The Impact of Mindfulness-Based Programs on Social Emotional Learning in U.S. Public Schools: A Systematic Literature Review

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Abstract

In response to the COVID-19 pandemic's adverse effects on youth mental health, U.S. public schools have increased efforts to support students' social, emotional, and mental well-being. This systematic literature review evaluates the impact of mindfulness-based programs (MBPs) in U.S. public schools on students' social-emotional learning (SEL) outcomes, specifically the five core competencies outlined by the Collaborative for Academic, Social, and Emotional Learning (CASEL): Self-Awareness, Self-Management, Social Awareness, Relationship Skills, and Responsible Decision-Making. A search for literature in PubMed, ERIC, and APA PsychInfo identified 17 studies that evaluate the impact of MBPs on these SEL competencies. The results found significant improvements in students' Self-Management and Relationship Skills. However, outcomes for Self-Awareness were inconsistent, and MBPs did not significantly impact the Social Awareness or Responsible Decision-Making domains. The RoBANS 2 tool assessed bias across the studies and revealed “high-risk” owing to the predominant reliance on self-reported outcomes assessments. These results indicate that while MBPs can effectively improve basic SEL competencies, thereby serving as a Tier 1 intervention in the MTSS school mental health framework, their application in improving complex emotional and cognitive domains requires further investigation with more rigorous evaluation methods. Future research using objective outcomes assessments can measure the effects of variations in MBP implementation and dose on all CASEL domains reflective of students' socioemotional development.

I. Introduction

The sudden unprecedented changes brought on by the COVID-19 pandemic have negatively impacted youth mental health, increasing both depression and anxiety symptoms (Madigan et al., 2023). Further, pandemic-related policies such as school closures, owing to imminent health and safety concerns, posed substantial challenges for public education in the United States. These COVID-19 educational disruptions adversely affected students, with over 80% of public schools in 2021-2022 reporting that the pandemic negatively impacted student behavior and socioemotional development (U.S. Department of Education, 2022). In response to this increased need for youth mental health support, U.S. public schools are prioritizing initiatives for students' social, emotional, and mental well-being. According to the U.S. Department of Education (2021), 86% of public schools encourage staff to address student well-being, with 59% offering teacher training and 46% establishing or expanding mental health programs.

Despite these efforts, 70% of schools reported needing additional training for socioemotional learning in 2022 (U.S. Department of Education, 2022a), highlighting the value in understanding what programs are effective in addressing the evolving needs of students in the post-pandemic period. While numerous programs targeting students' socioemotional development and mental health are available to educators, prior reviews of mindfulness-based programs (MBPs) delivered in schools have demonstrated evidence of supporting students in these areas (McKeering & Hwang, 2019; Mettler et al., 2023; Segal et al., 2021; Zenner et al., 2014). To better inform decision-makers on the ability of school-based MBPs to improve student mental health, this review examines the impact of MBPs in U.S. public schools on student socioemotional learning.

II. Background

Mindfulness Definitions

Originating in ancient Indian traditions, mindfulness is rooted in practices like "neti neti," a method of self-inquiry, and "dhyana," which encompasses meditation and contemplation. "Dhyana" serves as a central practice in Hinduism, Buddhism, Jainism, and Sikhism, emphasizing focused contemplation and meditation as pathways to self-realization and liberation from suffering, laying the foundation for modern Western conceptualization and applications of mindfulness (Singh, 2023). One of the earliest contemporary secular mindfulness programs is Dr. Jon Kabat-Zinn's widely popular Mindfulness-Based Stress Reduction (MBSR), created in 1979 at the University of Massachusetts Medical Center. This program defines mindfulness as the awareness that emerges from purposefully paying nonjudgmental attention to the present moment and the unfolding of experiences (Kabat-Zinn, 2003).

Building on the foundation laid by the success of the MBSR program, subsequent adaptations and applications of mindfulness have evolved. Still, most definitions of mindfulness emphasize two key aspects: anchoring attention to present moment experiences, which can encompass various sensations, emotions, thoughts, and perceptions; and adopting an open, accepting attitude towards these experiences, characterized by curiosity, detachment, and nonreactivity, inviting even challenging experiences without passive resignation (Creswell, 2017). Although mindfulness programs have been primarily studied within adult contexts, its application and study in youth has been on the rise for clinical and community-based settings. While the core principles of mindfulness programs tend to remain consistent, mindfulness practices can also be tailored to unique developmental stages across the life course which ensures their efficacy and relevance to youth populations (Porter et al., 2022).

Mindfulness Based-Programs in Schools

The integration and study of mindfulness-based programs (MBPs) in educational settings has surged since the early 2000s, yet evidence supporting their effectiveness among students in schools, while growing, remains relatively limited in volume and scope (Roeser et al., 2023). Although, prior research has identified how school-based MBPs can improve student mental health and socioemotional outcomes. For instance, systematic reviews and meta-analyses have shown medium effect sizes for outcomes like cognitive performance, resilience, and coping mechanisms (Zenner et al., 2014). Similar positive impacts have been observed in psychological functioning outcomes, including reduced internalizing symptoms and enhanced emotional regulation skills (McKeering & Hwang, 2019; Segal et al., 2021). Phan and colleagues (2022) conducted a comprehensive review of school-based MBPs, confirming high-quality evidence of improved prosocial behavior, resilience, attention, executive function, and mindfulness in students. They also identified strong support for reductions in anxiety attention, hyperactivity, and problematic conduct; however, high-quality evidence for overall well-being was mixed, with some studies showing improvement and others showing no change (Phan et al., 2022).

While promising, the evidence demonstrating the effectiveness of MBPs among students in educational settings is still emerging, and there has been a lack of consistency and understanding of what specific elements of MBPs in schools are truly driving these positive outcomes. Although, in 2022 Felver et al. published the results of a two-year long Delphi consensus process involving expert MBP scientists and instructors to determine the core program components of MBPs in youth populations. Their findings delineated crucial elements (e.g., self-awareness, non-judging, focused attention, orienting to the present moment, acceptance, compassion, somatic awareness, non-reacting, and decentering), underscoring essential facets vital for the efficacy of MBPs tailored specifically for youth (Felver et al., 2023).

Connections between Student's Social Emotional Learning and MBPs in Schools

Social emotional learning (SEL) is a longstanding practice in educational settings focused on implementing evidence-based programs, methods, and policies to equip students and educators with the necessary knowledge, skills, and attitudes to manage emotions and promote positive social interactions (Weissberg et al., 2015). The nonprofit educational organization Collaborative for Academic, Social, and Emotional Learning (CASEL) has developed a widely adopted framework for social-emotional learning (SEL) in schools, emphasizing five core areas (see Table 1 for a breakdown of constructs): Self-Awareness, Social Awareness, Self-Management, Relationship Skills, and Responsible Decision-Making (Collaborative for Academic, Social, and Emotional Learning, 2023). This framework is utilized by numerous state departments of education, serving as a foundational guide for the establishment of their statewide SEL standards (Collaborative for Academic, Social, and Emotional Learning, 2023).

Despite the fundamental similarities between the objectives of SEL and MBPs in schools, little work has been done to explicitly and concretely link the two distinct yet interrelated concepts. However, Feuerborn and Gueldner (2019) conducted a preliminary review to qualitatively investigate the link between MBPs in schools and the CASEL framework. Their findings revealed a strong conceptual alignment between school MBPs and SEL competencies. Constructs from all five CASEL competency areas were identified in the reviewed studies, with Self-Management emerging as the most frequently addressed competency. However, this exploratory research did not assess study quality or results to determine the extent to which MBP constructs in each SEL competency generated robust outcomes (Feuerborn & Gueldner, 2019).

Alignment with Social-Ecological Framework and Approaches to School Health

Finally, it is crucial to emphasize the coherence between integrating MBPs into educational settings and the socioecological perspective of promoting health in schools underpinning several prominent national school health frameworks. In the context of school health frameworks, such as the CDC Whole School, Whole Community, Whole Child (WSCC) framework, social and emotional climate is included as a key component. This WSCC framework emphasizes a holistic student-centered approach to fostering well-being in schools through promoting a social-ecological perspective of children's health (Centers for Disease Control and Prevention, 2023).

The multitiered systems of supports (MTSS) is a general framework employed in schools for organizing efficient and effective service delivery that also utilizes an ecological approach. Tier 1 encompasses universal services offered to all students, Tier 2 provides targeted services to those who do not respond sufficiently to Tier 1 interventions, and Tier 3 delivers intensive services to students requiring additional support for academic success (Stoiber & Gettinger, 2016). The Substance Abuse and Mental Health Services Administration's guidelines on Advancing Comprehensive School Mental Health Systems recommends implementing MTSS for mental health support and suggest that MBPs could serve as promising Tier 1 intervention in schools (Substance Abuse and Mental Health Services Administration, 2019).

Study Aims

The specific aims of this review correspond to the following overarching research question: "What is the impact of mindfulness-based programs in primary and secondary U.S. public school settings on social-emotional learning outcomes, specifically Self-Awareness, Self-Management, Social Awareness, Relationship Skills, and Responsible Decision-Making, according to the Collaborative for Academic, Social, and Emotional Learning framework?"

Aim 1: Conduct a systematic literature review on the impact of MBPs in K-12 public-school settings in the U.S. Primary outcomes of interest of the review include those relevant to the social-emotional competency areas of the CASEL framework—Self-Awareness, Self-Management, Social Awareness, Relationship Skills, and Responsible Decision-Making. The secondary outcomes focus on synthesizing insights from the primary outcomes to assess the overarching effectiveness of MBPs on overall SEL in U.S. public school students.

Aim 2: Evaluate the methodological rigor of the included studies using the RoBANS 2 tool to determine the strength of the body of evidence for MBPs impact on socioemotional learning outcomes in U.S. public school students.

III. Methods

Search Strategy

A systematic literature search was conducted in February 2024 in three different databases—PubMed, ERIC, and APA PsychInfo—to identify articles for inclusion in this review. All searches included the following terms: (mindful* OR meditat* OR yoga OR "breath* technique" OR "mindfulness based stress reduction" OR MBSR OR "non-judgmental awareness" OR "present-moment") and (evaluation OR intervention OR treatment OR outcome OR program OR trial OR experiment OR "control group" OR "controlled trial" OR "quasi-experiment*" OR random*) and (“educational settings” OR "school settings" OR "public school" OR "elementary school" OR "primary school" OR "high school" OR "secondary school" OR "middle school" OR kindergarten) and ("United States" OR US). This search strategy aimed to cast a wide net, ensuring the initial capture of the most relevant articles for subsequent screening and selection.

Eligibility Criteria

This systematic literature review followed specific selection criteria. Eligible studies employed a peer-reviewed Randomized Controlled Trial (RCT) design or quasi-experimental pre-post design with a well-defined comparison group. The program was required to focus on cultivating mindfulness in students, and the study had to report at least one outcome variable relevant to the five CASEL social-emotional learning competency areas: Self-Management, Self-Awareness, Responsible Decision-Making, Relationship Skills, and Social Awareness (Table 1). Finally, the studies were required to be conducted with students in grades Kindergarten through 12, enrolled in a traditional U.S. public school, and not identified as having any specialized educational or mental health needs.

Study Selection

Figure 1 depicts a PRISMA flow diagram representing the selection process for studies in this review. The three database searches resulted in the identification of 469 articles that were subsequently uploaded to Covidence, a web-based collaboration software platform for systematic literature reviews. Upon the removal of 49 duplicate articles, 420 total articles were first screened for inclusion by a scan of titles and abstracts by two reviewers (VM and PJ) who were public health graduate students. This initial screen produced fair inter-rater agreement, with a Cohen's Kappa value of 0.51 (Fleiss et al., 2003), and led to the exclusion of 371 articles. Subsequently, both reviewers independently assessed 49 full text articles based on predefined screening criteria. From these 49 articles, 31 articles were excluded in the full-text review. This second full-text review resulted in a higher Kappa value of 0.59. Any discrepancies were resolved through discussions to minimize the risk of bias in study selection. Overall, the literature screening process resulted in 17 articles that met inclusion criteria for final analysis.

Data Extraction and Synthesis

Reviewers extracted all relevant data from the 17 included studies using pre-determined, structured forms. Recorded details included the following information: study methodology, the components of the MBP intervention, the treatment and control groups employed, and measurement and effect size of any CASEL competencies included in outcomes assessments. Foundational research by Feuerborn and Gueldner established a clear conceptual link between outcomes reported in MBP studies and how they map on to CASEL competencies (Feuerborn & Gueldner, 2019). Table 2 in their study, titled 'SEL competency constructs measured and studies coded,' was utilized alongside construct definitions provided by CASEL (see Table 1), to guide the classification of MBP outcomes across studies into their corresponding CASEL domain.

Additionally, a previously validated Risk of Bias Assessment Tool for Nonrandomized Studies (RoBANS 2) (Seo et al., 2023) for both random and non-random study designs was applied to the included studies in this review. The RoBANS 2 tool has shown acceptable feasibility, fair to moderate reliability, and construct validity in measuring the level of study bias in key areas including confounders, measurement of intervention/exposure, blinding of assessors, outcome assessment, incomplete outcome data, and selective reporting of study outcomes (Seo et al., 2023). To visually represent the risk of bias assessments, the open-source R “robvis” tool was used to create the traffic light plot shown in Figure 2 (McGuinness & Higgins, 2021). Finally, the synthesis of extracted data employed a thematic analysis process to explore the factors that may influence the success of MBPs at enhancing SEL in U.S public schools, aiming to identify recurring patterns and themes across the extracted studies as well as significant outcomes related to the social-emotional development of students.

Outcomes of Interest

This review specifically examines the impact of MBPs on the five core competencies outlined by CASEL. These competencies serve as the primary outcomes of interest and exhibit a progression in complexity across each level. Starting with Self-Awareness, students learn to understand their own emotions, thoughts, and values along with their impact on behavior. Self-Management shifts to regulating these emotions, thoughts, and behaviors to achieve personal and academic goals. Next, Social Awareness extends students' understanding to include the perspectives and cultural backgrounds of others, with an emphasis on fostering empathy. Relationship Skills then develops students' ability to form and maintain healthy relationships through promoting positive communication and interpersonal skills. The most complex domain, Responsible Decision-Making, requires students to apply all previous skillsets to make informed and thoughtful decisions about personal and social behavior in various contexts. This structured increase in complexity ensures that each competency builds on the last, highlighting their utility in the understanding the socioemotional development of U.S. public school students.

Results

Study Characteristics

Among the 17 studies reviewed, nine were randomized controlled trials, while eight used a quasi-experimental pretest-posttest design with a comparison group. All studies were conducted in the U.S. and represent a range of urbanicity and geographic locations. Ten total studies were among urban schools: three studies in northeastern schools (Bergen-Cico et al., 2015; Felver et al., 2023; Sibinga et al., 2016), one study in a southeastern school (Thierry et al., 2022), four studies at schools in Western states (Keller et al., 2017; Napoli et al., 2005; Quach et al., 2016; Wendt et al., 2015), and two studies in Midwestern schools (Bakosh et al., 2016; Flook et al., 2024). One study was conducted in a rural school in the southeast (Parker et al., 2014). The

remaining six studies were conducted in suburban schools: four in the northeast (Campbell, 2015; Frank et al., 2021; Metz et al., 2013; Salmoirago-Blotcher et al., 2019), one in the southwest (Meyer & Eklund, 2020), and one in California (Bleasdale et al., 2019). Student grade levels also varied across the studies: seven studies in K-5 schools, three studies in middle schools, and seven studies were in high schools.

The same MBPs were employed across multiple studies in this review. Five studies utilized adapted versions of Kabat-Zinn's MBSR program, where core components of body-scan exercises, mindful breathwork, bodily awareness, and integrating mindfulness into everyday life were altered to fit the setting and context of the studies (Bakosh et al., 2016; Flook et al., 2024; Meyer & Eklund, 2020; Quach et al., 2016; Salmoirago-Blotcher et al., 2019; Sibinga et al., 2016). Additionally, the "Master Mind" (Parker et al., 2014), "Mindful Moments" (Meyer & Eklund, 2020), and ".b" (Campbell, 2015) programs also drew from MBSR principles.

Three studies utilized the "Learning to BREATHE" (L2B) program (Felver et al., 2019; Frank et al., 2021; Metz et al., 2013), which consists of six themes centered around the "BREATHE" acronym, addressing the core topics of bodily awareness, reflections, emotions, attention, tenderness, healthy mind habits, and self-empowerment. Finally, two studies examined the impact of the Maharishi Foundation's "Transcendental Meditation" (TM) school based "Quiet Time" program (Bleasdale et al., 2019; Wendt et al., 2015) which utilizes a mantra-based meditation technique. The remaining studies employed a variety of other MBPs that slightly varied in their approach and application to school contexts. Finally, five out of the 17 studies measured student mindfulness directly as an outcome, all of which employed the Greco et al. (2011) Child and Adolescent Mindfulness Measure (CAMM) (Frank et al., 2021; Keller et al., 2017; Meyer & Eklund, 2020; Quach et al., 2016; Sibinga et al., 2016).

CASEL Competency Coverage across MBP Studies Reviewed

Among the 17 studies reviewed, all but one (Meyer & Eklund, 2020) assessed outcomes relevant to the Self-Management CASEL construct (n = 16). The next most frequently evaluated competency was Self-Awareness (n = 8). Then, Social Awareness and Relationship Skills (n = 3), and Responsible Decision-Making (n = 2) were the least examined. Detailed information on these studies, including authors, MBP type, study designs, sample sizes, settings and instructors, specific outcomes, measurement tools, and the significance of results, is systematically presented across Tables 2 to 6, grouped by the five CASEL constructs, which can be found in the appendix.

Impact of MBPs on Self-Awareness Outcomes in Students

Among the eight studies including outcomes related to Self-Awareness, three found statistically significant self-awareness outcomes, the details of which are comprehensively cataloged in Table 2. Studies where no significant results were reported include: Meyer and Eklund (2020) who observed no difference in mindfulness, Keller et al. (2017) finding no improvements in mindfulness or emotion awareness, Frank et al. (2021) reported no changes in student mindfulness, self-compassion, or growth mindset, and Bleasdale et al. (2020) whose TM program did not impact student self-esteem. Finally, Quach et al. (2016) excluded the CAMM mindfulness measure due to poor reliability in their sample.

It is critical to also highlight the studies that report significant impacts of MBPs on students' Self-Awareness outcomes. Sibinga and colleagues (2016) evaluated an adapted 12-week MBSR program aiming to mitigate the effects of stress and trauma among 300 middle schoolers. The intervention significantly decreased negative affect and an improved psychological symptoms including depression, however it did not significantly change mindfulness (Sibinga et al., 2016). Metz et al. (2013) implemented the L2B program over 16

weeks within high school choir courses and report a significant medium to large effect on affective self-regulatory efficacy, indicating enhanced emotional regulation among participants. The students' high levels of satisfaction with the program also underscored the value they found in the principles of acceptance that were taught (Metz et al., 2013). Finally, the Settle Your Glitter program, implemented over the course of a school year, saw significant improvements in elementary student's emotion recognition capabilities (Thierry et al., 2022).

Impact of MBPs on Self-Management Outcomes

Self-management outcomes were assessed in 16 of 17 total studies (see Table 3 for detailed breakdown), with 12 studies demonstrating statistically significant improvements in this area. The four studies with no significant results included Bleasdale et al. (2020), who reported no effect on resilience, and Campbell et al. (2019), who observed no significant improvements in well-being or emotion regulation among high school students. In elementary schools, Thierry et al. (2022) found no changes in self-control, while Keller et al. (2017) noted no significant improvements in neither attention nor working memory. Aside from these outcomes, the broader evidence suggests a strong trend of efficacy for MBPs in enhancing student's self-management skills. The following paragraphs detail the 12 studies that reported statistically significant results, illustrating how MBPs can improve students' ability to manage emotions, thoughts, and behavior.

Felver and colleagues (2019) conducted an RCT of the Learning to BREATHE (L2B) program in a New York high school, finding significant improvements on psychosocial resiliency but no change in problem behaviors. A second RCT of the L2B program found significant increases in emotional awareness, goal-directed behavior, attention, and working memory for high schoolers (Frank et al., 2021). A third quasi-experiment assessing the L2B

program among choir courses in a Pennsylvania high school found significant increases in student's emotional regulation, including emotional clarity and awareness (Metz et al., 2013).

Several other studies highlight the efficacy of various MBPs in enhancing student self-management. For example, Sibinga et al. (2016) found that students from two predominantly African American, low-income middle schools in Baltimore exhibited significant improvements in coping mechanisms accompanied by reductions in rumination and self-hostility. Similarly, Bergen-Cico et al. (2015) report significantly improved self-regulation in 6th grade students involved in the MBP, contrasted with the comparison group who saw a decline in scores over the academic year. Behavior regulation and executive functioning (EF) improved while aggression and social issues decreased among rural elementary school students participating in the Master Mind program (Parker et al., 2014). Further supporting these findings, Flook et al. (2024) identified significant increases in cognitive flexibility EF skills among 5th grade students.

Finally, Wendt et al. (2015) significantly increased high school students' resilience through the Quiet Time TM program, although no change was observed in self-control. However, both Bakosh et al. (2016) with their MBSEL program and Napoli et al. (2005) with the Attention Academy Program found significant decreases in student's disruptive classroom behavior, with Napoli et al. reporting improvements in attention and social skills among urban elementary school students. Moreover, Quach et al. (2016) found enhanced working memory among junior high school students, and Salmoirago-Blotcher et al. (2019) significantly reduced impulsivity scores in high schoolers following an adapted 8-week MBSR program.

Impact of MBPs on Social Awareness Outcomes

Outcomes relevant to Social Awareness were included in three out of the 17 studies, none of which demonstrated significant improvements. In fact, the study by Thierry et al. (2022)

found that the "Settle Your Glitter" program did not yield the expected results in elementary student's social perspective taking skills. Instead, the comparison group where teachers worked with a literacy coach to enhance their use of strategies that engage students' comprehension of story characters' points of view, significantly outperformed the MBP group. The authors hypothesized that the active control's specific emphasis on student's understanding of literary characters' perspectives likely led to its stronger impact on social awareness outcomes (Thierry et al., 2022). Among high school students, Frank et al. (2021) found no change in social connectedness from the L2B program, and Wendt et al. (2015) report that the TM program had no impact on student's emotional intelligence. A comprehensive summary of the study outcomes related to Social Awareness is provided in Table 4.

Impact of MBPs on Relationship Skills Outcomes in Students

The fourth CASEL competency area, Relationship Skills, was addressed in only three of the 17 studies in this review. All three were conducted in public elementary schools and report at least one statistically significant finding relevant to the development of students' relationship skills. The Mindful Moments program by Meyer and Eklund (2020) significantly improved classroom climate through an increase in satisfaction and reduction in friction, although it did not impact competition and cohesion among students. Similarly, Thierry et al. (2022) observed a modest but significant improvement in social problem-solving abilities resulting from the Settle Your Glitter program. Adding to these findings, Flook et al. (2024) documented a significant improvement in teacher assigned SEL grades, reflecting students' improved management of behavior and interactions with peers. However, this adapted MBSR program found no impact on teacher-assessed social competence of students (Flook et al., 2024). A breakdown of these studies and their outcomes for Relationship Skills can be found in Table 5.

Impact of MBPs on Responsible Decision-Making Outcomes in Students

The final and most complex CASEL domain, Responsible Decision-Making, was the least examined with only two studies reporting no statistically significant results. In the Master Mind program, elementary students did not exhibit any change in their intentions to use alcohol or tobacco (Parker et al., 2014). Similarly, no significant outcomes were found for high school student's substance use or risk-taking behaviors following the L2B program (Frank et al., 2021). A more detailed overview of these two studies and their outcomes is presented in Table 6.

Risk of Bias Assessment (RoBANS 2)

A comprehensive overview of the risk of bias for the 17 studies in this review is presented in 'Risk of Bias Assessment Traffic Light Plot' under Figure 2, which illustrates the degree of bias across the eight domains of the RoBANS 2 tool. A traffic light plot is commonly utilized to visualize risk-of-bias across studies in a review by displaying the risk level (low, unclear, high) for each domain of bias as green, yellow, or red, respectively to provide a quick and intuitive overview of the included study's methodological rigor (McGuinness & Higgins, 2021). This visualization approach aligned well with the RoBANS 2 assessment tool, which categorizes each of the eight domains by the same 'low,' 'high,' or 'unclear' risk rankings. Of the 17 studies reviewed, nine were categorized as having a high risk of bias, three were assessed as unclear, and five were deemed to have an overall low risk of bias.

Despite all studies employing strong research designs, either RCTs or quasi-experimental pre-posttests with a comparison group, significant challenges were noted in the RoBANS 2 domains of 'Measurement of Intervention/Exposure,' 'Blinding of Assessors,' and 'Outcome Assessment.' These domains proved to be the most problematic, with high risk assessments noted in eight and nine out of the 17 studies, respectively. Many of these challenges stem from the

inherent complexities of evaluating the impact of MBPs on student socioemotional development in school settings. More objective measures such as teacher assessments were utilized less frequently, and often the teachers responsible for implementing MBPs also conducted these assessments, which prevents effective blinding. A common issue observed across many studies was the heavy reliance on solely self-reported measures for assessing the five CASEL domains. Given the personal nature of evaluating outcomes related to student social-emotional learning and development, these measures do offer valuable insights. However, they are inherently subjective and can introduce bias, especially when students are aware that their responses impact the assessment of the MBP in which they are participating. Thus, achieving a 'low' risk of bias in these critical areas was particularly challenging for many studies included in this review.

IV. Discussion

Impact of MBPs on SEL in U.S. Public Schools

The foundational CASEL competency, Self-Awareness, was assessed in eight of 17 studies, although only 37.5% (n = 3) reported statistically significant outcomes for this domain. An important factor to consider in interpreting these findings is the reliability of the measurement instruments used across studies. Specifically, the Child and Adolescent Mindfulness Measure (CAMM) was used to assess student's mindfulness across all five studies including this outcome, however no results were found to be significant. The CAMM was excluded from analysis in the study by Quach et al. (2016) where they found unacceptable internal consistency ($\alpha = .41$) with this tool in their sample of predominantly Hispanic low-income middle schoolers. This is notable considering that the CAMM was initially tested and validated in a predominantly Caucasian sample (Greco et al., 2011), and the subsequent lack of significant findings in the other four studies, which also focused on diverse low-income students,

may reflect an issue with the CAMM's ability to measure mindfulness this population. The uniform absence of significant mindfulness outcomes in more diverse student populations suggests a gap in the measure's cross-cultural and socio-economic sensitivity may exist.

For Self-Management outcomes, given that 75% (n = 12) of the 16 studies assessing this CASEL competency reported statistically significant outcomes, MBPs appear to be a promising approach in schools for enhancing students' emotional and behavior management skills. This trend suggests that mindfulness interventions can be effectively integrated into U.S. public school educational curricula to improve students' regulation of their emotions, thoughts, and behaviors, which are pivotal to their socioemotional development. The varied educational contexts and MBP types contributing to these positive outcomes also indicate a flexible applicability across diverse public-school settings and student age groups.

Far fewer studies of MBPs in U.S. public schools reported on the higher-level CASEL competencies of Social Awareness, Relationship Skills, and Responsible Decision-Making. This is line with prior foundational research that also identified Self-Management as the most represented domain, with relevant outcomes in all 40 articles included in the study, followed by Self-Awareness (n = 18), Relationship Skills (n = 15), Responsible Decision-Making (n = 3), and lastly, only two articles related to Social Awareness outcomes (Feuerborn & Gueldner, 2019). In the current review, the three studies including outcomes relevant to Social Awareness and the two relating to Responsible Decision-Making did not report any significant findings, yet at least one Relationship Skills outcome across the three relevant studies were statistically significant. This suggests that MBPs may be more effective for supporting student's basic social-emotional learning, such as managing thoughts, emotions, and behavior, along with healthy relationship skills, rather than improving social awareness or the ability to make responsible decisions.

The study by Thierry et al. (2022) exemplifies this, demonstrating that the Settle Your Glitter program did not significantly enhance social perspective-taking, whereas the literacy-based active control group did. Teachers in the active control group received monthly literary training on strategies for enhancing student's understanding of story characters' viewpoints and reported improvements in social perspective taking, suggesting that interventions more targeted at this area may be better suited for fostering social awareness than MBPs (Thierry et al., 2022). The significant outcomes in all three relevant studies for Relationship Skills, along with Feuerborn & Gueldner (2019) finding far less representation for representation for Social Awareness outcomes compared to Relationship Skills, also suggests a disparity in the ability to capture these SEL competencies. Unlike Relationship Skills' outwardly observable behaviors, Social Awareness involves more internalized processes like empathy, which may require longer interventions or more sophisticated tools to effectively measure. Considering these implications, the results supporting MBPs' efficacy in foundational SEL domains suggest they hold promise as effective Tier 1 interventions within the MTSS framework to broadly support all students' mental health and socioemotional development in U.S. public school settings. This is in alignment with the 2019 SAMHSA recommendations for advancing comprehensive school mental health systems, which suggest that MBPs could serve as a promising Tier 1 MTSS intervention for students (Substance Abuse and Mental Health Services Administration, 2019).

While school-based MBPs demonstrate positive outcomes, particularly in enhancing students' Self-Management and Relationship Skills, it is also vital to note concerns around the implementation of these programs. Specifically, the commercialized nature of Transcendental Meditation (TM) and its educational adaptation warrants attention. It is known that TM utilizes a mantra-based meditation technique, although specific program details remain largely undisclosed

until after enrollment fees are paid. Such gatekeeping raises questions about the transparency and motivations behind the adaptation of a traditional meditative practice for educational settings. It also starkly contrasts with the ethos of contemporary mindfulness programs that aim to make centuries-old knowledge and wisdom more approachable and broadly accessible for all.

Limitations

There are various limitations of this systematic literature review. For example, the external generalizability of findings is primarily limited by the review's narrow focus on U.S. public school students and studies employing RCTs or quasi-experimental designs with control groups. Such specificity may have excluded valuable quantitative and qualitative insights from less rigorously designed studies, along with those conducted in different educational or cultural settings. By restricting inclusion to peer-reviewed articles, the review may have also missed relevant information available in gray literature. Moreover, focusing on student SEL outcomes resulted in a missed opportunity to explore how MBPs in U.S. public schools may support the mental health and well-being of public educators who have also faced intense occupational challenges due to the COVID-19 pandemic. These limitations suggest that while the findings provide valuable insights into the effectiveness of MBPs on U.S. public school students' SEL, they do not capture the potential impact of MBPs on the broader educational environment or across varied cultural and educational contexts beyond student-specific outcomes.

Recommendations for Future Research

Many limitations in the body of research on school-based MBPs impact on student's socioemotional development are revealed by this review and help illuminate future research directions. More comprehensive tools for assessing student outcomes pertaining to the five CASEL domains are needed, reflected in the fact that the CAMM showed no significant

outcomes and had poor reliability among minority and low-income students in this review. This reflects a potential need for the development and validation of more culturally sensitive SEL assessment tools. The risk of bias assessment also highlighted a heavy reliance on self-report measures for SEL outcomes across studies; future MBP research should balance this with more objective assessment methods whenever possible. Finally, several of the reviewed articles called for longitudinal studies and specific dosage analyses to determine how variations in the frequency, duration, and intensity of MBPs impact students across various developmental levels. Fully understanding these variables will help optimize MBPs in U.S. public schools to better align with the evolving psychological and emotional needs of students at different educational levels and in turn, produce the most beneficial outcomes on student socioemotional development.

Conclusions

This systematic literature review revealed that while MBPs were able to significantly improve Self-Management and Relationship Skills among students in the included studies, they were less effective for Self-Awareness, Social Awareness, and Responsible Decision-Making outcomes in U.S. public school students. These varying outcomes warrant further investigation of dose factors so that the design and delivery of MBPs in schools can be optimized to achieve the greatest impact across all CASEL domains. Although, the demonstrated impact of MBPs in enhancing foundational SEL competencies like Self-Management and Relationship Skills suggests their promise as effective Tier 1 MTSS interventions in U.S. public schools to broadly support all students' mental health and socioemotional learning. Future research in this area should prioritize developing both school-based MBPs and SEL measurement tools that are well-validated in diverse demographics as a crucial step to promote equity and ensure that research in this area accurately reflects the impact of MBPs on student SEL across U.S. public schools.

V. Appendix

Figure 1. Selection of Studies for Review PRISMA Flow Diagram

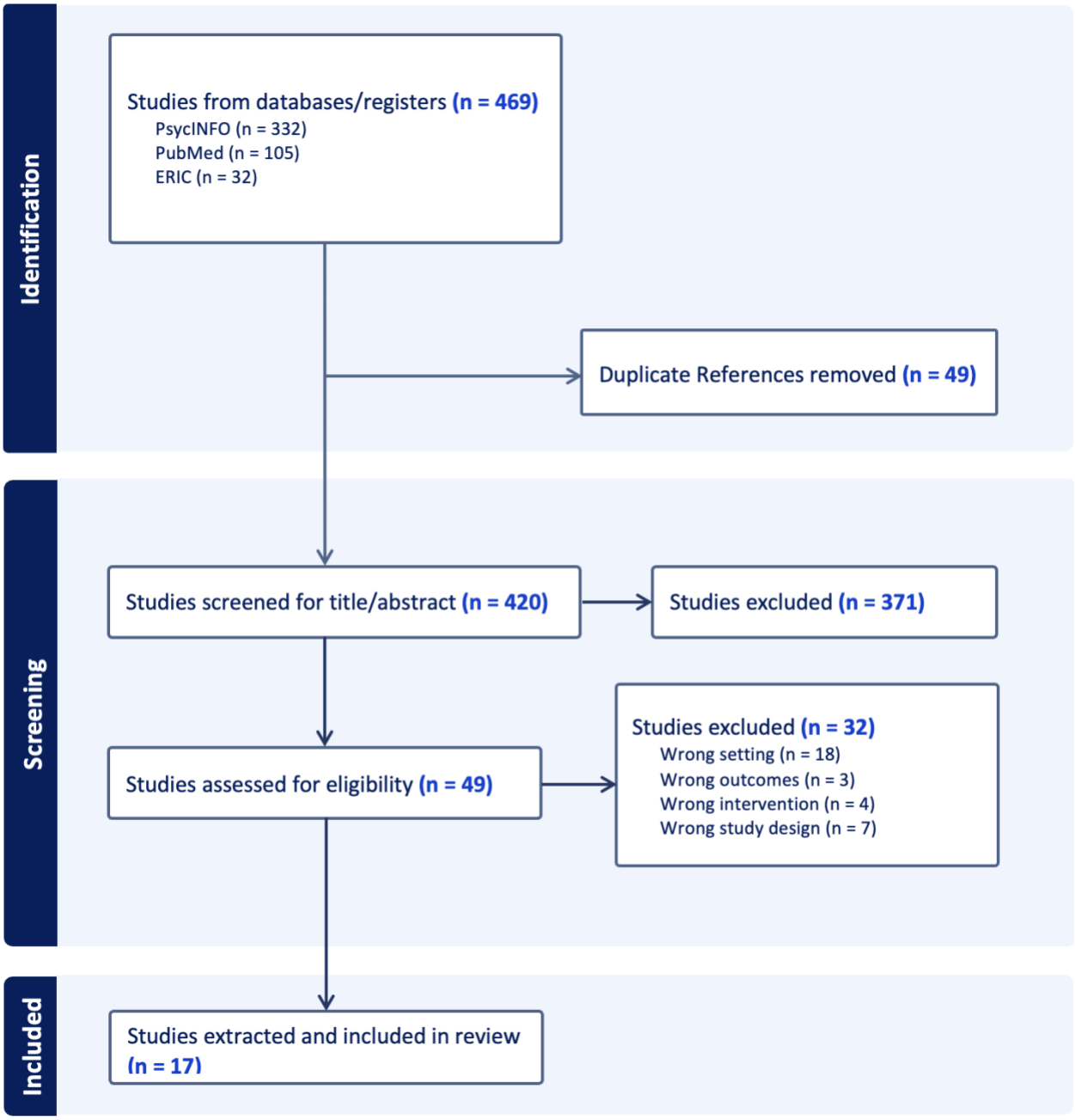

Figure 2. Risk of Bias Assessment Traffic Light Plot

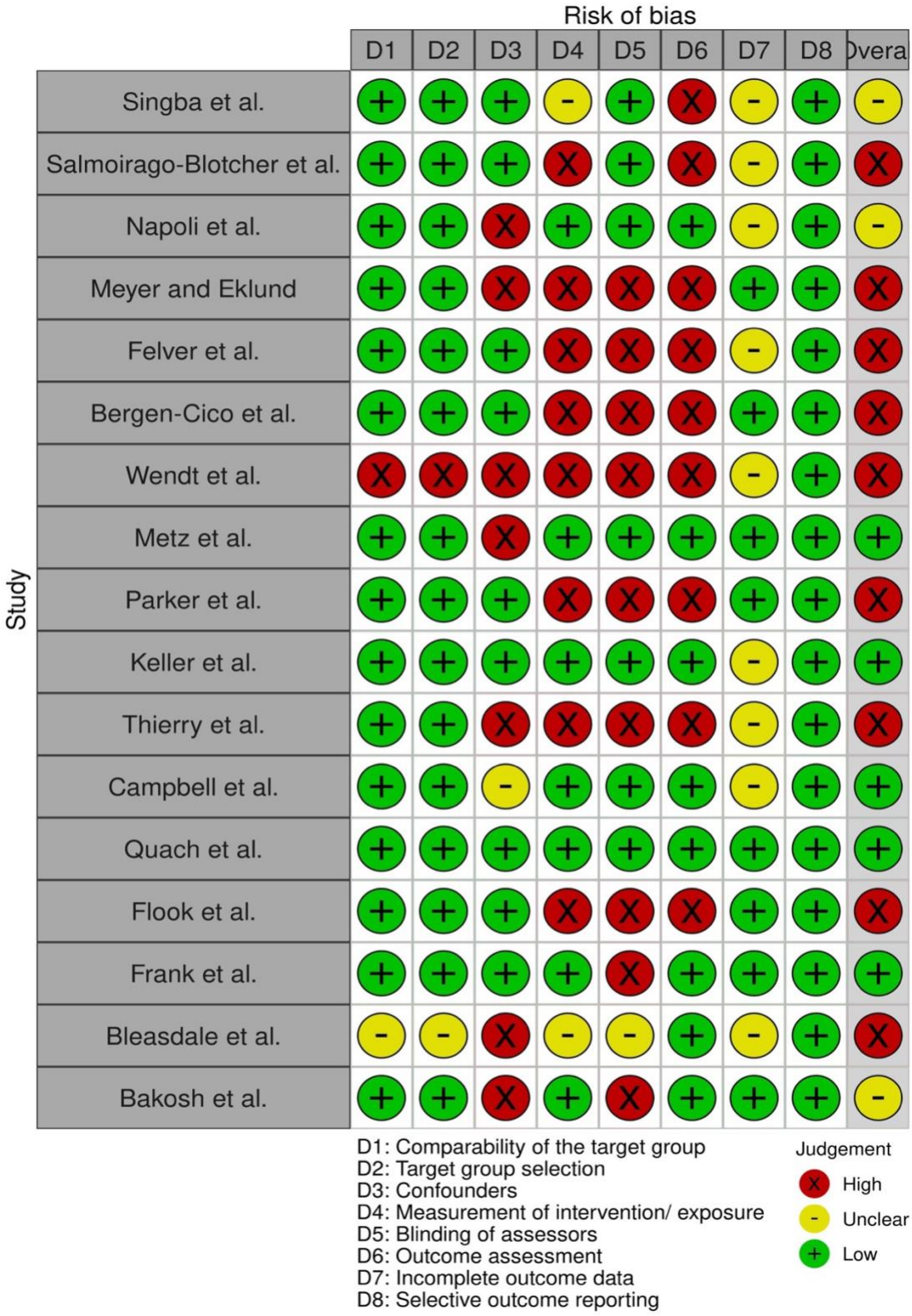

Table 1. Social Emotional Learning Domains as outlined by CASEL

Social Emotional Learning Domain	Definition	Example Skills
Self-Awareness	The abilities to understand one's own emotions, thoughts, and values and how they influence behavior across contexts.	1. Integrating personal and social identities 2. Identifying personal, cultural, and linguistic assets 3. Identifying one's emotions 4. Demonstrating honesty and integrity 5. Linking feelings, values, and thoughts 6. Examining prejudices and biases 7. Experiencing self-efficacy 8. Having a growth mindset 9. Developing interests and a sense of purpose
Self-Management	The abilities to manage one's emotions, thoughts, and behaviors effectively in different situations and to achieve goals and aspirations.	1. Managing one's emotions 2. Identifying and using stress management strategies 3. Exhibiting self-discipline and self-motivation 4. Setting personal and collective goals 5. Using planning and organizational skills 6. Showing the courage to take initiative 7. Demonstrating personal and collective agency
Social Awareness	The abilities to understand the perspectives of and empathize with others, including those from diverse backgrounds, cultures, and contexts.	1. Taking others' perspectives 2. Recognizing strengths in others 3. Demonstrating empathy and compassion 4. Showing concern for the feelings of others 5. Understanding and expressing gratitude 6. Identifying diverse social norms, including unjust ones 7. Recognizing situational demands and opportunities 8. Understanding the influences of organizations and systems on behavior
Relationship Skills	The abilities to establish and maintain healthy and supportive relationships and to effectively navigate settings with diverse individuals and groups.	1. Communicating effectively 2. Developing positive relationships 3. Demonstrating cultural competency 4. Practicing teamwork and collaborative problem-solving 5. Resolving conflicts constructively 6. Resisting negative social pressure 7. Showing leadership in groups 8. Seeking or offering support and help when needed 9. Standing up for the rights of others

Responsible Decision-Making	The abilities to make caring and constructive choices about personal behavior and social interactions across diverse situations	1. Demonstrating curiosity and open-mindedness 2. Learning how to make a reasoned judgment after analyzing information, data, and facts 3. Identifying solutions for personal and social problems 4. Anticipating and evaluating the consequences of one's actions 5. Recognizing how critical thinking skills are useful both inside and outside of school 6. Reflecting on one's role to promote personal, family, and community well-being 7. Evaluating personal, interpersonal, community, and institutional impacts

Table 2. Self-Awareness Outcome Measures

Study Reference	MBP Type	Study Design Sample Size	Setting and Instructor	Outcome and Measurement Tools	Significant Results
Self-Awareness					
Sibinga et al., 2016	Adapted 12-week MBSR program	Randomized Controlled Trial (RCT) – individual students randomized. Intervention: 159 Control: 141	2 public middle schools in Baltimore, Maryland. Not taught by classroom teachers, MBP led by two MBSR certified instructors.	1. Mindfulness: The Child and Adolescent Mindfulness Measure (CAMM) 2. Affect: Positive and Negative Affect measured using the Positive and Negative Affect Schedule (PANAS).	Negative affect significantly decreased in the intervention group $\beta = -0.19$ ($p = 0.003$) No significant results for mindfulness were reported.
Meyer and Eklund, 2020	Mindful Moments Intervention (curriculum based on MBSR)	Quasi-experimental pre-posttest. Intervention: 7 classrooms Comparison: 7 classrooms	2 public elementary schools (4^{th} and 5^{th} grade). Class teachers were trained to deliver MBP to students.	Mindfulness: The CAMM	No significant main effect for time or condition (pre- vs post-intervention) was found for mindfulness skills.
Metz et al., 2013	Learning to BREATHE program	Quasi-experimental pre-posttest. Intervention: 129 Comparison: 87	2 public high schools in suburban Philadelphia, Pennsylvania. Teacher who implemented MBP attended an 8-week MBSR program	Self-Efficacy in Emotion Regulation: Affective Self-Regulatory Efficacy Scale (ASRES)	A significant medium-large effect size, Cohen's d = 0.62, was reported for affective self-regulatory efficacy.
Keller et al., 2017	Intervention Components grounded in the	Randomized Controlled Trial (RCT) –	One urban public elementary school in the southwest	1. Mindful attention/ awareness: The CAMM	No results for mindful attention or emotion awareness

	work of Saltzman (2004)	individual students randomized Intervention: 28 Control: 13	U.S. (4th grade). Co-taught by trained classroom teacher and first author who was experienced in mindfulness.	2. Emotion Awareness: The Emotion Awareness Questionnaire (EAQ)	reached statistical significance.
Thierry et al., 2022	Settle Your Glitter program	Quasi-experimental pre-posttest. Intervention: 14 classrooms Comparison: 14 classrooms	2 elementary schools in an unnamed southeastern U.S. city. Delivered by classroom teachers who were trained.	Emotion Recognition: SELweb Early Education Assessment	Significantly improved emotion recognition ($p < 0.01$, Cohen's $d = 0.38$), particularly for those with lower initial self-control.
Quach et al., 2016	Adapted MBSR program (for adolescents)	RCT – individual students randomized. Intervention: 54 Control: 53	One public junior high school in California. Delivered by an outside teacher trained in MBSR.	Mindfulness: The CAMM	Excluded CAMM from analysis due to poor reliability ($\alpha = 0.41$), likely resulting from inconsistent responses and comprehension challenges among adolescents.
Frank et al., 2021	Learning to BREATHE program	RCT – schools and students randomized. Intervention: 131 Control: 124	2 urban high schools in Pennsylvania. Delivered by 4 health teachers who received training.	1. Mindfulness: The CAMM 2. Self-compassion: Self-Compassion Scale - Short Form (SCS-SF) 3. Growth mindset: Measured using the Implicit Theories of Intelligence Scale for Children (IT)	No significant effects were reported for mindfulness, self-compassion, or growth mindset outcomes.
Bleasdale et al., 2020	Transcendental Meditation (TM)	RCT – students randomized. Intervention: 29 Control: 23	One public high school in California. Outside certified TM instructor delivered the intervention to students.	Self-esteem: Rosenberg's Self-Esteem Scale (1979)	No significant effects were reported for self-esteem outcome.

Table 3. Self-Management Outcome Measures

Study Reference	MBP Type	Study Design & Sample Size	Setting and Instructor	Outcome and Measurement Tools	Significant Results
Self-Management					

Sibinga et al., 2016	Adapted 12-week MBSR program	Randomized Controlled Trial (RCT) – individual students randomized. Intervention: 159 Control: 141	2 public middle schools in Baltimore, Maryland. Not delivered by classroom teachers, MBP led by two outside MBSR certified instructors.	1. Coping: The Children's Response Style Questionnaire (CRSQ), Brief COPE, and Coping Self-Efficacy Scale (CSE) 2. Regulation Strategies: The Positive and Negative Affect Schedule (PANAS), Differential Emotions Scale (DES), and StateTrait Anger Expression Inventory (STAXI-2).	Negative coping $\beta = -0.13$ ($p = 0.04$), as Rumination $\beta = -0.13$ ($p = 0.03$). Regulation strategies: Self-hostility $\beta = -0.14$ ($p = 0.02$) Reexperiencing $\beta = -0.17$ ($p = 0.008$)
Salmoirago-Blotcher et al., 2019	Adapted 8-week MBSR program	RCT – schools randomized. Intervention: 30 Control: 23	2 suburban public high schools in Massachusetts. Not delivered by class teachers, taught by outside instructor certified in MBSR.	Impulsivity: The Barratt Impulsiveness Scale (BIS) adapted for adolescents.	Significant reduction in impulsivity immediately post-treatment (beta = -9.7, $p = 0.012$), with smaller, non-significant effects observed six months later (beta = -1.6, $p = 0.67$).
Napoli et al., 2005	The Attention Academy Program (AAP)	Quasi-experimental pre-posttest. Intervention: 97 Comparison: 97	2 public elementary schools in a Southwestern city. Not delivered by classroom teachers, led by two certified outside instructors.	1. Attention: Test of Everyday Attention for Children (TEA-Ch) 2. Classroom Behaviors: Teacher assessed with ADD-H Comprehensive Teacher Rating Scale (ACTeRS)	Significant improvements in selective attention (TEA-Ch, Cohen's $d = 0.6$, $p < .001$), attention (ACTeRS, Cohen's $d = 0.49$, $p = .001$), and social skills (ACTeRS, Cohen's $d = 0.47$, $p = .001$).
Felver et al., 2019	Learning to BREATHE program	RCT – two classes randomized. Intervention: 11 Control: 11	One public urban high school in New York. Not delivered by classroom teachers, led by two certified outside instructors.	1. Resiliency: The Social-Emotional Assets and Resilience Scales (SEARS-SF) 2. Problem Behaviors: The Behavior Assessment System for Children, third edition, Behavioral and Emotional Screening System (BASC-3 BESS)	Significant interaction effect on psychosocial resiliency (Cohen's $Np = 0.19$, $p = 0.040$), with significant differences at Time 2 ($p = 0.038$). No significant interaction effects for problem behaviors.
Bergen-Cico et al., 2015	Mindful Yoga Program (50% meditation, 50% yoga)	Quasi-experimental pre-posttest. Intervention: 72 Comparison: 72	One public middle school in the greater Boston, MA, area. Program was delivered to students by their English teacher who was certified	Self-Regulation: Adolescent Self-Regulatory Inventory (ASRI) short- and long-term subscales and totals analyzed.	MBP group improved significantly in total self- regulation from baseline to mid-year ($+3.82$, $p < 0.01$) and to program-end ($+3.23$, $p < 0.05$); Control declined (-2.58, $p < 0.05$). Long-

			in the YogaKids program and longstanding mindfulness practice.		Term Regulation: MBP group significantly improved from baseline to mid-year (+1.86, $p < 0.05$) and to program-end (+1.67, $p < 0.05$); Control declined (−1.97, $p < 0.05$).
Wendt et al., 2015	Transcendental Meditation (TM) "Quiet Time" Program	Quasi-experimental pre-posttest. Intervention: 142 Comparison: 53	2 public high schools in California. Delivered by outside TM certified instructors, not class teachers.	1. Self-Control: Self-Control Scale (Tangney et al., 2004) 2. Resilience: The Resilience Scale (Wagnild and Young, 1993)	Significant improvement in resilience scores (Cohen's d = 0.44, $p < 0.05$) among students participating in the Quiet Time program. No significant differences in self-control outcomes.
Metz et al., 2013	Learning to BREATHE program	Quasi-experimental pre-posttest. Intervention: 129 Comparison: 87	2 public high schools in suburban Philadelphia, Pennsylvania. Teacher who implemented MBP attended an 8-week MBSR program	Emotional Regulation Ability: The Difficulties in Emotion Regulation Scale (DERS)	Significant improvements in emotional regulation as measured by the DERS: Limited access to regulation strategies ($p = .037$), lack of emotional clarity ($p = .049$), total DERS scale score ($p = .021$), and lack of emotional awareness ($p = .016$) all showed significant decreases.
Parker et al., 2014	Master Mind program	RCT – schools randomized. Intervention: 71 Control: 40	2 public rural elementary schools in a southeastern state. Delivered by classroom teachers who were trained and provided MBP materials.	1. Executive Functioning: inhibitory control, cognitive flexibility, and working memory measured on the Flanker Fish task 2. Behavior Regulation: Assessed by teachers using the Children's Behavior Checklist-Teachers Report Form	Significant improvements observed in executive functioning ($p < .01$, Cohen's d = 0.42) and behavior regulation, including reduced social problems ($p < .05$, Cohen's d = 0.41) and aggression problems ($p < .01$, Cohen's d = 0.54).
Bakosh et al., 2016	Mindfulness-Based Social and Emotional Learning (MBSEL) program	Quasi-experimental pre-posttest. Intervention: 93 Comparison: 98	2 suburban public elementary schools in Illinois. MBP delivered by classroom teachers who were trained.	Classroom Behavior: Teachers kept daily logs documenting behavior events such as principal visits, calls home, suspensions, and disruptive incidents	Disruptive classroom behavior significantly decreased by over 50% in the intervention group and significantly increased by 15% in the control group.
Quach et al., 2016	Adapted MBSR	RCT – individual	One public junior high school in California.	Working Memory Capacity (WMC):	Statistically significant time by group interaction effect for

	program (for adolescents)	students randomized. Intervention: 54 Control: 53	Delivered by an outside teacher trained in MBSR.	The Automated Operation Span Task (AOSPAN)	WMC ($F(2,160) = 4.77$, $p = 0.01$) with a small effect size ($\eta^2 = 0.04$)
Flook et al., 2024	Modified MBSR program (for 5th grade students)	RCT – schools and classes randomized. Intervention: 154 Control: 138	Five public elementary schools in a midwestern state. Classroom teachers were trained in MBSR and delivered the MBP to students.	Executive Functioning: Assessed with the NIH Toolbox cognitive battery of behavioral tasks includes the Flanker task, Dimensional Change Card Sort (DCCS) task, and the List Sort task.	Significant improvement in Executive Functioning was observed in the Dimensional Change Card Sort (DCCS) task for the intervention group ($p = 0.001$, Cohen's $d = 0.32$). No significant changes were noted in the Flanker task or List Sort task.
Frank et al., 2021	Learning to BREATHE program	RCT – schools and students randomized. Intervention: 131 Control: 124	2 urban high schools in Pennsylvania. Delivered by 4 health teachers who received training.	1. Emotion regulation: The Difficulties in Emotion Regulation Scale (DERS) 2. Rumination: The Rumination subscale of the Rumination and Reflection Questionnaire (RRQ) 3. Mind Wandering: The Mind Wandering Questionnaire (MWQ) 4. Inhibitory Control & Attention: modified version of the Stroop Task 5. Working memory: Modified Emotional Faces N-back Task (EFN-back)	Significant outcomes include reduced emotional awareness ($d = -0.28$, $p = 0.01$) and difficulties in goal-directed behavior ($d = 0.37$, $p = 0.01$), increased rumination ($d = 0.23$, $p = 0.02$), faster reaction times on congruent ($d = -0.24$, $p = 0.01$) and incongruent Stroop trials ($d = -0.19$, $p = 0.03$), and fewer false alarms in the emotional faces N-Back test ($d = -0.35$, $p = 0.02$; 0-back $d = 0.24$; 2-back $d = -0.27$).
Bleasdale et al., 2020	Transcendental Meditation (TM)	RCT – students randomized. Intervention: 29 Control: 23	One public high school in California. Outside certified TM instructor delivered the intervention to students.	Resilience: Measured using Wagnild and Young's (1993) Resilience Scale	No statistically significant effect on resiliency outcomes reported in study.
Keller et al., 2017	Intervention Components grounded in the work of Saltzman (2004)	Randomized Controlled Trial (RCT) – individual students randomized	One urban public elementary school in the southwest U.S. (4th grade). Co-taught by trained classroom	1. Attention: Continuous Performance Test (AXCPT) and The Simon task (1969) 2. Working Memory:	Neither results for attention nor working memory were statistically significant.

		Intervention: 28 Control: 13	teacher and first author who was experienced in mindfulness.	Automated version of the Operation Span (AOspan)	
Thierry et al., 2022	Settle Your Glitter program	Quasi-experimental pre-posttest. Intervention: 14 classrooms Comparison: 14 classrooms	2 elementary schools in an unnamed southeastern U.S. city. Delivered by classroom teachers who were trained.	Self-Control: SELweb Early Education Assessment	No significant results reported for self-control outcome.
Campbell et al., 2019	The .b Program (based on MBSR)	Quasi-experimental pre-posttest. Intervention: 584 Comparison: 423	One public high school in the northeastern US. The program was not delivered by classroom teachers, but rather by specially trained program staff.	1. Well Being: International Positive and Negative Affect Schedule—Short Form (I-PANAS-SF) 2. Emotion Regulation: The Difficulties in Emotion Regulation Scale (DERS)	No significant results reported for well-being or emotion regulation outcomes among students.

Table 4. Social Awareness Outcome Measures

Study Reference	MBP Type	Study Design and Sample Size	Setting and Instructor	Outcome and Measurement Tools	Significant Results
Social Awareness					
Thierry et al., 2022	Settle Your Glitter program	Quasi-experimental pre-posttest. Intervention: 14 classrooms Comparison: 14 classrooms	2 elementary schools in an unnamed southeastern U.S. city. Delivered by classroom teachers who were trained.	Social Perspective Taking: SELweb Early Education Assessment	Active comparison group students showed significantly higher scores compared to intervention students at posttest ($p < 0.05$), hypothesized that this resulted from the literacy coaching received by control teachers. Pretest self-control levels positively predicted perspective-taking gains across both groups.
Frank et al., 2021	Learning to BREATHE program	RCT – schools and students randomized.	2 urban high schools in Pennsylvania. Delivered by 4	Social Connectedness: The Social Connectedness	No significant results reported for social connectedness outcome.

		Intervention: 131 Control: 124	health teachers who received training.	Scale-Revised (SCC-R)	
Wendt et al., 2015	Transcendental Meditation (TM) "Quiet Time" Program	Quasi-experimental pre-posttest. Intervention: 142 Comparison: 53	2 public high schools in California. Delivered by outside TM certified instructors, not class teachers.	Emotional Intelligence: The Bar-On Emotional Quotient Inventory	No significant results reported for emotional intelligence outcome.

Table 5. Relationship Skills Outcome Measures

Study Reference	MBP Type	Study Design and Sample Size	Setting and Instructor	Outcome and Measurement Tools	Significant Results
Relationship Skills					
Meyer and Eklund, 2020	Mindful Moments Intervention (curriculum based on MBSR)	Quasi-experimental pre-posttest. Intervention: 7 classrooms Comparison: 7 classrooms	2 public elementary schools (4th and 5th grade). Class teachers were trained to deliver MBP to students.	Class Climate: Assessed by both students and teachers using My Class Inventory-Short Form Revised (MCI—SFR) and the My Class Inventory-Teacher Form (MCI—TF)	Significant improvement in class climate specifically in satisfaction ($p = 0.00$, $\eta^2 = 0.02$) and friction ($p = 0.014$, $\eta^2 = 0.06$). No significant results for competition or cohesion reported.
Thierry et al., 2022	Settle Your Glitter program	Quasi-experimental pre-posttest. Intervention: 14 classrooms Comparison: 14 classrooms	2 elementary schools in an unnamed southeastern U.S. city. Delivered by classroom teachers who were trained.	Social Problem-Solving: SELweb Early Education Assessment	Small but significant improvement in social problem-solving compared to non MBP students ($d = 0.26$, $p < 0.05$).
Flook et al., 2024	Modified MBSR program (for 5th grade students)	RCT – schools and classes randomized. Intervention: 154 Control: 138	Five public elementary schools in a midwestern state. Classroom teachers were trained in MBSR and delivered the MBP to students.	1. SEL grades: Assessed by teachers with 13-items that assessed students' abilities related to schoolwork, behavior in school, and social interactions. 2. Social competence: The Teacher Social Competence Scale	Statistically significant gains in SEL grades for MBP group ($p = 0.041$, Cohen's $d = 0.29$). No significant results were found for teacher-rated social competence measures.

				(Conduct Problems Prevention Research Group - CPPRG)	

Table 6. Responsible Decision-Making Outcome Measures

Study Reference	MBP Type	Study Design and Sample Size	Setting and Instructor	Outcome and Measurement Tools	Significant Results
Responsible Decision-Making					
Parker et al., 2014	Master Mind program	RCT – schools randomized. Intervention: 71 Control: 40	2 public rural elementary schools in a southeastern state. Delivered by classroom teachers who were trained and provided MBP materials.	Intention to use drugs: The Intentions to Use Alcohol and Tobacco scale	No significant results reported for intentions to use alcohol or tobacco outcomes
Frank et al., 2021	Learning to BREATHE program	RCT – schools and students randomized. Intervention: 131 Control: 124	2 urban high schools in Pennsylvania. Delivered by 4 health teachers who received training.	1. Substance Use: Substance Initiation Index, which assesses gateway and illicit substance use, and the Negative Substance Use Consequences (YAAPST) 2. Risk taking: Modified version of the Balloon Analogue Risk Task (BART)	No significant results reported for substance use or risk-taking outcomes.

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