

Effects of Mindfulness-Based Interventions on the Mental Health of Adolescent Girls and Young Women: Scoping Literature Review

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Adolescents are experiencing rising rates of stress, anxiety, and depression worldwide. Mindfulness-based interventions (MBIs) have emerged as promising, low-cost strategies for improving mental health outcomes during this critical developmental period. Despite growing interest in mindfulness-based interventions, no recent review has synthesized evidence on their mental health effects among adolescent girls and young women, who experience disproportionately high rates of internalizing symptoms. This scoping review examined 21 studies evaluating the effects of MBIs on stress, anxiety, depression, emotion regulation, and overall well-being among adolescent girls and young women. The studies were analyzed by intervention type, study design, population characteristics, and outcomes. Findings showed MBIs consistently reduced stress, anxiety and depression, with strong effects among high-risk and trauma-exposed youth. Several studies reported greater gains in emotional regulation and well-being for girls than boys, and most mixed-gender studies formally tested gender as a moderator; findings on engagement and adherence were more mixed. Culturally adapted and somatic-based MBIs, such as mindfulness yoga, emerged as especially effective in improving accessibility and impact. Across the literature, outcomes varied based on gender, trauma history, intervention duration, and cultural relevance. Overall, our findings suggest that MBIs demonstrate strong potential for enhancing adolescent mental health, for girls and young women. To maximize effectiveness, gender-responsive, trauma-informed, and culturally tailored approaches are essential. Future research should aim to identify the mechanisms of change underlying MBIs, integrate neurobiological measures, and improve inclusivity through diverse samples and long-term follow-up. These findings support expanding access to mindfulness in schools and community settings as part of broader prevention and early intervention strategies with lasting impacts.

Keywords. mindfulness, mindfulness-based interventions, depression, stress, anxiety, adolescent girls, youth, mental health, wellbeing

Adolescent and young adult mental health concerns are rising sharply. Anxiety disorders are the most common mental health disorders in youth, and depression rates have surged in recent years. The 2023 Youth Risk Behavior Survey found that nearly 40% of high school students reported persistent sadness or hopelessness, and 28.5% reported poor mental health (CDC, 2024). By age 18, nearly one in three adolescents meet criteria for an anxiety disorder (Child Mind Institute, 2017), and adolescent girls are twice as likely to have an anxiety disorder (Child Mind Institute, 2018). During the COVID-19 pandemic, 37% of high school students reported poor

mental health (CDC, 2022) and globally, anxiety and depression prevalence rose by 25% due to isolation, grief, and disrupted education (WHO, 2022).

In 2023, female adolescents reported poorer mental health outcomes than males, including higher rates of persistent sadness or hopelessness (53% vs. 28%), poor mental health (39% vs. 19%), suicidal ideation (27% vs. 14%), suicide planning (21% vs. 12%), and suicide attempts (13% vs. 6%) (CDC, 2024). Recent data corroborate this disparity. In 2025, 51% of youth under 18 reported frequent suicidal ideation, up from 48% in 2024, the highest rate since Mental Health America began screening in 2014 (MHA, 2025). Ideation rates were highest among younger adolescents: 62% for ages 8–10 and 57% for ages 11–13. Sixty-six percent of screeners identified as female (MHA, 2025). This pattern echoes earlier findings during the COVID-19 pandemic; emergency department visits for suspected suicide attempts among girls aged 12–17 rose 50.6% between February and March 2021 compared with the same

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period in 2019, versus a 3.7% increase among boys (Yard et al., 2021). The disparity persists into adulthood: the 2021 National Survey on Drug Use and Health found that females aged 18–25 were more likely than males to experience any mental illness (41.7% vs. 25.6%), serious mental illness (16% vs. 6.9%), and major depressive episode (24.7% vs. 12.5%) (SAMHSA, 2024). Cross-national data confirm that this disparity extends beyond adolescence: younger generations overall report more poor mental health days, but the increase is significantly greater among women (Udupa et al., 2023).

National data show significant racial and ethnic disparities in adolescent mental health. Prevalence of major depressive episodes among ages 12–17 is highest among multiracial (27.2%) and Hispanic (22.2%) youth, followed by White (20.7%), African-American (14.0%), and Asian (13.8%) youth (National Institute of Mental Health, 2023). Suicide among Black youth aged 10–17 increased by 144% between 2007 and 2020, while American Indian and Alaska Native (AI/AN) youth experience the highest suicide rates nationally (36.3 per 100,000) (CDC, 2024). These disparities are further exacerbated by inequities in mental health care access and utilization, as racial and ethnic minority adolescents are less likely to receive mental health services than their peers. Notably, Asian American adolescent populations are among the lowest rates of mental health service utilization and are less likely than White individuals to receive mental health treatment (Ma et al., 2025).

Several factors contribute to these disparities. Adolescents face complex stressors, peer pressure, identity exploration, technology use, media influence, gender norms, and community violence (WHO, 2021). Risk factors often overlap family dysfunction, poverty, bullying, pre-existing health conditions, and unsafe environments. Biological, developmental, and psychosocial factors—including hormonal changes, greater exposure to gender-based stressors, and social media influences—likely contribute to these disparities. Technology and social media also play a dual role: providing connection but also fueling unrealistic beauty standards, cyberbullying, and addictive behaviors. Notably, female students were more likely than male students to report using social media several times per day, a pattern that may be associated with increased vulnerability to negative mental health outcomes (CDC, 2024). Excessive use can overstimulate the brain's reward pathways, potentially contributing to anxiety, ADHD symptoms, and reduced attention spans (Rideout & Rob, 2019; Katella, 2024).

Mindfulness-Based Interventions (MBI) for Youth Mental Health

Given the growing prevalence of depression, anxiety, stress, and emotional distress among adolescents and young adults, there is increasing interest in accessible, preventive, and evidence-based approaches that support mental health and well-being (Ünlü et al., 2025). Despite rising awareness of mental health needs, many youth continue to face barriers to care, including stigma, cost, limited service availability, and concerns about confidentiality (Alexander et al., 2025). Although 74% of youth report willingness to reach out for support, help-seeking intentions decline as youth transition into young adulthood (Alexander et al., 2025). These challenges highlight a need for interventions that can be implemented across schools, healthcare settings, and community environments while also promoting resilience, emotional regulation, and adaptive coping

skills.

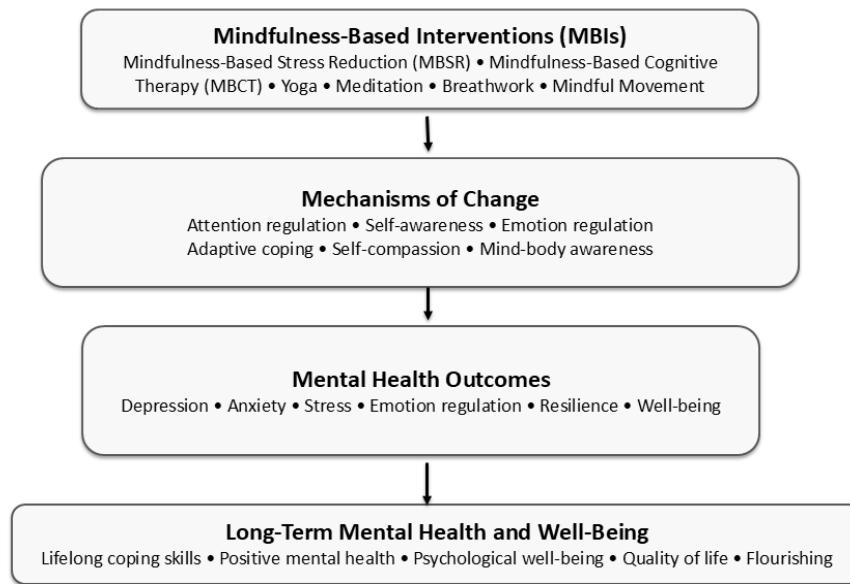
Mindfulness-based interventions (MBIs) have emerged as promising, practical approaches for supporting youth mental health that can be practiced at home, school or in community settings. Mindfulness, the practice of being aware of your body, mind, and feelings in the present moment, has its roots in contemplative traditions and is now widely incorporated into evidence-based therapeutic and educational programs. Common approaches include Mindfulness-Based Stress Reduction (MBSR), Mindfulness-Based Cognitive Therapy (MBCT), yoga, meditation, breathing exercises, and other contemplative practices. Use has grown sharply in recent years: among U.S. adults, meditation use nearly tripled from 2012 to 2017 (4.1% to 14.2%) (Clarke et al., 2018), while among children aged 4–17, it rose nearly tenfold over the same period (0.6% to 5.4%) (Black et al., 2018). Research has demonstrated that MBIs can reduce symptoms of stress, anxiety, and depression while improving emotional regulation, attention, resilience, and overall psychological well-being (Goldberg et al., 2018; Hofmann & Gómez, 2017). By building skills like emotional regulation and resilience, MBIs serve as both a preventive measure and an active coping tool for children (Malboeuf-Hurtubise et al., 2024). Importantly, early exposure to mindfulness practices may help adolescents develop lifelong skills that promote mental health, well-being, adaptive functioning, resilience, and positive long-term outcomes. (Duff, 2024).

Why a Gender-Specific Review is Needed

Adolescence and young adulthood are critical developmental periods characterized by substantial biological, cognitive, emotional, and social transitions that shape lifelong health and well-being. During this period, girls and young women experience disproportionately higher rates of depression, anxiety, emotional distress, and other internalizing mental health concerns compared to their male peers (National Council for Mental Wellbeing, 2023; WHO, 2021). These disparities often emerge during early adolescence and may persist into adulthood, contributing to long-term consequences for mental health, educational attainment, occupational functioning, relationships, and overall quality of life.

The mental health experiences of girls and young women are influenced by a complex interplay of biological, developmental, social, cultural, and environmental factors. Pubertal and hormonal changes coincide with increasing social expectations, gender norms, academic pressures, body image concerns, social media influences, caregiving responsibilities, and heightened vulnerability to harassment, victimization, and other forms of gender-based adversity (WHO, 2021; Rideout & Rob, 2019; Katella, 2024). These intersecting influences can increase psychological distress while also shaping emotional regulation, coping strategies, help-seeking behaviors, and perceptions of well-being. Understanding how interventions address these unique developmental and contextual factors is therefore essential to improving mental health outcomes among girls and young women.

Beyond biological and developmental differences, adolescent girls and young women experience unique gendered social and structural inequities that influence their mental health across the life course. Globally, girls are disproportionately exposed to gender-based violence, sexual harassment, child marriage, human trafficking, restrictive gender norms, caregiving expectations,



*Adapted from mindfulness and emotion regulation frameworks described by Kabat-Zinn (2003), Lomas et al. (2018), Goldberg et al. (2018), and Malboeuf-Hurtubise et al. (2024). This conceptual framework illustrates proposed pathways across the reviewed literature and should not be interpreted as a formal causal model.

Figure 1. Conceptual pathways linking mindfulness-based interventions to mental health and well-being among adolescent girls and young women*

educational inequities, and social pressures related to appearance, identity, and caregiving roles. These cumulative experiences contribute to elevated rates of chronic stress, internalizing symptoms, and adverse mental health outcomes (UN Women, 2025; WHO, 2021; UNICEF, 2021). From a health equity perspective, gender-responsive interventions should recognize these intersecting social determinants rather than viewing mental health solely as an individual clinical concern. Mindfulness-based interventions may therefore represent not only individual coping strategies but also equitable, accessible, and empowering approaches that strengthen resilience and emotional well-being among girls navigating gender-specific adversities.

Mindfulness-Based Interventions (MBIs) have emerged as promising approaches for promoting emotional awareness, self-regulation, resilience, stress reduction, and overall well-being among youth (Goldberg et al., 2018; Hofmann & Gómez, 2017). Practices such as mindfulness meditation, yoga, breathing exercises, and self-compassion training may be particularly relevant during adolescence, a developmental period marked by heightened emotional reactivity and ongoing neurocognitive maturation. By strengthening attentional control, emotional regulation, self-awareness, and adaptive coping, MBIs may provide young people with lifelong skills that extend beyond symptom reduction and support positive mental health across the life course (Lomas et al., 2018). Early adoption of these practices may help establish healthy coping habits that promote resilience, psychological well-being, and emotional functioning into adulthood.

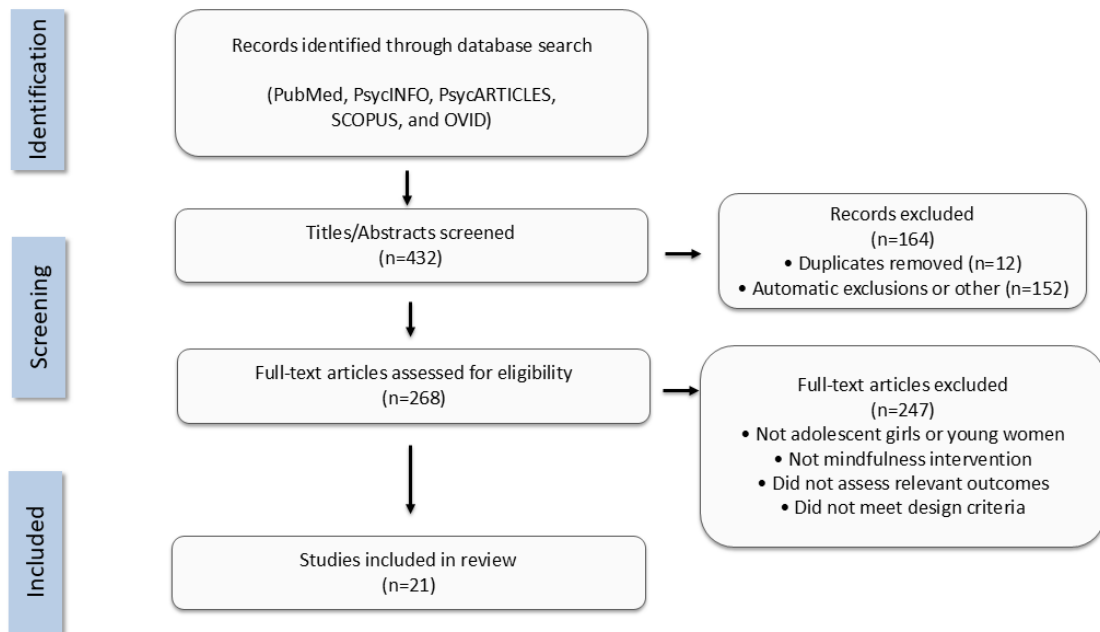
Despite growing interest in mindfulness-based interventions for youth mental health, important gaps remain in understanding their effectiveness among adolescent girls and young women. Existing reviews have generally focused on broader youth populations, often combining male and female participants and providing limited insight into gender-specific outcomes. Furthermore, relatively few

studies have synthesized which specific types of MBIs are most effective for adolescent girls and young women, or how intervention effects vary across mental health outcomes, developmental stages, and contextual factors such as trauma exposure, socioeconomic conditions, and cultural settings. Given the substantial mental health burden experienced by girls and young women and the potential for early intervention to foster resilience and well-being across the life course, a focused synthesis of the literature is needed to better understand the effectiveness of MBIs within this population and to inform future gender-responsive research, practice, and policy.

Figure 1 presents the conceptual framework underpinning this review. Drawing on existing mindfulness and emotional regulation literature, the framework illustrates the hypothesized pathways through which mindfulness-based interventions may influence mental health and well-being among adolescent girls and young women. Specifically, MBIs are proposed to strengthen self-awareness, attentional control, emotional regulation, and adaptive coping, which in turn contribute to reductions in stress, anxiety, and depression while promoting resilience, psychological well-being, and overall quality of life. Although the studies included in this review examined diverse intervention types and populations, this overall framework provides a conceptual lens for synthesizing findings across the literature.

Purpose of the Present Review

The purpose of this review is to better understand what MBI's most effectively mitigate mental health stressors of adolescent girls and young women and what methodologies and approaches to research seem to yield reliable evidence. However, existing reviews have not focused specifically on adolescent girls and young women or systematically synthesized how different types of mindfulness-based interventions vary in effectiveness across mental health outcomes.



Note. PRISMA-ScR = Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews. The search identified peer-reviewed studies published between 2015 and 2025 from multiple electronic databases.

Figure 2. PRISMA-ScR flow diagram for study selection

Adolescent girls and young women represent a distinct population in mindfulness research due to higher rates of internalizing symptoms and potential differences in engagement and response to mental health interventions compared to boys, particularly when introduced during earlier developmental stages. Given the concurrence of the rise in MBI techniques and adolescent mental health issues, it is important to identify the most effective strategies for young girls, as well critically review the ways in which the evidence was gathered and interpreted. In this scoping review of studies from 2015 to 2025, we aimed to better understand the effects of mindfulness-based interventions among adolescent girls globally on a range of mental health outcomes, including anxiety, depression, and stress reduction. Secondary observations were often made regarding self-regulation, self-esteem, and well-being-related outcomes.

Methods

A scoping literature review was conducted to identify and synthesize empirical studies examining the effects of mindfulness-based interventions (MBIs) on the mental health and well-being of adolescent girls and young women. To enhance methodological transparency, study identification, screening, eligibility assessment, and inclusion are summarized using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) flow diagram (Figure 2). The review was conducted initially in 2021 and updated in 2025 to capture newly published studies. Five electronic databases were systematically searched: PubMed, PsycArticles, PsycINFO, SCOPUS, and OVID. The titles and abstracts were independently identified and screened using predefined inclusion and exclusion criteria by two research assistants. Search terms included combinations of controlled vocabulary and keywords related to mindfulness-based interventions (e.g., mindfulness, meditation, yoga, MBSR, MBCT), the target

population (girls, adolescents, young women), and mental health outcomes (e.g., depression, anxiety, stress, well-being, and emotional regulation). S”. Keywords were combined using Boolean operators (e.g., “mindfulness” AND “girls” AND “adolescents”), and adapted for each database.

Then, full-text articles meeting the eligibility criteria were subsequently reviewed in detail. Two independent research assistants and one senior researcher independently evaluated eligible studies, extracted relevant information, verified inclusion criteria through discussion and consensus, and critically appraised. Discrepancies were resolved through team review to ensure consistency and methodological rigor.

Studies were eligible for inclusion if they: (1) were published between January 1, 2015 and December 31, 2025; (2) employed an empirical research design, including randomized controlled trials, quasi-experimental designs, mixed-methods studies, pilot studies, or pre-post intervention studies; (3) included participants between the ages of 7 and 25 years; (4) evaluated a mindfulness-based intervention, broadly defined to include: Mindfulness-Based Stress Reduction (MBSR), Mindfulness-Based Cognitive Therapy (MBCT), yoga-based intervention, meditation, breathing exercises, or other mindful practices designed to improve emotional regulation, mental health, or well-being; and (5) examined one or more mental health outcomes, including stress, anxiety, depression, emotional regulation, well-being, happiness, distress, or life satisfaction or quality of life. Studies were excluded if they: 1) were published before January 1, 2015; 2) did not investigate the effects of a mindfulness intervention; 3) did not include adolescent girls or young women, or provide sufficient information to examine female participants or gender-related findings; or 4) consisted of gray literature, dissertations, conference abstracts, reports, websites, editorials, or other non-peer-reviewed publications.

Because a few studies enrolled both male and female participants, all mixed-gender studies were re-examined during the revision process to determine and confirm whether sex-disaggregated findings were reported. When gender-specific analyses were unavailable, this limitation was explicitly acknowledged and considered during interpretation of the findings. To enhance methodological transparency, a PRISMA-ScR flow diagram was developed retrospectively to summarize the study identification, screening, eligibility and inclusion process (Figure 2).

Results

Overview of Included Studies

From 2015 to 2025, 21 studies met the inclusion and exclusion criteria and were included in this scoping review. Collectively, these studies examined the effects of mindfulness-based interventions (MBIs) on depression, anxiety, stress, emotional regulation, well-being, and related mental health outcomes among adolescent girls and young women across diverse cultural and geographic settings. Table 1 summarizes the characteristics of the included studies, including study design, participant demographics, intervention type, frequency, duration, and outcome measures. Table 2 provides a synthesis of the primary findings, highlighting changes in mental health outcomes, including reductions in stress, anxiety, and depression, as well as improvements in emotional regulation, psychological well-being, health-related quality of life, resilience, self-control, and other indicators of positive mental health. The major findings of the review are synthesized below.

Study Participant Characteristics

The reviewed studies represented diverse youth populations across diverse cultural and global contexts in high-, middle-, and low-income countries. Sample sizes ranged from small experimental studies of 30 (Khoshkarder & Raeisi, 2020) to large randomized trials of 3,519 (Volanen et al., 2020). Participants ranged from 7 to 25 years, with most studies ($n = 15$) focusing on adolescents aged 12 to 19. Detailed study characteristics are presented in Table 1.

In terms of gender, 13 studies sampled exclusively female participants, particularly high-risk or trauma-exposed populations such as sexual violence survivors (Lee and Cha, 2021), incarcerated adolescents (Middleton et al., 2019; Nicotera & Viggiano, 2021), female athletes (Anderson et al., 2025), or trafficking survivors (Namy et al., 2022). Eight studies enrolled mixed-gender samples, mostly within school or community settings (Butzer et al., 2017; Rojani et al., 2017; Galla et al., 2016) (see Table 1). Studies were conducted across North America, Europe, Asia, and Africa, including the United States ($n=9$), Finland ($n=2$), India ($n=3$), Iran ($n=2$), South Korea ($n=1$), Uganda ($n=1$), Liberia ($n=1$), Germany ($n=1$) and the United Kingdom ($n=1$) (Table 1). Although several studies reported racial and ethnic demographic characteristics, reporting practices varied considerably across settings.

Study Design Characteristics

As shown in Table 1, the 21 studies employed a range of research designs, including randomized controlled trials (RCTs) ($n = 9$), quasi-experimental studies ($n = 4$), mixed-methods studies ($n = 2$), and pilot or pre/post-test designs ($n = 3$). The remaining studies used longitudinal ($n=1$), cross-sectional ($n=1$), and experimental ($n=1$) designs. Study designs reflected varying levels of methodological

rigor, feasibility considerations, and contextual constraints. Both cross-sectional and longitudinal and experimental approaches were represented. Overall, RCTs were more commonly implemented in school-based and community settings within high-income countries, whereas quasi-experimental, mixed-methods, and pilot designs were more frequently utilized among vulnerable, trauma-exposed, or under-represented populations where randomization was less feasible or ethically appropriate.

Methodological choices often reflected the populations and settings being studied. RCTs generally involved larger samples and more structured intervention protocols, while quasi-experimental and mixed-methods studies were commonly used in real-world settings requiring greater flexibility and contextual sensitivity. Pilot studies were frequently employed to assess feasibility, acceptability, and preliminary effectiveness in emerging or under-researched areas. Collectively, the diversity of study designs highlights both the growing evidence base supporting mindfulness-based interventions and the need for continued rigorous evaluation across varied populations and contexts.

Trauma Exposure and Participant Risk Profiles

Understanding how trauma was addressed across studies is important for interpreting findings and assessing the applicability of MBIs, among adolescent girls and young women, particularly those facing significant adversity. Trauma exposure was a prominent characteristic across many of the included studies, though it was operationalized and incorporated in a variety of ways depending on the population, setting, and study objectives. Several studies explicitly recruited participants with documented trauma histories or exposure to high-risk environments including sexual violence survivors (Lee and Cha, 2021), incarcerated youth (Middleton et al., 2019; Nicotera and Viggiano, 2021), trafficking survivors (Namy et al., 2022) and abused/ orphaned girls (Sharei et al., 2025). In these cases, trauma was often a defining characteristic of the participant identity or experience and informed intervention design, and delivery. Due to ethical and practical considerations, these studies often employed quasi-experimental, mixed-methods or pilot designs rather than RCTs.

A second group of studies focused on adolescents experiencing elevated levels of depression, anxiety or stress, without explicitly referencing trauma histories (Anderson et al., 2025; Rentala et al., 2019a, 2019b; Shomaker et al., 2017). While trauma exposure was not a formal inclusion criteria, the presence of significant psychological symptoms suggested a high likelihood of underlying adverse life events or chronic stressors. These studies commonly used randomized or pre-post designs and implemented in school or university settings where participant risk could be monitored and managed more easily.

In contrast, several studies implemented universal, school-based mindfulness programs among general adolescent populations without targeting trauma exposure or clinical symptoms (Butzer et al., 2017; Volanen et al., 2020; Dumontheil et al., 2023; Von Salisch and Voltmer, 2023). These studies assumed a preventive rather than therapeutic function of the intervention, aimed to promote emotional regulation, stress management, and overall well-being. Such studies generally included larger samples, more rigorous research designs, and longer follow-ups.

Table 1. Results of the scoping literature review (2015-2025): Studies examining the effects of mindfulness-based intervention in girls and young women

Study	Author	Design	Study Sample	Intervention Type	Duration	Population/ Study Setting	Outcomes
1	Anderson et al., 2025	Quasi-experimental	All female, n=135, ages 18-23, race not reported, USA	MBI	6 weeks; 30 min/session	Female athletes with depression, anxiety symptoms	Mental and physical health-related quality of life
2	Butzer et al., 2017	Randomized Controlled Trial	Mixed gender, n=211, mean age 12.64 ± 0.33, White and Asian predominantly, USA	Yoga-based MBI	32 sessions; 45 min/session; Follow-up: 12 months	School-based, low-income students	Self-regulation; emotional regulation; perceived stress; mood; impulsivity
3	Callands et al., 2023	Quasi-experimental	All female, n=87, ages 18-25, African, Liberia	MBI	5 weeks; 10 sessions	Pregnant women receiving prenatal care or health services, between 13-24 weeks	Depression; stress; prenatal distress; PTSD
4	Clarke et al., 2022	Mixed-methods	Mixed gender, n=187, mean age 15.2 ± 1.3 years, Hispanic/Latinx, USA	Yoga-based MBI	6 weeks; 1 hour/week	High school students with depression/anxiety symptoms	Depression; anxiety; stress
5	Dumontheil et al., 2023	Randomized Controlled Trial	All female, n=51, ages 12-14, race not reported, UK	MBI daily home exercises	8 weeks; 90 min/week	No history of developmental or mental disorders/previous mindfulness training	Stress; emotional regulation
6	Galla et al., 2016	Longitudinal	Mixed gender, n=132, ages 13-20, primarily White, USA	MBI	5 day retreat; 30-60 min/day; Follow-up: 3 months	School-based adolescents, out-of-class	Depression; stress; emotional regulation; well-being
7	Kanchibhotla et al., 2021	Cross-sectional	Mixed gender, n=455, ages 13-17, South Asian, India	Yoga-based MBI (SKY Yoga and Meditation)	4 day workshop; daily 25-min practices	School-based adolescents (SKY meditation practitioners ≥ 1 year)	Stress; social behavior; emotional stability; and peer interaction
8	Khoshkerdar & Raeisi, 2020	Experimental	All female, n=30, ages 16-18, Middle Eastern, Iran	Mindfulness-based Stress Reduction for Youth (MBSRY)	8 sessions; 90 min/session; Follow-up: 40 days	High school girls with dysfunctional eating attitudes	Body image
9	Lassander et al. 2021	Randomized Controlled Trial	Mixed gender, n=3,519, ages 12-15, Caucasian/White, Finland	MBI; Home practice	9 weeks; 1 session/week (45 min/session) Home: 5-6 times/week (3-15 min); Follow-up: 26 weeks	School classroom with home practice	Emotional regulation; well-being; Health-related quality of life
10	Lee and Cha, 2021	Pilot Randomized Controlled Trial	All female, n=34, ages 18-24, Asian, South Korea	Virtual Reality MBI,	4 weeks; twice/week	Recent (≤ 6 months) sexual violence survivors	Perceived support; suicidal ideation; impact from sexual violence
11	Middleton et al., 2019	Mixed-methods	All female, n=597, ages 12-18, Latin, mixed race, Asian, Caucasian/White, African American, Pacific Islander, USA	Yoga-based MBI	Duration not specified; Average time in program: about 7 months	Female adolescents in juvenile detention (multiple jails)	Emotional regulation; well-being

12	Namy et al., 2022	Pilot pre-post study	All female, n=60, ages 15-20, African, Uganda	Yoga-based MBI	12 weeks; 60-90 min/session/week	Human trafficking survivors	Depression; emotional health
13	Nicotera & Viggiano, 2021	Pilot Study	All female, n=52, ages 13-21, African American, Latina, Native American, White, USA	Mindfulness-Based Stress Reduction for Youth (MBSRY)	8 weeks; 75 min/session/week; 5-10 min check-ins	Chronic treatment-resistant PTSD, Incarceration	Coping; self-regulation; stress management
14	Rentala et al., 2019a	Pilot pre-post study	All female, n=60, ages 16-19, South Asian, India	Mindfulness-based Stress Management	8 sessions; twice weekly for 4 weeks; Follow-up: 3 months	Adolescents with elevated stress symptoms	Academic stress; depression; anxiety
15	Rentala et al., 2019b	Randomized Controlled Trial	All female, n =230, ages 16-19, South Asian, India	MBI	8 sessions; twice weekly for 4 weeks; Follow-up: 1 month, 2 months, and 6 months	Adolescent girls pursuing pre university courses with high depression, anxiety, and stress scale scores	Academic and general stress; depression; anxiety; well-being
16	Rojiani et al., 2017	Quasi-experimental	Mixed gender, n=77; mean age 20.7 ± 3.0 race not reported, USA	MBI - Meditations	12 weeks; 3 times/week; 1 hour/session	Undergraduate students	Negative affect; mindfulness
17	Sharei et al., 2025	Quasi-experimental	All females, n=30; ages 15-18, Middle Eastern, Iran	MBI	8 sessions; 90 min/week	Orphaned and abused female adolescents in welfare care centers	Emotional regulation; self-awareness; tendency to high-risk behaviors
18	Shomaker et al., 2017	Pilot RCT	All females, n=33; ages 12-17 primarily Caucasian, USA	MBI	6 weeks; 1 hour/session/week	Adolescents with obesity and depressive symptoms	Depression; anxiety; stress
19	Volanen et al., 2020	Randomized Controlled Trial	Mixed gender, n=3519; ages 12-15, Caucasian, Finland	MBI + home assignments	9 weeks; 45 min/1 session/week, home assignments: 5-6 times/week; 3-5 min each	School-based adolescents	Depression; socioemotional functioning; emotional regulation
20	Von Salisch & Voltmer, 2023	Randomized Controlled Trial	Mixed gender, n=146, ages 7-11, Caucasian, Germany	MBI - Breathing break	9 weeks; 3 times/day	School-based adolescents	Prosocial behavior; supportive peer relationships
21	Walsh et al., 2016	Randomized Controlled Trial	All females, n= 64, ages 18-25, Caucasian, African American, USA	MBI - Meditation and yoga	4 weeks; 50 min/session/week	Undergraduate students with depressive symptoms	Depression

Collectively, the findings suggest that MBIs have been implemented across a broad continuum of risk, ranging from universal prevention programs to interventions designed specifically for trauma-exposed and highly vulnerable populations. This diversity highlights both the flexibility of mindfulness-based approaches and their potential applicability across varying levels of psychological need and adversity.

Mindfulness Intervention Characteristics

All studies utilized mindfulness-based interventions (MBIs), but many incorporated different forms of mindfulness practices, such as yoga (Butzer et al., 2017; Namy et al., 2022) or mindfulness-based

stress reduction (MBSR) techniques (Khoshkerdar & Raeisi, 2020; Nicotera & Viggiano, 2021). The studies also differed in intervention types, frequency, durations, and follow-up periods. Interventions included MBSR, yoga, meditation, breathing techniques, and even innovative and non-traditional formats like virtual reality mindfulness (Lee & Cha, 2021).

Several studies utilized versions of Mindfulness-Based Stress Reduction (MBSR), a manualized 8-week intervention incorporating sitting meditation, body scans, and mindful movement. For example, Khoshkerdar and Raeisi (2020) applied a standard MBSR protocol with Iranian high school girls while

Nicotera and Viggiano (2021) implemented a tailored version (MBSRY) for incarcerated adolescent girls with chronic, treatment-resistant PTSD. These structured interventions were primarily applied to older adolescents or young adults (ages 16–25), likely reflecting developmental readiness for cognitive and reflective components of MBSR.

Yoga-based MBIs were commonly used among trauma-exposed, marginalized, and school-based populations, emphasizing physical movement, breath regulation, and mind-body awareness (Table 1). Yoga's non-verbal and embodied nature may make it more accessible to youth with limited psychological insight or who struggle with introspective awareness due to trauma histories.

Several studies implemented short-form MBIs adapted for universal prevention in school contexts. For example, Volanen et al. (2020) and Lassander et al. (2021) used a 9-week mindfulness curriculum with thousands of adolescents in Finnish classrooms, integrating weekly 45-minute sessions and daily home practice. Dumontheil et al. (2023) applied an 8-week MBI in the UK targeting stress and emotion regulation in healthy youth. Von Salisch and Voltmer (2023) studied a “breathing break” intervention for German children (ages 7–11), consisting of three short daily mindfulness moments. These programs were designed for feasibility and scale and emphasized repetition and accessibility over depth, making them suitable for general youth populations in structured institutional environments.

Several studies adapted mindfulness interventions to enhance cultural relevance and engagement in specific regional or trauma-affected populations. Lee and Cha (2021) employed virtual reality-assisted mindfulness to support female survivors of sexual violence in South Korea. Rentala et al. (2019a, 2019b) developed mindfulness-based and stress management programs for South Asian adolescent girls in India with high distress levels, emphasizing culturally resonant themes such as self-love and academic stress. Sharei et al. (2025) delivered an MBI to orphaned and abused girls in Iranian welfare care centers, integrating mindfulness with cognitive self-awareness training. These culturally adapted or hybrid MBIs were typically employed in non-Western, trauma-affected contexts where standard protocols were not feasible or culturally appropriate.

Mindfulness intervention types tended to cluster around population characteristics. Standardized protocols, such as MBSR, were most often used with older adolescents in stable environments (e.g., schools or universities) where sustained attention and verbal processing were feasible (Khoshkherdar & Raeisi, 2020; Walsh et al., 2016). Yoga-based and somatically focused MBIs were more commonly applied with younger or trauma-exposed populations, particularly in low-resource or marginalized settings (Namy et al., 2022; Middleton et al., 2019; Clarke et al., 2022). Short-form school-based MBIs prioritized broad reach and age-appropriateness, focusing on emotion regulation and classroom behavior among general adolescent populations (Volanen et al., 2020; Von Salisch & Voltmer, 2023). Finally, hybrid and culturally specific programs were employed to address both trauma sensitivity and cultural fit, often incorporating regionally meaningful content or novel delivery methods (Lee and Cha, 2021; Sharei et al., 2025).

Mechanisms and Pathways of Change

Across the studies reviewed, mindfulness-based interventions appeared to improve mental health through several interconnected pathways. Improvements in emotional regulation, self-awareness, attentional control, and adaptive coping were frequently cited as mechanisms through which participants experienced reductions in depression, anxiety, and stress. By encouraging present-moment awareness and nonjudgmental observation of thoughts and emotions, mindfulness practices may help adolescents respond to challenges more effectively and build resilience over time.

Several interventions also incorporated yoga, breathing exercises, and other somatic practices that may support physiological regulation and mind-body awareness. These approaches may be particularly relevant for trauma-exposed youth, whose experiences are often reflected not only in cognitive and emotional processes but also in physiological stress responses (Gentsch & Kuehn, 2022; Zaccaro et al., 2023). Collectively, the findings suggest that MBIs may operate through interconnected cognitive, emotional, behavioral, and physiological pathways that promote well-being and positive mental health among adolescent girls and young women.

Across studies, MBIs varied considerably in content, duration, delivery format, and target population. Nevertheless, several patterns emerged. Standardized MBSR protocols were most commonly implemented among older adolescents and young adults in educational settings, whereas yoga-based and somatic interventions were more frequently utilized with trauma-exposed or marginalized populations. School-based programs demonstrated strong feasibility and scalability, while culturally adapted interventions showed promise in enhancing engagement and contextual relevance across diverse populations and settings.

Impact of MBIs on Mental Health Outcomes

Across the 21 studies reviewed, mindfulness-based interventions were associated with improvements in multiple domains of mental health and well-being among adolescent girls and young women. The most commonly assessed outcomes included depression, anxiety, stress, emotional regulation, and emotional well-being across studies are summarized in Table 2. While intervention types, duration, and study populations varied considerably, the overall pattern of findings suggests that MBIs consistently contribute to reductions in psychological distress and improvements in adaptive coping and emotional functioning across diverse cultural and developmental contexts.

Effects on Stress

Among the 21 studies reviewed, seven reported reductions in various forms of stress (Callands et al., 2023; Clarke et al., 2022; Galla et al., 2016; Kanchibhotla et al., 2021; Rentala et al., 2019a, 2019b; Shomaker et al., 2017). Of these, five (83%) demonstrated statistically significant reductions in stress symptoms following MBI exposure, underscoring mindfulness as a particularly effective approach for stress management in adolescent populations. Clarke et al. (2022) reported a significant 21.9% reduction in self-reported stress post six-week mindfulness-based yoga program delivered to a predominantly Hispanic student sample. Similarly, both Rentala et al. (2019a) and Rentala et al. (2019b) found significant decreases in academic stress among South Asian adolescent girls with elevated scores on the Depression, Anxiety, and Stress Scale (DASS-21),

following structured MBIs incorporating stress management and mindfulness techniques. These interventions were brief (typically 4–8 weeks) and embedded in educational settings that supported regular attendance and engagement. Kanchibhotla et al. (2021) also demonstrated meaningful reductions in stress through a condensed, four-day yoga and meditation workshop among Indian adolescents. In contrast, Shomaker et al. (2017) observed only marginal reductions in stress in a sample of U.S. adolescent girls with depressive symptoms and obesity, which may reflect the complex biopsychosocial factors influencing stress regulation in this subgroup.

Beyond adolescent populations, Callands et al. (2023) examined the effects of a trauma-informed MBI on young adult women (ages 18–25) in post-conflict Liberia. Their quasi-experimental study reported reductions in prenatal stress and PTSD symptoms three months post-intervention. While promising, the study relied solely on self-reported measures, which, like many others in this domain, may be susceptible to social desirability and recall bias. Nonetheless, it remains one of the few studies targeting prenatal stress, highlighting a critical gap in the literature on stress among young women beyond adolescence. Across these studies, MBIs varied in delivery format but commonly included structured, somatically grounded approaches such as yoga, breath regulation, and meditative reflection. Interventions embedded within school or community settings, especially those adapted to cultural contexts, were more likely to yield significant results. The use of somatic regulation practices may be particularly effective due to their enhancement of gamma-aminobutyric acid (GABA) activity, an inhibitory neurotransmitter system linked to reduced anxiety and improved emotion regulation (Streeter et al., 2020; Huang et al., 2023).

Importantly, all six out of the seven studies were conducted in distinct cultural contexts, including the U.S., India, and Liberia, and among racially and socioeconomically diverse populations. However, one study (Callands et al., 2023) included young women beyond adolescence, suggesting a need for more targeted research in this age group. Given that stressors in early adulthood often differ substantially from those experienced during adolescence, particularly related to caregiving, reproductive health, and economic instability, tailoring MBIs to reflect these distinct challenges could enhance intervention relevance and efficacy. Additionally, future studies would benefit from incorporating multi-method assessment strategies (e.g., physiological markers or behavioral measures) to complement self-reported stress data and reduce potential reporting biases.

Interestingly, Yoga-based mindfulness interventions (MBIs) were more consistently effective in reducing stress than in alleviating symptoms of depression or anxiety among adolescent girls. Across multiple studies, stress emerged as the most significantly improved outcome, particularly in school-based and culturally adapted yoga programs (Clarke et al., 2022; Butzer et al., 2017; Kanchibhotla et al., 2021). While some yoga-based MBIs also reported improvements in depression and anxiety, these effects were generally secondary or less pronounced. The physical and breath-based components of yoga likely contribute to its effectiveness for stress by directly engaging the parasympathetic nervous system and promoting physiological regulation. In contrast, depression and

anxiety may require more cognitively focused or intensive interventions to achieve comparable benefits. The evidence suggests that MBIs (yoga-based and other) are a promising approach for reducing stress among adolescent girls, particularly in academic or structured environments. However, greater attention to culturally diverse and developmentally distinct populations, especially young women in early adulthood, is essential for improving the generalizability and precision of mindfulness research in stress intervention contexts.

Effects on Anxiety

Among the 21 studies reviewed, five (24%) explicitly assessed anxiety symptoms as an outcome following MBIs targeting adolescent girls (Callands et al., 2023; Clarke et al., 2022; Rentala et al., 2019a, 2019b; Shomaker et al., 2017). Of these, three (60%) demonstrated statistically significant reductions in anxiety, while two reported non-significant directional improvements. Notably, all five studies were conducted in populations with elevated psychological distress, including exposure to trauma, depressive symptoms, or other clinical risk factors. None of the anxiety-focused studies emerged from universal, school-based prevention samples, suggesting that anxiety as an outcome measure is most commonly evaluated in targeted or clinical settings.

Significant anxiety reductions were reported in Clarke et al. (2022), Rentala et al. (2019a), and Rentala et al. (2019b). Clarke and colleagues found a 14.9% reduction in anxiety ($p = .005$) following a six-week mindfulness-based yoga intervention delivered to Hispanic adolescents in the United States who were experiencing elevated depressive symptoms, anxiety, and stress. Similarly, Rentala et al. (2019a) conducted an experimental pilot study among South Asian college-aged females and found significant reductions in anxiety after an eight-session stress management program grounded in mindfulness principles. These findings were replicated and reinforced in an RCT conducted by the same research group (Rentala et al., 2019b), with multiple follow-ups demonstrating sustained improvement. Importantly, these interventions were brief (typically 4–8 weeks), delivered in culturally relevant formats (yoga-based MBIs), and embedded in structured settings that facilitated high engagement and therapeutic adherence.

Two additional studies, Shomaker et al. (2017) and Callands et al. (2023), reported non-significant trends toward anxiety reduction. Shomaker et al. (2017) implemented a six-session mindfulness program among adolescent girls in the U.S. with elevated depressive symptoms and co-occurring obesity and insulin resistance. While some improvements in anxiety were observed, these did not meet the threshold for statistical significance, possibly due to the complex interplay between insulin resistance, emotional dysregulation, and response to intervention. Similarly, Callands et al. (2023) examined a trauma-informed MBI delivered over 10 sessions to young women (ages 18–25) in post-conflict Liberia, a population characterized by high exposure to sexual violence and cognitive impairment. While anxiety levels trended downward, improvements were not statistically significant. Nonetheless, both studies suggest that MBIs may confer psychological benefits even in highly vulnerable groups where traditional mental health services are limited or ineffective.

A notable trend across all five studies is that anxiety was assessed exclusively in populations already exhibiting elevated

Table 2. Summary of studies by outcomes of mindfulness-based interventions in girls, 2015-2025

Study	Author	Depression	Anxiety	Stress	Emotion Regulation	Overall Well-being	Primary Outcome*
1	Anderson et al., 2025					✓	↑ Mental well-being (HRQoL)
2	Butzer et al., 2017				✓		↑ Self regulation
3	Callands et al., 2023	✓	✓	✓			↓ Depression, stress
4	Clarke et al., 2022	✓	✓	✓	✓		↓ Depression, anxiety, stress ↑ Emotion regulation
5	Dumontheil et al., 2023				✓		↑ Emotion regulation ↓ Depression, stress
6	Galla et al., 2016	✓ (*)		✓ (*)	✓ (*)	✓ (*)	↑ Emotion regulation, overall well-being ↓ Stress
7	Kanchibhotla et al., 2021			✓	✓	✓	↑ Emotion regulation, overall well-being
8	Khoshkerdar & Raeisi., 2020					✓	↓ Body image concerns ↑ Overall well-being
9	Lassander et al., 2021					✓	↑ Overall well-being (HRQoL) ↓ Negative impact from sexual violence, suicidal ideation
10	Lee and Cha, 2021					✓	↑ Perceived support ↑ Emotion regulation, overall well-being
11	Middleton et al., 2019				✓ (*)	✓ (*)	↓ Depression ↑ Emotion regulation
12	Namy et al., 2022	✓				✓	↑ Emotion regulation
13	Nicotera & Viggiano, 2021				✓	✓	↑ Emotion regulation
14	Rentala et al., 2019a	✓	✓	✓			↓ Depression, anxiety, stress
15	Rentala et al., 2019b	✓	✓	✓		✓	↓ Depression, anxiety, stress ↑ Overall well-being ↓ Negative affect
16	Rojiani et al., 2017					✓	↑ Overall well-being, self-compassion ↓ Tendency to high-risk behaviors
17	Sharei et al., 2025				✓	✓	↑ Emotion regulation, Cognitive self-awareness
18.	Shomaker et al., 2017	✓	✓ (*)	✓ (*)			↓ Depression
19.	Volanen et al., 2020	✓				✓	↓ Depression ↑ Overall well-being
20.	Von Salisch & Voltmer., 2023					✓	↑ Overall well-being, Prosocial behavior
21.	Walsh et al., 2016	✓					↓ Depression

✓ = Primary Outcome improved significantly, $p < 0.05$. Other outcomes were also observed, but not shown. Results marked with an Asterisk (✓*) indicate that while there were improvements, they did not reach the threshold for statistical significance.

stress or trauma exposure. This reflects a broader clinical orientation toward anxiety as an outcome variable, one more frequently investigated in treatment-oriented studies than in population-wide,

preventative school-based MBIs. Moreover, studies that demonstrated statistically significant reductions in anxiety were more likely to incorporate somatic and culturally responsive

elements, such as yoga, breath regulation, and trauma-sensitive delivery formats. These modalities align with neurophysiological evidence that controlled breathing and physical mindfulness practices enhance GABA levels, a neurotransmitter associated with relaxation and reduced neural excitability (Streeter et al., 2020; Huang et al., 2023).

Emerging evidence suggests that young adult females (ages 18–25) may experience more durable benefits from MBIs targeting anxiety, stress, and depression (Walsh et al., 2016; Callands et al., 2023). This enhanced responsiveness may be partially explained by hormonal modulation, particularly the role of estradiol in regulating GABAergic activity, which is more pronounced in females during this developmental window (Streeter et al., 2020). These neurobiological mechanisms point to the need for greater attention to developmental stage and sex-based differences in MBI responsiveness, especially in post-adolescent female populations that are often underrepresented in prevention research.

Effects on Depression

Across the reviewed studies, 38% ($n = 8$) reported statistically significant reductions in depressive symptoms among adolescent girls following MBIs, while one additional study reported improvements that did not reach statistical significance. These varied in design and setting but shared key features, including targeting high-risk populations and implementing interventions tailored to participants' developmental and cultural contexts (Callands et al., 2023; Clarke et al., 2022; Galla et al., 2016; Namy et al., 2022; Rentala et al., 2019a, 2019b; Shomaker et al., 2017; Volanen et al., 2020; Walsh et al., 2016;).

Several studies demonstrated strong outcomes in trauma-exposed or clinically elevated populations. Callands et al. (2023) observed significant reductions in depression among young women in post-conflict Liberia after a 5-week MBI. In the U.S., Clarke et al. (2022) reported improvements in depression, anxiety, and stress in a high school sample using a culturally responsive, yoga-based intervention. Similarly, Namy et al. (2022) found significant reductions in depression symptoms and emotional health improvements in Ugandan adolescent girls with histories of human trafficking.

Rentala et al. (2019a, 2019b) reported consistent decreases in depression, anxiety, and stress among adolescent girls with elevated DASS-21 scores in India, using brief, intensive stress-management interventions. Notably, large-scale school-based RCTs also showed positive effects. Volanen et al. (2020) demonstrated significant reductions in depression and improvements in socio-emotional functioning among over 3,500 Finnish adolescents. Shomaker et al. (2017) similarly reported decreased depressive symptoms in adolescent girls with elevated baseline depression. In a university setting, Walsh et al. (2016) found improvements in depression following a 4-week MBI program for young women with higher baseline depression levels. These findings suggest that MBIs are particularly effective in reducing depressive symptoms when applied to populations with elevated psychological distress, and when interventions are culturally responsive, developmentally appropriate, and feasible within real-world settings. While not all studies assessed depression, those that did and found significant effects contribute to the growing evidence base supporting MBIs as

a scalable, low-cost strategy for addressing depression in adolescent girls.

When examining the impact of MBIs on depression specifically, this review suggests that mindfulness-based interventions (MBIs) can significantly reduce depressive symptoms among adolescent girls, particularly when implemented using certain methodological strategies. Interventions were most effective when they targeted participants with elevated baseline distress or trauma exposure, used culturally and developmentally tailored content, and maintained a clear structure, whether through manualized protocols or intensive short-form formats. Several studies with follow-ups assessments indicate that MBIs produce sustained, long-term effects (Galla et al., 2016; Khoshkardar & Raeisi, 2020; Lassander et al., 2021; Rentala et al., 2019a, 2019b; Shomaker et al., 2017; Volanen et al., 2020; Walsh et al., 2016) with some evidence of delayed effects as well (Butzer et al., 2017).

Yoga-based MBIs and adapted stress management programs appeared particularly effective in non-Western (Kanchibhotla et al., 2021; Namy et al., 2022) and trauma-affected populations (Clarke et al., 2022; Middleton et al., 2019; Namy et al., 2022; Nicotera & Viggiano, 2021), likely due to their accessibility, cultural relevance, and emphasis on somatic regulation. Brief interventions (4–9 weeks) also produced significant improvements in depression, supporting the feasibility of implementing tailored MBIs in school and community settings (Clarke et al., 2022; Galla et al., 2016; Shomaker et al., 2017; Volanen et al., 2020; Walsh et al., 2016).

Effects on Emotional Regulation

While depression, anxiety, and stress reduction were the most commonly targeted outcomes in MBI studies involving adolescent populations (Clarke et al., 2022; Rentala et al., 2019a, 2019b), improvements in emotion regulation and overall well-being emerged as frequently observed secondary outcomes (Lassander et al., 2021; Galla et al., 2016). Emotion regulation was measured across studies using a variety of validated self-report tools and behavioral assessments, including emotional self-control indices (Butzer et al., 2017), self-regulation subscales (Nicotera & Viggiano, 2021), and broader socioemotional functioning frameworks (Volanen et al., 2020). Improvements were reported among both general school-based populations (Kanchibhotla et al., 2021) and high-risk subgroups such as incarcerated youth (Middleton et al., 2019), orphaned or abused girls (Sharei et al., 2025), and adolescents with treatment-resistant PTSD (Nicotera & Viggiano, 2021). In nearly all cases, emotion regulation outcomes were linked to enhanced peer relationships, reduced impulsivity, and better stress management.

Notably, females consistently showed greater gains in emotional self-regulation compared to males, particularly in mixed-gender studies involving school-aged participants (Butzer et al., 2017; Galla et al., 2016; Volanen et al., 2020). These gendered differences suggest that MBIs may be especially effective for addressing the emotional developmental needs of adolescent girls, who may experience and express emotional distress differently than boys. Such findings underscore the value of incorporating gender-sensitive elements into MBI design, including content that reflects the social and emotional experiences of girls and the inclusion of safe, supportive settings for emotional processing.

Intervention type and duration also appeared to moderate

emotion regulation outcomes. Yoga-based MBIs were especially effective in fostering body awareness and emotional stability among adolescent girls (Clarke et al., 2022; Kanchibhotla et al., 2021), while classroom-based mindfulness and breathwork programs showed broad impact across genders when implemented over longer periods (Butzer et al., 2017; Volanen et al., 2020). Although short-term interventions such as Kanchibhotla et al.'s (2021) four-day workshop yielded positive effects, longer, multi-week programs like those in Sharei et al. (2025) and Volanen et al. (2020) were associated with more robust and lasting improvements. This suggests that the frequency, consistency, and context of delivery play a critical role in shaping emotional outcomes.

Effects on Well-Being and Positive Mental Health

Emotional well-being was measured in at least nine studies, often defined through constructs such as life satisfaction, happiness, perceived support, positive affect, resilience, socio-emotional functioning, and quality of life (HRQoL). It was typically treated as a secondary outcome, complementing primary outcomes like depression, anxiety, and stress. Across these studies, MBIs consistently improved emotional well-being, particularly when interventions incorporated elements of self-awareness, somatic practices (e.g., yoga), or group-based reflection (Anderson et al., 2025; Galla et al., 2016; Khoshkardar & Raeisi, 2020; Lassander et al., 2021; Lee and Cha, 2021; Namy et al., 2022; Nicotera & Viggiano, 2021; Rentala et al., 2019b; Rojiani et al., 2017; Sharei et al., 2025; von Salisch & Voltmer, 2023). Improvements were observed across both clinical and non-clinical populations, suggesting that MBIs can enhance emotional functioning beyond the reduction of psychological symptoms.

Yoga-based MBIs were particularly effective in promoting emotional well-being among high-risk populations. For example, Middleton et al. (2019) reported improvements in emotional regulation and well-being among incarcerated girls in California following participation in a long-term yoga program, while Namy et al. (2022) observed increased self-rated emotional health in Ugandan adolescent girls who had survived trafficking after a 12-week trauma-informed yoga intervention. Similarly, Sharei et al. (2025) found that orphaned and abused girls in Iran experienced enhanced cognitive self-awareness and emotional stability after completing an eight-session MBI program. These findings underscore the potential of somatic mindfulness practices to foster emotional resilience in trauma-exposed youth when delivered in culturally responsive and safe environments.

Beyond trauma-affected groups, MBIs also improved emotional well-being in general school and college populations. In a longitudinal study of U.S. adolescents, Galla et al. (2016) found that out-of-class meditation practice following a mindfulness retreat predicted sustained improvements in emotional well-being at three-month follow-up, particularly among female students who meditated more frequently and had strong personal commitment to continued practice. Likewise, Volanen et al. (2020) and Lassander et al. (2021) demonstrated significant improvements in socioemotional functioning and health-related quality of life, respectively, following a nine-week classroom-based MBI delivered to thousands of Finnish adolescents. These large-scale school interventions highlight the scalability and effectiveness of MBIs in promoting well-being in

universal settings. Notably, in a study of female college athletes, Anderson et al. (2025) reported improvements in quality of life and general well-being even in the absence of baseline clinical distress, suggesting MBIs may also serve a flourishing function in healthy populations.

Across studies, improvements in emotional well-being were typically assessed using self-report measures such as perceived support, mood states, and global quality of life ratings. Though useful, these tools may be limited by social desirability bias and cultural interpretation of well-being constructs. Nevertheless, consistent findings across diverse geographic and cultural contexts, including the United States, Finland, South Korea, India, Uganda, and Iran, indicate that MBIs are adaptable and broadly applicable. Furthermore, variation in intervention duration and format, from brief six-session protocols (Anderson et al., 2025) to longer 12-week or school-term interventions (Rojiani et al., 2017), suggests that both short- and long-form MBIs can positively impact emotional well-being, though longer programs may yield more sustained benefits.

Collectively, the findings suggest that MBIs are a promising approach to enhancing emotional well-being among adolescent girls and young women. Whether through yoga-based, classroom-integrated, or trauma-informed programs, these interventions appear to strengthen protective factors such as self-awareness, emotional regulation, and perceived social support.

Discussion

The examined studies illustrate potential of mindfulness-based interventions (MBIs) to improve a range of mental health outcomes in adolescent girls and young women. Stress, depression, and anxiety were the most commonly targeted and improved outcomes, particularly in trauma-exposed and high-risk populations. Emotion regulation and overall well-being were also frequently enhanced, with somatic practices like yoga showing particular effectiveness by addressing the physical embodiment of trauma and modulating autonomic nervous system activity. These findings provide a strong foundation for interpreting the broader implications of MBIs for adolescent mental health. From a positive psychology perspective, the findings suggest that MBIs may promote not only reductions in psychological distress but also broader dimensions of positive mental health, including emotional well-being, resilience, self-efficacy, and life satisfaction. However, relatively few studies directly assessed happiness or life satisfaction, highlighting an important direction for future research.

Collectively, the findings suggest that MBIs may improve mental health through several interconnected pathways, including enhanced emotional regulation, increased self-awareness, improved attentional control, and the development of adaptive coping skills. Interventions incorporating yoga, breathing exercises, and other somatic practices may additionally support physiological regulation and mind-body awareness, particularly among youth exposed to trauma or chronic stress. These mechanisms may help explain the consistent improvements observed across depression, anxiety, stress, and emotional well-being outcomes and underscore the potential of mindfulness-based approaches to promote resilience during adolescence. These pathways are consistent with the conceptual framework presented, providing additional evidence of important mechanisms through which MBIs improve mental health

among adolescent girls and young women.

Intervention Characteristics Associated with Positive Outcomes

Although mindfulness-based interventions varied considerably in content, duration, delivery setting, and target population, several common characteristics emerged across studies reporting favorable mental health and well-being outcomes. While these patterns should not be interpreted as causal, they provide useful insights into intervention features that may enhance engagement, acceptability, and effectiveness among adolescent girls and young women.

First, school-based programs demonstrated strong potential for broad reach, accessibility, and early prevention, suggesting that educational settings may provide an effective platform for promoting emotional well-being among adolescent girls and young women. Second, interventions incorporating yoga, mindful movement, and other somatic practices appeared particularly beneficial among trauma-exposed and high-risk populations, potentially supporting both psychological and physiological regulation. Third, studies suggested that regular participation and opportunities for ongoing practice were associated with more sustained improvements in emotional well-being, resilience, and coping. While intervention duration varied considerably, findings generally supported the importance of repeated engagement in mindfulness practices over time. Fourth, culturally adapted interventions demonstrated strong feasibility and participant engagement across diverse populations and settings, highlighting the importance of contextual relevance when implementing mindfulness-based approaches.

Finally, several studies utilized group-based formats that fostered peer support, shared learning, and opportunities for social connection. Together, these findings suggest that intervention effectiveness may depend not only on mindfulness practices themselves, but also on how interventions are delivered, culturally adapted, sustained over time, and aligned with participants' characteristics, developmental stage, trauma history or lived experiences, and opportunities for sustained practice and engagement.

Trauma, Gender and Cultural Context

Importantly, trauma exposure played a critical role in shaping intervention design and delivery. Some studies recruited participants with documented histories of sexual violence, trafficking, or incarceration, while others inferred trauma through elevated psychological symptoms. Trauma-focused studies tended to use more intensive, shorter-duration interventions emphasizing coping, emotion regulation, and self-efficacy. These were often delivered in group formats using embodied practices like yoga and breathwork, approaches that may be particularly effective for youth with limited verbal processing or psychological insight due to trauma histories. Universal school-based programs, by contrast, focused on prevention and used standardized mindfulness curricula over longer periods.

The types of interventions employed reflected thoughtful adaptation to population characteristics. Standard MBSR protocols were generally used in older or more cognitively mature populations, while yoga-based or hybrid programs were more common among

younger adolescents or those in trauma-affected or culturally distinct settings. The brief, school-integrated MBIs allowed for greater reach and feasibility but may have sacrificed depth and personalization. Culturally tailored MBIs, though less standardized, demonstrated strong contextual fit and engagement, particularly in non-Western contexts such as Iran, India, and Uganda. These adaptations illustrate the importance of balancing fidelity with flexibility to optimize relevance and accessibility.

Gender

Several studies reported strong engagement and positive outcomes among female participants; however, relatively few explicitly examined gender as a moderating variable or reported sex-disaggregated analyses, aligned with gendered equity frameworks. As a result, conclusions regarding comparative intervention effects between males and females should be interpreted cautiously. These patterns may be shaped by developmental differences, gendered norms around emotional expression, and greater receptivity to somatic or reflective practices among females. In contrast, boys' lower participation rates may reflect societal stigma around mental health and traditional masculine norms that discourage help-seeking (Sileo & Kershaw, 2020). These findings underscore the importance of developing gender-responsive MBI approaches that not only support the strengths of adolescent girls but also address barriers to engagement among boys and other underrepresented groups.

These findings should also be interpreted within a broader gender equity framework. Adolescent girls worldwide often experience intersecting forms of disadvantage - including gender-based violence, discrimination, restrictive gender norms, caregiving expectations, and unequal access to educational and mental health resources - that increase vulnerability to chronic stress and internalizing mental health conditions. Viewed through a gender equity lens, MBIs represent more than individual coping techniques; they offer accessible, trauma-informed, and culturally responsive strategies globally that may strengthen resilience, agency, and emotional well-being among girls while reducing inequities in mental health across the life course.

Cultural Context

The cultural and contextual diversity of study populations, from the U.S. to India, Liberia, and Iran, enhanced the generalizability of findings. Culturally adapted and trauma-sensitive MBIs, showed strong results among vulnerable populations, underscoring the value of tailoring interventions to participants' lived experiences. Longer-duration programs appeared to yield more sustained improvements in emotional well-being, while shorter programs demonstrated feasibility but may lack intensity for long-term change. Since MBIs have been practiced for centuries in the East and globally, more evidence or evaluations of such programs particularly given the situation for girls and women deserves much greater attention.

Methodological choices across studies reflected both the rigor and flexibility required to study MBIs in real-world contexts. RCTs were more commonly conducted in high-income countries with established research infrastructure and access to school-based samples. These studies typically involved universal or preventive interventions and emphasized broad psychosocial outcomes such as well-being and emotion regulation. In contrast, quasi-experimental and mixed-methods designs were more often used in studies

targeting high-risk or trauma-exposed youth, particularly in low- and middle-income countries. These methodological adaptations reflected ethical considerations, feasibility constraints, and the need to prioritize participant safety and contextual relevance over randomization.

Stigma and Access to Care

Stigma around mental health remains a key barrier to seeking, accessing and utilizing mental health services and MBIs, particularly among youth. Integrating MBIs into primary care and educational settings may reduce stigma and increase access. Moreover, well-being outcomes, such as improved self-esteem, self-efficacy, and reduced risky behaviors, were especially pronounced among girls, highlighting MBIs' potential to empower young women navigating adolescence.

Study Strengths and Limitations

This review offers several notable strengths. First, it addresses an important gap in the mindfulness literature by focusing specifically on adolescent girls and young women, a population that experiences disproportionately high rates of depression, anxiety, stress, and other internalizing mental health concerns, yet has received comparatively limited attention in mindfulness research. Second, the review synthesizes evidence from diverse racial, cultural, socioeconomic, and geographic contexts, including studies conducted in both high-income and low- and middle-income countries, enhancing the relevance and applicability of findings across settings. Third, the review examines a broad range of outcomes, including depression, anxiety, stress, emotional regulation, self-awareness, resilience, and emotional well-being, providing a multidimensional understanding of the potential effects of mindfulness-based interventions (MBIs). Finally, by examining intervention characteristics, participant populations, and contextual factors such as trauma exposure, developmental stage, and cultural setting, the review offers insights that may inform the design of more gender-responsive and developmentally appropriate mindfulness interventions.

Several limitations should also be acknowledged. First, substantial variability in intervention type, duration, intensity, delivery format, and implementation fidelity limited direct comparison across studies. Second, many studies relied primarily on self-report measures of mindfulness, mental health, and well-being, which may be subject to social desirability bias, recall bias, and other reporting limitations. Third, although this review focused on adolescent girls and young women, several included studies utilized mixed-gender samples and did not consistently report sex-disaggregated findings, limiting the ability to draw definitive conclusions regarding gender-specific intervention effects. Fourth, many studies included relatively small sample sizes and limited follow-up periods, restricting understanding of the long-term sustainability of intervention outcomes. Finally, because mindfulness was frequently delivered alongside complementary components such as yoga, counseling, psychoeducation, stress management, or other wellness activities, it was often difficult to isolate the independent effects of mindfulness practices alone.

Eight studies included mixed-gender samples and all reported sex-disaggregated analyses, with gender formally tested as a moderating or between-subjects factor in seven out of the eight

studies. However, the extent and consistency of sex-disaggregated reporting varied across studies; for example, some outcomes were disaggregated by sex while others were reported only for the sample as a whole, which may limit direct comparability of gender-specific effect sizes across studies. Therefore, conclusions regarding adolescent girls should be interpreted cautiously and viewed as indicative rather than definitive. Future studies should more consistently report gender-specific outcomes and explicitly use a gender equity framework to better understand differential intervention effects.

Implications for Policy and Practice

With consistent findings showing reductions in stress, anxiety, depression, and improvements in emotion regulation and well-being, MBIs warrant broader implementation across school, community, and juvenile justice settings. Importantly, MBIs were found to be particularly effective when tailored for high-risk or trauma-exposed populations and when culturally and developmentally adapted to their unique needs.

One promising pathway for expanding access to MBIs is through School-Based Health Centers (SBHCs). These centers have demonstrated significant capacity to reduce adolescent mental health issues, with female users significantly more likely to receive mental health counseling and report caring adult relationships within schools (Hodges et al., 2021). However, despite this potential, access remains limited. As of 2019, only 15.4% of adolescents aged 12–17 received mental health services in educational settings (SAMHSA, 2020). In 2022, 40% of U.S. schools lacked access to licensed mental health professionals, and more than half reported inadequate funding for mental health services (National Center for Education Statistics, 2022).

Given that half of all lifetime mental health conditions begin by age 14 (Kessler et al., 2005; NAMI, 2024), it is critical to expand early intervention programs, particularly MBIs, into schools, colleges, and other youth-centered environments. These interventions not only support resilience and emotional development but also help prepare students for the increased psychological vulnerability experienced during late adolescence and young adulthood (Connors et al., 2022). Thus, it is critical for policymakers and educational leaders to prioritize funding and infrastructure to support the integration of MBIs into existing school mental health systems. Training educators, school counselors, and youth workers in trauma-sensitive, gender-responsive mindfulness practices can further enhance impact and sustainability. Pairing MBIs with additional health services and primary care integration may reduce stigma and increase participation, particularly among boys and culturally diverse groups. Expanding access to MBIs in these ways has the potential to promote equitable, accessible, and preventive mental health care for a generation of adolescents at a critical stage of emotional and cognitive development.

Finally, given the disproportionate mental health burden experienced by adolescent girls globally, policymakers should prioritize equitable access to culturally responsive, trauma-informed, and gender-sensitive mindfulness programs within schools, community organizations, juvenile justice settings, and primary health care. Such investments align with broader goals of promoting gender equity, preventing violence, strengthening

resilience, and reducing mental health disparities across the life course.

Future Research Directions

Future research should explore how mindfulness-based interventions create change, particularly through self-awareness, body-based regulation, and social connectedness, and how these mechanisms are shaped by intervention type, culture, and developmental stage. There's also a need for neurobiological research to examine how MBIs impact brain structure and function, especially in adolescents, and how gender-specific brain development influences outcomes. Studies with larger, more diverse and contextualized samples, including youth and particularly girls from varied racial, cultural, and socioeconomic backgrounds globally, are critical. Understanding how stigma, trauma, and cultural norms affect engagement will help design more inclusive and effective MBIs. With stronger methods, longer follow-up, and integration of biological, social and cultural data, future research and evaluations must better determine how and for whom these interventions work best.

Additionally, several methodological limitations should be addressed in future research designs. First, the effectiveness of MBIs depends heavily on participant engagement and adherence. Previous research has reported substantial attrition rates across mindfulness studies, with one meta-analysis reporting average attrition rates of 24.7%, to 38.7% in larger trials (Linardon, 2023). Future research should examine factors that influence engagement, acceptability, and sustained participation among adolescent girls and young women.

Second, many studies rely primarily on self-report measures of mindfulness, stress, anxiety, depression, and well-being. While these measures provide valuable insights into participants' experiences, they are vulnerable to social desirability bias, recall bias, and subjective interpretation. Future studies should incorporate objective behavioral and physiological indicators, such as the Breath Counting Task (Levinson et al., 2014; Wong et al., 2018), heart rate variability, cortisol levels, and other neurobiological markers, to strengthen the validity of findings and improve understanding of the mechanisms through which mindfulness-based interventions influence mental health and well-being.

Third, although relatively few studies directly measured happiness or life satisfaction, improvements in emotional regulation, resilience, self-esteem, and psychological well-being suggest that MBIs may contribute to broader dimensions of positive mental health and flourishing. Future research should incorporate validated measures of happiness, life satisfaction, and flourishing, while examining the long-term impacts of sustained mindfulness practice across the life course of adolescent girls and young women.

And finally, future studies should examine how gender norms, structural inequities, discrimination, trauma exposure, and social determinants of health influence engagement with and effectiveness of mindfulness-based interventions among girls and women across the lifespan.

Conclusion

This scoping review provides consistent evidence that Mindfulness-Based Interventions (MBIs) are associated with

improvements in mental health and well-being of adolescent girls and young women, particularly symptoms of stress, depression, and anxiety. Positive effects were observed across diverse cultural, socioeconomic, and geographical settings and were especially pronounced among high-risk and trauma-exposed populations, where structured mindfulness programs provided accessible and meaningful strategies for emotional regulation, adaptive coping, and psychological support (see Table 2). Across the reviewed studies, stress reduction emerged as the most consistently improved outcome, followed by depression, anxiety, emotional regulation, and overall well-being; especially when interventions incorporated body-based practices like yoga and breathwork. Interventions incorporating yoga, mindful movement, and breathing practices appeared particularly promising for trauma-affected youth, underscoring the importance of tailoring intervention approaches to participants' developmental and contextual needs. While outcome variability existed across study designs and settings, the overall trend strongly supports MBIs as an evidence-informed strategy for addressing mental health concerns in youth.

Beyond synthesizing evidence on mental health outcomes, this review addresses an important gap in the literature by focusing specifically on adolescent girls and young women, a population that experiences unique developmental, social, and gender-related challenges yet remains underrepresented in mindfulness research. The findings suggest that intervention effectiveness may be influenced not only by mindfulness practices themselves, but also by factors such as trauma exposure, cultural context, delivery setting, and opportunities for sustained engagement. Together, these findings highlight the importance of gender-responsive and culturally relevant approaches when designing and implementing MBIs for youth.

As concerns surrounding adolescent mental health continue to increase globally, MBIs represent a promising, accessible, and potentially scalable strategy for promoting resilience, emotional well-being, and positive development among adolescent girls and young women; Careful attention to gender, trauma, and context will be essential for ensuring these interventions are not only effective but also equitable and inclusive. These findings point to the value of integrating MBIs into broader prevention and intervention frameworks, particularly in school-based, community, and clinical environments where adolescent girls are at increased risk for emotional distress. Continued investment in rigorous, longitudinal, and gender-responsive research will strengthen the evidence base and inform the integration of mindfulness into schools, healthcare systems, and community settings. By equipping girls and young women with lifelong skills for emotional regulation, self-awareness, and adaptive coping, mindfulness-based interventions have the potential to support not only reductions in psychological distress but also sustained mental health, well-being, and flourishing across the life course.

Compliance with Ethical Standards

Ethics Approval. This study did not involve human subjects or utilize individual, identifiable data. Therefore, an ethics approval statement is not applicable.

Consent Statement. This manuscript did not involve human participants, and therefore consent was not required.

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