

# Behavioral Interventions for Migraine Prevention

## *Executive Summary*



### Main Points

- Adults: Interventions including cognitive behavioral therapy (CBT), relaxation training, or mindfulness-based treatment (alone or combined with other components) may lower migraine/headache attack frequency, and education alone may also improve migraine-related disability (strength of evidence [SOE]: All low).
- Evidence regarding adverse effects among individuals of any age, effectiveness for children and adolescents, and biopsychosocial factors is inconclusive.
- Adults: Mindfulness-based stress reduction (MBSR) may offer greater benefit for disability than education; CBT + relaxation training might result in higher migraine attack frequency but also higher quality of life (QOL) than propranolol; relaxation training may outperform CBT + relaxation + education in QOL; MBSR + education may reduce attack frequency compared with stress management training + education; and biofeedback may reduce attack frequency compared with CBT + relaxation training (SOE: All low).
- Children/adolescents: a combination of CBT, biofeedback, and relaxation training may lead to lower migraine attack frequency and disability compared with education alone (SOE: low).
- Evidence is insufficient to address the effects of individual behavioral components.
- In adults with chronic migraine, behavioral sleep modification may reduce headache frequency at 6 weeks (SOE: low); no studies were included for children.





## Background and Purpose

Migraine affects one in six Americans and constitutes the second leading global cause of disability, often limiting activities during crucial life stages (e.g., schooling, parenting).<sup>1</sup> Migraine prevention strategies are aimed at lowering the frequency, severity, and life-affecting repercussions of migraine attacks. Behavioral interventions, including CBT, biofeedback, relaxation training, mindfulness-based therapies, and education, present a potentially beneficial alternative or adjunct to pharmacoprevention, which may be associated with adverse effects, drug interactions, and contraindications.

Existing guidance on behavioral interventions from professional societies is relatively limited and requires updating. The latest clinical practice guidelines, from 2012, exclude certain newer therapies such as mindfulness-based cognitive therapy.<sup>2</sup> Consensus statements from the American Headache Society (AHS) and the American Academy of Family Physicians (AAFP) regarding nonpharmacologic prevention for migraine were not developed from systematic reviews and did not provide guidance for prevention in pediatric and adolescent populations.<sup>3-6</sup> Existing systematic reviews on behavioral therapies are notably outdated and do not evaluate all available preventive behavioral therapy options.<sup>7-9</sup>

Due to the absence of a recent, comprehensive systematic review and the accumulation of new evidence, **we conducted a systematic review to evaluate the effects of behavioral interventions for migraine prevention among children, adolescents, and adults.** Our focus included the effectiveness and comparative effectiveness of migraine-specific behavioral interventions, comparisons with pharmacotherapy, potential harms, effects of non-migraine-focused behavioral interventions, and associations between effectiveness and biopsychosocial factors. For this review, behavioral interventions were defined as nonpharmacologic strategies intended to enhance outcomes by modifying behavior and/or ways of thinking. The Agency for Healthcare Research and Quality (AHRQ), AHS, and the Patient-Centered Outcome Research Institute (PCORI) collaborated to conceive this systematic review. The review will be used by members of AHS to inform decisions about a clinical practice guideline.



## Methods

Our methods were consistent with guidance from the AHRQ Evidence-based Practice Center Program Methods Guidance (<https://effectivehealthcare.ahrq.gov/topics/center-methods-guide/overview>). Five Key Questions determined the scope, after consulting with a wide range of experts and incorporating perspectives from patients and caregivers. We searched MEDLINE®, Embase®, PsycINFO®, PubMed®, the Cochrane Database of Systematic Reviews, and grey literature sources for English-language randomized trials published from 1975 to August 24, 2023. We included trials conducted in countries rated as “very high” on the 2022 Human Development Index (as defined by the United Nations Development Programme). The team systematically screened trials, extracted

data, assessed the risk of bias, conducted meta-analyses, and rated the strength of evidence in duplicate. We registered the protocol on PROSPERO CRD42023397752.



## Results

We included 63 randomized trials published since 1978. Most evidence was inconclusive, and this section describes only our analyses that resulted in strength of evidence (SOE) ratings of low, moderate, or high.

Adults may experience a reduction in headache frequency following interventions that included a CBT component (pooled effect from 10 trials, -1.1 migraine days/month, 95% confidence interval [CI] -0.4 to -1.8, SOE: low), or relaxation training (pooled effect from 13 trials, -1 migraine day/month, 95% CI -0.4 to -1.7; SOE: low), or mindfulness-based treatment (pooled effect from 5 trials, -1 migraine day/month, 95% CI -0.2 to -1.8 SOE: low). An improvement in migraine-related disability may follow education-only interventions (pooled effect not estimable; SOE: low).

Regarding comparative effectiveness in adults, MBSR may result in clinically important lower migraine disability and higher migraine-specific quality of life (MSQOL) compared with education (1 trial, for disability the impact was 18 points on the Migraine Disability Assessment [MIDAS] scale, 95% CI 7 to 30; SOE: low). CBT + relaxation training may result in higher migraine attack frequency than propranolol (1 trial, 1.40 migraine days/month, 95% CI: 0.16 to 2.63; SOE: low), but a clinically important advantage in MSQOL (1 trial, difference of -12 points on the MSQOL, 95% CI from -18 to -7; SOE: low). Biofeedback may result in lower migraine attack frequency than a combination of CBT and relaxation training (1 trial, difference in migraine days/month of -2.2, 95% CI -4.4 to -0.1; SOE: low).

Among children and adolescents, combined CBT, biofeedback, and relaxation training are likely to result in lower migraine attack frequency (one trial, -1.6 migraine days/month, 95% CI -2.7 to -0.4) and lower disability (one trial, pediatric MIDAS [PedMIDAS] difference -11, 95% CI -20 to -2) than education alone (SOE: low). Other evidence for children and adolescents was inconclusive.

We included five studies examining the specific impact of adding a behavioral component to other behavioral components, but none of the data were sufficient to permit conclusions.

A small body of evidence explored behavioral interventions aimed at sleep in adults with chronic migraine, with one trial suggesting potential benefits of behavioral sleep modification in reducing headache frequency at 6-week followup (about 7 fewer migraine attacks/month, SOE: low). No studies assessed behavioral interventions for anxiety or depression in migraine or for children with migraine addressing behavioral interventions for sleep, anxiety, or depression.

Adverse events were often not ascertained systematically, and the extent to which behavioral interventions are associated with any adverse events remains understudied (though rarely reported), as was delivery of interventions via digital technology or telehealth.



## Limitations

Intervention complexity, with much evidence coming from older trials and variations in the labeling and implementation of treatment components, introduced subjectivity to our analyses and the applicability of results. The incomplete data reporting and underpowered studies resulted in wide confidence intervals, undermining the precision of our meta-analyses. Outcome measurement inconsistencies and lack of uniform metrics across studies posed another major limitation.



## Implications and Conclusions

A limited body of evidence suggests some behavioral interventions possibly offer reductions in headache frequency and disability to adults. However, the extent to which behavioral interventions offer similar or greater benefit than pharmacoprevention remains unknown. The effect of behavioral interventions in children/adolescents is mostly uncertain. Adverse events are rarely reported, although this appears understudied. Future research needs to standardize treatment components and adopt standardized outcome measures to enable better comparability across studies. Future research should also address the potential variance in treatment effectiveness across patient biopsychosocial factors, such as gender, race, and comorbidities.



## References

1. Steiner TJ, Stovner LJ, Jensen R, et al. Migraine remains second among the world's causes of disability, and first among young women: findings from GBD2019. *J Headache Pain*. 2020 Dec;21(1):137. doi: 10.1186/s10194-020-01208-0. PMID: 33267788.
2. Holland S, Silberstein SD, Freitag F, et al. Evidence-based guideline update: NSAIDs and other complementary treatments for episodic migraine prevention in adults: report of the quality standards subcommittee of the American Academy of Neurology and the American Headache Society. *Neurology*. 2012 Apr;78(17):1346-53. doi: 10.1212/wnl.0b013e3182535d0c. PMID: 22529203.
3. Burch RC, Ailani J, Robbins MS. The American Headache Society Consensus Statement: update on integrating new migraine treatments into clinical practice. *Headache*. 2022 Jan;62(1):111-2. doi: 10.1111/head.14245. PMID: 34873692.
4. Ailani J, Burch RC, Robbins MS. The American Headache Society Consensus Statement: update on integrating new migraine treatments into clinical practice. *Headache*. 2021 Jul;61(7):1021-39. doi: 10.1111/head.14153. PMID: 34160823.
5. Ha H, Gonzalez A. Migraine headache prophylaxis. *Am Fam Physician*. 2019 Jan;99(1):17-24. <https://www.aafp.org/afp/2019/0101/p17.html>. PMID: 30600979.
6. American, Headache, Society. The American Headache Society position statement on integrating new migraine treatments into clinical practice. *Headache*. 2019 Jan;59(1):1-18. doi: 10.1111/head.13456. PMID: 30536394.
7. Lee HJ, Lee JH, Cho EY, et al. Efficacy of psychological treatment for headache disorder: a systematic review and meta-analysis. *J Headache Pain*. 2019 Feb;20(1):17. doi: 10.1186/s10194-019-0965-4. PMID: 30764752.

8. Seo E, Hong E, Choi J, et al. Effectiveness of autogenic training on headache: a systematic review. *Complement Ther Med*. 2018 Aug;39:62-7. doi: 10.1016/j.ctim.2018.05.005. PMID: 30012394.
9. Sharpe L, Dudeney J, Williams ACC, et al. Psychological therapies for the prevention of migraine in adults. *Cochrane Database Syst Rev*. 2019 Jul(7):CD012295. doi: 10.1002/14651858.CD012295.pub2. PMID: 31264211.

## Full Report

Treadwell JR, Tsou AY, Rouse B, Ivlev I, Fricke J, Buse D, Powers S, Minen M, Szperka C, Mull NK. Behavioral Interventions for Migraine Prevention. Comparative Effectiveness Review No. 270. (Prepared by the ECRI-Penn Evidence-based Practice Center under Contract No. 75Q80120D00002.) AHRQ Publication No. 24-EHC015. PCORI Publication No. 2024-SR-01. Rockville, MD: Agency for Healthcare Research and Quality; May 2023. DOI: <https://doi.org/10.23970/AHRQEPCCER270>. Posted final reports are located on the Effective Health Care Program [search page](#).

