantly reduced Pittsburgh Sleep Quality Index (PSQI) scores compared to both sham/placebo (MD -0.79, 95% CI -1.38 to -0.19) and pharmacotherapy (MD -2.76, 95% CI -3.67 to -1.85).(Shergis et al., 2016)

A more recent meta-analysis of 24 RCTs involving 1,475 patients confirmed these findings, showing significant PSQI score reduction (RR -0.74, 95% CI -1.07 to -0.40, $p<0.0001$) when acupuncture was compared to pharmacotherapy. Importantly, subgroup analyses revealed that therapeutic effects become statistically significant after three weeks of treatment, with optimal results at four weeks.(Kim et al., 2021)

The Insomnia Severity Index (ISI), another validated subjective measure, showed similar improvements. A large-scale RCT involving 270 patients with comorbid insomnia and depression demonstrated that electroacupuncture significantly reduced ISI scores compared to both sham acupuncture and standard care alone.(Yin et al., 2022)

4.2. Objective Sleep Parameters

The physiological effects of acupuncture are strongly supported by objective sleep measurement utilizing actigraphy and polysomnography. A systematic review of 11 studies involving 775 patients with primary insomnia demonstrated that acupuncture significantly increased TST (MD 55.29 minutes, 95% CI 29.16-81.42), improved SE (MD 8.96%, 95% CI 3.97-13.95), reduced WASO (MD -49.54 minutes, 95% CI -82.98 to -16.09), and decreased awakening frequency (MD -6.29, 95% CI -10.75 to -1.82) compared to controls.(Zhao et al., 2021)

Sleep architecture analysis revealed that acupuncture significantly decreased N1 percentage, reduced N2 percentage, and increased both N3 and REM sleep percentages compared to Western medication, indicating deeper and more restorative sleep. However, when compared to sham acupuncture, changes in sleep architecture were less consistent, suggesting that some effects may relate to non-specific mechanisms.(Fang et al., 2021; C. Wang et al., 2021)

A critical threshold of at least 12 acupuncture sessions appears necessary to achieve significant objective sleep improvements, with most studies demonstrating optimal results between 12-20 sessions over 3-4 weeks.(Zhang, Wang, et al., 2025)

4.3. Electroacupuncture Versus Manual Acupuncture

Numerous studies have shown that electroacupuncture (EA), which uses inserted needles to apply electrical stimulation, is more effective than manual acupuncture. When compared to placebo acupuncture, EA dramatically increased sleep efficiency and decreased wakefulness after sleep onset in a randomized controlled trial involving 60 individuals with primary insomnia. According to network meta-analyses, EA is the best option for improving respiratory metrics and lowering the apnea-hypopnea index in sleep disorders.(Li et al., 2025; Yeung et al., 2009)

The frequency of electrical stimulation matters, with 2 Hz most closely mimicking traditional manual acupuncture and producing sustained autonomic effects. EA offers advantages in standardization, reproducibility, and intensity control, making it particularly suitable for research and clinical applications requiring precise dosing.(W. Huang et al., 2011; Li et al., 2025; Yeung et al., 2009)

5. Comparative Effectiveness Studies

5.1. Acupuncture Versus Pharmacotherapy

Comparative studies demonstrate that acupuncture achieves sleep improvements comparable to, and in some cases superior to, conventional hypnotic medications. A meta-analysis of 15 RCTs showed acupuncture significantly reduced PSQI scores compared to benzodiazepines and non-benzodiazepines. A direct comparison study of 33 patients found that weekly acupuncture sessions improved PSQI scores at rates similar to nightly zolpidem 10mg over four weeks.(Kim et al., 2021; Tu et al., 2012)

Furthermore, acupuncture has better safety profiles than medication. Acupuncture only causes minor, temporary side effects, but hypnotic drugs are linked to daily drowsiness, cognitive decline, falls, reliance, and even long-term dementia risk. Additionally, among patients receiving treatment, both CBT-I and acupuncture considerably lower the use of prescription hypnotic drugs.(Garland et al., 2019; C. C. Huang et al., 2024; Ma et al., n.d.)

5.2. Acupuncture Versus Cognitive Behavioral Therapy for Insomnia

Eight weeks of acupuncture and CBT-I were compared in a significant randomized trial of 160 cancer survivors. CBT-I showed statistically greater efficacy overall (ISI reduction: -10.91 versus -8.31 points), especially among males, white participants, highly educated individuals, and those without baseline pain. Nonetheless, both treatments resulted in clinically significant improvements (≥8 points ISI reduction), and the effects persisted during the 20-week follow-up.(Garland et al., 2019; Mao et al., 2018)

Crucially, when compared to CBT-I, acupuncture showed comparable benefits in fatigue, mood, and quality of life as well as better pain alleviation. Response rates for patients with moderate-to-severe insomnia were similar for acupuncture (66%) and CBT-I (75%), indicating that acupuncture is a good option in situations where CBT-I is not available or appropriate.(Mao et al., 2018)

6. Treatment Protocols and Dosing Considerations

6.1. Treatment Frequency and Duration

When managing insomnia with acupuncture, systematic analyses show a dose-response connection. Three to seven sessions per week seems to be the ideal frequency for treatment, with three sessions per week showing notable effectiveness. When compared to shorter (≤2 weeks) or longer (>4 weeks) durations, treatment cycles lasting 3–4 weeks yield better benefits.(Zhang, Wang, et al., 2025)

The minimal treatment threshold is 12 sessions. While low session counts (≤10 sessions) demonstrate non-significant effects, moderate session counts (12–20 sessions) and high session counts (24–30 sessions) result in significant PSQI score reductions. Acupoint "fatigue," which lowers efficacy, can result from prolonging treatment beyond four weeks and does not offer any further benefits.(Zhang, Liu, et al., 2025; Zhang, Wang, et al., 2025; Zhao et al., 2021)

Conventional clinical practice usually recommends two to three sessions each week for ten sessions, which make up one treatment course. The length of the course is determined by the severity of the insomnia; acute insomnia may require fewer than ten sessions, while chronic insomnia may require several courses.

6.2. Session Parameters

With needle retention, individual acupuncture treatments usually take 20 to 40 minutes. Based on each patient's unique diagnosis, practitioners inject five to twenty needles per session, choosing from more than 350 acupuncture points spread across 20 meridians. To maximize the autonomic effects of electroacupuncture, a frequency of 2 Hz is advised.(W. Huang et al., 2011)

6.3. Follow-up and Maintenance

Acupuncture demonstrates sustained therapeutic effects extending beyond the treatment period. Studies document maintained improvements in PSQI and ISI scores at 4-week, 8-week, 12-week, and even 20-week follow-up assessments. This "after-effect" distinguishes acupuncture from pharmacotherapy, which typically requires continuous use to maintain benefits.(Guo et al., 2013; Liu et al., 2021; Mao et al., 2018)

7. Safety Profile and Contraindications

7.1. Adverse Events

The safety profile of acupuncture is excellent, with just 0.04–0.08 major adverse events per 10,000 treatments. Tiredness, disorientation, vasovagal reactions, bruising, moderate bleeding, or hematomas at needle insertion sites (occurring in less than 5% of patients) are among the most often reported minor and transient side effects.(C. C. Huang et al., 2024; Xu et al., 2023)

There were no significant adverse effects linked to acupuncture treatments for insomnia, according to a thorough systematic assessment of 1,229 systematic reviews. Acupuncture groups reported significantly fewer adverse events in meta-analyses when compared to medication.(Ma et al., n.d.; Xu et al., 2023)

7.2. Contraindications and Precautions

Specific populations require caution or modified protocols:

Pregnancy: Certain acupuncture points (LI4, SP6, BL60, GB21, CV3-CV7, BL27-BL34) are traditionally avoided before 37 weeks gestation due to potential labor induction effects. However, systematic reviews found no increased incidence of miscarriage, preterm delivery, or obstetric complications attributable to acupuncture when performed by trained practitioners. Pregnant women should seek acupuncturists with specialized obstetric training.(Carr, 2015)

Bleeding Disorders: Patients with bleeding/clotting disorders or taking anticoagulants should inform practitioners, as needle insertion carries minimal but present bleeding risk. Superficial needling and point selection modifications minimize risk in this population.

Pacemakers: Electroacupuncture is contraindicated in patients with cardiac pacemakers due to potential electromagnetic interference.

Medical Emergencies: Acupuncture should not replace necessary emergency medical care or surgical interventions.

Application to Young Adults: Special Considerations

Young adults represent an ideal population for acupuncture intervention due to several factors:

High Prevalence of Sleep Problems: With 70% of college students obtaining insufficient sleep and 50% experiencing daytime sleepiness, the need for effective, accessible interventions is substantial.(Hershner & Chervin, 2014; Killgore, 2015b)

Preference for Non-Pharmacological Approaches: Young adults increasingly seek complementary and alternative therapies, viewing them as more natural and holistic. Acupuncture aligns with this preference while avoiding medication side effects and dependency concerns.(Garland et al., 2019)

Comorbid Mental Health Conditions: Anxiety and depression frequently co-occur with insomnia in young adults. Acupuncture simultaneously addresses sleep disturbances and emotional symptoms, with studies demonstrating significant reductions in Hamilton Anxiety Scale (HAMA) and Hamilton Depression Scale (HAMD) scores alongside sleep improvements.(Hershner & Chervin, 2014; Liu et al., 2021; Yang et al., 2021)

Technology-Related Sleep Disruption:

The disruption of circadian cycles caused by excessive screen time and social media use presents special issues for young adults. These disturbances caused by technology may be mitigated by acupuncture's capacity to control neurotransmitters and autonomic balance.(Killgore, 2015a)

Academic Performance Impact: Sleep deprivation ranks as the second leading cause of academic difficulties among college students after stress. By improving sleep quality, acupuncture may indirectly enhance cognitive performance, memory consolidation, and academic outcomes.

Safety in Healthy Young Adults: The minimal contraindications and excellent safety profile make acupuncture particularly suitable for healthy young adults without complex medical comorbidities.(C. C. Huang et al., 2024)

8. Limitations and Future Directions

Although the evidence is encouraging, there are a few limitations that should be taken into account. Numerous studies show methodological issues such as inconsistent treatment procedures, small sample sizes, and insufficient blinding. Interpreting particular versus non-specific effects is made more difficult by the difficulty of developing really inactive sham acupuncture controls.

Few studies have particularly looked at young adults between the ages of 18 and 30, with the majority of study concentrating on middle-aged adults. This group should be given priority in future studies that look at age-stratified effects in sufficiently powered trials.

Beyond 20 weeks, long-term efficacy is still little understood. Extended follow-up research would shed light on whether acupuncture results in long-lasting improvements in sleep patterns or necessitates recurring maintenance treatments, even if short-term effects are well-documented.

In order to clarify the exact mechanisms by which acupuncture affects sleep architecture, mechanistic study might benefit from combining neuroimaging, polysomnography, and biomarker evaluation. Personalized protocol optimization may be made possible by an understanding of individual differences in treatment response.

Policy decisions about insurance coverage and treatment recommendations would be influenced by cost-effectiveness analyses that compare acupuncture to medication and CBT-I from the perspectives of the healthcare system and society.

Lastly, real-world efficacyand accessibility, could be evaluated by pragmatic trials looking at the integration of acupuncture into university health services.

9. Clinical Implications and Recommendations

Based on current evidence, the following recommendations might be considered for clinical practice:

Acupuncture as First-Line Alternative: Acupuncture is an evidence-based first-line alternative treatment for young adults with insomnia who refuse or are unable to receive CBT-I or who would prefer not to use medication.

Adjunctive Therapy: Acupuncture may be combined with other interventions including sleep hygiene education, stress management, and when necessary, reduced-dose pharmacotherapy for enhanced effects.

Treatment Protocol: Optimal protocols involve 3 sessions per week for 3-4 weeks (12-20 total sessions), using core point combinations including HT7, SP6, GV20, and PC6, with individualized additions based on patient presentation.

Patient Selection: Acupuncture appears particularly appropriate for young adults with stress-related insomnia, comorbid anxiety/depression, or insomnia secondary to chronic pain.

Qualified Practitioners: Patients should seek state-licensed acupuncturists with documented training and experience in treating sleep disorders.

Expectation Management: Patients should be informed that effects typically emerge after 2-3 weeks of treatment, with continued improvement through treatment completion and sustained benefits thereafter.

10. Conclusion

For young individuals experiencing sleep difficulties, acupuncture is a safe, efficient, and increasingly evidence-based remedy. Acupuncture causes clinically significant benefits in both subjective and objective sleep characteristics through a variety of processes, such as neurotransmitter modulation, HPA axis regulation, autonomic nervous system balancing, and direct effects on sleep architecture.

Research on comparative efficacy shows that acupuncture is more accessible than CBT-I, has better safety profiles than medication, and produces results that are on par with conventional treatments. For young adults looking for non-pharmacological sleep therapies, acupuncture is especially appropriate due to its minimal side effects, lack of dependency risk, and long-lasting therapeutic results.

The significant amount of evidence from systematic reviews, meta-analyses, and randomized controlled trials supports acupuncture's function in comprehensive insomnia care, even though methodological limitations in current studies call for cautious interpretation. Future studies that use rigorous methodology and explicitly target young adult groups will shed more light on the best practices and long-term results.

Acupuncture should be seen as a potential therapeutic option for young people with sleep difficulties, either as a stand-alone treatment or as a component of integrative treatment strategies. In order to make well-informed treatment decisions and appropriate referrals, healthcare professionals that work with university and young adult populations should be knowledgeable about the research supporting acupuncture.

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