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Mindfulness-Based Interventions in U.S. Schools-A Systematic Review

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Abstract of the Dissertation

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The purpose of this review is to collect, synthesize and analyze the outcome studies of mindfulness-based interventions in U.S. schools.

Mindfulness is a wellness practice that has been growing in popularity in the West for the last three decades. Beginning with adults suffering from chronic pain, a program called Mindfulness Based Stress Reduction (MBSR) was developed and has provided a foundation for many that came after it.

With adult populations, MBSR and its derivatives have been effective at reducing symptoms of chronic illness, boosting immune response, and helping individuals with multiple episodes of depression and substance abusers avoid relapse. Mindfulness-based interventions have positively affected working memory, sustained attention and emotional regulation as well. With children and youth, preliminary findings indicate that mindfulness-based interventions have

a positive effect on aggression, attention, perceived stress, anxiety and depression symptoms and coping.

Four scientific databases and additional hand-searches of scientific, peer-reviewed journals for the period 1995 through June 2017 produced a data set of 37 articles. The published studies were analyzed for risk of bias and demographic and intervention data was extracted.

This review is consistent with prior reviews in its findings that the research to date has many limitations due to lack of methodological rigor. The review summarizes the key components of effective interventions. The populations most likely to benefit are described as are the conditions most likely to correlate with highly efficacious programs. Outcomes such as aggression are responsive to mindfulness-based interventions whereas more distal outcomes such as grades and test scores are not.

Finally, recommendations regarding best practices for future programs and research studies are made. Universal programs are discussed as well as targeted interventions for particular student populations. Given the state of the research, it is proposed that mindfulness-based interventions should be integrated into Social Emotional Learning programming in an effort to increase the efficacy of both.

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LIST OF ABBREVIATIONS

ACT-Acceptance and Commitment Therapy

ADHD-Attention-Deficit/Hyperactivity Disorder

AYP-Adequate Yearly Progress

CAMM-Child and Adolescent Mindfulness Measure

CASEL-Collaborative for Academic, Social and Emotional Learning

CBGT-Cognitive Behavioral Group Therapy

CBT-Cognitive Behavioral Therapy

CHIME-Comprehensive Inventory of Mindfulness Expression-Adolescent

CSI-Collaborating States Initiative

DBT-Dialectical Behavior Therapy

ESEA-Elementary and Secondary Education Act

ESSA-Every Student Succeeds Act

FRPL-Free and Reduced Price Lunch

GAD-Generalized Anxiety Disorder

MAAS-A- Mindfulness Attention and Awareness Scale-Adolescents

MAAS-C- Mindfulness Attention and Awareness Scale-Children

MBCT-Mindfulness-Based Cognitive Therapy

MBI-Mindfulness-Based Intervention

MBRP-Mindfulness-Based Relapse Prevention

MBSR-Mindfulness-Based Stress Reduction

MICA-Mindfulness Inventory of Children and Adolescents

MS-Multiple Sclerosis

MSPTA-Mindfulness Scale Pre-Teen, Teen and Adult

MTASA-Mindfulness Thinking and Action Scale-Adolescent

NCES-National Center for Education Statistics

NCLB-No Child Left Behind

NDEA-National Defense of Education Act

PANAS-Positive and Negative Affect Scale

QED-Quasi-Experimental Design

RCT-Randomized Controlled Trial

REBT-Rational Emotive Behavior Therapy

RP-Relapse Prevention

SAD-Social Anxiety Disorder

SEDL-Social Emotional Development and Learning

SEL-Social and Emotional Learning

SGPP-Single-group Pre-/Post Design

SSD-Single-Subject Design

INTRODUCTION

WHAT IS THIS THING CALLED MINDFULNESS?

Recently the popular literature and media have become saturated with discussion of mindfulness. It is being touted as a virtual panacea for many human ailments and deficiencies and the watchword for wellness and good health. Over the past two decades, original articles about mindfulness in scientific journals and media pieces in newspapers have kept pace with each other, growing by the tens of thousands (Van Dam et al., 2017). The National Center for Complementary and Integrative Health reports that 18 million Americans surveyed said they practiced meditation in 2012, the most recent year for which data is available (Black, Clarke, Stussman, Barnes, & Nahin, 2015). In the West, many are taking the opportunity to develop smartphone apps and classes, making meditation nearly a $1 billion per year industry (Sheridan, 2017). The practice of mindfulness and its corollary, meditation, are not without merit. Individuals suffering from a multitude of ills, and those who are simply seeking optimal health, have seen its benefits.

PROMISING OUTCOMES WITH ADULTS

In the United States, mindfulness training as part of a stress reduction program has been shown to have positive effects with people suffering with chronic pain (Kabat-Zinn, 1982) and autoimmune conditions (Gaylord et al., 2011; Schmidt et al., 2011). It has also boosted immune response in patients with HIV/AIDS (Creswell, Myers, Cole, & Irwin, 2009; Gonzalez-Garcia et al., 2014; Seyedalinaghi et al., 2012).

The positive effect of mindfulness-based interventions with individuals with clinical mental health issues is mixed. Mindfulness interventions for individuals with anxiety have been found to be only moderately helpful (Arch & Ayers, 2013; Goldin et al., 2016; Hoge et al., 2013; Williams et al., 2008). However, the integration of mindfulness into existing treatment modalities has shown very positive outcomes for individuals at high risk of relapse who have a history of clinical depression or substance abuse (Bowen et al., 2009; Bowen et al., 2014; Huijbers et al., 2016; Ma & Teasdale, 2004; Teasdale et al., 2000; Witkiewitz & Bowen, 2010; Witkiewitz et al., 2014).

In diverse groups of adults, mindfulness interventions were linked to improvements in working memory, sustained attention and emotional regulation as compared to participants who did not receive mindfulness training. These results were achieved with varied populations, including military members during stressful pre-deployment periods (Jha, et a., 2015), novice meditators (Chambers, Chuen Yee Lo, & Allen, 2008), non-clinical undergraduate students (Broderick, 2005; Mrazek, Franklin, Phillips, Baird, & Schooler, 2013; Zeidan, Johnson, Diamond, David, & Goolkasian, 2010), and individuals with high anxiety (Arch & Craske, 2010).

EMERGING OUTCOMES WITH CHILDREN

Prior systematic reviews published between 2007 and 2012 report positive outcomes of mindfulness-based interventions with children and youth in clinical and non-clinical settings. Among the outcomes of interest, there were reductions in aggression, perceived stress and anxiety and depressive symptoms. Participants showed improvements in attention and increases

in coping measurements as well (Black, Milam, & Sussman, 2009; Burke, 2010; Zenner, Herrnleben-Kurz, & Walach, 2014).

BARRIERS TO EDUCATION

Since the Industrial Revolution when the education of children became a public, rather than a private, concern, there has been much debate about the purpose and aims of a good educational system. Beginning after the end of World War II, the focus of education in America has been to train a globally competitive workforce. In an effort to quantify results, or the lack thereof, standardized tests have been touted as a proxy measure for excellence in education. It is with this in mind that this review includes standardized test scores as an outcome measure.

Short and long-term effects of poor school attendance are well known. One of the most compelling correlations of poor school attendance is the higher likelihood of dropping out of school before completing 12th grade. Dropping out is linked to many deleterious lifetime conditions, such as lower average income, higher unemployment rates, an increased likelihood of incarceration, health issues and early death (Schoeneberger, 2012).

In some communities, negative school behaviors that result in disciplinary action are epidemic. Within the United States generally, in 2007, 25% of public high school students reported at least one suspension since they started school (Aud, KewalRamani, & Frohlich, 2011). Out of school suspensions for one or more days occurred 1.3 million times in the 2014/15 school year. During the 2011/12 school year, 3.4 million public school students, or almost 7% of the total student population, were removed from the classroom for at least half a day, to serve an in school suspension (Musu-Gillette, Zhang, Wang, Zhang, & Oudekerk, 2017).

Stress, in the form of anxiety, depression and somatic complaints are on the rise in children and adolescents. Twenty percent of children between the ages of 5 and 17 reported that they worry a lot or a great deal about things in their lives (American Psychological Association, 2010). These figures are even higher when the sample is strictly adolescents. In 2013, almost three out of four teens 13-17 years old reported having one or more physical or emotional symptoms associated with stress. The most commonly mentioned source of stress was school (American Psychological Association, 2013). In the general population, up to 20% of American children experience a mental disorder in a given year and the prevalence of those with ADHD, anxiety and depression is increasing (Centers for Disease Control and Prevention, 2013).

MINDFULNESS AS A POSSIBLE INTERVENTION

Given the positive results emerging from the literature with adults, young people might benefit from mindfulness and its components as well. Because young people are required to attend school between the ages of 5 and 18 years, providing a universal intervention that incorporates mindfulness in the educational setting makes sense.

A SNAPSHOT OF THE RESEARCH TO INFORM PRACTICE AND POLICY

The publicly funded education system in the United States is reliant on the scientific literature to make prudent choices about spending its limited resources. It is sensible to look with a critical eye at current practices in an effort to maximize return on investments in the educational setting. This is especially true with children and youth whose development is rapid

and with whom educators have a short period to intervene. Because mindfulness is ubiquitous in popular culture and the scientific literature, the call to collect, analyze and synthesize findings takes on more urgency. This review is an attempt to provide a picture of the "state of the research" with an eye to informing best practices. Because education is a public good, best practice naturally is intertwined with policy. And because research on mindfulness-based interventions is in its nascent phase, it is incumbent upon the scientific and educational community to know precisely what steps to take to forge ahead.

LITERATURE REVIEW

HISTORY OF MINDFULNESS

Mindfulness is not a new term. In fact, it has been part of Buddhist texts for more than 2,500 years. The fact that mindfulness has its roots in Buddhist discourse has been a blessing and a curse for those who would seek to introduce the practice to mainstream western culture. The formal introduction of Eastern thought, which includes Buddhist teachings, can be traced back to the late 1700s when British scholars began to translate Indian spiritual texts from Sanskrit. A century later, some of these and other Eastern philosophical writings influenced members of the American Transcendentalist movement which included philosophical and literary figures such as Henry David Thoreau and Ralph Waldo Emerson.

After World War II, increased communication and ease of travel led to the exposure to, and subsequent interest in, Eastern teachings in the West. People from Asian cultures immigrated to America. For example, many Tibetans, including monks, fled their homeland following invasion by China in 1959 and decades of war in Southeast Asia (Kabat-Zinn & Hahn, 2013). In the 1960's, during an age of cultural expansion and searching for alternatives to convention, creative thinkers and beat writers such as Alan Watts, Jack Kerouac and Allen Ginsberg incorporated Eastern philosophy into their published works and lectures. Young Americans followed the lead of famous people like the Beatles and embraced Transcendental Meditation, seeking emotional freedom and ultimately enlightenment. In 1971, former Harvard psychologist Ram Dass published his seminal book *Be Here Now* which has remained in print since its original publication, and has sold over 2 million copies.

As the interest in Eastern concepts grew, inevitably clinical psychologists were among the interested. This led to them infusing components of their personal practice into their work. The practice of meditation made its way into mainstream scientific inquiry in the mid-1970's when Herbert Benson, a cardiologist, began studying outcomes of his Relaxation Response technique, an antidote to the fight or flight response. The trend toward scientific study of contemplative practices eventually led the American Psychiatric Association to call for a formal examination of the clinical effectiveness of meditation in 1977.

In 1979, Jon Kabat-Zinn opened the Center for Mindfulness at the University of Massachusetts Medical School, where he piloted a program designed to reduce stress as an adjunct to medical treatment for chronically ill patients of the hospital. His program of Mindfulness Based Stress Reduction (MBSR) has been replicated in hundreds of medically and non-medically based programs worldwide, and has provided a foundation for its many derivative programs aimed at helping those who suffer from particular psychological disorders, or who might be subject to unique conditions, such as members of the U.S. military (Germer, 2013). Although he was a student of Buddhism, Kabat-Zinn has walked a fine line and suffered accusations of misuse of Buddhist principles from secularists and followers of Buddhist teachings alike. When describing the MBSR program in his book, Full Catastrophe Living, he attempts to explain the inclusion of principles of mindfulness and other concepts related to Buddhist teachings, commonly referred to as the dharma, "My intention and hope was that the book might embody to whatever degree possible the dharma essence of the Buddha's teachings put into action and made accessible to mainstream Americans facing stress, pain, and illness." (Kabat-Zinn, 2011, p. 282). In response to critics from both sides, he states, "The intention and approach behind MBSR were never meant to exploit, fragment, or decontextualize the dharma,

but rather to *re-contextualize* it within the frameworks of science, medicine (including psychiatry and psychology), and healthcare so that it would be maximally useful to people who could not hear it or enter into it through the more traditional dharma gates, whether they were doctors or medical patients, hospital administrators or insurance companies." (Kabat-Zinn, 2011, p. 288).

The interest in mindfulness and mindfulness based interventions has expanded greatly in recent years. As of 2012, the most recent year for which figures are available, eight percent of the U.S. adult population, or 18 million people, reported having practiced meditation within the last year (Black, et al., 2015) . In 1998, almost twenty years after the inception of the MBSR program, a search of peer-reviewed articles in the mindfulness literature (PsycINFO) yielded 97 articles containing the term "mindfulness". Ten years later, in 2008, that number increased to 830, and a search performed in September 2017, including any pending 2018 articles, netted 6,555 peer-reviewed articles on the subject. As the body of research grows, so does the need for synthesis of the results. It is important to review it with a critical eye regarding research methods, especially as pertains to a subject that has deep ties to a philosophy and culture that is perhaps non-scientific.

DEFINING MINDFULNESS

Conceptual definition

Western clinical researchers have found precisely defining the term mindfulness to be difficult. Jon Kabat-Zinn, arguably one of the individuals responsible for introducing the concept and practice to western science, offers the following definition in his book, Full-

Catastrophe Living: "the awareness that arises by paying attention on purpose, in the present moment, and non-judgmentally" (Kabat-Zinn & Hanh, 2013, p. xxxv).

Since the 1990's, there has been a surge in interest in mindfulness which has led to a dramatic increase in psychological and medical research on the topic (Brown, Ryan, & Creswell, 2007). As a result of this increased interest, researchers from various educational institutions came together in a series of meetings in an effort to establish consensus on the various components of mindfulness, as well as to develop operational definitions. They arrived at a two-component model of mindfulness, including dimensions of *attention* and *orientation* to experience rooted in the present moment. Stated another way, mindfulness practice is the ability to focus one's attention on a specific "object", and bring an attitude of non-judgment when the attention inevitably wanders. Specific "distractions" might include rumination or elaboration about one's thoughts, feelings and sensations as they arise. The practice of mindfulness would involve a direct experience *of* those events without becoming caught in "elaborative thought streams *about* one's experience and its origins, implications and associations" (Bishop et al., 2004, p. 232).

Although the research interest in mindfulness and its putative benefits is relatively new, Brown, Ryan & Creswell have pointed out that it exists in a context that includes more than Buddhist psychology (2007). Their argument is that the core activities of mindfulness, attention and awareness share features derived from philosophical and psychological traditions as widely varied as ancient Greek philosophy, later Western European theories of phenomenology, existentialism, naturalism, and more recently transcendentalism and humanism in America (Brown et al., 2007).

Contrast with psychotherapy

Perhaps some of the difficulty with precisely and accurately defining mindfulness can be attributed to the fact that western psychology has been focused on the ***content*** of an individual's consciousness, that is, the memories, thoughts, emotions, etc. which one experiences. In contrast, mindfulness requires an emphasis on the ***context*** in which those memories, thoughts and emotions are experienced, or consciousness itself (Brown et al., 2007). For example, Cognitive Behavioral therapy is a general classification of psychotherapy that is organized around an examination of thoughts, and subsequent strategies to challenge or modify thoughts if they are contributing to distress. Two examples within this general classification are Cognitive Therapy and Rational Emotive Behavior Therapy. Beck's model of Cognitive Therapy is framed around an understanding that disturbed cognitive processes lead to psychological distress; therefore therapy is focused on modifying cognitions (Scott & Freeman, 2010). Rational Emotive Behavior Therapy (REBT), pioneered by Albert Ellis, has similar underpinnings. In REBT, the client is prompted to assess the "empirical veracity of one's beliefs, along with their utility and logical consistency" (DiGiuseppe, 2010, p. 119) .

In contrast, a mindful approach to an anxiety producing event would not require an analysis of the content of the thoughts as they arise. Using a specific example, imagine an individual experiencing a feeling of anxiety anticipating exposure to a novel experience. One reaction to this might include the thought, "I am getting anxious,", then, "This is BAD,", leading to "I will always get anxious. This is awful," escalating to "What is wrong with me?" If the individual could bring a mindful approach or attitude to the experience, she might have the same initial thought, "I am getting anxious,", then, "My heart is racing. My palms are sweating," followed by "I am breathing faster," then, "My thoughts are racing," and similar non-reactive

observations of sensory experience that would not lead to an increase in distress (Bostic et al., 2015).

MINDFULNESS AS AN INTERVENTION

Outcomes with adults

Physical outcomes

Early non-randomized studies with adults suffering from chronic pain showed that a program of Mindfulness Based Stress Reduction (MBSR) was instrumental in reducing pain symptoms and dependence on pain-relieving medications (Kabat-Zinn, 1982). Since that study, mindfulness in general, and MBSR and its derivations in particular, have been associated with positive results for many patients with medical issues, ranging from symptom reduction in those susceptible to the common cold, to slowing or reversing the progression of AIDS/HIV-related issues. One large initial randomized controlled trial showed promising results that MBSR may reduce the number of self-reported illness days and the duration of illness over the course of a cold and flu season relative to a no-treatment group (Barrett et al., 2012). Targeting symptoms of more chronic conditions, initial large, well-controlled RCT studies showed reduced physical symptoms and improved quality of life for patients with fibromyalgia (Schmidt et al., 2011), Irritable Bowel Syndrome (Gaylord et al., 2011), and among distressed breast-cancer survivors (Carlson et al., 2013). Because chronic stress has been known to affect immune function, mindfulness interventions have been applied with positive results reducing inflammatory responses (Creswell et al., 2016; Malarkey, Jarjoura, & Klatt, 2013; Rosenkranz et al., 2013) and slowing or reversing the loss of lymphocytes in patients with HIV/AIDS (Creswell et al., 2009;

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Gonzalez-Garcia et al., 2014; Seyedalinaghi et al., 2012). Less promising is the evidence of

mindfulness interventions' impact on antibody levels or the antibody response post-vaccination

(Hayney et al., 2014; Moynihan et al., 2013). Additionally, since stress is known to negatively

impact health behaviors such as sleep, exercise, smoking and healthy diet, there have been a few

studies designed to measure how mindfulness based interventions might mitigate the negative

impacts associated. The most encouraging research has found initial RCT evidence that

mindfulness based interventions help reduce smoking and/or cravings in heavy smokers (Brewer

et al., 2011; N. N. Singh et al., 2011; Westbrook et al., 2013), and that in two other programs,

participants exhibited more enjoyment while eating as well as increased likelihood of choosing

healthy food alternatives after taking part in mindfulness training relative to control group

participants (Arch et al., 2016; Mason et al., 2016). Finally, a review of mindfulness

interventions for individuals with developmental disabilities found that, using mostly single-

subject designs, improvements in healthy behaviors such as weight loss for obese participants

and reduced smoking were found in adolescents and adults (Hwang & Kearney, 2013).

Clearly, mindfulness interventions have promise helping patients dealing with medical

diagnoses cope with corresponding stress-related issues. It would naturally follow, then, that

clinicians and researchers would seek to apply mindfulness and learn its effects on more

cognitive and affective aspects of human experience.

<u>Mental health outcomes</u>

Depression

The most clear-cut positive results in the mindfulness intervention literature indicates that a program of Mindfulness Based Cognitive Therapy (MBCT) has helped individuals diagnosed with depressive disorders avoid relapse. The first randomized controlled trial tested recurrently depressed patients in remission, and was designed with the hypothesis that a major contributor to relapse might be related to their habits of thinking. If this cycle of thinking could be interrupted, then the patients might avoid relapse into full-blown depression. The patients in the treatment group were randomly assigned to receive MBCT, an 8-week manualized program designed to train patients to disengage from depressogenic thinking, and the control group continued with treatment as usual. At the one-year follow-up, patients who participated in the treatment group had better outcomes regarding relapse likelihood, and time to relapse. The results were especially marked with patients who had a history of two or more previous depressive episodes (Teasdale et al., 2000).

Building on these results, another study sought to determine whether particular patient features and/or life experiences might be associated with the likelihood of reaping the benefits of MBCT. Ma & Teasdale (2004) replicated the earlier studies and confirmed the results that, for those individuals with four or more depressive episodes, participation in an MBCT program was associated with better relapse results. Interestingly, their study found that for participants with two or fewer depressive episodes, participation in an MBCT program correlated with no improvement in relapse potential and in some cases, may be contraindicated. When they analyzed the two groups further, they found that the individuals who responded favorably to MBCT often had a history of childhood trauma, earlier age of onset of depression and at least

one stressful life event occurring between the end of the treatment period and the one-year follow-up. Their conclusion was that the two groups originated from different base populations and that the individuals with fewer historical episodes were not just "at different points in their depressive careers" (Ma & Teasdale, 2004, p. 39).

To compare the efficacy of MBCT with psychopharmaceutic interventions, one study sample included patients with a history of depressive episodes who were not symptomatic at the time of the study and who were on a maintenance dose of antidepressants. This sample was randomly assigned to a treatment group who would receive MBCT and, working with their prescribing physicians, they were to taper off the antidepressant medication during the 8-week program period. The other half of the sample served as a control and continued with medication (treatment) as usual. Although the initial research hypothesis was that the treatment group would have superior results at a two-year follow up than the control group, the fact that the results were comparable with respect to relapse is still encouraging for those who would like an alternative to maintenance medication. This might include patients who suffer unwanted medication side-effects, or for whom medication might be contraindicated (due to pregnancy, for example). In addition, the availability of a comparably effective relapse prevention option to antidepressant medications increases patients' autonomy as it pertains to their mental healthcare (Kuyken et al., 2015). This study expanded on the previous findings that among those with higher depression rating scales, despite meeting conditions to be considered in remission, MBCT plus medication tapering/removal was as effective at preventing relapse as medication only, and both were more effective than participants who tapered from antidepressant to placebos (Segal et al., 2010). These results explored the most effective mono-therapeutic treatment options; however other

trials suggest that the combination of MBCT and maintenance antidepressant medication is the optimal choice for protection against depressive relapse (Huijbers et al., 2016).

Given positive results preventing relapse in depressed patients who are in remission, one of the next areas of research examined the effects of mindfulness-based interventions with patients currently meeting diagnostic criteria for a depressive or anxiety disorder. One meta-analysis of randomized controlled trials focused on interventions where mindfulness was core to the intervention, rather than those that include a mindfulness component utilized to a lesser degree. In the introduction to this meta-analysis, the reviewers discuss three reasons why standard mindfulness-based interventions (MBIs) may not be of benefit to populations currently experiencing a depressive or anxious episode. They note that the fact that many MBIs require participants to bring full awareness to present moment experiences might prove difficult for individuals with depression and anxiety to tolerate, insofar as those current experiences often include aversive automatic thoughts and unpleasant feelings (anxious arousal or low mood). The reviewers propose that the mechanism central to Cognitive Behavioral Therapy whereby patients are asked to change the content of negative thoughts and beliefs might be more appealing to them than the process of decentering from unpleasant experiences, which is a main strategy in MBCT (Strauss, Cavanagh, Oliver, & Pettman, 2014). A second reason they posit that MBIs may not help actively depressed or anxious clients is the difficulty they may experience becoming aware of, and then detaching from, negative thoughts and feelings in the middle of an episode. The skill of remaining aware of present experience without perseverating on it would be difficult to learn while actively depressed. Finally, clients who are in an active anxious or depressive state often struggle with motivation and concentration, both of which are necessary to practice MBIs. When presented with a perceived "failure" to motivate oneself or concentrate,

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the client may use that to fuel negative thinking patterns that increase symptoms (Strauss, et al., 2014). Despite these potential barriers, to their surprise, the reviewers found that there were significant benefits of MBIs resulting in a reduction in depressive symptom severity for those who had a primary depressive disorder diagnosis. In fact, this benefit (reduction in depressive symptom severity) was also noted in those who had a primary anxiety disorder diagnosis. There were no significant effects on anxiety symptom severity, however (Strauss et al., 2014). It is still encouraging to find that depressive symptom severity can be reduced for people during a depressive or anxious episode.

Anxiety

The benefits of mindfulness based interventions are not as clear with patients presenting with anxiety disorders or symptoms as they are with those presenting with depressive disorders or symptoms. For example, one study randomly assigned veterans who met criteria for any DSM-IV anxiety disorder (excluding PTSD) into an adapted MBSR intervention or a group CBT intervention. The researchers found that only those participants who had co-morbid mood disorders responded better to the MBSR intervention versus those in the CBT intervention on measures of symptom severity of their primary diagnosis at the 3-month follow up (Arch & Ayers, 2013). Another study included patients in remission, but with a history of suicidal ideation and behavior. The patients included individuals with unipolar and bipolar diagnoses. In a randomly assigned trial, individuals with bipolar diagnoses who participated in a MBCT intervention versus wait-list controls saw a reduction in both anxiety and depression symptoms. The individuals with unipolar diagnoses did not see a similar significant result (Williams et al., 2008).

In seeking the most efficacious treatment for persistent anxiety disorders, researchers have tried to determine how mindfulness based interventions fare in helping patients with Generalized Anxiety Disorder (GAD) versus one of the more traditional and proven effective treatments that are based on Cognitive Behavioral strategies. A 2007 study by Koszycki, et. al. found that traditional Cognitive Behavioral Group Therapy (CBGT) resulted in lower post-intervention patient and clinician ratings of social anxiety and remission rates for participants versus participants who took part in an 8-week MBSR intervention; however, there were no significant between group differences in measures of mood, functionality or Quality of Life.   A more recent study sought to isolate the components of mindfulness meditation from Cognitive Behavioral strategies. Forty-eight individuals with DSM-IV diagnosed with GAD were randomly assigned to an 8-week MBSR intervention and forty-five patients meeting the same diagnostic criteria took part in an active control condition that included elements of group support, attention from the instructor and education. Given the rigor of this design (random assignment and active controls), their results are compelling. The participants who learned mindfulness meditation saw a clinically significant reduction in anxiety symptoms and an increase in coping ability following a laboratory-induced stress test as compared to the active control group (Hoge et al., 2013). In another study, 108 un-medicated adults with generalized social anxiety disorder (SAD) were randomized to receive CBGT, MBSR or no treatment (wait-list control). The patients who received CBGT and MBSR experienced a reduction in severity of SAD symptoms versus the wait-list patients, both immediately post intervention and at the one-year follow-up. This did not support the researchers' hypothesis that CBGT would produce greater results than MBSR. Nevertheless, it would seem that given these positive results from a

well-designed trial, MBSR can be counted among possible treatment options for adults with SAD (Goldin et al., 2016).

Mental health outcomes--patients with primary medical diagnoses and non-clinical populations

Primary Medical Diagnoses

Mindfulness based interventions have been used with populations who do not meet the clinical criteria for psychological diagnosis, but who, nevertheless are prone to depressive symptoms. Often these populations are experiencing depressive symptoms secondary to a chronic and/or serious medical condition. One such group includes those affected by Multiple Sclerosis (MS), which is the most common non-traumatic neurologic disease among young adults. Along with physical symptoms, sufferers experience reduced quality of life and increased depression, fatigue and anxiety. A randomized trial of 150 MS patients found that after undergoing an 8-week program of mindfulness training, participants in the intervention group showed significantly lower scores on a depression scale and significantly higher scores measuring health-related quality of life as compared to a usual care control group. These results were evident immediately post-intervention and maintained at 6-month follow-up (Grossman et al., 2010).

Similarly, symptoms of depression are common in patients experiencing fibromyalgia, a chronic pain disorder. Ninety-one females with fibromyalgia participated in a randomized trial where half of the participants received an 8-week MBSR program and the other half were part of a wait-list control group. The participants in the intervention group reported a noticeable reduction in depression symptoms and this result persisted through the 2-month follow-up period (Sephton et al., 2007).

Patients diagnosed with cancer experience distress in the form of depression, anxiety and increased anger while undergoing medical treatment. A sample of patients with various types of cancer and at various stages participated in a randomized, wait-list controlled trial of a 7-week mindfulness based intervention. Patients in the intervention group experienced reduced depression, anxiety and anger post-intervention compared to the patients receiving no mindfulness-based intervention. Another interesting finding was that there was strong correlational evidence that the participants who attended more sessions and who reported more meditation time had better outcomes than those who did not (Speca, Carlson, Goodey, & Angen, 2000). Another study of women with breast cancer found that among survivors within 18 months of treatment completion, those who participated in a 6-week MBSR program saw significant improvements in psychological status, including state and trait anxiety, depression and quality of life compared with patients in a usual care wait-list condition (Lengacher et al., 2009).

With a different population, a randomized controlled trial of patients receiving solid organ transplants experienced better outcomes after completing an MBSR program than those who participated in a health education program. The organ recipients who learned MBSR saw reduced symptoms of anxiety, depression, and poor sleep quality and improved quality of life and the benefits were sustained over one year (Gross et al., 2010).

Non-Clinical Populations

One of the earlier studies of the effects of MBSR with a non-clinical sample examined short-term effects with pre-medical and medical students. Seventy-eight students were matched across gender, ethnicity and pre-medical/medical status, then randomized to a treatment group or a wait-list control group. After undergoing a 7-week mindfulness based stress reduction

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intervention program, the treatment group showed statistically significant reductions in symptoms of depression and anxiety as compared to the control group. To test the findings in a replication study, the same outcomes were measured in the wait-list control group after they participated in the intervention. The results were consistent with the first group's. The researchers also note that post-measures for both intervention and control groups were administered during an exam period during the first trial. To replicate these conditions, the post-measures were administered during an exam period for participants in the second trial. The fact that there were significant positive mental health outcomes (reduced depression and anxiety) at post-test under highly stressful conditions is meaningful (Shapiro, Schwartz, & Bonner, 1998).

A 2007 study measured the effects of MBSR on the mental health of a group of master's level counseling psychology students. Using a cohort-control design, MBSR was offered to an intervention group of students who enrolled in a Stress & Stress Management semester course. There were two control groups in the same cohort: students enrolled in a Psychological Theory course and those enrolled in a Research Methods course. Students from all three classes completed pre- and post- measures and participants in the MBSR program reported significant declines in anxiety, perceived stress, negative affect and rumination and increases in positive affect and self-compassion as compared to the students in the control groups (Shapiro, Brown, & Biegel, 2007). Although these differences were marked, the study design had limitations so the conclusions must be analyzed in that context.

Another group of professionals who do not meet DSM-IV criteria for psychological disorders but who nevertheless are at high risk for psychological symptoms are graduate healthcare students. Twenty-eight students in training to become podiatrists, physical therapists, occupational therapists, Physician's Assistants and nurses took part in a quasi-experimental trial

to determine if participation in an 8-week MBSR program had an effect on anxiety symptoms, empathy and levels of burnout. The results were mixed, with MBSR participants showing significantly lower anxiety symptoms immediately post-intervention and at 3-week follow up as compared to students in the control group. MBSR participants also demonstrated an increase in empathy scores immediately post-intervention, but those results were not maintained at the 3-week follow up. Finally, there were no significant between group differences on measures of burnout between MBSR participants and the control group (Barbosa et al., 2013).

In another study with a non-clinical sample, researchers examined the efficacy of a brief mindfulness-based stress reduction program with a sample of 119 non-clinical undergraduates enrolled in elective health courses. They compared changes in psychological health between brief MBSR (5-week) treatment and parallel control groups. After the 5-week program, the control group anxiety scores had increased, and the treatment group anxiety scores decreased, but the decrease fell short of the predetermined significance criterion. Similarly, the treatment group self-compassion scores increased while the control group self-compassion scores did not change measurably; and the differences were not statistically significant (Bergen-Cico, Possemato, & Cheon, 2013).

Substance Use Disorders

A clinical population prone to high rates of relapse are those suffering with substance abuse and addiction. To reduce the reported 60% relapse rate, alternatives to the long-standing and commonly available 12-step or mutual support group model have been proposed. Some individuals with substance use disorders may be averse to the disease model of addiction that underlies the 12-step approach, or they may have spiritual beliefs that conflict with current treatment options. In this context, Mindfulness-Based Relapse Prevention (MBRP) was piloted

as an aftercare alternative for populations who have completed inpatient or outpatient primary treatment for substance abuse. MBRP is a mindfulness-based substance abuse aftercare approach that trains participants to look for early warning signs of relapse, increase their awareness of internal and external cues previously associated with substance use, and develop effective coping skills. The hypothesis is that this training would not only decrease the likelihood of relapse but would allow addicts to minimize the guilt, blame and negative thinking in the event of a lapse, thereby assisting in regaining abstinence. The initial results were promising, given that the treatment group showed an overall reduction in days of substance use and craving two months' post-intervention. Although these gains appeared to diminish (days of substance use were roughly the same for treatment and control groups) at the four-month post-intervention point, the researchers point out that this could be because the study design allowed the treatment group to return to treatment as usual post-intervention. They suggest that future applications of MBRP include continuing, intervention-consistent support, which may improve treatment efficacy long-term (Bowen et al., 2009).

Other researchers sought to address the existence of cravings or the suffering and subsequent substance abuse resulting from cravings by introducing mindfulness as an intervention. One study reported reductions in cravings for MBSR participants versus patients undergoing CBT treatment (Garland, Roberts-Lewis, Tronnier, Graves, & Kelley, 2016), and another study found that MBRP helped patients reduce the conditioned response of cravings to depressive symptoms and replace it with alternative responses to emotional discomfort (Witkiewitz & Bowen, 2010). Specialized populations, such as female criminal offenders, saw positive results at 15-week follow up in the form of reduced legal problems and drug use days following MBRP versus a standard relapse prevention program (Witkiewitz et al., 2014).

A 2014 study with a large sample of subjects who had completed initial treatment for substance use disorders (N=286) was randomly divided into an intervention group that received MBRP, another intervention group that received a cognitive-behavior relapse prevention (RP) program and the standard 12-step treatment group aftercare. Participants in the intervention groups reported 59% reduction in relapse to heavy drinking and a 54% reduction in relapse to drug use. The cognitive-behavior relapse prevention (RP) participants had advantages at the six month follow-up versus the MBRP participants on the measure of time to first drug use, but at the 12-month follow-up, MBRP participants reported a fewer number of drug use days overall (Bowen et al., 2014).

Cognitive/affective outcomes

Sustained attention

Given that the definition of mindfulness includes the term "paying attention", it would naturally follow that clinical researchers would be interested in how mindfulness (as a trait or state) might correlate with ability to sustain attention to task. One study recruited undergraduate volunteer students who had no prior meditation experience and expressed an interest in learning meditation. They were randomly assigned into treatment and control groups. Students in the treatment group participated in a brief mindfulness meditation training program consisting of four weekly sessions of twenty minutes each. The control group listened, in small groups to an audio book. Both interventions improved mood, but only the mindfulness training significantly improved working memory and ability to sustain attention (Zeidan et al., 2010).

In another study, researchers sought to determine whether military members demonstrated reduced ability to maintain attention during the stressful period of pre-deployment

preparation. During an 8-week period, 103 active-duty military members were assigned to three groups: Group One received an experiential mindfulness-based training program with opportunities to practice during class sessions. Group Two received a didactic mindfulness-training program. Group Three received no training outside the usual pre-deployment protocol. A fourth group of civilians (n=60) were also given assessments and received no pre-deployment training and did not participate in the pre-deployment protocol. Within the three military groups, the didactic mindfulness group and the no training group both showed significant degradations in ability to sustain attention. The military group whose intervention was more experiential and included opportunities for practice and discussion and reflection showed no significant reduction in ability to sustain attention. In fact, their results most closely resembled those of the civilian group's. This suggests that mindfulness training that focuses on in-class training exercises may help individuals resist negative effects on attention when they are exposed to high demand situations (Jha et al., 2015). Similar results were found in a prior study with the same design. Military members in the mindfulness training group scored significantly higher on working memory assessments. Moreover, during stressful pre-deployment periods, greater mindfulness practice time corresponded with better working memory (Jha, et. al., 2010) .

In addition to determining how mindfulness might assist groups such as active military members preparing for combat deployment, researchers have sought to compare the effect that a short-term intensive training in mindfulness might have on novice meditators. One such study sought to reveal the effects of mindfulness training on executive cognition, especially attentional control, and its relationship to psychological well-being. Twenty individuals who had voluntarily applied to take part in an intensive 10-day mindfulness meditation course were assigned to the treatment group. Twenty other individuals taken from a wait-list for the same

course and recruited from graduate and undergraduate programs at a university in Australia were assigned to the control group. Prior to the 10-day program, all participants were given baseline assessments of sustained attention ability, working memory and measures of depression, anxiety and positive and negative affect. After taking part in the 10-day training, participants in the treatment group showed significant improvements in their ability to sustain attention, and working memory and a significant reduction in negative affect compared to the control group, whose assessment values did not change significantly. Interestingly, the negative affect score was affected in the meditation group, with no significant change in positive affect. The researchers hypothesize that this could be due to the fact that the scale used, the Positive and Negative Affect Scale, primarily measures a state of high arousal positive affect (i.e., joy, excitement), and that the effects of meditation are commonly associated with low arousal positive emotions, such as contentment or satisfaction (Chambers et al., 2008).

Working memory

In addition to measuring ability to sustain attention, some studies evaluated the effects of brief mindfulness training on other cognitive abilities, such as working memory or reading comprehension. In a study of undergraduate students, an intervention group of twenty-six participants met in groups for 45 minutes four times per week for two weeks. A control group of twenty-two students met for the same frequency and duration, and were given lessons on nutrition and healthy eating. Both groups were assessed prior to the classes beginning on measures of working memory, mind wandering, and reading comprehension using a modified verbal-reasoning section of the GRE (Graduate Record Examination) with the vocabulary component removed. The mindfulness intervention group demonstrated significant increases in their working memory capacity and superior reading comprehension scores. In fact, the change

in GRE scores for the mindfulness group was analogous to 16 percentile points. The improvements in reading comprehension and working memory were most pronounced for participants who had higher mind wandering scores prior to the intervention (Mrazek et al., 2013). Another brief mindfulness training offered participants the option of receiving four twenty minute sessions of meditation training or listening to a recorded book. This brief intervention proved to have positive effects such as reducing fatigue and anxiety. In addition, significant increases were shown on tests of working memory compared to pre-intervention. (Zeidan et al., 2010).

Emotional regulation

The second term of the two-part definition of mindfulness describes the ability to hold in awareness emotions, thoughts or sensations that arise without judgment (Bishop et al., 2004). To that end, studies have been conducted to examine the relationship of trait mindfulness to emotional regulation and health. One study measured mindfulness in two samples, one presenting with fear-based anxiety disorders and one healthy and non-anxious. After assessing their trait mindfulness, both groups were subjected to anxiety-producing stressors in a laboratory setting. Trait mindfulness was found to be predictive of greater persistence in the face of discomfort and lower negative reactivity, especially in subjects who initially presented with high anxiety (Arch & Craske, 2010). Another laboratory-based study began by inducing a dysphoric mood in 177 participants using a method that included reading and listening to depressogenic statements, and exposure to background music known to contribute to negative mood induction. Immediately following, the participants were separated into three groups: one group was instructed to ruminate, a second group was instructed to distract themselves and the third group was provided with mindfulness meditation instruction. Each participant completed the mood

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assessment three times: prior to mood induction, immediately following mood induction and immediately following the experimental task. As expected, the subjects who were instructed to ruminate following a negative mood induction exhibited higher levels of dysphoria than those in the other two groups. Distraction was associated with a reduction of dysphoric mood, and meditation group participants were significantly less dysphoric than those in the distraction group (Broderick, 2005). This study has important ramifications because there is a well-studied link between ruminative coping style and poor problem-solving ability and prolonged periods of distress (Nolen-Hoeksema, 1998). The results of this study suggest that meditation may be an alternative to distraction for non-clinically depressed or dysthymic at-risk individuals experiencing dysphoric moods.

The relationship between mindfulness and emotional health was the subject of a 2012 article by Hill & Updegraff. They gave 96 undergraduate students a questionnaire measuring dispositional mindfulness as well as a scale that measured difficulties with emotion regulation. Using these scores and researcher constructed indexes of emotional differentiation and lability, they found that for this sample, a general tendency to be mindful was correlated with lower levels of emotional reactivity, lower frequency of self-reported emotional dysregulation and higher levels of emotional differentiation, which has been linked to higher emotional health. In another study of college students in romantic relationships, higher dispositional mindfulness scores were positively related with relationship satisfaction, self-control and accommodation, all predictors of healthy primary relationships. Encouraged by these results, the same researchers exposed couples to relationship conflict in a laboratory setting. Individuals who scored higher in dispositional mindfulness reported less severe emotional stress responses post-conflict,

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specifically on measures of anxiety and anger/hostility (Barnes, Brown, Krusemark, Campbell, & Rogge, 2007).

In an intervention study of Mindfulness Based Stress Reduction and its effects on emotional regulation and expression, it was found that participants in the intervention group who took part in an 8-week program demonstrated a reduction in reported emotional regulation difficulties post-intervention as compared to a wait-list control group. The effects were significant and group differences were moderate to large in magnitude, both immediately post-intervention and at a 2-month follow-up (Robins, Keng, Ekblad, & Brantley, 2012).

Prior Reviews of Mindfulness Based Interventions with Children

While several reviews have been conducted analyzing and synthesizing the research of mindfulness based interventions with adults, there are fewer reviews focused on outcomes of mindfulness-based approaches with children, and substantially fewer studies to review. A search for reviews of mindfulness based interventions and their efficacy revealed seven articles that concerned children and youth. Three of those were traditional narrative reviews that described a variety of mindfulness-based approaches (Greenberg & Harris, 2012; Meiklejohn et al., 2012; Thompson & Gauntlett-Gilbert, 2008). Two of the reviews examined mindfulness practices in clinical, prevention or health promotion contexts (Greenberg & Harris, 2012; Thompson & Gauntlett-Gilbert, 2008) and Meiklejohn et al. (2012) synthesized literature concerning mindfulness practices in primary and secondary education settings. All three reviews pointed out the methodological weaknesses in the studies to date, a fact that makes outcome and efficacy claims minimally reliable. Nonetheless, the two narrative reviews that discussed demonstrations

of efficacy noted that mindfulness based interventions with children and youth showed promise in improving measures of attention, ADHD, working memory, academic and social skills, emotional regulation, self-esteem, perceived stress and symptoms of eating disorders. Specifically related to school activities, the reviews noted improvements in student absenteeism, suspensions, hostility, school infractions, academic performance and school related functioning. It must be noted that the lack of methodological rigor to date means consumers of this outcome data ought to temper enthusiasm for the results. In addition, these are narrative reviews, rather than systematic reviews or meta-analyses, meaning that none of the authors explicitly described their search, selection, or coding procedures. Any conclusions regarding mindfulness-bases interventions with children and youth drawn from them are thus limited (Greenberg & Harris, 2012; Meiklejohn et al., 2012; Thompson & Gauntlett-Gilbert, 2008).

The authors of four additional reviews used systematic methods to search, screen, code and synthesize results of mindfulness based interventions with children and youth. One review collected 16 studies with youth in school, community and clinical settings through December, 2008. The reviewers found that sitting mindfulness meditation interventions correlated with positive outcomes on some measures of cardiovascular functioning for African American adolescents at risk for clinical cardiovascular disorders. The same systematic review reported positive outcomes in areas as diverse as anxiety symptoms, social behavior, attention, aggression, and bullying for students who participated in sitting meditation practice. The studies under review explored feasibility and acceptability of the intervention, reporting treatment session attendance rates ranging from 68-90% and retention rates through the end of the study including post-intervention assessments ranging from 64-100%. Limitations of the studies reviewed included small clinical samples, and the authors note that the fact that they only

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included sixteen studies was evidence of the limited body of empirical support for mindfulness based interventions with young people (Black, et al., 2009).

A second systematic review published in 2010 examined mindfulness based interventions with preschool, elementary and high school age children in school, clinic and home settings. The reviewers reported on one study with preschool age children. In this study, they found that following an 8-week mindfulness based intervention, there were some measured improvements in the children's executive function. Of the six studies reviewed with elementary age children, the three conducted with clinical participants were found to be well tolerated as feasible and acceptable interventions, but the lack of rigor in design and/or small sample size prevented any definitive conclusions regarding efficacy and generalizability. The other three studies with non-clinical elementary age children reported improvements in posttreatment measures of anxiety, attention, social skills, selective attention, and emotional reactivity. The eight studies reviewed that were conducted with high school age children reported improvements in sleep quality, objective measures of attention and self-reported improvements in ADHD symptoms, perceived stress, anxiety, and subjective happiness. All of these improvements were measurable post-intervention and some, including perceived stress and anxiety, persisted through the 3-month follow up phase (Burke, 2010).

A more recent search was performed in August 2012 and systematically reviewed the effects of mindfulness based interventions in schools on psychological outcomes. One of the aims of the review was to utilize quantitative measures to ascertain which cognitive or behavioral domains show effects of mindfulness based interventions, and whether those effect sizes are large enough to warrant further investigation. Outcomes included within the twenty-four studies in the review were cognitive performance, mostly in the form of attention, emotional problems,

such as anxiety, depression and emotional regulation difficulties, stress and coping and resilience, which incorporated measures of well-being, positive affect, social skills/positive relationships and self-esteem. Their findings were that the effects were large and significant on measures of cognitive performance and small to moderate (but still significant) in the areas of stress and resilience. The effects were small and not significant with respect to emotional problems (Zenner et al., 2014). The authors of the meta-analysis point out that the heterogeneity of the programs implemented is a function of the exploratory nature of the topic thus far. Nonetheless, this initial systematic review and meta-analysis is useful in that it provides direction and may assist future researchers to develop more precise hypotheses regarding the intervention.

A fourth systematic review included twenty studies of mindfulness based interventions with youth through July, 2011. Authors of this review were interested in determining which types of moderators might be associated with stronger effects, including sample origin (clinical or non-clinical), session length, treatment frequency or length, intervention type, sample demographics and dependent variable, i.e., psychopathology. Their calculated effect sizes for clinical samples was in the moderate range and nearly three times the magnitude of that found with non-clinical samples. The other variable that showed significance as a moderator was the presence of psychological symptoms. To confirm that these moderations were not confounded, the reviewers used a multivariate meta-regression model and each was shown to uniquely predict effect sizes when the other was simultaneously controlled. Interestingly, in contrast with studies conducted with adults, the presence or absence of practice outside the intervention program and teacher experience had no significant effect on outcomes. The reviewers acknowledge that their contradictory results could be due to an inability to detect effect due to the limited number of studies available for meta-analysis. On the other hand, they posit that it may be the case that

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there exist fewer moderators for children and youth to reap the benefits of mindfulness based

interventions (Zoogman, Goldberg, Hoyt, & Miller, 2015).

METHODOLOGY

SYSTEMATIC REVIEWS AS METHOD

History of Systematic Reviews

Systematic reviews are a relatively new research methodology that was developed from an unlikely source in the early 1970s. Prior to the 1970s, a search of the literature on a given topic would return individual studies. As the amount of available information has increased, it has become unwieldy for primary researchers to review every possible related study. Therefore, a need has arisen for the collection of studies, an evaluation of their quality, and a synthesis and presentation of their collective findings in a concise reliable format. Around 1972, recognizing that health care resources are finite, Archie Cochrane, a British specialist in tuberculosis treatments, proposed a method of evaluating results from intervention trials in a form that would become the underpinnings of any form of health care used in the UK. He emphasized the use of evidence from controlled trials and developed systematic methods of data gathering, analysis and reporting that continue as the "gold standard" known as systematic reviews today. In 1992, the Cochrane Collaboration was established, bringing together an international network of people from over 100 nations, to synthesize evidence of healthcare interventions in an effort to inform policy and practice (Boland, Cherry, & Dickson, 2013).

Around the same time in the United States, a statistician named Gene Glass, inspired by his personal benefit from his years in psychotherapy, became increasingly more disturbed by the introduction and proliferation of articles debunking the efficacy of psychotherapy (Glass, n.d.). He began to develop criticisms of these articles, for example how authors had included or excluded studies for review, and the treatment of heterogeneous study designs. Ultimately his

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work laid the foundations for what are now called meta-analyses, which are the application of statistical procedures to synthesize quantitative data from outcome studies.

Social science researchers, seeing a need for a counterpart to the Cochrane Collaborative's coverage of healthcare evidence, adopted many of the same standards, and established the Campbell Collaboration in 2000 (Boland et al., 2013). The Campbell Collaboration's stated areas of research cover crime and justice, education, international development and social welfare (The Campbell Collaboration, n.d.).

Definition of Systematic Review

Chalmers (2003) wrote about the need for rigorous, up-to-date evaluations of all relevant research as tools for policymakers and practitioners. He offers the reminder that "science is a cumulative activity," (Chalmers, 2003, p. 25). As a topic of inquiry moves from exploratory through descriptive and into explanatory phases, it becomes more important to bring together and report findings. If one thinks of each study as a unit of analysis, then a systematic review would report findings of a "sample" of studies. Although many published studies are vetted for methodological and conceptual rigor, it is also possible that an individual article might report limitations or anomalous results, so that generalization from the individual study would be unreliable. The aggregation of study findings that accounts for the limitations inherent in each included study would mitigate against these kinds of errors (Gough, Oliver, & Thomas, 2017). To that end, a systematic review is a comprehensive literature review that "is designed to *locate, appraise* and *synthesize* the best available evidence relating to a specific research question to provide *informative* and *evidence-based* answers" (Boland et al., 2013, p. 3). There are multiple purposes for systematic reviews, including driving future research on a given topic, informing best practices for clinicians, and providing direction for policy makers responsible for

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maximizing benefit with limited resources. This is especially important for policy and practice, since it is within these domains that people's lives are most affected. Chalmers said that because they "intervene in people's lives" policymakers and practitioners should "ensure that their prescriptions and proscriptions are informed—if not dictated—by reliable research evidence," (Chalmers, 2003, p. 27).

Components of a Systematic Review

Simply stated, a systematic review differs from less rigorous narrative reviews by following particular steps to minimize bias and increase validity of findings. First, a reviewer must conduct a scoping search and develop one or more appropriate research questions. A protocol is written, which explicitly states criteria for including and excluding studies, defining relevant search terms and stating a search strategy, e.g., which electronic databases will be searched or whether unpublished literature will be retrieved. The second step is to conduct the search, which will inevitably return articles outside the parameters of the protocol. The reviewer screens abstracts and then full-text papers, applying inclusion and exclusion criteria. If the protocol includes citation searching as a source, then the reviewer carries out a citation search of studies gathered so far. Once a final "data set" has been collected, the third step is to perform a quality assessment of included studies. Following this critical appraisal, step four is to extract data from each included study and summarize it. Finally, the reviewer synthesizes and presents an analysis of the aggregated findings, especially as relates to what evidence claims can be made (Boland et al., 2013; Chalmers, 2003; Gough et al., 2017). The validity of a systematic review rests on the thorough and disciplined application of all steps above.

PRIOR REVIEWS

When conducting primary research, the first step is to review published literature on a given topic. This is also the case when preparing to conduct a systematic review. A search for prior systematic reviews of the use of mindfulness-based interventions with children and youth revealed three narrative reviews, and four systematic reviews and/or meta-analyses. Although the narrative reviews are interesting as background information, they did not report the use of a well-designed protocol that would insure that the conclusions drawn were comprehensive and inclusive (Greenberg & Harris, 2012; Meiklejohn et al., 2012; Thompson & Gauntlett-Gilbert, 2008). The remaining four reviews reported used rigorous methods; however, they were limited in other ways. One review was limited to studies of only one intervention delivery method (sitting meditation) and a specific population (African American adolescents) (Black et al., 2009). Only one of the four reviews focused exclusively on school-based programs (Zenner et al., 2014), with the other three including a combination of school, clinic, community and home settings (Burke, 2010; Zenner et al., 2014; Zoogman et al., 2015). Finally, among the four systematic reviews, an aggregate of seventy-five included studies were included. Of those, only forty-six or 62% included school-related outcomes, and none of those outcomes included academic performance or achievement (Black et al., 2009; Burke, 2010; Zenner et al., 2014; Zoogman et al., 2015). Most notably, however, is the fact that the most recent data was collected in August, 2012 (Zenner et al., 2014). Given the accelerating interest in the subject and the ever increasing numbers of publications about it, it is likely that the body of research has evolved greatly since then.

CONTRIBUTION OF THIS REVIEW

This proposed systematic review will provide a more focused and current representation of the state of mindfulness-based interventions in schools. First, there will be a systematic and transparent search protocol followed, an analysis of the quality of studies included and a thoughtful synthesis of results, in an effort to advance the state of knowledge on the topic. The studies reviewed will contain interventions provided in a school-setting to students in grades K-12. It will include any mindfulness-based interventions that incorporate mindfulness as a prominent part of the intervention, regardless of method of delivery (i.e., sitting meditation, yoga with meditation). Finally, it will bring the issue up to date so that future researchers, practitioners and policy makers have the latest comprehensive knowledge with which to make their decisions.

OBJECTIVE OF THIS REVIEW

Research questions

- What are the types of mindfulness-based interventions that are being implemented and evaluated in school settings?

- What is the state/quality of intervention outcome studies of mindfulness-based interventions in school settings?

- What are the effects of mindfulness-based interventions on academic achievement/performance (grades/test scores), attendance, disciplinary referrals, aggression, and mental health (anxiety, depression, affect) in school settings?

Outcome variables chosen

- Academic achievement (grades/test scores)

Since the advent of formal education in America, the purpose of education has been a source of debate. Among those who have participated in the conversation, there is consensus that graduates of compulsory education ought to be able to function as contributing citizens in society. The New York State Board of Regents, in the preface to the latest iteration of learning standards, states that the intended function of schools in New York is to "[prepare] our students to become lifelong learners and thinkers, as well as active participants in civil, community and professional endeavors" (NYSED, 2017). What constitutes "professional endeavors" has changed as industries have come and gone, and humankind has had to adapt accordingly. Simultaneously, educators and policymakers have responded to marketplace leaders to make those adaptations in schools and to use evaluation tools to measure their success at doing so. Since 1983 and the publication of the federally commissioned report, *A Nation at Risk*, there has been a movement to use standardized testing of students at regular intervals as a critical evaluation tool. It is for these reasons that this review has included academic performance, specifically in the form of grades and standardized test scores, as an important outcome measure.

- Attendance

This review includes an analysis of mindfulness based interventions and the effects on school attendance because of the negative short and long-term effects that poor attendance has on student success. Children who do not attend school regularly miss critical instruction and are at an increased risk of dropping out before they graduate. Chronic absenteeism, defined as missing ten percent or more of the school year or missing a month or more of school in the previous year, is not routinely measured, perhaps because of the assumption that most students and their parents

understand the importance of regular attendance (Balfanz & Byrnes, 2012). Nonetheless, each

year, an estimated 5 million to 7 million students are missing nearly a month of school annually.

Absenteeism in ninth grade is a better predictor of dropout status than eighth grade standardized

test scores (Jordan & Chang, 2015). Students who begin school in kindergarten with acceptable

attendance records, then develop an increased propensity to miss ten percent or more regular

school days beginning in late elementary school, have a 25% dropout rate. Dropping out of

school before high school graduation is linked to a lower lifetime average income, higher

unemployment rates, an increased likelihood of health issues and incarceration. High school

dropouts are also 2.5 times more likely to die at a younger age (Schoeneberger, 2012).

- Disciplinary problems

Some students miss school due to illness (excused absence) or truancy (unexcused

absence), and some students are out of school due to code of conduct infractions. In 2007, one in

four public school students in 9th through 12th grade reported that they had been suspended from

school at least once during their educational career (Aud et al., 2011). A recent survey by the

U.S. Department of Education showed that during the 2014/2015 school year, there were 1.3

million reported discipline incidents resulting in the removal of a student from a regular

education program for at least one school day. This figure only includes discipline incidents that

are a result of alcohol, drugs, violence or weapons possession since these are the only types that

states are required to report. Infractions that are ostensibly less serious might warrant an in-

school suspension which is defined as an instance in which a student is removed from the regular

classroom for at least half a day, under the direct supervision of school personnel. During the

2011/2012 school year, 3.4 million public school students received this type of consequence,

which represents 6.83% of the total student population (Musu-Gillette et al., 2017). Students

who miss classes for disciplinary reasons experience direct consequences of losing instructional time. Countries with fewer discipline problems consistently score at the top of international comparisons of standardized math and science assessments. Nations with above average discipline problems show lower test score performance than would be expected given their levels of economic development (Arum & Ford, 2012). The negative consequences of disruptive students affect their peers and teachers. During the 2011/2012 school year, in a survey reported by the National Center for Educational Statistics, 38.5% of public and private school teachers reported that student misbehavior interfered with their teaching (Musu-Gillette et al., 2017). These reports of prevalence and the consequences of disciplinary issues are the reason this outcome variable and its corollary, aggression, are under review.

- Anxiety/depression/affect

This review includes outcome variables related to anxiety, depression and affect because stress and mental disorders in school-aged children are at significant levels and on the rise. A study in the summer of 2010 reports that one out of every five children between the ages of 5 and 17 years stated that they worry *a lot* or *a great deal* about things in their lives. In the same survey, nearly one-third of the same group of children reported that within the last month, they experienced physical health symptoms associated with stress (APA, 2010). These figures increase as children enter adolescence. In 2013, in a survey of more than 1,000 U.S. teens 13-17 years old, 74% reported having one or more physical or emotional symptoms associated with stress, including feeling nervous, depressed, tired or overwhelmed, lying awake at night or experiencing headaches or gastrointestinal distress. The most commonly mentioned source of stress is school, with 83% of the sample stating that school is a *somewhat* or *significant* stressor. More than one in four (27%) of these young people said that their level of stress could be

characterized as high during the school year, and 31% report an increase in stress level in the past year (APA, 2013).

Increasing stress levels could be a contributing factor to the increase in prevalence in mental disorders in children under 18 years old. The U.S. Department of Health and Human Services defines mental disorders as "serious deviations from expected cognitive, social, and emotional development" (CDC, 2013, p. 2). They go on to report that a total of 13%-20% of children in the U.S. experience a mental disorder in a given year, and that the prevalence of conditions such as ADHD, anxiety and depression is increasing. This is a serious public health issue that affects the children, their families and communities with an estimated annual cost of $247 billion (CDC, 2013).

INCLUSION/EXCLUSION CRITERIA

This review will be limited to interventions that take place in a school setting (during the school day or in an after-school program) and used by students in grades Kindergarten through 12th grade in the United States. Any program using a mindfulness-based intervention as a primary component will be included, rather than those that have m0.indfulness features as part of a larger treatment method, i.e., Dialectical Behavior Therapy (DBT) or Acceptance and Commitment Therapy (ACT). Studies with no control, such as single-case designs or pre-/post-test with the same sample will be included, as will studies with a control, active or otherwise. Outcomes of interest will be academic achievement/performance (in the form of grades and standardized test scores), attendance, disciplinary referrals, aggression and mental health/well-being in the form of anxiety, depression and positive or negative affect. The search will capture English-language literature published in peer-reviewed journals between 1994 and June 2017.

The review will exclude unpublished studies and formats that are alternative to journal articles, e.g., books, book chapters, theses, conference proceedings or dissertations.

SEARCH STRATEGY

Published studies meeting the above criteria will be retrieved using a comprehensive search that includes multiple electronic databases as well as citation searches of reference lists of previously published reviews and included studies.

- Electronic Databases
  - PubMed
  - PsycINFO
  - SocINDEX
  - Scopus
- The reference lists from prior reviews and included studies will be reviewed for potential studies. Author searches will be performed for all authors of included studies. A hand search will be completed of all issues of the key journal, *Mindfulness*.

SEARCH TERMS AND KEYWORDS

Search terms related to the intervention, setting and outcomes will be combined to search the electronic databases. Database-specific strategies will be used, including consulting thesauri

or controlled vocabularies to insure precision and completeness of returns. Some examples of search terms that will be used are:

- **Intervention:** mindfulness OR meditation OR mindfulness based intervention OR MBSR OR mindfulness based stress reduction OR MBCT OR mindfulness based cognitive therapy OR non judgmental awareness OR present-moment OR MM OR contemplative practice

AND

- **Setting:** Schools OR middle school OR school based intervention OR elementary schools OR public schools OR high schools OR junior high schools

AND

- **Outcome 1 (academic achievement/performance):** Educational Measurement OR academic achievement OR standardized tests OR educational tests OR school grades OR student grades

RESEARCH DESIGNS

To be included in this review, studies may use one of the following research designs: randomized controlled trial (RCT), quasi-experimental design (QED), single-group pre-post test design (SGPP) or single subject design (SSD). Single subject designs will be included due to the emerging nature of the research on this subject and the aim of the review to present a picture of the research as it currently stands. Acceptable comparison groups for RCT and QED studies will be wait list control, no treatment, treatment as usual and alternative treatment. Qualitative data

in the form of feasibility and/or acceptability will be reviewed and reported, only if such data is collected as part of a quantitative study.

DATA EXTRACTION/CODING PROCESS

Quality Assurance Instrument--Randomized Controlled Trials

Included studies that are randomized controlled trials or quasi-experimental will be assessed for risk of bias using the Cochrane Collaboration's risk of bias tool. This tool has been found to be valid and reliable when used to determine threats to internal validity of individual studies, especially flaws in design, conduct, analyses and reporting. Important sources of bias contained in the tool include selection bias, detection bias, attrition bias and reporting bias. Careful application of the tool to randomized studies within a systematic review will mitigate the possibility that intervention effects will be underestimated or overestimated (Higgins et al., 2011).

Quality Assurance Instrument—Non-Randomized Studies

Using the Cochrane Collaboration risk of bias tool as its basis, the ROBINS-I tool (Risk of Bias In Non-Randomized Studies of Interventions) has been developed and tested for reliability and validity. Just as with the Cochrane tool, the ROBINS-I calls for reviewers to assess risk of bias within specific domains that address particular threats to a study's internal validity. The tool requires the development of a target trial which is a hypothetical pragmatic randomized controlled trial against which the non-randomized study will be judged. This hypothetical trial does not need to be feasible or ethical, which allows for the description of an "ideal" RCT with very high internal validity. The ROBINS-I includes assessment domains that

are included in the Cochrane Collaboration risk of bias tool with two additional domains that are applied prior to the introduction of the intervention under study (Sterne et al., 2016).

SYNTHESIS PROCESS/ANALYSIS

Following quality analysis of included studies, this review will include a comprehensive descriptive analysis of variables of interest and general findings. Attributes of study participants will be discussed, including age, grade level, gender, clinical or non-clinical status and clinical diagnosis if applicable. When reported in the individual studies, features of the settings such as type of school or classroom, geographical location and community characteristics will be described. Details of interventions applied will be outlined, for example, strategies used, duration of intervention, implementer training and intervention period. Finally, results from the use of the risk of bias tools will be shared.

RESULTS

STUDY SELECTION

Search Procedure and Results

To ensure coverage of all articles related to the subject matter under review, four major databases were searched. To capture articles within the biomedical and life sciences literature, PubMed was chosen. PsycINFO and SocINDEX were selected to represent the behavioral and social science body of literature. Initially, Education Source was chosen due to the setting defined in this review. A scoping search of Education Source for articles including the terms, "mindfulness" and "meditation" produced no results, so this database was not ultimately used. Rather, Scopus, a relatively new database that, as its name implies, covers a broad scope of abstracts and citations from a variety of disciplines was chosen.

An exhaustive list of synonyms intended to operationalize all relevant variables was developed. When a term had synonyms outside the controlled vocabulary, these were entered into the search as text words. See Appendix A for concept table, search strategies and search strings by database.

The four databases were searched, two each on two different dates. On March 23, 2017, searches were performed in PubMed and PsycINFO, with a yield of 12 and 303 articles, respectively. On April 3, 2017, searches were conducted in SocIndex and Scopus. SocIndex netted 559 articles and Scopus 184, for a total of 1058 references. Twenty-one duplicate references were detected and removed, and 1037 were advanced to the next stage: title and abstract screening.

Abstract Screening

A previously developed Abstract Screening Checklist (Appendix B) was used for the next stage of the review. Titles and abstracts were screened for relevance, first applying publication related criteria such as format (article in a peer-reviewed scientific journal), language (English language) and year of publication (after 1995). The next screening criterion captured only those articles describing programs that included mindfulness-based interventions as a primary component of the intervention. Following that, titles and abstracts were reviewed to make sure the population under investigation included children less than eighteen years old, and/or students in grades K-12. The next group of inclusion and exclusion criteria had to do with setting, so that only studies of programs provided in school settings and in the United States advanced to the next stage. Finally, abstracts and titles were evaluated to make sure one or more outcomes of interest to this review were present. At the end of this process, 748 studies were excluded. Full-text articles were downloaded for the remaining 289 references.

Full-Text Review

Using a reviewer designed checklist (Appendix C), inclusion and exclusion criteria including format, setting, population, outcomes and study design were applied and 271 were found to lack relevance. Of these, thirty-nine were not articles from scientific peer-reviewed journals, 45 were not in a school setting, and 55 were programs for adults or preschool-age children. Forty studies included interventions that were not primarily mindfulness-based and 14 measured outcomes other than grades, test scores, attendance, disciplinary issues, aggression, anxiety, depression or affect. Sixty-nine articles described studies that were not either randomized controlled trials, Quasi-experimental, Single-group Pre-/Post-test or Single Subject Designs. Nine articles were determined to be duplicates of articles previously excluded or

intended to be included. Eighteen articles were therefore selected for inclusion in this review at this stage.

Hand Searching

The reference lists from prior systematic reviews on the same topic were reviewed and additional articles were obtained. A search was conducted to find all works by authors of included studies. Scopus was the database used to conduct these searches which netted 11 additional articles. Tables of contents for the journal *Mindfulness* from its inception in March 2010 through June 2017 were hand searched and one additional study was found to be relevant. In total, 37 studies are included in this review. See Figure 1 for a Study Retrieval Flow Chart.

STUDY RETRIEVAL FLOW CHART

Figure 1

Database searches returned 1058 references

Removed 21 duplicates

Screened 1037 titles and abstracts for full-text eligibility

Excluded 748 articles upon title/abstract

Full-text reviewed for 289 articles

Excluded 271 articles that did not meet inclusion/exclusion criteria
Study design (n=69)
Population (n=55)
Setting (n=45)
Intervention (n=40)
Format (n=39)
Outcome (n=14)
Duplicate/secondary reports (n=9)

18 articles met criteria for inclusion in review

Hand search nets 19 additional articles

37 Studies included in review

DATA EXTRACTION

Each study that passed the screening process above was coded using a structured data extraction form. The data extraction form included items related to study design including: sample characteristics, assignment methods and procedures, blinding and description of control groups, if applicable. In addition, the form captured data points such as participant characteristics, setting, details about interventions, and outcome data. See Appendix D for a blank Data Extraction Form and a template including possible values for each data point.

DESCRIPTION OF INCLUDED STUDIES

Design Characteristics

As would be expected in a burgeoning area of research, a large majority (76%) of the 37 included studies were published within the last 7 years, between 2011 and 2017. The largest percentage of the programs took place in the Northeast region of the United States (38%), followed by 24% occurring in the West. Encouragingly, the most common research design was randomized controlled trials (54%), and Quasi-Experimental designs accounted for 11% of the studies. Outcome studies in school settings lend themselves to Single-group Pre-/Post-designs, and 30% of the studies in this review fell under that category. The two remaining articles described Single Subject Design studies, which accounted for 5% of the total. See Table 1.

DESIGN CHARACTERISTICS								
Publication year	n	%	**Region**	n	%	**Study design**	n	%
1995-2000	0	0%	West	9	24%	RCT	20	54%
2001-2005	3	8%	Midwest	1	3%	QED	4	11%
2006-2010	6	16%	South	6	16%	SGPP	11	30%
2011-2015	19	52%	Northeast	14	38%	SSD	2	5%
2016-2017	9	24%	Not Stated	7	19%			

Table 1

Participant characteristics

A total of 3150 students were participants in the thirty-seven selected studies. Just over half (n=18) of the studies had fewer than 50 participants, with the remainder nearly evenly split among sample sizes of 51-100 (n=6), 101-150 (n=4) and 151-300 (n=9). Mean ages of participants ranged from 8.5 to 17.3 years. Four studies did not report participant grade levels. Among those that did, the distribution was 36% Elementary age (grades K-6), 30% Middle School age (grades 7-8) and 33% High School (grades 9-12).

The majority (84%) of the studies grouped female and male students, with four (11%) male only samples and two (5%) female only. Most (n=26) studies included a distribution among ethnicities consistent with the region. However, 11% of samples (n=4) were almost exclusively African American, 16% (n=6) were almost all European American subjects and one study sample was entirely Hispanic. See Table 2.

PARTICIPANT CHARACTERISTICS					
Sample size (n)	n	%	Grade(s)	n	%
<50	18	49%	Elem (K-6)	12	32%
51-100	6	16%	MS (7-8)	10	27%
101-150	4	11%	HS (9-12)	11	30%
151-300	9	24%	Not Stated	4	11%
Race/Ethnicity			Gender		
Majority (95-100%) African American	4	11%	Female/Male	31	84%
Majority (90-100%) European American	6	16%	Male only	4	11%
100% Hispanic	1	3%	Female only	2	5%
Multiple races/ethnicities	19	51%			
Not Stated	7	19%			

Table 2

Four articles (11%) reported on programs in a private school setting, three (8%) in alternative schools, two (5%) in charter schools and the remaining 26 (71%) that reported school type took place in public schools. Twenty-one articles included information about the community setting. Fifty-seven percent were in urban, 19% in suburban, and 24% were in rural settings.

Ten articles reported percentages of students eligible for Free or Reduced-Price Lunch (FRPL). As proposed by a National Center for Education Statistics blog, the FRPL number can be used as a proxy measurement for concentration of low income students within a school, since eligibility for FRPL is means tested. Using the NCES definition, a school or community is considered "low poverty" if 25% or fewer students are eligible for Free or Reduced-Price Lunch. If 25.1-50% of students are eligible for FRPL, then they are considered "mid-low poverty"; if 50.1-75% are eligible, they are "mid-high poverty" and if 75.1% or more qualify, then they are considered "high poverty". (Snyder & Musu-Gillette, 2015). Six articles (16%) reported that

their samples fell in the mid-high to high poverty range. Two additional articles did not state percentages, rather they described the population as "demonstrating financial need" or a "disadvantaged school district" (Sibinga et al., 2013; Steiner, Sidhu, Pop, Frenette, & Perrin, 2013). See Table 3.

COMMUNITY CHARACTERISTICS		
Type of school	n	%
Public	26	71%
Private	4	11%
Alternative	3	8%
Charter	2	5%
NS	2	5%
Community		
Urban	12	32%
Suburban	4	11%
Rural	5	14%
Not Stated	16	43%
FRPL		
Low poverty (<=25% eligible)	3	8%
Mid-low poverty (25.1-50% eligible)	0	0%
Mid-high poverty (50.1-75% eligible)	2	5%
High poverty (>=75.1% eligible)	4	11%
Not Stated	28	76%

Table 3

Six of the 37 studies specifically mentioned General Education and/or Special Education status. Two samples were restricted to General Education students, two samples included only Special Education students and two reported both types of students within the sample. Almost

half (n=17) of the populations under review presented with specific medical or psychological/behavioral issues, including high blood pressure (n=2), Learning Disability (n=1), anxiety or depression (n=3), ADHD (n=3), behavioral issues (n=3), academically struggling/at-risk of dropping out of school (n=4) and current/recent homelessness (n=1).

Intervention characteristics

The preferred method of delivery for 86% (n=32) of the interventions was in a group or class. Approximately one-third (n=10) met once a week, another third met 2-3 times per week and the rest met 3-5 times per week. About half (n=17) of the interventions lasted 30-45 minutes, and the remaining programs were evenly split between 10-30 minute and 50-60 minute durations. Five (13%), programs spanned less than four weeks, 11 programs (30%) lasted between 5 and 8 weeks and 12 (32%) were from 9-12 weeks long. The remaining took place for longer than 13 weeks. See Table 4.

Almost all programs (n=34) were delivered during the school day. Approximately half of the articles reported that the intervention was provided with a manual for fidelity. Most interventions did not include a homework component. For those that did, six explicitly assigned homework and another nine gave participants CDs or workbooks and/or "encouraged" home practice. None of the studies reviewed mentioned involving parents.

Twenty-one articles described the philosophy or method from which the children's intervention was derived. Of these, seventeen, or 81%, revealed that they were based on the Mindfulness Based Stress Reduction (MBSR) program. The most common element among all interventions was the teaching of breathing techniques or exercises (n=27), followed by meditation (n=22), and present moment awareness (n=20). Nineteen studies reportedly included

some yoga or mindfulness training, and 12 included leading the participants through a body scan. Other less common skills or themes were relaxation, self-awareness, social awareness and visualization.

Just over half (n=19) of the interventions were provided by outside instructors, therapists or graduate psychology students. Nearly one fourth (n=8) were provided by either the classroom teacher or school staff.

INTERVENTION CHARACTERISTICS					
Ratio	n	%	Duration (mins)	n	%
Group	32	86%	10-30	8	23%
Individual	4	11%	30-45	17	45%
Individual/Group combined	1	3%	50-60	8	23%
			Varied (3-12 mins; 5-10 mins)	2	5%
			Not Stated	2	5%
Frequency			Length (# of wks)		
1 time per week	10	27%	1-4	5	13%
2-3 times per week	10	27%	5-8	11	30%
3-4 times per week	4	11%	9-12	12	32%
5 times per week	6	16%	13-20	4	11%
Other (2x/day; 2x/month)	3	8%	21+	4	11%
Unclear	2	5%	Not Stated	1	3%
Not Stated	2	5%			

Table 4

Risk of Bias—Randomized Controlled Trials and Quasi-Experimental Studies

For Randomized Controlled Trials and Quasi-Experimental designs, the Cochrane Collaboration Risk of Bias tool (Appendix E) was applied. First, studies were analyzed for risk of *selection bias*. When selection bias is an issue, there may be systematic differences between baseline characteristics of the treatment and control groups and those differences may account for changes in the dependent variable. To reduce this risk, the sample should use a random (unpredictable) sequence to assign participants to the groups. The Cochrane Risk of Bias tool labels this Random Sequence Generation. Some acceptable procedures are using a computer random number generator, or tossing a coin. In addition to insuring random sequence generation, participants and investigators should not be able to predict assignment. This is called Allocation Concealment on the Cochrane Risk of Bias tool.

In this review, of the 24 RCT or QED studies, all of them reported that they used a random procedure to assign participants to treatment or control groups, but they did not describe the procedure. Only two studies reported using a computer to randomize, two more used a coin toss, and another reported that they "drew slips". Two studies mentioned that they concealed allocation; the rest did not comment on this so it is unclear whether attempts were made. Because most studies reported that random procedures were used but the method was not disclosed, the overall risk of Selection Bias was moderate.

Randomization happened at the participant level in nine studies, at the class level in eight studies and at the school level in seven studies. Nineteen, or 80%, of the RCT or QED control groups received "no intervention", or the "usual" curriculum while the remaining five, or 20% received lifestyle, health, or substance abuse education programs.

Although random sequence generation and allocation concealment are designed to insure no systematic differences exist between groups prior to the intervention, it is possible that they may occur anyway. One method researchers can use to detect differences at baseline is to collect data on characteristics, such as gender, ethnicity, and other variables that may account for changes in the dependent variables besides the intervention. Just over half (n=13) of the RCT or QED studies collected this data and determined that there were no significant between group differences at baseline. About a quarter (n=5) found differences and reported them, and another 5 studies did not report whether they collected data of this sort prior to the intervention.

Performance bias or *detection bias* can occur when participants and/or outcome assessors are aware of the student's assignment to treatment or control groups. Due to the nature of mindfulness-based interventions, blinding of participants and personnel to treatment is not feasible. Therefore, all studies in this review are subject to performance and detection bias. In addition, because many of the outcomes measured include self-report questionnaires, it is not possible to blind outcome assessors. This means that performance bias is a risk for almost all outcomes, with the exception of objective measures such as grades and attendance. These kinds of objective measures accounted for approximately 7% of outcome measures in this review, with the remaining 93% obtained using self-report, teacher-report or parent-report instruments. Each of these reporters was aware of the student's participation in the program. In some cases, the reporter (e.g., teacher) was also responsible for reporting on outcomes, which increases the risk of detection bias. The overall risk of Performance and Detection Bias was moderate.

Attrition bias occurs when there are systematic differences between those who complete the study and those who do not. Half (n=12) of the RCT or QED studies did not state whether there was attrition, so it is unclear whether the study was vulnerable to attrition bias. Ten studies

reported low attrition or the researchers applied statistical methods to determine whether there were significant differences between program completers and those who did not complete. Two studies reported significant attrition and differences between those who dropped out and those who finished. Therefore, the overall risk of Attrition Bias was moderate.

Reporting bias refers to systematic differences between reported and unreported findings. Without comparing the pre-study protocol to the results reported, it is difficult to determine if a study is prone to reporting bias. Within this review, since the protocols were not obtained, all studies were assigned an "Unclear" status for this type of bias, making the overall risk of Reporting Bias moderate.

Other biases that were considered reflected the researcher role in the program implementation. For example, nearly two-thirds (n=15) of the researchers conducting RCT or QED studies were independent, whereas a quarter (n=6) either provided the intervention or created and/or trained the providers. The overall risk of Other Biases was moderate.

See Appendix F for Risk of Bias Across Studies (RCT & QED) and Appendix G for Risk of Bias by Study.

Risk of Bias—Single-group Pre-Post-test Studies

As this systematic review was conducted, it was decided to deviate from the original proposed quality assurance tool for Single-Group Pre-/Post-test designed studies, the ROBINS-I tool. The ROBINS-I tool (Risk of Bias In Non-Randomized Studies of Interventions) was developed less than one year ago. Therefore, it has not been yet been extensively field tested a great deal. It was determined that a better method of assessing internal validity for these studies

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would be a researcher developed tool. This tool evaluates internal validity due to History, Maturation, Testing, Instrumentation and Mortality, using values of "Low", "High" or "Unclear" in each category. See Appendix H for an example of the Single-group Pre-/Post-test Internal Validity Tool.

Using the researcher designed Internal Validity Tool, one of the eleven Single-group Pre-Post-test design studies report that there were two events (a flu outbreak and standardized testing) that occurred during the intervention period that may have influenced outcome scores, especially those related to stress. This study was the only one vulnerable to a threat to internal validity related to *History*, making an overall threat low.

Maturation was a potential threat to internal validity for approximately half (n=5) of this type of study due to the length of the program. Interventions that lasted 1-12 weeks or fewer were coded with a "Low" threat of this type. The articles reporting on programs of longer duration (two lasted 14 weeks, one 24 weeks, one 29 weeks and one 3 months) were coded as "Unclear" in this category. Therefore, an overall threat due to *Maturation* was moderate.

An analysis of the types of instruments used concluded that it is unlikely that exposure to the pre-test influenced a participant's answers on the post-test. Consequently, a *Testing* threat to validity was not found and the overall threat is low.

The majority of the programs used the same instrument to test pre-intervention and post-intervention, so a threat to validity due to *Instrumentation* was low.

The threat to internal validity due to *Mortality* was spread among the eleven SGPP studies in the review. Four articles reported no attrition and the fifth used statistical methods to determine that there were no significant differences between participants who completed the

program and those who did not. One study was coded as Unclear because it was not reported whether attrition occurred during the intervention period. The remaining five articles either reported data on only those who completed pre-and post-tests, or noted the number of participants who did not finish but did not investigate possible differences between completers and non-completers. The higher the percentage of non-completers, the more important it would be to analyze possible differences. The mean percentage of non-completers among these studies was 12%, so these were coded at High risk of threat in this group. The overall threat to internal validity due to *Mortality* was moderate.

See Appendix I for Risk of Bias by Study for Single-Group Pre-Post-test designs**.**

Risk of Bias—Single Subject Design Studies

To determine the rigor, and therefore validity, of results from the two Single Subject Designs included in the review, a Quality Assessment tool was developed. In order to allow for replication, it includes questions related to adequate description of participants, conceptualization and operationalization of Independent and Dependent variables, obtaining a stable baseline after ensuring inter- or intra-rater reliability. To assess validity of results, there are questions about obtaining a minimum number of data points per phase and whether results were replicated across a minimum of three subjects. See Appendix J for an example of the Single-Subject Design Quality Assessment tool.

Both Single Subject Design studies in this review met quality standards describing the participants and intervention as well as defining variables and ensuring inter-/intra-rater reliability. One of the two reported stable baselines for the subjects and collected a minimum

five data points in each phase of the intervention. Neither study reported replication of the

effects of the intervention across three or more subjects. See Appendix K for Risk of Bias by

Study for Single Subject Designs

Outcome results

Of the six outcome measures included in this review, the most commonly measured were

related to affect, anxiety or depression. Twenty-nine articles (78%) reported the effects of

mindfulness-based interventions on such variables as positive and negative affect, perceived

stress, anxiety or depression. Just over half captured data on discipline and aggression. More

distal outcomes such as grades, academic performance and attendance were reported in six, one

and two articles, respectively. See Table 5.

OUTCOMES STUDIED	n	%
Grades	6	16%
Academic performance	1	3%
Attendance	2	5%
Disciplinary Problems	13	35%
Aggression	5	14%
Affective Measures	29	78%

Table 5

The majority of articles (n=35) reported at least one significant effect of mindfulness-based interventions. Only two articles reported no significant intervention effects. However, there is likely publication bias present, and the interventions that had no significant effect may not be available in peer-reviewed literature.

There was little consensus in instruments chosen to measure outcomes. For example, anxiety was measured with eight different instruments and depression with seven unique instruments. The most commonly used instruments were: the Perceived Stress Scale, used in 10 unique studies; the Positive and Negative Affect Scale, used in 5 unique studies; and the Child Behavior Checklist and Youth Self-Report, used in four studies. Overall, 72 different instruments were used to measure all study outcomes, including those that fell outside the criteria for inclusion in this review. For example, some of the studies were interested in the effects of mindfulness-based interventions on attention, impulsivity, and mindfulness itself. See Appendix L for a list of instruments used within the 37 included studies.

DISCUSSION

The current study was developed in response to the explosion of interest in mindfulness and its application with school-age children in the United States. A database search of peer-reviewed scientific journals found that between 2008 and 2017, the number of articles containing the term "mindfulness" grew 800% from 830 to 6555.

Mindfulness-based interventions (MBIs) have been found to be effective helping adults cope with chronic pain and illness (Carlson et al., 2013; Gaylord et al., 2011; Kabat-Zinn, 1982), boost immune response to ward off illness (Barrett et al., 2012; Creswell et al., 2009; Creswell et al., 2016; Gonzalez-Garcia et al., 2014; Malarkey et al., 2013; Rosenkranz et al., 2013; Seyedalinaghi et al., 2012) and increase positive health habits and behaviors (Arch et al., 2016; Brewer et al., 2011; Hwang & Kearney, 2013; Mason et al., 2016; N. N. Singh et al., 2011; Westbrook et al., 2013). It has helped individuals with multiple episodes of depression and substance abusers avoid relapse (Bowen et al., 2014; Ma & Teasdale, 2004) Positive results have been measured with adults on working memory (Zeidan et al., 2010), sustained attention and emotional regulation (Broderick, 2005; Jha et al., 2010; Robins et al., 2012). Studies with undergraduate and graduate college students in stressful conditions have found mindfulness-based interventions correlated with reductions in anxiety and depression symptoms and stress (Shapiro et al., 2007; Shapiro et al., 1998).

In clinical, home and school settings, the literature shows promising results of MBIs with children and youth on outcomes such as attention, anxiety, (Black et al., 2009; Burke, 2010), emotional reactivity, stress, (Burke, 2010), coping (Zenner et al., 2014), bullying and aggression (Black et al., 2009).

In this environment of tightening school budgets, it is important to make sure that programs implemented with school children demonstrate evidence of efficacy. This is especially true since high-stakes testing and accountability have been the trend in education. Mindfulness-based interventions may provide an antidote to school related stress. Additionally, it is possible that they could be integrated into current education systems in an effort to advance academic goals and increase student preparation for college and/or careers in rapidly evolving work settings.

The purpose of this systematic review is to collect, analyze and synthesize results of intervention studies of mindfulness-based interventions in schools. This will present a "state of the research" from which informed future practice, research and education policies can be made.

Research question 1—What are the types of mindfulness based interventions that are being implemented and evaluated in schools?

Elementary

Thirteen articles described mindfulness-based interventions applied to elementary age students. Each intervention was unique, meaning there was no manualized, standard program implemented among the studies. In most cases, the researcher developed and named the intervention, although there were common components. For example, ten of the thirteen included teaching the children breathing techniques or exercises. Nine programs included meditation instruction and practice and eight programs incorporated some form of yoga. Seven articles reported that present moment awareness was part of the elementary curriculum and four described leading the students through a body scan. There were three articles that mentioned teaching relaxation skills. One curriculum incorporated visualization. Another discussed making healthy choices, avoiding risky behavior and coping effectively with the children. See Appendix M for a graph of program components by age group.

The programs for elementary students were most likely to be offered 5 times per week for between 10 and 30 minutes, and lasting from 5-8 weeks. Most articles did not mention homework, and those that did (n=4) said it was "encouraged" but not mandatory.

In summary, most elementary interventions took place 5 times per week for 10-30 minutes. The programs lasted between 5 and 8 weeks. The four most common elements among

programs were: breathing techniques/exercises, meditation, yoga and present-moment

awareness.

<u>Middle or Junior High School</u>

Twelve articles described mindfulness-based interventions with middle school students. There were eight unique programs implemented. For example, MBSR was found in three separate articles and *mindfulness meditation* was taught twice. Upon investigation, in each of these cases, the same researchers were involved. In one case, two articles reported on the same sample, with the second article analyzing moderator variables looking for effects (Quach, Gibler, & Jastrowski Mano, 2017; Quach, Jastrowski Mano, & Alexander, 2016). In the second case, the later study resembled the first—an apparent attempt to replicate and build on the prior results (Sibinga et al., 2013; Sibinga, Webb, Ghazarian, & Ellen, 2016).

The majority of programs included a manual for implementation. Like the elementary age programs, nine of the ten programs included teaching the youth breathing techniques or exercises. Seven articles reported that present moment awareness was part of the curriculum. Five programs included meditation instruction and practice. Five programs each incorporated some form of yoga and four described leading the students through a body scan. Two articles mentioned teaching relaxation skills. See Appendix M for a graph of program components by age group.

The programs for middle school students were most likely to be offered just once per week. The most common durations reported were split between 30-45 minutes and 50-60 minutes, which is consistent with class period durations for this age group. Most of the programs

lasted between 9 and 12 weeks. Just as with elementary programs, most of the articles did not

mention homework, and those that did (n=3) said it was "encouraged" but not mandatory.

In short, most middle school interventions took place once a week for 30-60 minutes.

The programs lasted between 9 and 12 weeks. Common elements mirrored those for elementary

students: breathing exercises, present-moment awareness, meditation and yoga.

High School

High school students represented the sample in twelve articles in the review. With this

population, eight unique programs were implemented, meaning there was more homogeneity of

interventions. In most cases, the researcher developed and named the intervention, although

there were common components. For example, eight of the twelve included teaching the young

people breathing techniques or exercises. Eight programs included meditation instruction and

practice. Seven articles reported that present moment awareness was part of the high school

curriculum and six programs incorporated some form of yoga. Four described leading the

students through a body scan. There were two articles that mentioned teaching relaxation skills.

One curriculum included visualization strategies. Another discussed making healthy choices and

maintaining healthy relationships. See Appendix M for a graph of program components by age

group.

High school programs most often met two to three times per week. The most common

session length was split between 10-30 minutes (n=5) and 30-45 minutes (n=5). They were most

likely to last 9-12 weeks. Most articles did not mention homework. Two articles reported

providing workbooks and CDs to students should they wish to practice at home. Two other

programs assigned daily homework sessions, seven days per week.

To recap, most of high school programs met 2-3 times per week for 10-45 minutes. The programs lasted between 9 and 12 weeks. Common elements were identical as those for younger students: breathing techniques, meditation, present-moment awareness and yoga.

Research question 2—What is the state and quality of outcome studies of mindfulness-based interventions in schools?

Mindfulness-based interventions have been increasing in popularity as complementary programs within school settings. To maximize return on investment, educators are demanding that programming be evidence-based. Researchers in education have stepped forward to fill that demand. Because the subject matter is relatively new in educational settings, the research designs have some common strengths, but more common limitations.

Strengths

Many of the articles in this review mention an overall acceptance of the mindfulness programming by stakeholders including faculty, administration and student participants. The programs that were of shorter duration (3-15 minutes per session) were well-received. The programs that integrated mindfulness into the school day or curriculum were found to be feasible by all school staff and administration. This was true, for example, for the interventions that integrated yoga instruction into the Physical Education curriculum. Finally, the less training or preparation needed to administer the program, the more likely it would be considered feasible. For example, in one study classroom teachers were designated as providers and were supplied with recordings and equipment to lead students and themselves through guided meditation. The requirement was to schedule these sessions at the same period each day, and teachers quickly

agreed to implement the intervention before recess every day, or before a particular subject, keeping the time of day constant (Bakosh, Snow, Tobias, Houlihan, & Barbosa-Leiker, 2016).

There were individual studies that stood out as including features that increased the rigor or confidence in outcome results. One program included a pre-pre-test for the period two weeks prior to the baseline measure to ensure stability of outcome measures prior to introduction of the intervention. Therefore, any changes seen post-intervention are more likely to be due to the intervention itself (Edwards, Adams, Waldo, Hadfield, & Biegel, 2014). Another study followed students and obtained outcome measurements three months after the intervention ended. Results observed beyond the intervention period demonstrate the power of the intervention (Fung, Guo, Jin, Bear, & Lau, 2016). Singh, Lancioni, Joy, et al. (2007) studied a program that included opportunities for participants to practice skills in real-life, which had positive effects outside of the intervention period. And one study reported that program developers deliberately focused on a single-component intervention for students with ADHD that was easy to learn and apply. This decision increased the likelihood that participants would use the new skill and benefit from it during the study period and beyond (Grosswald, Stixrud, Travis, & Bateh, 2008).

Limitations

Many of the limitations of studies in this review are related to study design. For example, in one study, a school staff co-facilitator was added after a few sessions, and the primary facilitator began visiting the school on non-program days in order to improve relationships with study participants. Initial sessions were held in a classroom, and due to participant misbehavior,

the program was moved into the school gym (Bluth et al., 2016). These inconsistencies reduce the replicability of the study.

Some researchers across multiple studies in this review provided interventions in which the delivery was markedly different for control and intervention groups. Such features as frequencies, durations, length of program and provider credentials/characteristics were not held constant.

Comparison among programs is hindered by the fact that there is no consensus regarding appropriate instruments to measure similar constructs. In addition, many of the questionnaires or checklists measuring outcomes were subjective and administered by teachers who provided the program or by participants themselves. Often, researchers developed their own instruments which had not been properly assessed for validity and reliability. And in one case, multiple raters evaluated students without an adequate assessment of reliability or accuracy of scoring (Wisner & Norton, 2013)

Variable definition was an area of weakness as well. In one article, outcome variables were conceptualized and operationalized in a way that included non-mutual categories. The variable tardiness was defined as both "tardies" and "excess tardies"; in addition, the variable absence was defined as "absences" and "illegal absences". It was not clear whether there was a distinction between them (Barnes, Bauza, & Treiber, 2003).

Multiple studies in this review did not adequately account for differences between participants who completed the intervention and those who did not. Many did not report having analyzed these two groups looking for important differences. For those that did, few applied

statistical analyses to address the possibility of outcome measurements being due to systematic differences between the groups rather than application of the interventions.

Although most programs were found acceptable by participants, in at least one case, many of the students were not pleased with the program. When yoga was offered as the semester long intervention, some of the students in the intervention group reported preferring the usual physical education over yoga. In fact, one article reports that of the 110 students assigned to yoga, approximately 20 students evaluated the program very negatively by choosing the lowest point on the rating scale of the qualitative evaluation survey (Butzer, LoRusso, Shin, & Khalsa, 2017). This calls into question the validity of results, especially those relying on the accuracy of self-reporting.

It is worth noting that in all studies reviewed, consistent with ethical guidelines for research with human subjects, participants volunteered in most cases to receive the intervention and in all cases consented to be included in the study. This suggests that the program, and its roots in mindfulness, had some appeal to participants prior to their becoming involved. This fact could mean that positive effects are more likely to be found than if participants had not volunteered.

The lack of active controls is another possible confounding condition. Eighty percent of studies offered "instruction as usual" to members of the control group. Due to this, the outcome results may be a function of reactivity rather than the intervention itself. Given that in a real-world school setting, a mindfulness-based intervention would most likely be offered as a supplement to the regular curriculum, this may be a research problem rather than a practice problem.

Similarly, because many of the samples in this review are derived from special populations, generalizability to the typical school population is limited. However, if the outcome research continues to progress, incorporating more rigorous methods and encompassing special and typical populations, then it may well be that mindfulness-based interventions are most helpful to individuals with particular traits or presenting issues. At this point, the research has not developed to the point where it is clear which populations of children might benefit most from mindfulness-based interventions.

Research question 3—What are the effects of mindfulness-based interventions on academic achievement/performance (grades and/or test scores), attendance, disciplinary problems, aggression, and mental health (anxiety, depression, affect) in school settings?

<u>Academic Measures</u>

Seven articles included outcome measures related to academic performance. Four reported changes in grades or academic tests that met criteria for statistical significance(Bakosh et al., 2016; Butzer, Day, et al., 2015; Butzer, Van Over, Noggle Taylor, & Khalsa, 2015; Nirbhay N. Singh et al., 2016). These results must be taken in context, because in one case, the improvements were in two subjects only (reading and science) and there were no significant changes in math, writing, spelling or social studies grades (Bakosh et al., 2016). In another study, the improvements in grades were measured by the students' teacher who had provided and participated in the program (Butzer, Day, et al., 2015). It is worth noting that in two studies, no significant improvements in grades were measured.

There could be many reasons for the relative lack of evidence that mindfulness-based interventions resulted in an appreciable effect on academic achievement. Because most programs were offered for a maximum of 12 weeks, perhaps the interventions were not in place long enough to affect this more distal outcome.

Attendance

Given the importance of regular attendance on student success, it was surprising that this outcome measure was found in just two articles. In both cases, MBIs had a positive and significant impact. In one study with a student population prone to negative school behaviors, absentee periods for students in the intervention group dropped from an average of 26 within a four month span pre-intervention to 19 post-intervention. At the same time, absentee periods for students in the control group *increased* from an average of 12 in four months to 17 (Barnes et al., 2003). A 2017 study by Frank, et al. reported a statistically significant drop in unexcused absences for a sample of 6th and 9th graders in a high-poverty, inner city urban community.

Even though only two studies included attendance measures, the fact that mindfulness-based interventions correlated with improvements for student populations seemingly at risk is very encouraging. This is especially the case because, like academic performance, attendance is an outcome that may not be likely to emerge after a short intervention.

Disciplinary Problems

       Thirteen studies included disciplinary outcome measures such as detentions, suspensions, and classroom misbehavior. The effects of mindfulness-based interventions on these types of outcomes was mixed. In one study, there was no significant difference in suspensions (Frank, Kohler, Peal, & Bose, 2017). However, another measured a decrease in days suspended for the intervention group while that figure increased in the control group (Barnes et al., 2003). One article reported significant improvements in the number of detentions assigned (Frank et al., 2017). Three studies analyzed classroom behavior: all three detected marked improvements in classroom behavior, as evidenced by teacher logs, school records and a validated and reliable instrument that measures problem behavior (Bakosh et al., 2016; Beauchemin, Hutchins, & Patterson, 2008; Steiner et al., 2013). Four articles reported "externalizing", defined as delinquent or aggressive behaviors, as one of the outcome measures (Britton et al., 2014; Crowley et al., 2017; Fung et al., 2016; Steiner et al., 2013). The effect of the interventions was mixed. This was further complicated by the fact that in multiple cases, the instrument used had questionnaires for the participant and the teacher, and the results were not consistent. Sometimes the participant report would indicate significant improvements and the teacher report would not, and vice versa.

       The disagreement among results warrants further analysis of this outcome measure. Due to the possibly subjective nature of this variable, it would be important to seek out the most appropriate method of measurement or instrument. In this case, the reliability and validity of the measurement is key.

<u>Aggression</u>

There was little consensus among studies when measuring anger and hostility. Validated instruments were used to assess "revenge motivation", "aggression problems" and "hostility". Teacher reports of "aggression & bullying" were used to determine effects in one study of three conduct disordered participants. All five articles reporting on this measure found that mindfulness-based interventions correlated with significant changes in aggression, regardless of how it was defined (Beauchemin et al., 2008; Parker, Kupersmidt, Mathis, Scull, & Sims, 2014; Nirbhay N. Singh et al., 2007; Wisner & Norton, 2013; Wright, Gregoski, Tingen, Barnes, & Treiber, 2011).

Since aggression and disciplinary problems are closely tied, it is not surprising that mindfulness-based interventions would be first correlated with aggression, the more proximal of the two. The fact that the effects on this outcome were unanimously positive and significant is encouraging.

<u>Affect</u>

Mood and positive and negative affect

Affective measures were by far the most ubiquitous within the studies under review. MBIs had a significant effect on mood/general affect and negative affect approximately half of the times it was measured. However, the effect on positive affect was only significant 1 out of 7 times. This may be a function of the instrument used, the Positive and Negative Affect Scale (PANAS). The PANAS asks participants to report how many times in the last given period (day, week, etc.) one has felt "inspired", "excited", "enthusiastic", and other relatively high energy

positive states. MBIs and especially meditation, has been found to elicit positive states such as relaxation, quietness, or tranquility, which may not be detected by the PANAS.

Anxiety & depression

On measures restricted to anxiety, reductions were significant 12 times and not significant 8 times. Depression measures were more balanced, with 6 significant findings and 5 non-significant. Another instrument measured "internalizing" behaviors (including feeling withdrawn, expressing somatic complaints and/or feeling anxious and/or depressed). The results gleaned from using this instrument were evenly split between significant and non-significant. Just as with the measurement of disciplinary problems, there were inconsistencies between participant and teacher or parent ratings using this instrument, which may be related to the intervention or may be cause to seek another instrument for this outcome measure.

Emotional Regulation

The most commonly measured variable in the reviewed studies was emotional regulation or its converse, emotional dysregulation. MBIs were found to have significant effects on emotional regulation 11 times, and non-significant effects were reported 21 times. As with many other outcomes in this review, lack of consistency among instruments may have some impact. No fewer than eleven separate validated instruments were reportedly used. One study used a researcher developed, non-validated instrument and another article did not report how they measured emotional regulation.

Anger

In synthesizing study results, the values for anger, hostility and physical arousal were combined. Non-significant effects of MBIs on these measures were reported 14 times and significant effects five times.

Stress

Since many of the interventions in this review were rooted in Mindfulness Based Stress Reduction (MBSR), one would predict strongly positive and significant effects on measures of stress. In this review, significant effects were reported 10 times and non-significant results 8 times. This mixed result is surprising, and could be related to dosage issues, i.e., length of programs or frequency of sessions.

Intrusive Thoughts/Rumination

Although cognitive measures of attention were not within the scope of this review, a construct that could be described as the absence of purposeful attention might be the presence of intrusive thoughts or rumination. Within this review, mindfulness-based interventions were found to have a significant, positive impact reducing these 8 times and did not meet the criteria for significance 2 times.

Self-esteem and self-acceptance

Non-judgmental awareness is a key component of mindfulness-based interventions. It is with this in mind that measures of self-esteem and self-acceptance were searched. Surprisingly,

the results for this outcome were mixed: 4 significant and 5 non-significant occurrences. Notably, of the 7 instruments used to capture this data, 3 were not validated instruments. Two were derived from validated instruments but had been altered by researchers or, in one case, completely researcher designed. Therefore, the mixed results ought to be considered in that context.

Other outcomes measured

Due to the nascent status of the topic, some outcomes of analysis bore little fruit. Somatic complaints, quality of life measures and coping scales did not exhibit significant changes due to the mindfulness-based interventions. It is possible that these outcomes are not as relevant or sensitive to the intervention as some of the others previously mentioned.

Summary of Findings

Findings by Outcome

The most compelling significant changes occurred on measures of ***aggression*** with all 5 studies that included it as an outcome measure reporting decreases. Eighty percent of studies (n=10) reporting on ***intrusive thoughts and rumination*** found significant reductions. Only 2 studies in the review reported on ***attendance*** measures and although they both saw improvement, the small number of studies should moderate enthusiasm for the results. Decreases in ***anger*** were reported in about one-fourth of the studies (n=19) in which it was measured. Outcome results on measures of ***discipline*** are promising but mixed and dependent on the reporter. MBIs seemed to affect ***anxiety and depression*** symptoms about half of the times it was reported (n=31). ***Emotional regulation*** was affected by the interventions only about one-third of the

times it was measured (n=31), but this could be due to the heterogeneity of measurement instruments used. Changes in ***academic performance*** as measured by grades or standardized tests were not remarkable. There were studies that showed no appreciable difference, one that showed subject specific increases and one that showed increases that were reported by the teacher who provided the program. Finally, ***mood, affect (positive and negative) and stress*** did not consistently show effects, perhaps due to the short duration of the programs or the nature of the instruments used to measure them.

Findings by Population

Although there is some overlap among categories, there are some population conditions or characteristics that correlated with particular outcomes. For example, if a study reported that the population community was ***urban,*** this correlated with improvements in improved ***attendance*** and ***discipline*** and a reduction in ***intrusive thoughts or rumination***. Those samples designated as having a ***large percentage of ethnic minorities*** saw improvements in ***discipline*** and reductions in ***aggression*** and ***anxiety and depression*** symptoms. Samples drawn from ***low socio-economic status*** communities as measured by percentage of children eligible for Free or Reduced Price Public Lunch were more likely to see better ***attendance*** and lower ***discipline problems***, ***aggression***, ***rumination or intrusive thoughts*** and ***anxiety and depression***.

The samples of participants drawn from populations with ***Learning Disabilities*** were highly correlated with decreases in ***discipline problems*** and ***anxiety and depression***. Students ***at risk of dropping out*** of school or who came from a setting with ***high negative school behaviors***

were responsive to MBIs on measures of *discipline, aggression, rumination or intrusive thoughts* and *anxiety and depression*.

STRENGTHS OF THE REVIEW

This review is meant to provide a "state of the research" report to inform future practice and policy incorporating mindfulness-based interventions in schools. The recent acceleration of interest in the topic of mindfulness and schools underscores the urgency to synthesize and analyze program intervention results on an ongoing basis. This review includes articles published through June 2017. The reader is therefore exposed to up-to-date information on the topic, which is helpful to guide practice and policy.

Inclusion and exclusion criteria for this review were determined in an effort to mirror the student populations in the United States who are subject to compulsory education laws. Because this is a burgeoning area of interest, it makes sense to investigate programs within the large U.S. educational system where the next phases of practice are likely to take place.

This review is highly relevant in that it encompasses proximal and distal outcome measures. Included are analyses of affective and behavioral changes that one might expect to see within a short period of introducing a mindfulness-based intervention. Other improvements such as academic performance and attendance measures that are important to educators might appear if the interventions were continued. One of the strengths of this review is the inclusion of both kinds of outcomes.

Another strength of this review is the analysis of study quality which has a direct bearing on interpretation of any results. As consumers of research, it must be a priority to verify methods used looking for rigor and threats to internal and external validity. This serves to inform and temper conclusions drawn as well as point the way to next steps in the development of the topic for future research.

LIMITATIONS OF THE REVIEW

To avoid bias and ensure completeness of the data set, it is considered best practice for two independent reviewers to participate in the screening and data extraction phases of a systematic review (Gough et al., 2017). The fact that only one reviewer carried out these steps is a limitation.

In addition, although the rationale for excluding pre-Kindergarten age children was stated above, the inclusion of preschool age children may have added to the robustness of the findings.

Limiting the included studies to school settings located in the United States serves to bolster any policy proposals set forth since United States education policy is independent of policy and practice in other parts of the world. However, during the scoping review, it was discovered that there are many published outcome studies of mindfulness-based interventions in schools. These articles are likely to contain findings that are relevant to the research questions. This, in addition to limiting the review to articles published in English, is a limitation of this review.

This review did not capture cognitive outcomes such as attention and impulsivity that may have some bearing on school-age students' experience. These outcomes are also likely to be impacted by mindfulness-based interventions. Additionally, excluding physiological outcomes such as measurement of salivary cortisol levels as a measure of stress limits the conclusions that might be drawn and the confidence about those conclusions.

The review included only articles published in peer-reviewed scientific journals. There are likely unpublished works (conference papers, dissertations) that would have been germane in answering the research questions. The decision not to search the gray literature increases the possibility of publication bias in the review.

IMPLICATIONS FOR FUTURE PRACTICE AND RESEARCH

Practice Recommendations—Mindfulness as Stand-Alone Program

The value of a systematic review lies in the take-away messages regarding future practice and research. The results of this review offer guideposts to drive the next wave of mindfulness-based interventions in schools.

Although more research is needed, the data in this review show that the most effective programs have common attributes. The programs that were best received, that is, deemed acceptable and feasible within the schools, are those that were most aligned with day-to-day operations. A recommendation for the future would be to integrate a mindfulness intervention into the school schedule. In elementary and middle school, having sessions five days per week would be most likely to garner the most benefits. In high school, if this is not feasible, at least mindfulness interventions should at least be integrated into an alternative day schedule, so that

the students would be receiving it 2-3 times per week. The duration of sessions should be graduated within the school year, and increase as the children grow older. For example, in a Kindergarten curriculum, start with 3 minute sessions, gradually increasing throughout the year to 10 minute sessions. In 1st grade, start with 5 minute sessions, increasing to 12, and so on. By 12th grade, the school year might begin with 10 minute sessions, increasing to 30-45 minutes by graduation. This method would allow success within grades and account for developmentally appropriate practice.

An ideal mindfulness program would be universal, meaning offered to every student in the school environment. The students would have opportunities to practice their new skills in real-life situations. The faculty and staff would be included as active participants, helping to bring a "mindful culture" to the school. A fully integrated mindfulness program would require short, simple training for classroom teachers, who would then be providers and participants and beneficiaries of the program.

A universal program would also mitigate one of the complaints reported by school pupil personnel staff. For a selective program, there is a need for school psychologists or teachers to screen and select students with particular clinical or behavioral needs for eligibility to participate. A universal program would not unduly burden school staff and would therefore increase acceptance and possibly fidelity.

Given limited resources, if a universal program is not feasible, then the students who have shown the most benefit within this review would be those who are already exhibiting some issues. For example, students who are prone to aggression and negative school conduct would likely see improvements in these behaviors given the option to take part in a mindfulness-based intervention. Likewise, students at risk of academic failure have been among the populations

reviewed who were highly correlated with improved outcomes. Finally, a reduction in disciplinary issues and anxiety and depression measures have been demonstrated with students with Learning Disabilities.

The studies in this review that reported significant improvements had in common the following components: there was a present-moment focus; meditation training, breathing techniques and exercises were taught; and they included yoga practice. The yoga practice for effective programs did not require a great deal of space and the students were not required to leave their classrooms.

It bears noting that these four main elements were best used with non-clinical populations. With younger students or those with attentional issues or special needs, a simpler approach is recommended. In one included Single Subject Design study with students diagnosed with ADHD, the researchers limited the training to present-moment focus coupled with breathing exercises. This was in an effort to increase successful learning and application of the program given the students' limitations.

Practice Recommendations—Mindfulness integrated with Social and Emotional Learning

Mindfulness-based interventions have much in common with programs reported in the literature about Social and Emotional Learning or SEL. SEL is defined as "the process through which children enhance their ability to integrate thinking, feeling, and behaving to achieve important life tasks." (Zins, 2004, p. 6). More specifically, the five key SEL competencies are: Self-Awareness, Self-Management, Social Awareness, Relationship Management and Responsible Decision Making.

Self-Awareness refers to the ability to identify and recognize one's emotions, having an accurate self-perception, recognizing one's strengths, needs and values and feeling a sense of self-efficacy (Zins, 2004). It also includes understanding how one's interpretation of experience influences behavior (Brensilver, 2016).

Self-Management means someone is skilled at regulating thoughts, emotions and behaviors. It includes demonstrating good impulse control and managing stress well. Goal setting, organizational skills, self-motivation and self-discipline fall under this category (Brensilver, 2016; Zins, 2004).

Social Awareness includes the ability to take another person's perspective, show empathy, respect diversity and generally respect others (Zins, 2004).

Relationship Skills or Relationship Management includes working cooperatively, negotiating appropriately and resolving conflict. It includes the ability to communicate clearly, listen to others, seek and provide help and maintain healthy relationships (Brensilver, 2016; Zins, 2004).

Responsible Decision Making encompasses the ability to identify problems and analyze situations. Once problems are identified, problem solving skills are engaged, and evaluation and reflection take place (Zins, 2004). This domain involves making choices considering social norms, weighing consequences and considering implications for oneself and others (Brensilver, 2016).

According to Brensilver (2016) mindfulness programs include four main practices. The first is training attention on the breath or sensory experience. Second, mindfulness helps participants develop positive emotional states such as gratitude, kindness and compassion. MBIs

help one to regulate impulses and develop equanimity, meaning "an ability to let go of reactivity and act from a greater place of ease, stability and wisdom, rather than compulsively pursuing our preferences." Finally, mindfulness interventions include psychoeducation that normalizes experiences and helps increase understanding of one's internal life and behavior.

There is a great deal of overlap between SEL and mindfulness-based programs. MBIs especially lend themselves to helping develop self-awareness and self-management skills that lead to better social awareness, relationship management and responsible decision making. For example, mindfulness practices of training attention on the breath allows participants to slow automatic thought and the emotions and behaviors that follow. Once this pause is achieved, learning about one's emotions leads to an increased ability to regulate them. Impulsivity is reduced which leads to a higher likelihood of organization that is required to achieve long-term personal and academic goals. Empathy is promoted in both mindfulness and SEL programs. Where mindfulness interventions cultivate personal development of kindness and compassion, SEL is focused on creating an atmosphere of emotional safety, reinforcing prosocial behaviors and a commitment to group cohesion. These contribute to better communication, perspective-taking and conflict resolution. Finally, the contributions to self-awareness, self-management, social awareness and relationship skills provided by integrating mindfulness potentiate the efficacy of teaching responsible decision-making that is central to Social Emotional Learning curricula.

Research Recommendations

The implementation of mindfulness-based interventions in school settings is in its beginning stages. There are many improvements that can and should be made in research design going forward that would increase the strength of claims made about efficacy.

The most robust program evaluations incorporate elements that reduce the threats to internal validity. Therefore, any change to outcome variables can be attributed to the intervention alone, because any confounding influences have been reduced or eliminated.

To reduce selection bias, future studies should be random samples of the larger population, using a reliable randomization procedure that is explicitly stated. Participants of the sample should be randomly assigned to treatment and control groups and the process for that should be reported. Whether random assignment is possible or not, baseline measurements of possible confounding attributes should be taken. The groups should be statistically analyzed for any significant differences that might explain different outcome measurements not due to the intervention. The same procedure should be applied to participants who do not complete the program, to look for systematic reasons for non-completion.

Obtaining multiple baseline measurements would ensure that values for dependent variables are stable prior to application of the intervention. Multiple reporting sources would diminish the risk of social desirability and demand characteristics explaining post-test measures. Self-report bias is especially problematic because those with less mindfulness training are possibly less insightful about the nature of their own minds and therefore may not report accurately. One remedy would be to rely not just on first-person data (self-report), but to acquire second-person data (from parents and/or teachers) and especially third-person data (behavioral

and academic records). The benefit of obtaining third-person data lies in its objective nature.

Additionally, changes to outcome variables at post-test that were represented by data from all

three sources brings much higher validity. To determine if effects last post-intervention,

researchers should take follow up data months and/or years after the program ends.

One of the main limitations among studies in this review is the lack of consensus in

measurement instruments. The outcome results in this review are therefore constrained. Future

research would benefit from the adoption of a small number of outcome instruments relevant to

the intervention and setting. As the topic interest and literature body have grown, some

adaptations of adult mindfulness measures have been developed, as have instruments grounded

in Buddhist teachings coupled with child development theory. There are six validated

instruments that measure mindfulness currently in use with children and adolescents and one

instrument that is not yet validated but shows promise. The Child and Adolescent Mindfulness

Measure (CAMM) has been validated with non-clinical populations between 10 and 17 years old

and captures elements of present-moment, non-judgmental awareness. The Mindfulness

Attention Awareness Scale for Adolescents (MAAS-A) was validated with non-clinical as well

as clinical (with anxiety and/or mood disorders) populations between 14 and 18 years old. The

Mindfulness Attention Awareness Scale for Children (MAAS-C) was validated with non-clinical

populations as young as 8 and as old as 13 years. Both the MAAS-A and MAAS-C emphasize

"presence" as a key component of mindfulness. The Comprehensive Inventory of Mindfulness

Experiences-Adolescents (CHIME-A) measures trait mindfulness and its eight subscales have

been validated with youth 12-14 years old. The overall score has been shown to exhibit poor

overall internal consistency and is not recommended. The CHIME-A subscales include

awareness of internal & external experiences, acting with awareness and decentering and

nonreactivity among others. The Mindful Thinking and Action Scale for Adolescents (MTASA) also measures trait mindfulness and has been validated with non-clinical adolescents 13-17 years old. It incorporates four subscales including healthy self-regulation, active attention, awareness and observation, and accepting experience. The Mindfulness Scale for Pre-Teens, Teens and Adults (MSPTA) measures four-factors including attention and awareness, being non-reactive, being non-judgmental and being non-self-critical. It has been validated with non-clinical 9-19 year olds, as well as 17-25 year olds. Finally, the Mindfulness Inventory for Children and Adolescents (MICA) has not yet been psychometrically evaluated or validated but includes five subscales and is appropriate for use with 8-18 year olds. It was created by a subject-matter expert who incorporated Buddhist concepts of mindfulness and a psychologically-based child cognitive development framework.

There are limitations with each of the abovementioned instruments. The CAMM, MAAS-A and MAAS-C are all single-factor instruments that would not be useful for isolating the "active ingredients" or specific components of mindfulness influenced by MBIs. The CHIME-A is useful within a narrow age range and only the subscale scores are recommended. Most of the instruments are useful with students with little to no yoga or meditation experience, because the nature of the concepts and interpretation of terms has been found to evolve as participant experience grows. Finally, it is important that any instrument chosen has applicability with specific population characteristics. For example, the CAMM was reportedly validated with Caucasian, middle to low-middle class young people. Use with samples from other socio-economic or cultural groups may not be indicated (Goodman, Madni, & Semple, 2017).

Optimal research results would be more likely if programs were manualized and fidelity were monitored and emphasized. Additionally, since some of the articles in this review covered programs in the pilot phase, it would eliminate a source of bias if researchers beyond program developers implemented the programs and studied efficacy.

Many of the recommendations here are aimed at research of mindfulness-based stand-alone programs. These proposals are applicable to an integrated Mindfulness/Social Emotional Learning program as well and are consistent with literature on best practices and research in SEL.

Mindfulness and Learning

Yoga, breathing exercises and techniques and meditation are all practices that improve the skill of maintaining present-moment awareness. This ability to focus attention is a prerequisite for learning. In order to learn, students must engage with external sources to obtain novel information. Then they must integrate that information with ongoing internal representations and reactions. If those internal reactions are unrelated to the subject at hand, for example, worries about an upcoming event or regret about one that has past, then their ability to fully engage and integrate the new material is diminished (Morrison, Goolsarran, Rogers, & Jha, 2014). This supports the argument for incorporating mindfulness-based interventions into educational settings, whether the next lessons be Social and Emotional in nature or otherwise.

POLICY

HISTORY OF U.S. EDUCATION—COLONIAL TIMES TO THE PROGRESSIVE ERA

Education in the Colonies

When the United States was in its infancy, the education of children was a task left mostly to their families. Most citizens in colonial times lived agrarian lives on farms that were self-sustaining. To prepare young people for adulthood, practical skills were emphasized and were either taught at home or through trade apprenticeships. Academic pursuits were not necessary for survival; however there was a demand for literacy so that citizens could practice religion. A fundamental tenet of Protestantism is the belief that each person should develop a personal relationship with God. This required the ability to read and interpret holy scripture. Gradually, as more people came to settle in the New World and as populations increased in towns and cities, there was a call for training children in reading, writing and other academic subjects. It was then that town or city-dwelling wealthy families began to demand more formal education in schools, especially for males (Rury, 2002).

The Industrial Revolution

After a tumultuous beginning, the United States came out of the Colonial era and into the 19th century into a period of rapid expansion of industry and automation. Industrialization changed almost all facets of American life, from where people lived to what they did to support themselves in the rapidly developing market economy. Manufacturing grew at an unprecedented rate, so that by the end of the century it represented half of the gross national product. Industrial

production replaced apprenticeships, and thousands of unskilled jobs meant immigrants and rural citizens flocked into cities and industrial towns. Although many of the adults learned the necessary skills on the job, their children required preparation so that they might one day work in the factories as well. Training the next generation included building essential skills of literacy, numerical calculation, and knowledge of history and geography. Perhaps more importantly, young people were introduced to behaviors and habits that would serve them in the emerging industrial order. Educators focused on preparing future factory workers who would be required to be punctual, follow orders, and conform to industrial processes. Specifically, they sought to instill attentiveness, self-discipline and deference to authority in their students, so that an almost factory-like approach to education could be observed (Rury, 2002).

Rapid movement of large groups of people into cities introduced new social problems. Many public institutions were created or grew to deal with these problems, including jails, poorhouses, asylums, and to some degree schools. In some cities, schools were held up as a method of fostering social order and control, effectively offering an alternative to youth who might otherwise live a life of deviance and crime.

As public education became more widespread, eventually there was a call for a uniform system of public education by reformers such as Horace Mann. Mann was a lawyer and former state legislator, who was appointed to the newly created post of secretary of the State Board of Education in Massachusetts. He was a pioneer of what came to be known as the common school movement. Mann and his contemporaries proposed extending school terms from four or five months to eight or nine months, since the shorter terms had been in place to support an agrarian lifestyle that by and large no longer applied. In addition, the common school reformers proposed increasing consistency among schools by requiring systematic examinations for

students. This practice also had the effect of raising the standards of education, as did the advent

of professional schools for teachers and subsequent minimum training requirements for them.

The reforms instituted during the so-called "common school movement" amounted to laws

passed by some of the states, with funding distributed at local levels, an arrangement that is still

in place in many locations today (Rury, 2002).

The Progressive Era

As the 20th century dawned in the United States, there was an acceleration of immigration

from Europe into American cities and an increase in opportunities for trade and manufacturing.

The first wave of immigrants came from western European countries, such as Germany, Ireland

and England. A second wave followed from poorer areas in Southern and eastern Europe,

especially Italy, Poland and Russia. Although the jobs were plenty, the increase in industrialism

brought prosperity to only a few, including wealthy factory owners. In contrast, conditions for

workers were harsh, workdays and weeks were long, and pay and job security were low. As

trade volume increased, a division of labor became more pronounced, so that there were a wider

range of roles within the local economy and social order. These circumstances together

contributed to ensuing labor riots and the rise of Progressivism in politics. These changes in

thinking and practice had an impact on education, which became the setting for lively debates.

Schooling came to be a possible venue for addressing the social problems of the day. Within the

debate, two diverging philosophies quickly emerged: those of the pedagogical progressives and

the administrative progressives. The differences were mainly in their concentration.

Pedagogical progressives were mainly concerned with the methods of instruction and

administrative progressives sought to mirror trends in the business sector, for example, stressing efficiency.

An influential pedagogical progressive writer of the day was William James. He was a Harvard professor and pioneer in psychology who emphasized teaching through experience, citing an inborn tendency for children to exhibit curiosity and an inherent drive to learn. Picking up on James' ideas, John Dewey became one of the most famous and steadfast proponents of the tenets of pedagogical progressivism. Dewey believed that school was a crucial domain of a modern society charged with fully developing every citizen. He proposed that the success of the democratic society depended on schools training children in skills and knowledge necessary for political participation. He went farther than his predecessors who advocated for a well-informed polity, promoting the cultivation of values such as tolerance, fair play, critical discussion of social issues and respect for the rights of others. In order to foster development of these in children, pedagogical progressives called for a rejection of traditional drill and memorization methods of instruction, offering a more child-centered option that would bring out their natural curiosity and propensity to learn (Rury, 2002).

Less concerned with instructional practice, administrative progressives proposed changes to the education system that would mirror the increasing specialization of labor that was occurring in the economy and the market. The watchword here was "efficiency", and the goal was a cost-effective, organized school system. Within the progressive era, a separation of students according to their natural abilities emerged. This led to enormous growth in the development of secondary, or high, schools. The practices of differentiation became more widespread, with students placed on "tracks" designed to train them for future employment as clerical workers, managers and in manual arts and home economics, for example. Tracking was

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helped by the burgeoning mental testing movement, supported by a new subfield of psychology

called psychometrics. This branch of psychology developed standardized tests, which were

initially used with special needs populations. As advanced systems of bookkeeping and

accounting gained traction in the industrial world, standardized testing of children gained favor

(Rury, 2002).

Given their different emphases, the tension between pedagogical and administrative

progressives was high. Residual effects of their reforms as well as the conflict between their

philosophies still exist today. In fact, as the country moved into the next era, offering students

opportunities to learn social skills in school would be lost as the priorities shifted almost

exclusively to academic concerns.

POST-WORLD WAR II TO THE PRESENT

National Defense Education Act

The post-World War II era was characterized by an expansion of global markets,

technology and information. The isolationist tendencies of the United States were challenged as

economic and national security issues moved to the forefront. One significant event that

impacted American education was the launch of the first satellite, *Sputnik*, into space by the

Soviet Union in October 1957. Followed four years later by the Soviets' sending cosmonaut

Yury Gagarin into orbit and back safely, a new era of international competition, especially in

technology and science, began. For the first time, a federal policy linking education and national

security was adopted in the form of the National Defense Education Act of 1958 (NDEA). The

act provided federal funds to schools and universities for direct instruction and teacher training in

mathematics, science and foreign language. Thus marked a new global focus on international

competition and the beginning of federal interest in local education (Graham, 2007; Kataoka,

Rowan, & Hoagwood, 2009).

Elementary and Secondary Education Act

The next significant federal education legislation was the Elementary and Secondary

Education Act of 1965 (ESEA). Prior to the passage of the ESEA, the Civil Rights Act of 1964

called for the federal government to cut funds for districts that maintained segregated schools.

At the time, the federal government provided approximately 4.4 percent of funds to local

districts, so many districts had little incentive to comply. With passage of the ESEA, the

percentage of district funds from the federal government rose to 8.8 percent in 1964 and a peak

of 9.8 percent in 1980.

The ESEA offered funding to districts to provide "compensatory education" programs for

children in low-income areas. The goal was to reduce the persistent and widening achievement

gap between white students and minorities, as part of President Johnson's War on Poverty

legislation (Graham, 2007). For example, in 1964 whites accounted for 94% of the population

who had attended at least four years of high school or any college, with "non-whites"

representing the other 6%. Also that year, the median years of school completed for whites was

11.4, and for non-whites it was just 9.4 years (U.S. Census Bureau, 1964).

The ESEA laid the foundation for a significant amount of federal funding that was tied to

specific education practices. In this way, the federal government was technically allowing local

government to retain autonomy and create their own policies. However, the financial incentives

have proven compelling to states and local education agencies, which has given the federal government authority over local education practices.

In addition to a federal interest in funding and measuring achievement for minority students, some educational pioneers began looking at education with a more holistic view. Many of the students who were not succeeding came from low-income communities with multiple risk factors that oftentimes correlate with poverty. These included addiction and criminal justice involvement. Additionally, for African Americans especially, these children were attending school not long after the 1954 Supreme Court decision, *Brown v. Board of Education,* which disallowed school segregation by race.

One individual who brought a novel and more holistic approach to education was Dr. James Comer. In fact, Dr. Comer's work marked the beginning of what is now known as Social and Emotional Learning in education.

Dr. James. P. Comer is a child psychiatrist whose curiosity about education was prompted by his own experiences. Comer is one of four black children who came from a low-income community and were educated in a different community. They attended a racially integrated school among students of higher socioeconomic status. Dr. Comer is highly accomplished, has published numerous books and articles, and is a professor at the Yale Child Study Center and associate dean at the Yale School of Medicine.

Perhaps Dr. Comer's most important contribution came out of his curiosity about his success compared to the relative difficulties experienced by the other three individuals who were given the same opportunity to attend elementary school in an affluent area. He states, "I began to speculate that the contrast between a child's experiences at home and those in school deeply

affects the child's psychosocial development, and that this in turn shapes academic achievement." (Comer, 1988, p. 43). In 1968, Comer and his colleagues began a twelve-year School Development Project in two low-achieving, highly problematic elementary schools in New Haven. Dr. Comer says he and his team were "guided by our knowledge of public health, human ecology, history and child development—and by common sense." (Comer, 1988, p. 44). Without a significant change in socioeconomic makeup of the schools, by 1980 when the consulting team left, there were remarkable gains in academic test scores, attendance and reductions in serious behavior problems. Dr. Comer's hypothesis that promoting psychological development in students would lead to widespread improvements including higher academic achievement was supported (Comer, 1988). A movement toward integrating Social and Emotional Learning in schools was underway.

In addition to addressing inequities along racial lines, the three decades following World War II were characterized by education reform that was focused on increasing access and equity for other groups of students who had experienced marginalization. Laws affecting gifted and talented students, non-English speaking children and special needs children were enacted alongside legislation aimed at racial desegregation and equity for girls (Graham, 2007). With the exception of NDEA, the changes that took place in curriculum hearkened back to the pedagogical progressives, where the intention was "to liberate students from burdensome requirements" (Ravitch, 2010, p. 23). Educators were allowed and encouraged to experiment with curriculum and teaching strategies, with classrooms mirroring the outside world of the 1960's and 70's. This approach, coupled with the solutions addressing particular constituencies, meant that wholesale school reform was absent during that period (Graham, 2007).

The child-centered style of education changed when a report published by a commission under President Ronald Reagan gained the attention of the American public and resulted in yet another shift in education practice. In 1983, a report called *A Nation at Risk* was published. Using very colorful and dramatic language, the report described a dire situation in American education. According to the authors, the United States had experienced a decline in education performance, with nothing less than the future of the country at stake. In its introduction, the report says, "the educational foundations of our society are presently being eroded by a rising tide of mediocrity that threatens our very future as a Nation and a people," and "if an unfriendly foreign power had attempted to impose on America the mediocre educational performance that exists today, we might well have viewed it as an act of war." (U.S. Department of Education, 1983). Perhaps due to its flowery language, the report caught the attention of the American press, and so launched a "standards movement" in public education. The report stated that there were high numbers of functionally illiterate adults in the United States, and that regardless of prior policies, the achievement gap persisted between white and minority children. There was also discussion of complaints from business and military leaders about the need for remediation in basic skills. Notably, many presidents have commissioned reports on national education and its priorities. However, the findings in *A Nation at Risk* deviated from the agenda of the presidential administration at the time. The Reagan platform called for a move toward privatization and school choice and the promotion of freedom to pray in schools. *A Nation at Risk* called for stronger high school graduation requirements, and higher standards for academic performance through curriculum reform. The report also recommended increased standards for entry into the teaching profession, higher salaries for teachers and more time devoted to instruction and homework (Ravitch, 2010). Even with the press and public attention, as with

most school reforms, the changes proposed would be slow to roll out. It would be just about a decade later that the so-called "standards movement" would take hold in force.

No Child Left Behind

Since the 1990's, U.S. policymakers in nearly every state have implemented a set of accountability standards, usually accompanied by mandatory tests of student achievement. Reforms were proposed at the federal level by President George H.W. Bush, who said he wanted to be the "Education President". This practice was followed at the state level by many governors (Gibbs, Howley, Education, & Small, 2000). The stated goal of these reforms was to ensure that graduates of the public-school system be prepared to participate in an increasingly complicated world economy. The process in most states followed these basic steps: 1) convene committees of legislators, business people and educators to discuss what students ought to know and/or be able to do upon graduation from high school; 2) using these standards, develop educational outcomes for students at all grade levels; and 3) develop and implement competency tests to insure outcomes are being reached. This recipe produced mixed and sometimes questionable results. For example, the state of Texas boasted increasing numbers of students passing the state tests, and a reduction of the achievement gap between white and minority students. Some analysts pointed out that these results were misleading. They said that the new testing system caused mainly African American and Hispanic students, many of whom had been held back repeatedly, to give up and drop out. Removal of them from the testing pool therefore inflated the scores artificially. Nonetheless, when George W. Bush took office, he rode on the tide of the supposed success in his home state of Texas and used that experience to inform federal education policy (Ravitch, 2010).

When the 1965 Elementary and Secondary Education Act, came up for re-authorization at the beginning of George Bush's administration, the new policy was called No Child Left Behind (NCLB). This catchy name was derived from a pre-Revolutionary war military motto. As part of its reporting requirements, the ESEA required schools receiving federal funds to send standardized achievement scores of disadvantaged students to the federal government on an annual basis. The 2002 policy, NCLB, took this requirement one step further. For states seeking federal monies, *all* students in grades 3-8 must be given standardized achievement tests in reading and math annually. Furthermore, states were required to disaggregate scores by race, ethnicity, low-income status, disability status and limited English proficiency to ensure that each group's progress was appropriately monitored. This was because under ESEA, states engaged in combining test results into so-called "supergroups" in an effort to present them in a more favorable light. To avoid what might be deemed federal overreach, under NCLB states could choose their own testing instruments and could define what construed "proficiency" for their students. However, financial incentives were offered for states adopting a common core (national) curriculum and tests. At its inception, No Child Left Behind required states to submit a timeline showing how students would reach 100 percent proficiency in reading and mathematics by 2013-14. Schools and districts were expected to make "adequate yearly progress" (AYP) toward the goal of 100 percent proficiency or suffer increasingly harsh penalties. For example, if a school did not make AYP for two consecutive years, they must offer students the option to transfer to another, more successful school, with transportation at district expense. If no AYP was achieved by year three, low-income students were provided tutoring, also at district expense. In the fourth year of failing to make AYP, the district would be required to take "corrective action", for example, increase the length of the school day or year, or make

staff or curriculum changes. If the targets were missed for any subgroup for five years,

restructuring would be required, which could mean converting to a charter school, firing the

principal and/or staff, or coming under state or private management control (Ravitch, 2010).

There were many critics of NCLB. Some felt it went too far and created a culture of testing by

mandating annual exams for all students starting in 3rd grade. Others felt that it was weakened

by allowing each state to determine what constituted proficiency, which they thought made

comparisons between states meaningless.

Race to the Top

As might be expected, when President Obama was elected in 2008, he had his own ideas

about education and education reform. President Obama was sworn in during arguably the

biggest financial crisis since the Great Depression. One of the first policies he enacted was the

American Recovery and Reinvestment Act of 2009, also known as the "Stimulus Package" or

ARRA. Fashioned after parts of the New Deal, the ARRA included a competitive education

grant program called the Race to the Top (RTTT) initiative. RTTT contained weighted selection

criteria worth a total of 500 points. States were free to choose among the possible reform

categories and would be awarded points accordingly. If a state opted for more reform in more

categories, it would earn a greater number of overall points. More points increased the odds an

award would be given, and increased the amount of the award.

The reforms proposed in RTTT had some overlap with those of NCLB and there were

some novel ideas included as well. Just as with NCLB, there was a call for states to adopt

common standards and assessments by August 2010. The new policy went a step further by

including a provision for the institution of performance based teacher evaluations. Perhaps most controversially, the policy proposed tying student progress on standardized tests to teacher ratings. To be fair, RTTT also offered points for states that offered teacher "support", for example, professional development opportunities.

Another area that overlapped with NCLB was the incentive to turn around low performing schools using a few specific models. On closer review, the proposed models looked very similar to the "restructuring" defined in NCLB. The Race to the Top favored the development of charter schools, offering 40 points to states that promoted the expansion of "high-quality" charter and other innovative schools. Finally, RTTT awarded points to states that implemented data systems on a statewide basis. The purpose of this was to use the data to improve instruction and to share data collected with stakeholders, including parents, students, teachers, principals, school district leaders, and policymakers (U.S. Dept. of Education, 2009).

Perhaps one of the most contentious topics in educational circles has been the introduction of Common Core Learning Standards. When No Child Left Behind was passed in 2002, there was an incentive for states to develop and implement a common set of educational standards across the states. The Race to the Top initiative added the need for competency based tests that would be tied to teacher, administrator and school evaluations and ultimately funding. All but four states submitted grant proposals for RTTT monies, and most states adopted what have come to be known as Common Core State Standards. In theory, the standards appear to be based in common sense. They detail what each student is required to know in mathematics and English by the end of each grade, establish consistent standards across states to insure a quality education for all U.S. students, and are meant to ensure that students are college or career-ready upon graduation from high school.

Although consistent standards and college and career-readiness are sensible goals, the implementation of Common Core State Standards was not well received. Some of the controversy had to do with the roll-out, especially because under RTTT, each state's standardized test scores could be used to evaluate teacher, school and administrator quality. Teachers and administrators pointed out that whether students make progress yearly or not depends of many factors besides teacher competence. Nationwide, teachers' unions and parents began a groundswell of opposition which culminated in parents exercising their right to "opt-out" their children, so that they did not have to take the standardized Common Core tests (Ujifusa, 2015).

One of the specific complaints educators had of Common Core was a function of timing. A curriculum was developed *after* the tests, and in some cases, students were tested on material they had not seen before. Predictably, test scores plummeted. The media began reporting teachers complaining that they had not been fully trained in the new curricula and had not received new materials or textbooks before testing took place. The news also showed children refusing to attend school and families reacting to this. Aside from the mental health effects on children, implementing standardized tests prior to teaching the curriculum would almost guarantee a drop in scores in the short-term. Subsequently, any decisions about teacher quality or school performance were deemed unfair (Baker, 2014).

Another feature of the Common Core Standards had to do with its "one size fits all" approach to teaching and testing. Early childhood educators had large concerns about the standards and methods proposed for students in Kindergarten through grade 2. They leveled criticisms of a predominantly didactic teaching approach, the length and method of standardized testing and the lack of time allowed for play-based learning for younger students (V. Strauss,

2013). By the spring of the 2014/15 school year, the parents of twenty percent, or one in five,

eligible students in grades 3-8 in the state of New York had opted out and did not sit for the

Common Core examinations (Ujifusa, 2015).

Every Student Succeeds Act

In 2007, No Child Left Behind was due for reauthorization. It would not be until 2015

that the Every Student Succeeds Act (ESSA) took effect, updating and replacing NCLB. Amid

the backlash against Common Core Standards, ESSA represents a shift back to state control in

the areas of testing and accountability. The act allows states more flexibility in annual testing,

such as using one summative test or multiple interim assessments that are aggregated to provide

a summative score. The new law requires the federal Education Department to remain neutral

regarding Common Core or any other standards, effectively removing any incentive to adopt a

particular set of standards. Unlike NCLB, the new policy does not require that the performance

of all students improve, rather the accountability goals are left strictly up to the states. The states

are obligated to submit accountability plans to the federal government and must include limited

"guardrails" such as graduation rates and test scores in those plans along with more subjective

measures. Finally, ESSA retains some language regarding low performing schools, defining

more specifically what determines if a school falls into this category, but leaving much more

vague what actions are to be taken in response (Korte, 2015).

Next Generation Learning Standards

In New York state, where there was a great deal of resistance to the Common Core

Standards implementation, the State Education Department officials recently developed and are

adopting Next Generation Learning Standards. This is an attempt to counteract some of the

major objections to Common Core posed by parents and educators. Following a two year

"listening tour", policymakers have agreed that there should be a three-year period for educators

to learn about and implement new curriculum before student testing begins. Accordingly,

student performance measured by standardized tests in English and mathematics will *not* factor

into teacher evaluations for at least three years, if at all (Kenmore & Materazzo, 2017). There

will be small adjustments made to the standards themselves, including changing the reading

requirements to include both literature and reading for information, since they had previously

emphasized mainly reading for information. Another change is the introduction of new verbs

into the standards so that students will be encouraged to "explore" new concepts as they are

introduced with an eye toward mastery in later grades (Sawchuk, 2017). Lastly, early childhood

educators were instrumental in developing the new standards for younger children which will

allow a shift to play-based learning for younger students (Kenmore & Materazzo, 2017).

POLICY IMPLICATIONS OF THE REVIEW

The Purpose of Elementary and Secondary Education in the United States

As soon as educating children moved from the home setting into a public one, the

question of what defined a quality education became a topic of public debate. Given that,

education policy in the United States should theoretically reflect a national and local consensus on the purpose of compulsory, free education. Beginning with industrialization, schools have served to shape young people into adults able to take advantage of, and participate in, the economies of the time. Typically, this has meant training students in skills and aptitudes that serve employers. It is only beginning with the progressive era that educational experts in the form of pedagogical progressives proposed enlarging educational goals to include cultivation of values such as fair play, tolerance and a respect for others' rights. That movement was quickly engulfed by advocates of international competition and narrow definitions of academic achievement became the focus.

It is short-sighted to presume that non-cognitive skills are not as important as the academic achievement that is so dear to proponents of standardized testing. In fact, a 2006 survey of over 400 employers in the United States found that the four most important skills they look for in employees are: critical thinking/problem solving, professionalism/work ethic, teamwork/collaboration and strong oral communication (Casner-Lotto & Barrington, 2006). Additionally, econometric studies show that non-cognitive skills are more strongly correlated with higher future earnings than test scores (Rothstein, 2004).

Recently, there has been an emergence of educators promoting a more wholistic view of children and adolescents. For example, ASCD, formerly the Association for Supervision and Curriculum Development, in defining a "whole-child approach", is looking to redefine what a successful learner is from mere academic achievement to a more comprehensive and current set of skills and aptitudes. Specifically, they call on schools to prepare students to *think critically* and *creatively, evaluate massive amounts of information, solve complex problems* and *communicate* well. These competencies do not presume to replace a strong foundation in

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reading, writing, mathematics and other core subjects. Their contention is simply that a

foundation in these subjects is important, yet not sufficient for lifelong success (Slade & Griffith,

2013).

The Organization for Economic Cooperation and Development (OECD) is a global

voluntary organization made up of 35 member countries and founded in 1960. Their mission is

to stimulate economic progress and world trade. They do this by providing a platform to

compare policy experiences, finding answers to common problems, identifying good practices

and coordinating domestic and international policies of its members in an effort to improve the

economic and social well-being of people all over the world. In a recent report on 21st century

learning, they outline key skills that they would like to see education systems develop in young

people. The skills are: *collaboration*, *teamwork*, *problem solving*, *creativity*, and *ability to*

easily live and work in an ever changing environment (Slade & Griffith, 2013). They also make

the point that given the speed with which knowledge is acquired and must be accessed, that

approaches to learning are also important. This means that students need to become lifelong

learners, able to establish goals, monitor progress, persevere, adjust learning strategies as

necessary and overcome learning difficulties as they arise (Center for Educational Research and

Innovation, 2008).

Mindfulness-Based Interventions and Social and Emotional Learning

Mindfulness-based interventions are currently being implemented in schools as stand-

alone programs and, to a smaller degree, as complements to larger behavioral support programs

or as part of Social and Emotional Learning (SEL) initiatives. Given the similarities in goals and

methods between MBIs and Social and Emotional Learning, blending the two to maximize efficacy makes sense. For example, by training attention, mindfulness allows students to slow automatic thought which creates conditions for understanding and then regulating one's emotions. Both mindfulness and SEL include the fostering of empathy and understanding of others' perspectives and help participants to reduce impulsivity. Mindfulness practices ease reactivity, which sets the stage for development of SEL skills such as goal setting and responsible decision-making.

Another way to state this is that SEL uses an outside-in approach and focuses on teaching concrete skills. The idea is the teacher introduces a skill, such as resolving conflict, the students practice it, and once they demonstrate mastery, they and the teacher move on to the next skill. Mindfulness, on the other hand, could be described as working from the inside out. The underlying assumption is that each person has intrinsic qualities such as empathy and kindness, which help to build strong relationships. Mindfulness practice helps people to become aware of their emotions, thoughts and bodily sensations. The next step is to bring this awareness to bear on individual behavior and connections with others.

Neither SEL nor mindfulness alone are as effective at improving functioning as the combination of the two. For example, if two children want to be line leader on the way to recess, mindfulness training would help them to become aware of their physical experience of frustration. Perhaps their faces feel flushed, their heartbeat increases and their breathing becomes rapid and shallow. The awareness of this experience alone does not help to resolve the conflict. It does allow space before they simply react. In that space, they can bring the conflict resolution (SEL) skills they had previously learned leading to a positive outcome.

Social and Emotional Learning in the Age of High-Stakes Testing

Social and Emotional Learning has been promoted and has slowly gained momentum since the 1980's. With the success of the James Comer's School Development Project in New Haven, psychologists and educators began to take notice. Researchers and practitioners from diverse fields were working independently to advance what was then called School-Based Promotion of Social Competence. In 1987, a Consortium of professionals was formed from such diverse areas of psychology as community, child-clinical, pediatric, school and applied developmental psychology. Additionally, experts in criminology, urban journalism, education, public health, sociology and epidemiology were included due to their common involvement in primarily prevention interventions in elementary and secondary education. The Consortium goals were to share information, provide mutual support and increase the awareness and need for systematic efforts to promote social competence among students in U.S. schools (Elias et al., 1996).

In 1994, many members of the Consortium joined with educators, policymakers, government staff, businesspeople, private citizens and philanthropists to bring social and emotional learning to action. The organization they formed was the Collaboration for the Advancement of Social and Emotional Learning (CASEL), which has similar goals as the Consortium, but is much larger, has access to more resources and therefore can exert more widespread influence. The organization has since changed its name to include academics, calling itself the Collaborative for Academic, Social, and Emotional Learning. They assist with program development and implementation, gather leading researchers to advance the knowledge base and assist in driving public policy at all levels (Elias, 1997).

CASEL's goals span many areas. For example, they are currently looking to define how social and emotional learning is measured by convening leading practitioners and researchers in an Assessment Work Group. They provide direct assistance and resources for districts and schools nationwide (CASEL, n.d.-b).

One way that CASEL assists states is to help them develop policies or guidelines to support implementation of quality SEL in schools. As part of its 2016-2018 three-year strategic plan, CASEL is bringing together an advisory group of experts who are available to support state teams in advancing SEL. This effort is called the Collaborating States Initiative or CSI. State control of priorities is retained, as the CASEL experts assist states that want to focus on professional development for educators, articulation of SEL goals and competencies or any other priority as determined by the state team. Since CASEL opened applications on September 5, 2017, over 40 states have expressed an interest in the Collaborative States Initiative (CASEL, n.d.-a).

CASEL recently conducted a nationwide scan of state social and emotional learning policies. In January 2017 they published a document describing each state's current status with respect to articulation of goals and development of guidelines for student SEL. They found that all 50 states had documents outlining what preschool age children should know and be able to do with regard to SEL. Six states have SEL benchmarks that extend from preschool into the early elementary grades. Only three states, Illinois, Kansas and West Virginia have adopted free-standing standards for SEL that extend from preschool through 12th grade (Dusenbury & Weissberg, 2017). There is growing interest in developing policies, guidelines and grade-level benchmarks, as demonstrated by the overwhelming response to the CSI referenced above (CASEL, n.d.-a).

In New York specifically, passage of the Children' Mental Health act in 2006 was an attempt to reduce issues such as poor attendance and grades and school behavior problems stemming from untreated mental health issues. The Act requires school districts to include social and emotional development standards in their educational guidelines (NYC Bar). The Act also called for the development of a Children's Plan to address unmet student needs for earlier intervention and coordinated treatment of particular conditions, especially emotional disturbance.

The Plan had many themes, including: supporting families and increasing their engagement; an emphasis on early treatment and intervention; the development of integrated and effective services; and promoting provision of developmentally appropriate social and emotional learning in schools (Oneida, n.d.). The Children's Plan was published in 2008 and although most of the document highlights systemic approaches to improve outcomes for students with mental health issues, some of it describes interventions that target the mental health and ***well-being*** of all students (Office of Mental Health, 2008).

In 2011, the New York State Board of Regents published a document of guidelines and resources for Social and Emotional Development and Learning or SEDL. The stated purpose in issuing the ***voluntary*** guidelines is to offer school districts information about SEDL in support of their attending to child and adolescent affective development as well as cognitive development (NYSED, 2011). The document is convoluted and the format is not conducive to accessing meaningful information. It is an example of an obstacle that exists within the field generally. In describing this barrier, Elias (2013) says, "the field needs a coherent way to communicate about its theory, research, and practice" (p. 143). In his case, he is referring to the way in which individuals in the field communicate ***to*** policymakers. The argument also holds true for the way New York state policymakers communicate SEDL expertise to local stakeholders.

Future Directions in Mindfulness and Social and Emotional Learning Policy

ASCD, formerly the Association for Supervision and Curriculum Development, is a nonprofit organization whose stated purpose is to promote a "whole child approach" to education. To that end, they partnered with the Rennie Foundation for Education Research and Policy to evaluate Social and Emotional Learning policy and practice as of November 2015. They conducted a review of the literature and a policy scan similar to the state survey conducted by CASEL to determine what SEL programs were in practice and what policies were in place nationwide.

They defined key lessons that are recommended to improve integration of Social and Emotional Learning in schools. The first criterion for success was the requirement for states to make SEL an independent priority, rather than combining it with other existing standards and domains. SEL should be *aligned* with other initiatives, while maintaining visibility in its own right.

In an environment where there is considerable backlash against establishing standards, especially as they have been used in ways that educators feel is punitive, it is important to roll out SEL standards prudently, making success more likely. To that end, state level standards should be combined with adequate and appropriate supports that indicate a commitment from the state to the initiative. In Kansas for example, the state board's mission statement includes a statement about SEL and character education. Furthermore, the new Kansas school accreditation system incorporates SEL, and they have established a cross-stakeholder committee to align SEL with existing standards.

Some states have developed free-standing standards including competencies for each developmental level as relates to the SEL competency. For example, in Illinois, there are three

goals related to SEL that describe the content and skills expected for students in Kindergarten through 12th grade. These goals encompass Self-Awareness and Self-Management (Goal 1), Social Awareness and Interpersonal Skills (Goal 2) and Responsible Decision-Making (Goal 3). Within the broad goal, the state has defined 3-4 learning standards with benchmarks for five grade bands, i.e, Early Elementary (K-3), Late Elementary (4-5), Middle/Jr. High (6-8), Early H.S. (9-10) and Late H.S. (11-12). A sample of the Goals, Learning Standards and grade band-based competencies is available in Appendix N (Illinois State Board of Education, n.d.).

There are additional tangible inputs that states can offer to increase local innovation and integration. States can work across districts, centralizing resources and offering information or professional development. In Rhode Island, there is a state database for disseminating information on indicators. In New Hampshire, the state offered seed grants challenging districts to offer creative professional development to staff and faculty.

Finally, states can improve accountability and assessment by moving away from commonly used proxies for SEL data such as absenteeism and disciplinary actions. Another typical way to measure social and emotional competencies rests on student self-report which may have low validity in real-life. In pilot programs throughout the country, measurement alternatives are in use, and states would benefit from the lessons learned. For example, in California, a group of urban school districts formed the CORE Consortium, and they have developed a School Quality Improvement Index that draws from behavioral data (school records) as well as student self-reports and teacher observations. The student self-report questions have been expanded to include measures of a Growth Mindset and Self-Efficacy in addition to Self-Management and Social Awareness, two areas commonly found in SEL programs (Griffith et al. 2015).

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The *Every Student Succeeds Act (ESSA)* offers states an opportunity to commit to SEL programs due to the greater flexibility in defining student success and the call for greater educational equity. CASEL outlined key strategies for states to consider when finalizing plans that were submitted to the U.S. Department of Education this fall. One of the strategies suggests that states clearly articulate a well-rounded and comprehensive vision of student success. This is related to standards and accountability and echoes what was recommended in the ASCD webinar. The CASEL document emphasizes a commitment to improving educator SEL capacity through effective professional development. School improvement is targeted by the use of evidence-based SEL interventions that include outcomes outlined in the previously articulated picture of student success. CASEL describes how states can leverage these changes into additional funding available through Title VI of the *Student Support and Academic Enrichment Grants* portion of the ESSA. Finally, a novel suggestion is for states to make data related to SEL transparent to the public. This will serve to highlight positive developments brought about by SEL programs and increase public engagement and commitment (Gayl, 2017)

Full Integration, not just "Train and hope"

These specific strategies are indications of a state's commitment to full integration of Social and Emotional curriculum into its education system. This is a tall order. It will require transformation of the whole school environment, rather than creating temporary pockets of improvement. Many school reform efforts have been stalled when key personnel or funding disappear. The inevitable result is that a potentially relevant and effective intervention is discarded. Nearly every new school year, the latest promising strategy is introduced to jaded school personnel with no follow-up after the initial presentation. School personnel are expected

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to adopt it with enthusiasm. This is the "train and hope" model which has little to no meaningful or lasting effect.

Mindfulness-based interventions as a complement to a comprehensive, well-designed Social and Emotional Learning program may be an important contributor to supporting the next generation of students to thrive in the world of the 21st century.

Social Workers Leading the Way

We humans are complex and multi-dimensional beings who are comprised of behaviors, thoughts, feelings and, some would say, spiritual components. Our education system has been defined thus far as a vehicle for developing cognitive abilities, with little attention to the other domains. With the backlash against the implementation of Common Core and high-stakes testing, we are presented with an opportunity to expand what we collectively define as a "good education". Excellent educators have known, and research is beginning to bear out, the fact that non-cognitive, or social and emotional skills, are equally important as cognitive ones.

In an attempt to explore further interventions aimed at whole-child development, this review examines the effects of a relatively new method of cultivating non-cognitive skills. Although the methods need improving, even at this nascent phase of investigation, the findings are that mindfulness-based interventions in schools are effective on specific outcomes, and are most helpful for disadvantaged populations. Students who are vulnerable and not able to access our current education system would benefit from any intervention such as mindfulness that reduces anxiety, depression, intrusive thoughts and aggression and will help mitigate the disciplinary problems that result. While we continue the quest through research to advance the knowledge base, these young people should not have to wait until we have all the answers

regarding dosage or "active ingredients". Students from low socio-economic backgrounds and those who are becoming marginalized from traditional academic settings should be provided mindfulness-based interventions without delay. Ideally, these interventions will combine mindfulness components outlined in this review with Social and Emotional Learning for the most positive impact.

Reformers in education policy should be called upon to fund programs that will round out the narrowly defined education provided for our children. They must also continue to support and fund further high-quality research to determine best practices in non-cognitive skills instruction. This type of learning must be integrated into the current educational system with as much commitment as we have devoted to standards and accountability.

Social workers and others committed to social justice should lead the charge in transforming the current system into one that takes the entire student into account. The fact that in this review, mindfulness-based practices have been shown to be most efficacious with students most in need inspires an urgency to begin. While working to mitigate larger, systemic causes of inequity, the compulsory education system is an ideal setting within which to serve.

The field of social work is also uniquely qualified to promote Social and Emotional learning and mindfulness in schools. Many of the principles and skills taught in these programs revolve around relationships. That is, one's relationship with oneself, and then how one relates to others. Promoting the teaching and development of non-cognitive skills is directly aligned with the social work belief in the value of human relationships. SEL and mindfulness are ideal vehicles through which to support the well-being of individuals, families, communities and ultimately society at large.

Nearly two decades into the 21st century, we have unprecedented access to information at speeds that were recently unfathomable. It is unlikely that our species would be able to adapt to this new condition in a timely way, and perhaps some of the increases in anxiety, depression and reductions in ability to attend are the result. It may seem counterintuitive, but to cope with the barrage of input, perhaps slowing down to "pay attention, on purpose, in this moment" is exactly what is needed.

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Appendix A: Concept Table, Search Strategies and Search Strings

Research Question		
The effects of mindfulness based interventions with school aged children K-12 on academic performance, standardized test scores, grades, attendance, anxiety, aggression, and disciplinary problems.	**Core Databases** MEDLINE (PubMed) PsycINFO Scopus SocIndex	**Limits** Language: English Years: 1995 - present Age Groups: K-12 Publication Types: N/A Geographical: USA

Database: PubMed - MEDLINE

	Concept: mindfulness based intervention	Concept: School	Concept: test scores	Concept: grades	Concept: Attendance	Concept: Anxiety	Concept: Aggression	Concept: disciplinary problems
MeSH Terms/Sub-headings	mindfulness [mh], meditation [mh]	Schools [mh]	Educational Measurement [mh]		Student dropouts [mh]	Anxiety [mh]	Aggression [mh], bullying [mh], anger[mh], anger management therapy [mh]	
Textwords	"mindfulness based intervention" [tw], "MBSR" [tw], "mindfulness based stress reduction" [tw], "MBCT" [tw], "mindfulness based cognitive therapy" [tw], "non judgmental awareness" [tw], "present-moment" [tw], "MM" [tw], "contemplative practice"[tw]	"middle school"[tw], "school based intervention" [tw], "elementary schools" [tw], "public schools" [tw], "high schools" [tw], "junior high schools" [tw]	"academic achievement" [tw], "standardized tests" [tw], "educational tests & measurement" [tw]	"school grades" [tw], "student grades" [tw]	"school attendance" [tw], "attendance" [tw], "truancy" [tw], "student engagement" [tw]	"school adjustment" [tw], "academic stress" [tw]	"aggressive behavior" [tw], "anger issues"[tw], "anger-treatment" [tw], "anger control" [tw]	"discipline" [tw], "disciplinary problems" [tw], "discipline referrals" [tw], "classroom discipline" [tw], "school discipline" [tw], "school suspension" [tw], "suspension" [tw], "classroom management"[tw]

PubMed SEARCH STRATEGY

Date: 03/23/2017

YIELD: 12

Line 1 – mindfulness [mh] OR meditation [mh]
Line 2--"mindfulness based intervention" [tw] OR "MBSR" [tw] OR "mindfulness based stress reduction" [tw] OR "MBCT" [tw] OR "mindfulness based cognitive therapy" [tw] OR "non judgmental awareness" [tw] OR "present-moment" [tw] OR "MM" [tw] OR "contemplative practice" [tw]
Line 3—Line 1 OR Line 2
Line 4-- Schools [mh] OR "middle school" [tw] OR "school based intervention" [tw] OR "elementary schools" [tw] OR "public schools" [tw] OR "high schools" [tw] OR "junior high schools" [tw]
Line 5—Line 3 AND Line 4
Line 6-- Educational Measurement [mh] OR "academic achievement" [tw] OR "standardized tests" [tw] OR "educational tests" [tw]
Line 7--"school grades" [tw] OR "student grades" [tw]
Line 8— Student dropouts [mh] OR "school attendance" [tw] OR "attendance" [tw] OR "truancy" [tw] OR "student engagement" [tw]
Line 9-- Anxiety [mh] OR "school adjustment" [tw] OR "academic stress" [tw]
Line 10—Aggression [mh] OR bullying [mh] OR anger [mh] OR anger management therapy [mh] OR "aggressive behavior" [tw] OR "anger issues" [tw] OR "anger-treatment" [tw] OR "anger control" [tw]
Line 11--"discipline" [tw] OR "disciplinary problems" [tw] OR "discipline referrals" [tw] OR "classroom discipline" [tw] OR "school discipline" [tw] OR "school suspension" [tw] OR "suspension" [tw] OR "classroom management" [tw]
Line 12—Line 6 OR Line 7 OR Line 8 OR Line 9 OR Line 10 OR Line 11
Line 13—Line 5 AND Line 12

(("schools"[MeSH Terms] OR "middle school"[tw] OR "school based intervention"[tw] OR "elementary schools"[tw] OR "public schools"[tw] OR "high schools"[tw] OR "junior high schools"[tw]) AND (("mindfulness based intervention"[tw] OR "MBSR"[tw] OR "mindfulness based stress reduction"[tw] OR "MBCT"[tw] OR "mindfulness based cognitive therapy"[tw] OR "non judgmental awareness"[tw] OR "present-moment"[tw] OR "MM"[tw] OR "contemplative practice"[tw]) OR ("mindfulness"[MeSH Terms] OR "meditation"[MeSH Terms]))) AND ((((((("educational measurement"[MeSH Terms] OR "academic achievement"[tw] OR

"standardized tests"[tw] OR "educational tests"[tw]) OR ("school grades"[tw] OR "student grades"[tw])) OR ("student dropouts"[MeSH Terms] OR "school attendance"[tw] OR "attendance"[tw] OR "truancy"[tw] OR "student engagement"[tw])) OR ("anxiety"[MeSH Terms] OR "school adjustment"[tw] OR "academic stress"[tw])) OR ("aggression"[MeSH Terms] OR "bullying"[MeSH Terms] OR "anger"[MeSH Terms] OR "anger management therapy"[MeSH Terms] OR "aggressive behavior"[tw] OR "anger issues"[tw] OR "anger-treatment"[tw] OR "anger control"[tw])) OR ("discipline"[tw] OR "disciplinary problems"[tw] OR "discipline referrals"[tw] OR "classroom discipline"[tw] OR "school discipline"[tw] OR "school suspension"[tw] OR "suspension"[tw] OR "classroom management"[tw]))

Database: PsycINFO

	Concept: mindfulness based intervention	Concept: School	Concept: test scores	Concept: grades	Concept: Attendance	Concept: Anxiety	Concept: Aggression	Concept: disciplinary problems
Thesaurus Terms/ Subheadings	DE "mindfulness", DE "meditation"	DE "schools", DE "school based intervention"	DE "academic achievement", DE "standardized tests", DE "educational measurement"		DE "School Attendance", DE "school dropouts", DE "student engagement", DE "truancy"	DE "Anxiety", DE "academic stress"	DE "Aggressive Behavior", DE "Anger Control", DE "Anger"	DE "Classroom Management"
Textwords	TX "mindfulness based intervention", TX "MBSR", TX "mindfulness based stress reduction", TX "MBCT", TX "mindfulness based cognitive therapy", TX "non judgmental awareness", TX "present-moment", TX "MM", TX "contemplative practice"	TX "school", TX "public schools", TX "secondary schools", TX "primary schools"		TX "grading & marking (students)", TX "school grades", TX "student grades" "	TX "student dropouts"		TX "aggression", TX "anger issues", TX "anger-treatment", TX "anger management therapy"	TX "disciplinary problems", TX "discipline referrals", TX "school discipline"

PsycINFO SEARCH STRATEGY

Date: 03/23/2017

YIELD: 303

Line 1 – DE mindfulness OR DE meditation
Line 2—TX "mindfulness based intervention" OR TX "MBSR" OR TX "mindfulness based stress reduction" OR TX "MBCT" OR TX "mindfulness based cognitive therapy" OR TX "non judgmental awareness" OR TX "present-moment" OR TX "MM" OR TX "contemplative practice"
Line 3—Line 1 OR Line 2
Line 4—DE "schools" OR DE "school based intervention" OR TX "school" OR TX "public schools" OR TX "secondary schools" OR TX "primary schools"
Line 5—Line 3 AND Line 4
Line 6— DE "academic achievement" OR DE "standardized tests" OR DE "educational measurement"
Line 7-- TX "grading & marking (students)" OR TX "school grades" OR TX "student grades"
Line 8— DE "School Attendance" OR DE "school dropouts" OR DE "student engagement" OR DE "truancy" OR TX "student dropouts"
Line 9-- DE "Anxiety" OR DE "academic stress"
Line 10-- TX "aggression" OR TX "anger issues" OR TX "anger-treatment" OR TX "anger management therapy"
Line 11—DE "classroom management" OR TX "disciplinary problems" OR TX "discipline referrals" OR TX "school discipline"
Line 12—Line 6 OR Line 7 OR Line 8 OR Line 9 OR Line 10 OR Line 11
Line 13—Line 5 AND Line 12

DE mindfulness OR DE meditation OR TX "mindfulness based intervention" OR TX "MBSR" OR TX "mindfulness based stress reduction" OR TX "MBCT" OR TX "mindfulness based cognitive therapy" OR TX "non judgmental awareness" OR TX "present-moment" OR TX "MM" OR TX "contemplative practice" AND DE "schools" OR DE "school based intervention" OR TX "school" OR TX "public schools" OR TX "secondary schools" OR TX "primary schools" AND DE "academic achievement" OR DE "standardized tests" OR DE "educational measurement" OR TX "grading & marking (students)" OR TX "school grades" OR TX "student grades" OR DE "School Attendance" OR DE "school dropouts" OR DE "student engagement" OR DE "truancy" OR TX "student dropouts" OR DE "Anxiety" OR DE "academic stress" OR TX "aggression" OR TX "anger issues" OR TX "anger-treatment" OR TX "anger management therapy" OR DE "classroom management" OR TX "disciplinary problems" OR TX "discipline referrals" OR TX "school discipline"

Database: SocINDEX

	Concept: mindfulness based intervention	Concept: School	Concept: test scores	Concept: grades	Concept: Attendance	Concept: Anxiety	Concept: Aggression	Concept: disciplinary problems
Subject Terms / Subhead-ings	DE "MINDFULNESS (Psychology)", DE "meditation"	DE "schools"	DE "EDUCATIONAL tests & measurements", DE "academic achievement"		DE "SCHOOL Attendance", DE "student engagement"	DE "ANXIETY"	DE "AGGRESSION (Psychology)", DE "ANGER", DE "ANGER—Treatment"	DE "SCHOOL discipline", DE "CLASSROOM management"
Textwords	TX "mindfulness based intervention", TX "MBSR", TX "mindfulness based stress reduction", TX "MBCT", TX "mindfulness based cognitive therapy", TX "non judgmental awareness", TX "present-moment", TX "MM", TX "contemplative practice"	TX "school", TX "primary schools", TX "middle schools', TX "high schools", TX "junior high schools", TX "secondary schools", TX "school based intervention"		TX "school grades", TX "student grades"		TX "performance anxiety", TX "school adjustment", TX "academic stress"	TX "agonistic behavior", TX "anger issues", TX "anger management therapy"	TX "disciplinary problems", TX "discipline referrals", TX "suspension", TX "school suspension"

SocINDEX SEARCH STRATEGY

Date: 04/03/2017

YIELD: 559

Line 1--DE "MINDFULNESS (Psychology)" OR DE "meditation"

Line 2—TX "mindfulness based intervention" OR TX "MBSR" OR TX "mindfulness based stress reduction" OR TX "MBCT" OR TX "mindfulness based cognitive therapy" OR TX "non judgmental awareness" OR TX "present-moment" OR TX "MM" OR TX "contemplative practice"

Line 3—Line 1 OR Line 2

Line 4—DE "schools" OR TX "school" OR TX "primary schools" OR TX "middle schools' OR TX "high schools" OR TX "junior high schools" OR TX "secondary schools" OR TX "school based intervention"

Line 5—Line 3 AND Line 4

Line 6— DE "EDUCATIONAL tests & measurements" OR DE "academic achievement"

Line 7-- TX "school grades" OR TX "student grades"

Line 8-- DE "SCHOOL Attendance" OR DE "student engagement"

Line 9-- DE "ANXIETY" OR TX "performance anxiety" OR TX "school adjustment" OR TX "academic stress"

Line 10-- DE "AGGRESSION (Psychology)" OR DE "ANGER" OR DE "ANGER—Treatment" OR TX "agonistic behavior" OR TX "anger issues" OR TX "anger management therapy"

Line 11-- DE "SCHOOL discipline" OR DE "CLASSROOM management" OR TX "disciplinary problems" OR TX "discipline referrals" OR TX "suspension" OR TX "school suspension"

Line 12—Line 6 OR Line 7 OR Line 8 OR Line 9 OR Line 10 OR Line 11

Line 13—Line 5 AND Line 12

DE "MINDFULNESS (Psychology)" OR DE "meditation" OR TX "mindfulness based intervention" OR TX "MBSR" OR TX "mindfulness based stress reduction" OR TX "MBCT" OR TX "mindfulness based cognitive therapy" OR TX "non judgmental awareness" OR TX "present-moment" OR TX "MM" OR TX "contemplative practice" AND DE "schools" OR TX "school" OR TX "primary schools" OR TX "middle schools' OR TX "high schools" OR TX "junior high schools" OR TX "secondary schools" OR TX "school based intervention" AND DE "EDUCATIONAL tests & measurements" OR DE "academic achievement" OR TX "school grades" OR TX "student grades" OR DE "SCHOOL Attendance" OR DE "student engagement" OR DE "ANXIETY" OR TX "performance anxiety" OR TX "school adjustment" OR TX "academic stress" OR DE "AGGRESSION (Psychology)" OR DE "ANGER" OR DE "ANGER—Treatment" OR TX "agonistic behavior" OR

TX "anger issues" OR TX "anger management therapy" OR DE "<u>SCHOOL discipline</u>" OR DE "CLASSROOM management" OR TX "disciplinary problems" OR TX "discipline referrals" OR TX "suspension" OR TX "school suspension"

Database: Scopus

	Concept: mindfulness based intervention	Concept: School	Concept: test scores	Concept: grades	Concept: Attendance	Concept: Anxiety	Concept: Aggression	Concept: disciplinary problems
Textwords	"mindfulness", "meditation" "mindfulness based intervention", "MBSR", "mindfulness based stress reduction", "MBCT", "mindfulness based cognitive therapy", "non judgmental awareness", "present-moment", "MM", "contemplative practice"	"schools", "school", "primary schools", "middle schools', "high schools","public schools", "elementary schools", "junior high schools", "secondary schools", "school based intervention" n	"academic achievement","standardized tests", "educational measurement", "EDUCATIONAL tests & measurements",	"grading (educational)", "grading & marking (students)"	"school attendance", "attendance", "truancy", "student engagement", "student dropouts", "school dropouts",	"Anxiety", "performance anxiety", "school adjustment", "academic stress"	"aggression", "anger", "anger—Treatment", "agonistic behavior", "anger issues", "anger management therapy", "aggressive behavior", "bullying", "anger control", "anger management"	"discipline", "disciplinary problems", "discipline referrals", "classroom discipline", "school discipline", "school suspension", "suspension", "classroom management"

Scopus SEARCH STRATEGY

Date: 04/03/2017

YIELD: 184

Line 1-- "MINDFULNESS (Psychology)" OR "meditation"
Line 2— "mindfulness based intervention" OR "MBSR" OR "mindfulness based stress reduction" OR "MBCT" OR "mindfulness based cognitive therapy" OR "non judgmental awareness" OR "present-moment" OR "MM" OR "contemplative practice"
Line 3—Line 1 OR Line 2
Line 4— "schools" OR "school" OR "primary schools" OR "middle schools" OR "high schools" OR "junior high schools" OR "secondary schools" OR "school based intervention"
Line 5—Line 3 AND Line 4
Line 6— "EDUCATIONAL tests & measurements" OR "academic achievement"
Line 7-- "school grades" OR "student grades"
Line 8-- "SCHOOL Attendance" OR "student engagement"
Line 9-- "ANXIETY" OR "performance anxiety" OR "school adjustment" OR "academic stress"
Line 10-- "AGGRESSION (Psychology)" OR "ANGER" OR "ANGER—Treatment" OR "agonistic behavior" OR "anger issues" OR "anger management therapy"
Line 11-- "SCHOOL discipline" OR "CLASSROOM management" OR "disciplinary problems" OR "discipline referrals" OR "suspension" OR "school suspension"
Line 12—Line 6 OR Line 7 OR Line 8 OR Line 9 OR Line 10 OR Line 11
Line 13—Line 5 AND Line 12

"MINDFULNESS (Psychology)" OR "meditation" OR "mindfulness based intervention" OR "MBSR" OR "mindfulness based stress reduction" OR "MBCT" OR "mindfulness based cognitive therapy" OR "non judgmental awareness" OR "present-moment" OR "MM" OR "contemplative practice" AND "schools" OR "school" OR "primary schools" OR "middle schools" OR "high schools" OR "junior high schools" OR "secondary schools" OR "school based intervention" AND "EDUCATIONAL tests & measurements" OR "academic achievement" OR "school grades" OR "student grades" OR "SCHOOL Attendance" OR "student engagement" OR "ANXIETY" OR "performance anxiety" OR "school adjustment" OR "academic stress" OR "AGGRESSION (Psychology)" OR "ANGER" OR "ANGER—Treatment" OR "agonistic behavior" OR "anger issues" OR "anger management therapy" OR "SCHOOL discipline" OR "CLASSROOM management" OR "disciplinary problems" OR "discipline referrals" OR "suspension" OR "school suspension"

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Appendix B: Abstract Screening Checklist

1. Is the study an article in a peer-reviewed journal?

          YES   UNSURE   NO (Exclude)

2. Was the study published in English?

          YES   UNSURE   NO (Exclude)

3. Was the study published after 1995?

          YES   UNSURE   NO (Exclude)

4. Does the study include one or more mindfulness-based interventions as a primary

    component of the intervention?

          YES   UNSURE   NO (Exclude)

5. Is the population K-12 students and/or children < 18 years old?

          YES   UNSURE   NO (Exclude)

6. Does the study take place in a school setting?

          YES   UNSURE   NO (Exclude)

7. Is the location of the intervention in the United States?

          YES   UNSURE   NO (Exclude)

8. Is at least one of the outcome variables related to:

   a. academic achievement (standardized test scores and/or grades)

   b. Attendance

   c. disciplinary referrals

   d. aggression, or

   e. mental health (anxiety, depression, affect)?

   YES   UNSURE   NO (Exclude)

DECISION: _____ Exclude   _____ Include/Move to Full-text Screening

Appendix C: Full-Text Review Checklist

1. Is the study an article in a peer-reviewed journal?

       YES   **NO (STOP-Exclude**-Reason: Non-peer reviewed (*Format)*)

2. Does the study take place in a school setting?

       YES   **NO (STOP-Exclude**-Reason: Wrong setting)

3. Does the study take place in the United States?

       YES   **NO (STOP-Exclude**-Reason: Outside U.S.)

4. Does the study population include K-12 students and/or children < 18 years old?

       YES   **NO (STOP-Exclude**-Reason: Adult Population OR Preschoolers)

5. Is at least one of the outcome variables related to:

   a. academic achievement (standardized test scores and/or grades)

   b. Attendance

   c. disciplinary referrals

   d. aggression, or

   e. mental health (anxiety, depression, affect)?

       YES   **NO (STOP-Exclude**-Reason: Wrong outcomes)

6. Does the study include one or more mindfulness-based interventions as a primary

   component of the intervention?

          YES   **NO (STOP**-Exclude-Reason: Wrong intervention)

7. Is the study one of these designs:

   a. Randomized Controlled Trial

   b. Quasi-Experimental

   c. Single Group Pre-/Post-test

   d. Single Subject Design

          YES   **NO (STOP-Exclude**—Reason: Wrong study design)

DECISION: _____ Exclude

                  _____ Include/Move to Risk of Bias Assessment/Data Extraction

Appendix D—Data Extraction Form

DATA EXTRACTION FORM (BLANK)					
STUDY CHARACTERISTIC					
Study ID					
PARTICIPANTS/SETTING					
n					
Age range (yrs)					
Mean age (yrs)					
Grade/grade range					
Gender					
Race/Ethnicity	African American (%)	Asian American (%)	European American (%)	Hispanic American (%)	Other (%)
FRPL					
General Ed					
Special Ed					
Special Ed. Classification/diagnosis					
Type of school					
Admission criteria					
Community					
INTERVENTION					
Name of Intervention					
Derived from					
Manual					
Ratio					
Frequency					

Duration (mins)					
Length (# of wks)					
Total # of sessions					
Time of day					
Homework					
Present moment					
Meditation					
Relaxation skills					
Breathing techniques/exercises					
Mindfulness					
Body scan					
Yoga					
Other					
Fidelity					
Provider					
Special training					
Parents					
Teacher					

DESIGN					
Study design					
Sample characteristics					
Assignment to condition					
Unit of assignment					
Random assignment method					
Allocation concealment					
Outcome assessor blinding					
Differences at baseline					
Researcher role					
Control group received					
OUTCOMES/RISK OF BIAS					
Outcomes					
Data Source/Instrument					
Results					
Outcome Code					
ROB-RSG					
ROB-AC					
ROB-BOA					
ROB-IOD					
ROB-OSB					
Strengths					
Limitations					

DATA EXTRACTION FORM (WITH POSSIBLE VALUES)					
STUDY CHARACTERISTIC					
Study ID	1st/2nd author last names (yr)				
PARTICIPANTS/SETTING					
n	#				
Age range (yrs)	#				
Mean age (yrs)	#				
Grade/grade range	#				
Gender	% M/F				
Race/Ethnicity	African American (%)	Asian American (%)	European American (%)	Hispanic American (%)	Other (%)
	#	#	#	#	#
FRPL	% (school or TG/CG)				
General Ed	Y/N				
Special Ed	Y/N				
Special Ed. Classification/diagnosis	*Open text*				
Type of school	Public/Private/Alternative/Charter				
Admission criteria	*Open text*				
Community	Urban/Suburban/Rural				
INTERVENTION					
Name of Intervention	*Open text*				
Derived from	*Open text*				
Manual	Y/N				
Ratio	I/G or both				
Frequency	x per day/6-day cycle/week/month				
Duration (mins)	#				
Length (# of wks)	#				

Total # of sessions	#				
Time of day	During/After				
Homework	*Open text*				
Present moment	Y/N				
Meditation	Y/N				
Relaxation skills	Y/N				
Breathing techniques/exercises	Y/N				
Mindfulness	Y/N				
Body scan	Y/N				
Yoga	Y/N				
Other	*Open text*				
Fidelity	*Open text*				
Provider	*Open text*				
Special training	Y/N				
Parents	Y/N				
Teacher	*Open text*				
DESIGN					
Study design	RCT/QED/SGPP/SSD				
Sample characteristics	*Open text*				
Assignment to condition	Random/Quasi-random/Random-matched/N/A				
Unit of assignment	Participant/Class/School				
Random assignment method	*Open text*				
Allocation concealment	Y/N/N/A				
Outcome assessor blinding	Y/N				
Differences at baseline	*Open text*				
Researcher role	*Open text*				
Control group received	*Open text*				

OUTCOMES/RISK OF BIAS					
Outcomes	*Open text*				
Data Source/Instrument	Instrument/data source				
Results	ns or Significance, p-value, effect size (S/M/L)				
Outcome code	GR/AP/AT/DP/AG/AF				
ROB-RSG	L/H/U				
ROB-AC	L/H/U				
ROB-BOA	L/H/U				
ROB-IOD	L/H/U				
ROB-OSB	L/H/U				
History	L/H/U				
Maturation	L/H/U				
Testing	L/H/U				
Instrumentation	L/H/U				
Mortality	L/H/U				
Strengths	*Open text*				
Limitations	*Open text*				

Appendix E: RCT/QED Risk of Bias Tool

## The Cochrane Collaboration's tool for assessing risk of bias

Reviewer's Initials: _____ **Study ID:** _____   **Date (dd/mm/yy):** _____

Domain	Description	Risk of Bias	Consensus (circle)
Random sequence generation		Was the allocation sequence adequately generated? LOW / HIGH / UNCLEAR	LOW HIGH UNCLEAR
Allocation concealment		Was allocation adequately concealed? LOW / HIGH / UNCLEAR	LOW HIGH UNCLEAR
Blinding of participants and personnel	*Subjective Outcomes*	Was knowledge of the allocated intervention adequately prevented during the study? LOW / HIGH / UNCLEAR	LOW HIGH UNCLEAR
	Objective Outcomes		
Blinding of outcome assessment	*Subjective Outcomes*	Was knowledge of the allocated intervention adequately prevented during the study? LOW / HIGH / UNCLEAR	LOW HIGH UNCLEAR
	Objective Outcomes		
Incomplete outcome data	*Subjective Outcomes*	Were incomplete outcome data adequately addressed? LOW / HIGH / UNCLEAR	LOW HIGH UNCLEAR
	Objective Outcomes		
Selective outcome reporting		Are reports of the study free of suggestion of selective outcome reporting? LOW / HIGH / UNCLEAR	LOW HIGH UNCLEAR
Other sources of bias		Was the study apparently free of other problems that could put it at a high risk of bias? LOW / HIGH / UNCLEAR	LOW HIGH UNCLEAR
Overall risk of bias	*Subjective Outcomes*	LOW / HIGH / UNCLEAR	LOW HIGH UNCLEAR
	Objective Outcomes	LOW / HIGH / UNCLEAR	

Appendix F: Risk of Bias across Studies (RCT and QED)
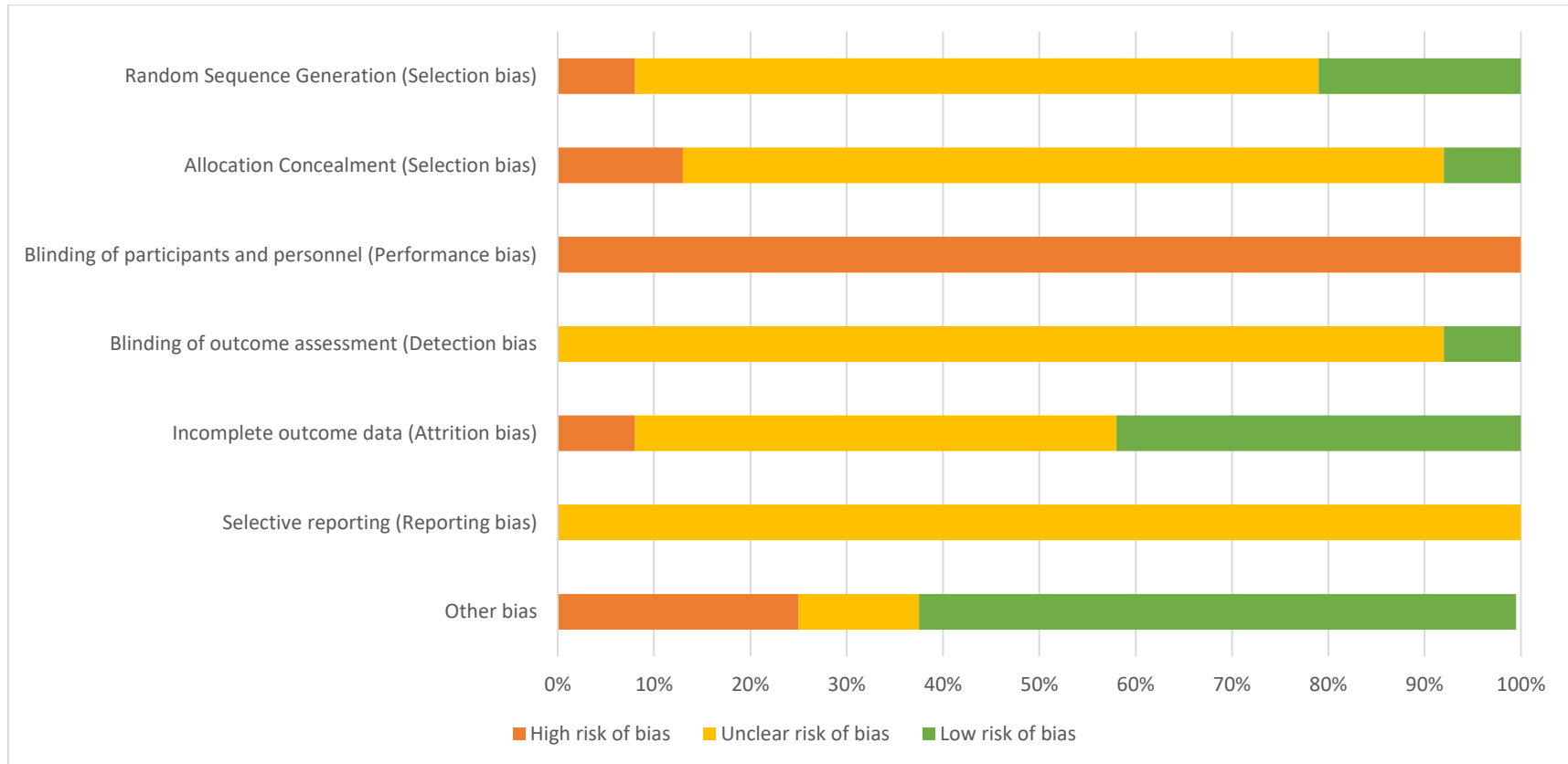
Appendix G: Risk of Bias by Studies (RCT and QED)

Title	Random Sequence Generation (Selection Bias)	Allocation Concealment (Selection Bias)	Blinding of Participants/personnel (Performance Bias)	Blinding of outcome assessment (Detection Bias)	Incomplete Outcome Data (Attrition Bias)	Selective Outcome Reporting (Reporting Bias)	Other sources of Bias (Research allegiance, funding)
Bakosh, Snow et al., (2016)	H	H	H	U	U	U	H
Barnes, Bauza, et al., (2003)	U	U	H	L	L	U	L
Beets & Mitchell (2010)	U	U	H	U	L	U	L
Bluth, Campo, et al. (2016)	L	U	H	U	H	U	H
Britton, Lepp, etal. (2014)	L	U	H	U	L	U	L
Broderick, Metz et al. (2009)	H	H	H	U	L	U	H
Butzer, LoRusso, Shin (2017)	U	U	H	U	U	U	L
Butzer, van Over et al. (2015)	U	U	H	L	H	U	L
Frank, Kohler et al. (2017)	U	U	H	U	L	U	L
Fung, Guo et al. (2016)	L	U	H	U	U	U	H
Gould, Dariotis et al. (2012)	U	U	H	U	U	U	U
Khalsa, Hickey-Schultz et al. (2011)	U	U	H	U	L	U	L
Mendelson, Greenberg et al., (2010)	U	U	H	U	U	U	U
Metz, Frank et al. (2013)	U	U	H	U	L	U	H
Napoli, Krech et al. (2005)	U	U	H	U	U	U	U
Noggle, Steiner et al. (2012)	L	U	H	U	L	U	L
Parker, Kupersmidt et al. (2014)	U	U	H	U	U	U	H
Quach, Gibler et al. (2016)	U	U	H	U	U	U	L
Quach, Jastrowski et al. (2016)	U	U	H	U	U	U	L
Sibinga, Perry-Parrish et al. (2013)	U	L	H	U	L	U	L
Sibinga, Webb et al. (2016)	U	L	H	U	U	U	L
Viafora, Mathiesen et al. (2015)	L	H	H	U	U	U	L
White (2012)	U	U	H	U	U	U	L
Wright, Gregoski et al. (2011)	U	U	H	U	L	U	L

Appendix H: Single Group Pre-/Post-test Internal Validity Tool

STUDY TITLE	THREAT TO INTERNAL VALIDITY	COMMENTS	L/H/U
	HISTORY		
	MATURATION		
	TESTING		
	INSTRUMENTATION		
	MORTALITY		

Appendix I: Risk of Bias by Studies (Single Group Pre-/Post-test Design)

Title	History (External event influencing outcome)	Maturation (Outcome due to natural maturation/growth) (Selection Bias)	Testing (Pre-test influencing outcome)	Instrumentation (Instrum./observer changed betw. pre-/post-test)	Mortality (Completers similar to non-completers)
Beauchemin, Hutchins (2008)	L	L	L	L	L
Butzer, Day et al. (2015)	U	L	L	L	U
Crowley, Nicholls, et al. (2017)	U	L	L	L	H
Edwards, Adams et al. (2014)	U	L	L	L	H
Frank, Bose et al. (2014)	U	U	L	L	L
Grosswald, Stixrud et al. (2008)	U	U	L	L	H
Semple, Reid et al. (2005)	U	L	L	L	L
Singh, Lancioni, Joy et al. (2007)	U	U	L	L	L
Singh, Lancioni, Karaszia et al. (2015)	U	U	U	U	L
Steiner, Sidhu, et al. (2013)	H	U	L	L	H
Wisner, Norton et al. (2013)	U	L	L	H	H

Appendix J: Single Subject Design Quality Assessment Tool

DESCRIPTION OF PARTICIPANTS AND SETTINGS

_____1. Was/were the participant(s) sufficiently well described to allow comparison with other studies or with the reader's own patient population?

INDEPENDENT VARIABLE

_____2. Were the independent variables operationally defined to allow replication?

_____3. Were intervention conditions operationally defined to allow replication?

DEPENDENT VARIABLE

_____4. Were the dependent variables operationally defined as dependent measures?

_____5. Was interrater or intra-rater reliability of the dependent measures assessed before and during each phase of the study?

_____6. Was stability of the data demonstrated in baseline, namely lack of variability or a trend opposite to the direction one would expect after application of the intervention?

DESIGN

_____7. Were there an adequate number of data points in each phase (minimum of five) for each participant?

_____8. Were the effects of the intervention replicated across three or more subjects?

ANALYSIS

_____9. Did the authors conduct and report appropriate visual analysis, for example, level, trend, and variability?

_____10. Did the graphs used for visual analysis follow standard conventions, for example x- and y-axes labeled clearly and logically, phases clearly labeled (A, B, etc.) and delineated with vertical lines, data paths separated between phases, consistency of scales?
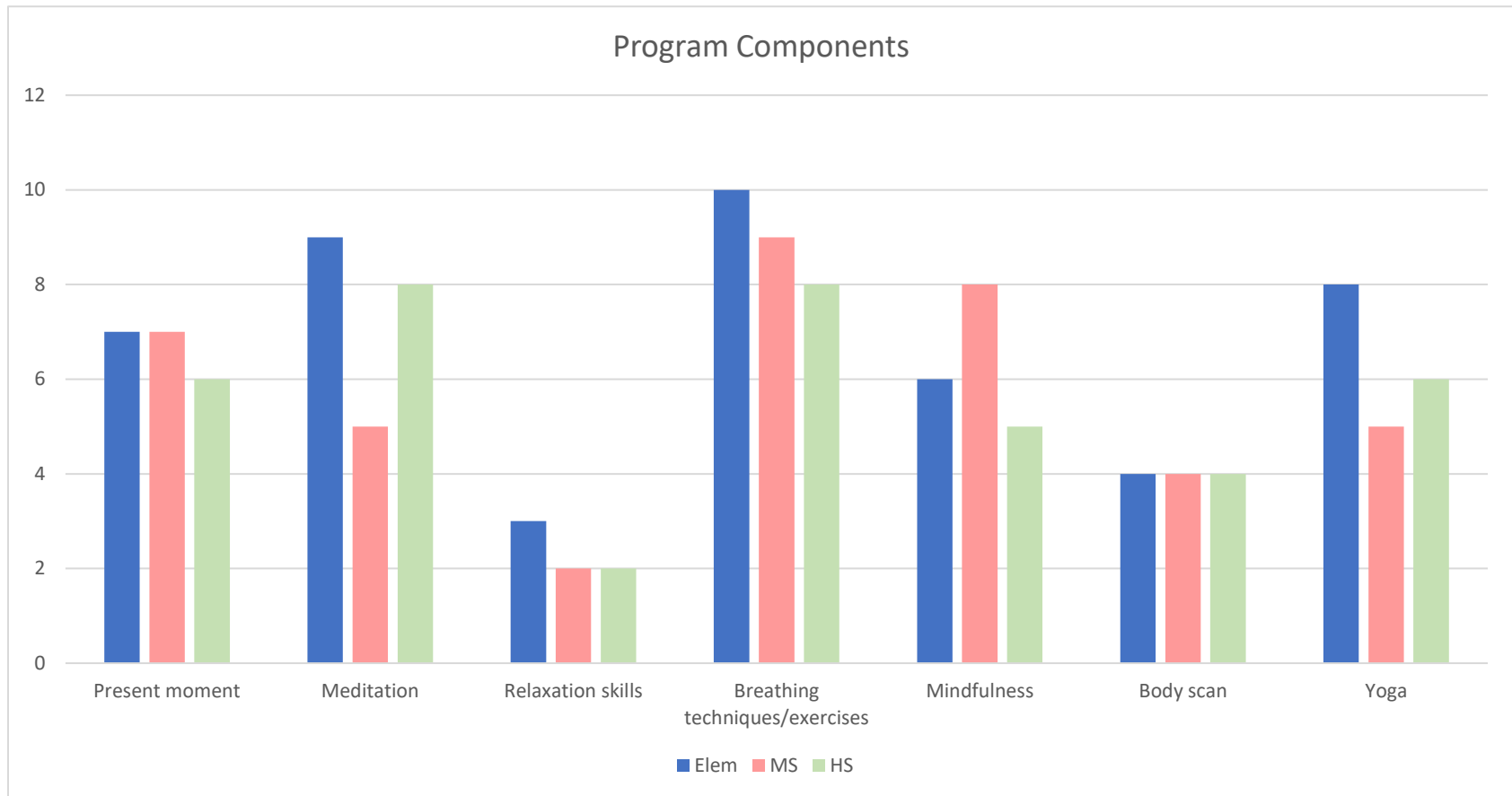
TOTAL SCORE: _____/10

Appendix K-Risk of Bias by Studies (Single Subject Design)

Title	Participant Description	IVs Operationally Defined	Intervention conditions defined	DVs Operationally Defined	Inter/intra-rater reliability	Stable baseline	5+ data points/phase	Replicated across 3+ subjects	Report visual trends/variability	Graph well-constructed
Carboni, Roach et al. (2013)	Y	Y	Y	Y	Y	Y	Y	N	Y	Y
Felver, Frank et al. (2014)	Y	Y	Y	Y	Y	N	N	N	Y	Y

Appendix L: List of Instruments Used across Studies

ACMI	IE
ActeRS subscale	IPPA
AFQ-Y	IUAT
ALS, WCI, CAMS, CSMS	Kidscreen-27
AOSPAN	KINDL
AS	K-W
Attitude Toward Violence Scale	MAAS-A
AVS	MASC
BARON-Eqiv:YV	MTASA
BASC-2	PANAS
BERS-2	PCS
BOSS (AET & PET)	PIML
BRIEF	POMS-SF
BRUMS	PSS
BSI-18	RRS
CAMM	RS
CAMS-R	RSQ
CAS Accuracy	SCARED
CAS Expressive Attention	School bonding scale
CBCL	SCL-90R
CDI-S	SCRS
CES-D	SCS
CIRP	SCS-C (child-modified version-not validated)
CSMS	SCSI
CPSS	SICBC
Credibility scale (Borkevic & Nau)	SPPC
CSE	SSRS
CSRQ	STAI
C-TRF (subscale)	STAXI-2
DERS	TAS
DES	TEA-Ch
D-KEFS Category fluency	TRIM-12
EP	UPPS-P
ERQ-CA	Wills scale
Feel Bad Scale	YRBS-MS
Flanker fish task	YSR

Appendix M: Program Components by Age Group

Program Components bar chart showing values for Elem, MS, and HS across seven components:
- Present moment: Elem 7, MS 7, HS 6
- Meditation: Elem 9, MS 5, HS 8
- Relaxation skills: Elem 3, MS 2, HS 2
- Breathing techniques/exercises: Elem 10, MS 9, HS 8
- Mindfulness: Elem 6, MS 8, HS 5
- Body scan: Elem 4, MS 4, HS 4
- Yoga: Elem 8, MS 5, HS 6

Appendix N: Illinois Social Emotional Learning Standards

Goal 1: Develop self-awareness and self-management skills to achieve school and life success.	Why this goal is important: Several key sets of skills and attitudes provide a strong foundation for achieving school and life success. One involves knowing your emotions, how to manage them, and ways to express them constructively. This enables one to handle stress, control impulses, and motivate oneself to persevere in overcoming obstacles to goal achievement. A related set of skills involves accurately assessing your abilities and interests, building strengths, and making effective use of family, school, and community resources. Finally, it is critical for students to be able to establish and monitor their progress toward achieving academic and personal goals.

Learning Std	Early Elem	Late Elem	Middle/Jr. High	Early H.S.	Late H.S.
A. Identify and manage one's emotions and behavior	**1A.1a.** Recognize and accurately label emotions and how they are linked to behavior.	**1A.2a.** Describe a range of emotions and the situations that cause them.	**1A.3a.** Analyze factors that create stress or motivate successful performance.	**1A.4a.** Analyze how thoughts and emotions affect decision making and responsible behavior.	**1A.5a.** Evaluate how expressing one's emotions in different situations affects others.
	1A.1b. Demonstrate control of impulsive behavior.	**1A.2b.** Describe and demonstrate ways to express emotions in a socially acceptable manner.	**1A.3b.** Apply strategies to manage stress and to motivate successful performance.	**1A.4b.** Generate ways to develop more positive attitudes.	**1A.5b.** Evaluate how expressing more positive attitudes influences others.

Learning Std	Early Elem	Late Elem	Middle/Jr. High	Early H.S.	Late H.S.
B. Recognize personal qualities and external supports.	**1B.1a.** Identify one's likes and dislikes, needs and wants, strengths and challenges.	**1B.2a.** Describe personal skills and interests that one wants to develop.	**1B.3a.** Analyze how personal qualities influence choices and successes.	**1B.4a.** Set priorities in building on strengths and identifying areas for improvement.	**1B.5a.** Implement a plan to build on a strength, meet a need, or address a challenge.
	1B.1b. Identify family, peer, school, and community strengths.	**1B.2b.** Explain how family members, peers, school personnel, and community members can support school success and responsible behavior.	**1B.3b.** Analyze how making use of school and community supports and opportunities can contribute to school and life success.	**1B.4b.** Analyze how positive adult role models and support systems contribute to school and life success.	**1B.5b.** Evaluate how developing interests and filling useful roles support school and life success.