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Mind & body practices in the treatment of adolescent anxiety

Abstract: *Although anxiety is the most common mental health condition among adolescents in the United States, the current standards of practice for treatment are expensive, may be difficult to obtain, and potentially harmful. Although mind and body practices show great promise in the treatment of adolescent anxiety, financial constraints, lack of education, and structural barriers can hinder the integration of these practices into primary care.*

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MB, 14-year-old female patient, presents to her pediatric NP with a report of severe anxiety that is interfering with school performance, sleep, and social interactions. The patient's mother states that therapy and/or psychiatry is "too expensive and is not covered by our insurance" and that she is opposed to psychiatric medications. Considering the family's particular attitude toward mental health care, how might a pediatric primary care NP approach treatment for this child?

The interplay between concerns about adverse reactions of antidepressants and the increasing costs of mental health care provides new ways for NPs to treat anxious adolescents with low-cost, alternative treatment methods. This article explores the value of mind and body practices in adolescents suffering from anxiety.

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Overview

Anxiety is the anticipation of a threat, whereas fear is the physical and emotional reaction to a potential threat.¹ The phrase "anxiety disorder" is an umbrella term for a variety of disorders that are characterized by excessive and perpetual anxiety and fear that severely impact daily life.¹ Anxiety disorders tend to be comorbid with one another, and the specific fears or triggers that produce pathologic anxiety differentiate them from each other.

Common anxiety disorders in adolescents include specific phobias, generalized anxiety disorder, social anxiety disorder, panic disorder, and agoraphobia.² Due to their comorbid nature, this article does not differentiate between specific anxiety disorders, but will rather address adolescent pathologic anxiety as a whole.

Keywords: adolescents, anxiety disorder, biofeedback, complementary therapies, hypnosis, mind and body practices, mindfulness, worrying, yoga

■ Background

Prevalence and demographics. Anxiety disorders are the most common adolescent mental health conditions in the United States, with approximately one-third (31.9%) of 13- to 18-year-old children suffering from clinical anxiety.³ In addition, 8.3% of adolescents with anxiety disorders experience severe impairment in their daily functioning.³ Females are more commonly affected than males, with lifetime prevalence rates of 38% and 26%, respectively.³ A 2017 *New York Times Magazine* article highlighted the increasing problems of anxiety disorders in adolescents.⁴ The article cites academic pressures, physical and intellectual insecurities, cyber-bullying, and peer judgment on social media sites as factors contributing to the increasing rates of intense juvenile anxiety.

■ Clinical presentation

Several signs and symptoms help NPs differentiate between adolescents suffering from normative fear and anxiety versus clinical anxiety. Whereas anxiety and fear are typical reactions to the academic, social, and developmental challenges common during the adolescent years, clinical or pathologic anxiety is excessive, persistent, and disruptive.¹ Furthermore, while normative anxiety is often transient and situational, clinical anxiety disorders are typically chronic and usually last 6 months or more.¹

Clinical anxiety also deviates from normative anxiety through an overestimation of risk or danger.² While adolescents typically experience anxiety with regard to developmentally appropriate fears and concerns, adolescents with clinical anxiety have an intense interpretation of everyday events.² Clinical anxiety may manifest as a fear response called a panic attack, which is a sudden burst of intense fear accompanied by physical manifestations, such as heart palpitations, accelerated heart rate, sweating, shaking, shortness of breath, chest pain, dizziness, paresthesia, and nausea.¹

Screening. Due to the high prevalence of anxiety disorders among children and adolescents, the American Academy of Child and Adolescent Psychiatry (AACAP) recommends that clinicians practice developmentally appropriate anxiety screening during routine mental health assessments.⁵ The American Academy of Pediatrics and the AACAP recommend several self-report tools.⁵⁻⁷ These tools are available at no cost and include the Screen for Child Anxiety Related Emotional Disorders in children and adolescents for children over 8 years and the Spence Children's Anxiety

Scale, which has been shown to be a reliable and valid measure of anxiety in adolescent populations.

■ Current treatment practices

The most common practices in the treatment of adolescent anxiety include cognitive behavioral therapy (CBT), pharmacotherapy with antidepressants, or a combination of the two therapies.⁵ Although CBT therapy has been shown to be useful in the treatment of anxiety, hindrances to the use of CBT include limited affordable mental health services, long waiting lists for treatment, and demanding parental time commitments to care.²

The pharmacologic treatment of choice is the use of selective serotonin reuptake inhibitors (SSRIs), which can be worrisome to parents due to an FDA black box warning for increased risk of suicidal ideation. Furthermore, the risk of SSRIs to the developing brain remains unclear and underresearched.

While adolescents are less likely to obtain mental health services, they are more likely to use complementary therapies than any other pediatric subgroup.⁸ In addition, children with anxiety disorders are more likely to use complementary therapies for the treatment of symptoms. Mind and body practices encompass self-regulation and positive thinking, including techniques such as biofeedback, mindfulness, yoga, and hypnosis to help promote self-control, physical health, and emotional well-being.⁹

■ Review of literature

A search of PubMed, Columbia Libraries Catalog, and Google Scholar was performed to find articles related to the reduction of adolescent anxiety through mind and body practices. The research yielded four subcategories of interest: biofeedback, mindfulness, yoga, and hypnosis. Studies published between 2010 and 2016 were selected based on the quality of the research, application to anxiety control, incorporation of mind and body practices, and relevance to the adolescent population. Key search words included adolescents, teens, pediatrics, high school, anxiety, anxiety disorder, worrying, mind and body practices, complementary and alternative medicine, yoga, hypnosis, biofeedback, and mindfulness.

Biofeedback. Biofeedback is a tool that enables individuals to increase self-awareness and physical control through physiologic feedback. (See *Biofeedback therapies in the treatment of adolescent anxiety*.) This feedback can include heart rate monitoring, neurofeedback, skin conductance levels, skin temperature measurements, or electromyography for muscle tension awareness.⁹ The

two methods of biofeedback studied in anxious adolescents include heart rate variability (HRV) and video game-based biofeedback. HRV is a low-cost, portable, and commercially available method of reducing anxiety through the measurement of an adolescent's pulse in diverse situations.^{10,12}

Game-based biofeedback mechanisms apply relaxation techniques in a video game scenario where adolescents complete tasks through controlling heart rate, skin conductance, and/or emotion regulation techniques.^{11,13} In the adolescent population, both HRV biofeedback and video game-based biofeedback demonstrated progress in combating anxiety and stress.¹⁰⁻¹³

Mindfulness. Mindfulness training involves the refinement of consciousness, which provides individuals with skills to focus their attention on the present moment

and to separate from negative thoughts or feelings. (See *Mindfulness in the treatment of adolescent anxiety*.) Mindfulness programs use components of Buddhist Vipassana meditation, which emphasizes sensory detachment through reducing bias, remaining nonjudgmental, and focusing on a separation from negative outlooks.^{9,11} Mindfulness programs often incorporate aspects of thought meditation, body scanning, and mindful breathing to promote anxiety reduction.^{10,11,14}

Randomized controlled trials (RCTs) have demonstrated the benefits of mindfulness training in adolescents.^{10,12,14-17} Several of these studies found that mindfulness programs implemented in secondary school settings were effective in alleviating anxiety and stress in students.^{12,14-17} While adolescence itself can be a tumultuous period of emotional, physical, and

Biofeedback therapies in the treatment of adolescent anxiety¹⁰⁻¹³

Sample	Purpose	Study design	Conclusions
De Bruin et al. (2016)			
75 young adults (ethnicity unspecified) with high "worrying" levels	Assess the effects of meditation, biofeedback, and physical exercise on worrying, attention, self-compassion, and executive function	RCT Randomized to mindfulness (n = 27), biofeedback (n = 25), or physical activity (n = 23) groups for 5 weeks "Worrying" was measured with the Penn State Worry Questionnaire (PSWQ)	Meditation, biofeedback, and physical exercise all reduced level of worrying on the PSWQ (all P values measured <.03)
Knox et al. (2011)			
24 mixed-race children ages 9-17 with an anxiety disorder	Investigate the efficacy of game-based biofeedback on anxiety and depression in children and adolescents	RCT Assigned to intervention and control sequentially to biofeedback (n = 12) and control (n = 12) The biofeedback group had eight sessions using computer-based gaming to teach and practice relaxation	Analysis of covariance analysis found significantly reduced anxiety scores in the intervention group on postintervention anxiety scores (P = .035)
Scholten et al. (2016)			
138 adolescents from the Netherlands ages 11-15 at risk for anxiety	Test the effectiveness of biofeedback video game <i>Dojo</i> for high anxiety	RCT Randomly assigned to Dojo biofeedback game (n = 70) or control game (n = 68) Anxiety levels measured with the Spence Children Anxiety Scale	In latent growth curve modeling, the study demonstrated a linear decrease in personalized anxiety that was higher in the experimental group (P = .022)
Ratanasiripong et al. (2015)			
89 female students from Thailand ages 18-21 years in a public nursing college	Investigate the efficacy of biofeedback, and mindfulness meditation on levels of stated anxiety and perceived stress in nursing students	RCT Randomly assigned to biofeedback (n = 20), mindfulness meditation (n = 29), or control (n = 31) groups Biofeedback and mindfulness each had two training sessions All three groups completed Perceived Stress Scale and State-Trait Anxiety Inventory before and after an intervention	The mindfulness meditation group (P = .001) and the biofeedback group (P = .006) had significant reductions in anxiety

RCT, randomized controlled trial

Mindfulness in the treatment of adolescent anxiety^{10,12,14-17}

Sample	Purpose	Study design	Conclusions
Anila and Dhanalakshmi (2016)			
50 Indian adolescents ages 15-18 with anxiety	Test the effectiveness of Mindfulness-Based Stress Reduction (MBSR) on adolescent anxiety	RCT Randomly assigned to MBSR or control group over 8 weeks Anxiety levels measured with State-Trait Anxiety Inventory for Children	Multivariate Analysis of Variance (MANOVA) and Multivariate Analysis of Covariance (MANCOVA) found MBSR to be effective in reducing anxiety among adolescents ($P < .001$)
de Bruin et al. (2016)			
75 young adults (ethnicity unspecified) with high "worrying" levels	Assess the effects of meditation, biofeedback, and exercise on worrying, attention, executive function, self-compassion, and executive function	RCT Randomized to mindfulness ($n = 27$), biofeedback ($n = 25$), or physical activity ($n = 23$) 5-week intervention groups "Worrying" was measured with the Penn State Worry Questionnaire (PSWQ)	Meditation, biofeedback, and physical exercise all reduced level of worrying on the PSWQ (all P values measured $< .03$)
Ebrahiminejad et al. (2014)			
30 female students from Iran ages 12-18 with social phobia	Examine the effectiveness of mindfulness on social anxiety and self-esteem	Semi-Experimental Study The students randomly assigned to eight sessions of mindfulness therapy ($n = 15$) or the control group ($n = 15$) The Social Phobia Inventory and the Rosenberg Self-Esteem Scale were used	Statistically significant improvement in both social phobia ($P = .000$) and self-esteem ($P = .040$)
Liehr and Diaz (2010)			
18 Caribbean and Central American children ages 8-16 at risk for anxiety and depression	Test the effectiveness of mindfulness on anxiety and depression levels in minority children	RCT Randomly assigned to mindfulness classes or standard health education classes Anxiety measured with the State Anxiety Inventory for Children	While both groups had decreased anxiety over time ($P = .003$), the mindfulness group had more significant decreases in anxiety (40 ± 1.4 to 35 ± 8.7) than the group receiving health education alone (35 ± 8.7 to 34 ± 10.1)
Semple et al. (2010)			
25 mixed-race inner-city children ages 9-13 with academic problems and indicators of anxiety	Determine the effectiveness of mindfulness-based cognitive therapy on anxiety and behavior in low-income inner-city children	RCT The study was a randomized cross-lagged design with an initial treatment group ($n = 13$) and a wait-listed control group ($n = 12$) and the second trial of Mindfulness-based Cognitive Therapy for Children, as well as a 3-month follow-up Anxiety measures included the Child Behavior Checklist (CBCL), State-Trait Anxiety Inventory for Children, and the Multidimensional Anxiety Scale for Children	Reductions in anxiety were found in the subgroup of children who initially reported high anxiety Of the six participants who reported anxiety on the pretests, only three reported anxiety in posttests Additionally, CBCL total behavior problem scores in anxious children improved ($P = .045$)
Ratanasiripong et al. (2015)			
89 female students from Thailand ages 18-21 years in a public nursing college	Investigate the efficacy of biofeedback and mindfulness meditation on levels of state anxiety and perceived stress	RCT Randomly assigned to biofeedback ($n = 20$), mindfulness meditation ($n = 29$), or control ($n = 31$) All three groups completed Perceived Stress Scale and State-Trait Anxiety Inventory before and after the intervention	The mindfulness meditation group ($P = .001$) and the biofeedback group ($P = .006$) had significant reductions in anxiety

cognitive development, several predisposing factors can put this population at even higher risk for symptoms of anxiety.¹⁵⁻¹⁷ Three high-risk populations that demonstrated positive effects from mindfulness therapy included minority children, inner-city youths, and teens with social anxiety.¹⁵⁻¹⁷

Yoga is a mind and body practice that incorporates physical postures (asanas), breathing control (pranayama), and mindful meditation to elicit relaxation,

improve flexibility, regulate emotions, and reduce stress and anxiety.^{9,18} As one of the most popular mind and body practice therapies in the United States, yoga has numerous anxiolytic effects. Focusing specifically on the adolescent population, researchers recently demonstrated the benefits of yoga.¹⁸⁻²¹

Low in cost, easy to implement, and accessible to individuals of all physical fitness levels, yoga has become an increasingly popular anxiety management tool. The

Yoga in the treatment of adolescent anxiety^{18-20,29,30}

Sample	Purpose	Study design	Conclusions
Carei et al. (2010)			
54 adolescents (ethnicity unspecified) ages 11-21 years with eating disorders and concurrent anxiety	Evaluate the effectiveness of yoga on eating disorder outcomes, including anxiety levels	RCT Students were randomized to an 8-week yoga intervention (n = 26) or standard care (n = 27) Anxiety scores were measured using the State-Trait Anxiety Inventory before the intervention, after 9 weeks, and after 12 weeks	Among the yoga group, there were decreases in both state anxiety (P = .02) and trait anxiety (P < .001)
Daly et al. (2015)			
38 students (ethnicity unspecified) ages 15-17 attending a selected New York City public high school	Evaluate the impact of yoga on the emotional regulation of high school students	RCT Students randomly assigned to a 16-week yoga class (n = 19) or a standard physical education class (n = 18) The emotional regulation was assessed by students, parents, and teachers with the Emotion Regulation Index for Children and Adolescents after 8 weeks of the intervention, and again within 2 weeks of completion	Among the yoga group, emotion regulation increased significantly in comparison to the control group (P = .1)
Frank et al. (2017)			
159 mixed-ethnicity inner-city 5th and 9th graders in a California public school	Evaluate the effectiveness of yoga wellness program (Transformative Life Skills) on adolescent emotional distress, prosocial behavior, and school function	RCT Students were randomly allocated to a 3-4 day per week yoga wellness program or a control group. The Responses to Stress Questionnaire was administered before and after the intervention	The yoga wellness group displayed statistically significant effects in primary coping (P = .02) and emotion regulation (P = .05) comparison to the control group
Khalsa et al. (2013)			
135 adolescents (ethnicity unspecified) enrolled in a residential summer music program (mean age 16)	Evaluate the effectiveness of yoga on music performance anxiety	Nonrandomized pre- and postcontrol group study students were randomized into a 6-week yoga intervention group (n = 84) or a control group (n = 51) Anxiety scores were measured with the Performance Anxiety Questionnaire (PAQ), the Music Performance Anxiety Inventory for Adolescents (MPAI-A), and the State-Trait Anxiety Inventory	Among the yoga group, there were significant reductions in anxiety according to the PAQ and MPAI-A questionnaires (P ≤ .01)
Noggle et al. (2012)			
51 mixed-ethnicity 11th and 12th graders at a rural public high school	Evaluate the feasibility and efficacy of yoga for psychosocial well-being	RCT Students were randomly allocated 2:1 by class to either yoga (n = 36) or standard physical education (n = 15) two or three times per week for 10 weeks The Profile of Mood States-Short Form (POMS-SF) measured mood and anxiety	Tension-Anxiety subscale of the POMS-SF was significantly better in the yoga group compared with physical education (P = .002)

Hypnosis in the treatment of adolescent anxiety²²⁻²⁴

Sample	Purpose	Study design	Conclusions
Aviv (2006)			
12 Israeli adolescents ages 12-15 years with a history of school anxiety and refusal	Evaluate the effectiveness of telephone hypnosis in elevating school anxiety and refusal	Quasi-Experimental Study Patients call the hypnotherapist before school to receive telehypnosis Anxiety levels were measured through the ability to attend school	Among the 12 telehypnosis students, 8 students held full-time attendance at the 1-year follow-up, 3 showed improvement, and 1 student did not improve
Goldbeck and Schmid (2003)			
50 White German children ages 6-15 years	Evaluate the effectiveness of autogenic relaxation training (ART), a form of self-hypnosis, on school-aged children with emotional and behavioral problems, including anxiety	RCT Patients were randomly assigned to the ART group (n = 36) or the waitlist group (n = 16) The Child Behavior Checklist was used before and after the 8 weeks of hypnosis sessions	Self-hypnosis via ART therapy reduced anxiety/depression (P = .36)
Huet et al. (2011)			
30 patients (ethnicity unspecified) ages 5-12 attending a state-run dental clinic in Rennes, France	Evaluate the effect of preanesthesia hypnosis on anxiety and pain during dental procedures	Prospective Controlled Patients randomly assigned to the Ericksonian hypnosis (n = 15) or a control (n = 15) Anxiety was evaluated with the Yale Preoperative Anxiety Scale	The hypnosis anxiety scores were lower than among the control group (P = .0021)

recent implementation of yoga in high school and summer program curriculums has been shown to improve anxiety and reduce stress.^{20,29} Practicing yoga for 30 minutes 3 to 4 days per week over a semester improved students' primary coping skills and emotional regulation (see *Yoga in the treatment of adolescent anxiety*).¹⁸

Hypnosis. Clinical hypnosis is a form of mind-body therapy that strives to reduce the sympathetic stress response through the activation of the parasympathetic nervous system.⁹ Through guided relaxation techniques, the parasympathetic nervous system activates and creates an altered state of consciousness that aids in forming a mind-body connection and control over one's stress response.^{9,21} Hypnosis is a low-cost therapy that incorporates imagery and relaxation techniques. These relaxation techniques can be easily taught to adolescents to reduce the sympathetic stress response.²²⁻²⁴

Ericksonian hypnosis, which provides patients with indirect suggestions for relaxation, has been shown to significantly reduce anxiety in preprocedural adolescent patients.²³ Additionally, telehypnosis has been shown to be an effective tool in the management of anxiety-related absenteeism in high school students.²² Biofeedback, mindfulness, and yoga each incorporate components of hypnosis and may even be considered

subtypes of the hypnotic state (see *Hypnosis in the treatment of adolescent anxiety*).²¹

Summary of literature findings. A growing body of evidence supports the implementation of mind-body practices as a low-risk and cost-effective strategy in the management of adolescents with anxiety. Biofeedback, mindfulness, yoga, and hypnosis are all promising forms of mind and body practices in the battle against rising rates of adolescent anxiety. The literature supports the use of mind and body practices in the home, the classroom, and in clinical settings. A lack of randomized studies, appropriate sample sizes, and longitudinal data emphasize the need for future research to refine the benefits of mind and body practices for adolescents with anxiety.

■ Role of the pediatric NP

Clinical. In the field of pediatric primary care, there is a dire need for affordable and accessible mental health care strategies. As of 2014, 55% of adolescents with mental health disorders did not receive any form of professional mental health care.²⁵ Of this 55%, the least likely adolescents to receive psychiatric healthcare were teens with underlying anxiety disorders.

The NP should provide competent anxiety screening at every annual health visit.⁵ Ensuring that the child is

getting adequate sleep is an integral part of the history, as recent data point to a lack of sleep being a risk factor for mental health disorders.²⁶ The use of screening tools enables NPs to identify the signs and symptoms of anxiety and subsequently form the appropriate plan of care. Low-cost, low-barrier, and effective mind and body practices can be explained in the primary care setting to create a personalized plan to combat anxiety.

Recognizing barriers to mind and body practices in primary care. Financial and structural barriers hinder the integration of these practices into primary care. By acknowledging and overcoming these obstacles, patients can benefit from the full potential of mind and body practices. Three significant challenges to mind and body practices in primary care include time restrictions, financial constraints, and a lack of administrative support.

Two recent studies analyzing clinician perceptions of mind and body practices in primary care found that time restraints are the primary barriers to the using these therapies.^{27,28} Similarly, reimbursement and billing constraints hinder the time clinicians can spend using complementary therapies in the office setting.²⁸ A lack of administrative support and financial backing was also a significant hindrance to using complementary therapies.²⁸ Without the help of the clinic administration and leadership, continuing-education resources and opportunities for providers were limited.

Education. Research has demonstrated a severe deficit in NP education regarding complementary therapies. Although 81% of NPs believe that complementary

therapies have a place in primary care medicine, only 32% of NPs feel that they have adequate knowledge of mind and body practices.²⁷ Education regarding the benefits and methods of integrating mind and body practices into patient care should be initiated in nursing school, supported in NP master's programs, and reinforced in the primary care workplace (see *Mind and body educational resources for NPs*).

Need for further research. Future studies tailoring mind and body practices to primary care mental health management should include large and diverse population samples that highlight the benefits and disadvantages of mind and body practices among various cultural groups. Finally, an understanding of the short-term versus long-term benefits, feasibility, and adherence should be appreciated to determine the effectiveness of these treatments over time.

Conclusion

In response to the intense need for adolescent mental health care in the United States, the pediatric NP's role must expand to integrate screening and treatment for anxiety among adolescents. Increased interest in complementary therapies, high rates of childhood anxiety, the controversy surrounding SSRI use in adolescents, and the climbing costs of mental health care point to the need for mind and body therapeutic approaches to anxiety management. Despite the many barriers to mind and body practices, current research focusing on biofeedback, mindfulness, yoga, and hypnosis demonstrates that these methods show promise to reduce anxiety among adolescent populations. 

Mind and body educational resources for NPs

National Center for Complementary and Integrative Health
www.nccih.nih.gov/training/videlectures

Center Institute for Research and Education in Integrative Medicine
www.healthandhealingny.org/Institute/integrative-medicine-informatics/online-educational-modules.aspx

The Center for Mind-Body Medicine
www.cmbm.org/trainings

Massachusetts General Hospital
www.mghcme.org/page/benson_henry_institute_for_mind_body_medicine

Benson-Henry Institute
www.bensonhenryinstitute.org

Applied Psychophysiology and Biofeedback
www.aapb.org/i4a/pages/index.cfm?pageid=3653

The University of Minnesota
www.csh.umn.edu/education/online-modules-and-resources/learning-modules-healthcare-professionals

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