

MINDFULNESS AND RESILIENCE IN SECONDARY STUDENTS

by

Rachel Emery

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Rachel Emery

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Terry Ford, Ph.D., Member of the Faculty

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ABSTRACT

This paper examines the effects of mindfulness on resilience and academic achievement for secondary students. It proposes that mindfulness and resilience are necessary qualities for citizens to develop in order to confront systemic oppression and prejudice. A literature review found strong evidence that for secondary students, mindfulness enhances resilience by improving executive function and attention, and by reducing stress and anxiety. It found emerging evidence that mindfulness enhances self-awareness and psychological well-being. It found no conclusive evidence that mindfulness improves academic achievement, mitigates anger and aggression, or increases autonomy for secondary students. The paper proposes integrating mindful awareness practices into the regular academic curriculum as a complement to metacognitive classroom practices, and calls for further research into developmentally appropriate, culturally responsive techniques for teaching mindfulness to secondary students.

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CHAPTER 1: INTRODUCTION

Introduction

Mindfulness, or sustained attention to present experience without judging it, does not simply affect personal well-being, but responsible citizenship as well. Piaget theorized that people negotiate the discrepancy between reality and their schemas, or mental “scripts” describing reality, through a combination of assimilation, in which they adjust perception of experience to more closely fit existing schemas, and accommodation, in which they adjusted their schemas to more closely fit their experience. He observed that people sometimes favor assimilation over accommodation (Miller, 2011). Langer (1989) also noted the human tendency to become mentally trapped in familiar schemas and categories, prejudicing them over the feedback from lived experience. She argued that this mindlessness stunted human potential by causing undue constriction of identity and self-image and by causing overreliance on societal roles—for instance, a wife or mother coming to define herself primarily by that role. Langer (1989) suggested these processes greatly exacerbate issues of learned helplessness, external vs. internal locus of control, self-limitation of personal choice, and failures of self-regulation and self-control. Taken together, she observed, these factors often lead to unintentional callousness or cruelty towards other people. Siegel (2009) found that when people practice mindfulness, it develops the parts of the prefrontal cortex responsible for emotional balance, fear modulation, insight, sensory awareness, intuition, response flexibility, interpersonal attunement, empathy, and morality. Similarly, Hölzelet al. (2011) found that meditation and mindfulness

practices were strongly correlated with gains in attention, body awareness, emotional regulation, and changes to perceptions of the self. Conversely, an underdeveloped prefrontal cortex leads to decreased self-awareness, greater rigidity in self-perception, reaction without reflection, and diminished empathy for others. On a societal level, habits of mind that diminish citizens' empathy, self-awareness, and response flexibility leave them poorly equipped for adaptive challenges at the personal and societal level. Such habits may well contribute to socially and ecologically destructive lifestyle choices, as well as crime and other antisocial behavior.

If we lived in a particularly fair or equitable society, these findings alone would be sufficient to give one pause. Consider, however, the experience of a person facing prejudice and disadvantage over race or socioeconomic status. Issues such as rigid self-image, learned helplessness, external locus of control, poor response flexibility, diminished compassion and self-compassion, and difficulty unlearning fear place that person in a much more vulnerable position. It's also likely that people will hold more tightly to societal biases when they favor assimilation over accommodation and have rigid self-images, constrained insight, and diminished empathy. Mindfulness and mindlessness may well influence people's capacity to be resilient in the face of societal injustice, and to work for a more just society.

Vickers (2005) proposed that for people in marginalized groups, mindfulness can be a powerful tool to confront and transform both external and internalized oppression. Noting patterns of greed, anger, and confusion in present and historical oppression against First Nations groups, Vickers (2005) argued that mindlessness ultimately creates and sustains cultural oppression. She explored the similarities between

Mahayana Buddhist practices and Nisga'a purification practices, arguing that traditional Nisga'a morning rituals were in fact a mindful awareness practice. She proposed that these techniques may be especially useful for breaking cycles of generational and historical trauma, because they return the practitioner to awareness of the present, foster connectedness with the land and with family lineage, encourage compassion for oneself and for those who've done harm, and invite practitioners to "step outside" oppressive identities they've internalized about their culture and ethnicity from the dominant culture. This, in turn, gives practitioners a firmer foundation to give back to their communities and to organize for political and institutional change. Vickers (2005) emphasized both the universality of mindful awareness practices—especially regarding compassion, relationship, and presence—and the rich heritage of such practices in many cultures. It may be especially effective, Vickers (2005) theorized, to find and honor the mindful awareness practices in a community's culture of origin, rather than simply importing practices from Eastern traditions or a psychology-based meditation course.

Orr (2002) asserted that mindfulness and mindlessness are powerful mediating factors for bias and prejudice, and that mindfulness is an important asset for beginning to deconstruct entrenched oppressive ideologies and internalized stereotypes. Langer (1989) also found that higher levels of mindfulness can decrease prejudiced attitude. Lillis and Hayes (2007) evaluated a pilot program among adolescents that found teaching mindfulness skills significantly decreased prejudicial attitudes among the intervention sample.

Rationale

Teaching and practicing mindfulness skills is just one potential strategy that teachers may use to address issues of social and educational inequity within the classroom, but it may be a particularly fruitful one, especially for educators working with diverse or under-served youth. Thornton and McEntree (1995) theorized a relationship between mindfulness and multiculturalism in learner-centered schools, proposing that mindfulness practices help teachers, administrators, and students alike to observe assumptions about intercultural interactions, distance themselves from entrenched ideas, develop ambiguity tolerance, embrace complexity, and empathize across cultural differences. As such, these practices may be particularly valuable in ethnically and linguistically diverse schools. A preliminary review of the available literature suggests that weaving mindfulness into pedagogy may be an attractive option for educators because adolescents' mindfulness levels affect cognition and academic achievement, self-regulation and classroom behavior, and resilience. Additionally, there is tentative evidence suggesting that mindfulness practices may have a more pronounced effect on young people in adversity.

Mindlessness in learning is characterized by assimilation rather than accommodation—top-down rather than bottom-up processing. It is correlated with poorer memory and diminished attention (Carson and Langer, 2001), but more importantly, when students have learned incorrect information in the past, mindless learning makes it more difficult for them to adopt more correct models of the world. This may have a particular impact on students from struggling schools, students who already have a pattern of academic failure, students facing language barriers, and students

whose education was disrupted. Orr (2002), Thornton and McEntree (1995), and Langer (1989) all theorize that mindlessness in learning is itself a learned behavior, and is reinforced by mindlessness in teaching. Carson and Langer (2001) tested Langer's theory of "mindful learning" in which teachers, as part of everyday methods of content instruction, encourage students to solve problems multiple ways, tolerate ambiguity, and continue looking for new or unexpected information in familiar material.

Mindfulness can be a protective factor for students who otherwise face educational inequity. For instance, mindful learning methods in a high school class were found to erase the gender gap for a mathematics task (Anglin, Pirson, & Langer, 2006). More importantly, trait-level mindfulness was shown to mitigate the effects of the subliminal priming one study used to induce autonomous or extrinsic motivation in a classroom setting. The study also revealed correlations between autonomous motivation and academic achievement (Radel, Sarrazin, Legrain, & Gobancé, 2009). This suggests that higher trait-level mindfulness protects students from responding unconsciously to subtle or nonverbal cues in their education, which may be an asset if students face labeling, low teacher expectations, or institutionalized discrimination within their school environment.

There is extensive literature connecting children's participation in mindful awareness practices to emotional self-regulation and classroom behavior outcomes. In one school, a fifth and sixth grade class engaged in a two-minute mindful awareness practice following the breath. Students all participated, and reported feeling calmer, less rushed, more focused, and more aware of their bodies. One student reported, "You can leave things that are rushing in your head" (McClain, Ylimaki, & Ford, 2010).

Other studies reported adolescent students who participated in mindful awareness practices decreased stress and anxiety (Schonert-Reichl & Lawlor, 2010), decreased aggressive behavior (Birnbaum, 2005; Napoli, 2001), and decreased bullying (Napoli, 2001). The impact of mindfulness practices on adolescent students with learning disabilities has been studied more than the impact of these practices in the general classroom. Case studies reported substantial decreases in aggressive behavior for students with Asperger Syndrome (Singh et al., 2011a), autism (Singh et al., 2011b), and conduct disorders (Singh et al., 2007). Beauchemin, Hutchins, & Patterson, (2008) found that a course in mindfulness meditation increased social skills, decreased anxiety, and increased academic achievement for youth with learning disabilities. Beauchemin, Hutchins, & Patterson, (2008) suggested that mindfulness mediation increased students' attention for social and academic activities by modulating anxiety responses and decreasing dysfunctional self-focus characterized by criticism and negative self-talk. Students' gains in self-awareness and emotional self-regulation have an impact on academic achievement as well as classroom conduct.

Resilience is defined as a person's capacity to recover or thrive in the presence of stress, change, or adverse life events; it's a normal process shared to a degree by all people. Factors that increase resilience include personal factors such as temperament and intelligence, personal spirituality, social and community support, and family relationships that encourage autonomy, connectedness, and self-esteem (Goldstein & Brooks, 2005). Student resilience is an important issue for educators interested in building a more just society because it mediates students' abilities to break out of cycles of poverty and disempowerment despite facing prejudice, deprivation, violence, or

miseducation during their childhoods. Furthermore, resilience is closely interrelated with academic achievement (Masten et al., 2008). Interventions that develop students' social and emotional skills are correlated with better grades and higher achievement on standardized testing, both in public school and afterwards in college (Fleming et al., 2005).

Mindfulness and resilience may in fact have an important relationship. There is some evidence that mindfulness techniques may increase internal locus of control, an important factor in resilience. For instance, Flinton (1997) found that an eight-week meditation program that taught concentration exercises from Zen and Yogic traditions, progressive muscle relaxation techniques, and sensory-based mindfulness practices decreased anxiety and increased internal locus of control for adolescent boys in a juvenile detention center. Siegel (2009) asserted that mindful awareness practices build the prefrontal cortex, which increases empathy and interpersonal attunement, which in turn influences resilience factors such as family and community connectedness. Insight, emotional balance, and fear modulation are also related to resilience.

Historical Background

There are recorded lineages of meditation and mindfulness practices going back at least 2500 years, nearly everywhere on the planet. These practices have featured in most of the world's major religious traditions, including Yoga, Buddhism, Taoism, Judaism, Christianity, Islamic Sufism, and shamanism from Africa, North and South America, Indonesia, Siberia, and Japan (West, 1987). If Siegel (2009) is correct, mindfulness practices may be as old as the prefrontal cortex in the human brain!

Early psychological research into meditation, conducted in the 1950's and 1960's by researchers such as Kasamatsu and Gagchi, focused on physiological changes to brain waves, breath, and heart rate during meditation itself. There were no longitudinal studies on the long-term effects on meditators. Transcendental Meditation became popular in the 1960's, and in 1970 Keith Wallace published research on the physiological effects of the practice; some of his more sensational claims may have attracted more researchers to study the effects of mindfulness and meditation. In the 1970's and 1980's, researchers began exploring meditation as a therapy for chemical dependency, depression, headaches, and body pain (West, 1987).

Thus far, the strongest debates revealed by an initial literature review revolve around how to define and operationalize mindfulness. Secondarily, there is a debate between Kabat-Zinn and Siegel about the role attention plays in mindful awareness practice, as well as the definition of presence.

Langer (1989) operationalized mindfulness as the capacity to continually create new schemas and recategorize information from older schemas, seeking novelty and fresh perspectives in apparently familiar information. She also emphasized the importance of developing ambiguity tolerance, not jumping to conclusions, welcoming new information, and seeking out multiple points of view.

Kabat-Zinn (2002) defined mindfulness as a form of focused attention—that is, “paying attention to life as if it actually mattered.” Kabat-Zinn has developed an eight-week Mindfulness-Based Stress Reduction therapy that uses didactic teaching, group discussions, yoga, breathwork, and Buddhist techniques as an intervention for people in physical and psychological distress. Mindfulness-Based Cognitive Therapy

was developed from this framework. In contrast to Kabat-Zinn (2002), Siegel (2009) argued that neurologically speaking, mindfulness is closer to relationship than to strict concentration, since they involve activation of the prefrontal cortex rather than the dorsolateral regions of the brain associated with attention and concentration.

Siegel (2009) investigated the neurobiology of mindfulness. He proposed that children originally learn self-regulation processes through their relationship with a caregiver, and that the intrapersonal insight experienced during mindfulness practices is really a form of interpersonal “emotional mapping” turned inwards to map interior states. In short, he argued that mindfulness is about developing a relationship with oneself, even empathizing or developing compassion. He emphasized the role of fear modulation, and learning to “love without fear”—even oneself. He termed this interpersonal and intrapersonal mapping “mindsight.” This kind of intense intrapersonal attunement, Siegel (2009) argued, helps free a person’s experience from the constraints of a rigid self-identity. This has particular applicability to issues of resilience.

This paper will develop a more nuanced examination of the history of resilience research. An initial examination of the literature shows a decent quantity of research, but it is difficult to discern historical movements in what kinds of questions researchers have asked. Kolar (2011), Goldstein and Brooks (2006) all note the general paucity of research on the topic until about twenty years ago. Perhaps the recent emergence has something to do with the positive psychology movement. Kolar (2011) suggested that the recent explosion of interest on the topic has led to inconsistencies in how resilience is defined and operationalized, especially between disciplines.

Frankl's (1992) Auschwitz memoir, *Man's Search for Meaning*, laid important

groundwork for the modern concept of resilience, though he didn't use that terminology. He described the emergence of several traits that helped prisoners survive the brutal conditions, psychologically and otherwise: an acute sense of natural and artistic beauty, a robust sense of humor, contemplation of memories of loved ones, an active and enriching mental life, and a sense of the purpose to one's life and even to one's suffering. Frankl later developed this inquiry into one's particular life purpose into a form of existential psychotherapy.

Garmezy (1972) coined the term resilience; he initially conceived of it as an "exceptional characteristic" that allowed a few special children to succeed despite difficult life circumstances. Early studies conceived resilient children as having an intrinsic quality that rendered them "invulnerable" to these adverse events. Werner & Smith's (1982) examination of socioeconomically disadvantaged children living with violence, poverty, and substance abuse in their families and communities found that about a third of such children grew up into adults with successful life outcomes—adequate careers, functional family lives, no involvement with crime or addiction. This number was much higher than earlier research would have predicted. Masten & Obradovic (2006) argued that resilience is a normal aspect of children's development and reflects basic human adaptation, rather than an exceptional quality of only a few. Goldstein and Brooks (2006) pioneered the adaptation of research on resilient children into application for schools.

Definition of Terms

For the purposes of this paper, mindfulness is defined as sustained,

non-judgmental attention on both internal experiences and concrete, sensory experiences as they unfold in the present (Kabat-Zinn, 2002). This paper operationalizes mindfulness this way because it is the most widely-used definition in the research, and describes the common ground between important mindfulness researchers such as Lazar, Baer, Kabat-Zinn, and Siegel.

The literature sometimes distinguishes trait mindfulness, describing a person's degree of mindfulness in everyday life, from state mindfulness, describing the level of mindfulness measured at a particular point in time, such as during a meditation practice. Siegel (2009) proposed that the practice of state mindfulness may build the neural circuitry to support increases in trait mindfulness, and advocated further study on this topic. This paper examines both state and trait mindfulness, and will explicitly distinguish between the two. Even if a study doesn't explicitly distinguish between state and trait mindfulness, this distinction is revealed by the study's choice of assessment methods—when and how measurements are taken, as well as what measurement scales or outcome criteria the study uses. This paper will always state whether a study has distinguished between state and trait mindfulness.

Mindful awareness practices (MAPs) include breath practices, movement practices such as yoga and qi gong, concentration practices such as centering prayer and mindfulness meditation, and bringing mindful awareness to informal daily activities such as chores or the walk to school. Each of these activities is an entry-point to becoming present with thoughts, emotions, and sensations without either pushing them away or participating in them. Mindful awareness practices aren't simply about becoming aware of such things, but about intentionally developing an "awareness of the

awareness” during the practice (Siegel, 2009).

For the purposes of this paper, resilience is defined as a person's capacity to recover or thrive in the presence of stress, change, or adverse life events (Willoughby et al., 2003). Various authors operationalize resilience as a mindset (Goldstein and Brooks, 2005), personality trait, developmental process (Willoughby et al., 2003), a personal and social identity mediated by relationships (King et al., 2003), or even neuroplasticity (Siegel, 2009). Each particular framework emphasizes important aspects of resilience: attitudinal frameworks, daily habits of cognition and behavior, personal identity, growth and development over time, social and societal situatedness, and physical changes in the human brain. This paper operationalizes resilience as a developmental neurophysical phenomenon reinforced by daily attitudes, habits, and behaviors.

Limitations

The purpose of this paper is to investigate the applicability of mindful awareness practices in teaching that supports the development of resilience among secondary school students. Because it's examining applications to secondary-level teaching, this paper limits its literature review to studies regarding youth in grades 5-12. There is stronger research on the effects of mindful awareness practices on adults, particularly college students, and there is broader debate about mechanisms of change. Though there are studies on the neurological effects of mindfulness practices on adults, there's a scarcity of research about their effects on children and adolescents. Because of the significant differences between developing adolescent and adult brains, this may be a

significant blind spot. Many of the studies available on teaching mindful awareness practices to youth are case studies, feasibility studies, or evaluations of pilot programs (Burke, 2010). An initial survey of the research found no longitudinal follow-up measures for studies of youth, but resilience and mindfulness both show their strongest effects on adults' lives over time, especially given practice. Participating youth in these studies may experience effects years later, even in adulthood, that are not evaluated. Similarly, participants may only experience temporary gains from mindful awareness practices, but this wouldn't be apparent from a post-assessment taken immediately at the end of a pilot program. Studies on youth often lack the large sample sizes available in the literature about adults and mindfulness, which hinders methodological rigor (Burke, 2010). Burke (2010) concluded that the feasibility studies show mindfulness-based interventions to be promising possibilities, and exhorted prospective researchers to conduct follow-up research with large sample sizes.

Because this paper focuses on resilience, many of the studies reviewed involve youth in adversity—youth who are socioeconomically disadvantaged, infected with HIV, involved in the juvenile justice system, or struggling with learning disabilities. This presents three difficulties. First, life stressors such as autism and poverty are substantially different from one another, and it may be methodologically inappropriate to compare mindfulness-based interventions for the two. Alternatively, one might argue that resilience is a fairly universal process, and that the programs evaluated were attempting to increase resilience rather than intervene in a particular life event. Second, many of these studies focused on youth with externalizing behaviors; because male adolescents are more likely than female adolescents to respond this way to stressors,

males tended to be more heavily represented in the participant sample for these pilot programs and feasibility studies. There is little indication whether there are gender differences in the effects of mindful awareness practices on adolescents, but this may be a serious blind spot in the research. Third, an initial search of the literature found only a few studies that evaluated the effects of mindful awareness practices on the general adolescent population, and little comparison of differences between gains for relatively privileged youth and youth in adversity. This may also reflect a bias in what research has been conducted or funded. Mindfulness-Based Stress Reduction and Mindfulness-Based Cognitive Therapy were initially developed to help clients cope with physical and mental illness. Applications to help youth thrive, rather than recover from difficulty, have been more recent.

Additionally, many studies reviewed were conducted outside the school environment. The findings of these studies may have limited transferability to a school setting, especially given time constraints in the classroom. Alternatively, the techniques explored in these settings may be extremely adaptable to classroom needs at the secondary level. For instance, Ellen Langer has conducted dozens of studies on mindfulness-informed pedagogy, using particular content instruction techniques to increase students' mindfulness, engagement with the material, and attention spans. That said, an initial review finds limited information about this transferability

Statement of Purpose

This paper analyzes current research on the effects of mindful awareness practices on resilience for secondary students, particularly secondary students in

adversity. It examines what, if any, effects these practices may have on academic achievement. If this paper finds that mindful awareness practices improve secondary students' resilience and/or academic achievement, this research may suggest best practices for implementing pedagogies that support the development of students' mindfulness.

Summary

This paper defines mindfulness as sustained, non-judgmental attention on both internal experiences and concrete, sensory experiences as they unfold in the present. It defines resilience as a person's capacity to recover or thrive in the presence of stress, change, or adverse life events. Both mindfulness and resilience are important processes for citizens to cultivate because they mediate the capacity to respond meaningfully and effectively to issues of bias, prejudice, and injustice in society. They may be a powerful tool for teachers, educators, and students working to address educational inequality. Among high school students, mindfulness may be associated with improved academic achievement, and research suggests a relationship between mindfulness and better emotional regulation and classroom management. There may also be an important interrelationship between mindfulness and resilience, both of which may affect students' academic achievement. The historical context of the research on resilience and mindfulness requires further research and elaboration. This paper limits its literature review to studies on students in Grades 6-12, though the research on mindfulness and resilience in adults is more robust. Most of the research available on adolescents evaluates pilot programs or feasibility studies, most of it is conducted on

specialized populations of youth in adversity, and most of it is conducted outside the school environment. These issues pose methodological challenges for the paper. Ultimately, this paper aims to investigate the relationships between mindfulness, resilience, and academic achievement; if the research shows mindfulness to improve students' resilience and/or academic achievement, this paper will also seek to find best practices for supporting mindfulness as part of everyday pedagogical practice.

CHAPTER 2: CRITICAL REVIEW OF THE LITERATURE

Introduction

In Chapter 1, this paper delineated the rationale for investigating the potential effects of mindfulness on adolescents' resilience and academic achievement. Chapter 1 defined mindfulness as sustained, non-judgmental attention on both subjective internal experiences and concrete sensory experiences as they unfold. It defined resilience as a person's capacity to recover or thrive in the presence of stress, change, or adverse life events. Both mindfulness and resilience are important processes for citizens to cultivate because they mediate the capacity to respond meaningfully and effectively to issues of bias, prejudice, and injustice in society. They may be powerful tools for teachers, educators, and students working to address educational inequality. This paper aims to investigate the relationships between mindfulness, resilience, and academic achievement; if the research shows mindfulness to improve students' resilience and/or academic achievement, this paper will also seek to find best practices for supporting mindfulness as part of everyday pedagogical practice.

Chapter 2 conducts a literature review of studies on mindfulness and Mindful Awareness Practices among students in Grades 6-12, though there is a more well-developed body of research on mindfulness and resilience in adults. The research available is primarily comprised of quantitative, quasi-experimental studies that relied heavily on self-report survey data. Additionally, many of these studies evaluate pilot programs, and are methodologically weaker than quantitative research of mindfulness in adults. The paucity of qualitative research is a weakness in the field, because several

of the studies indicated that mindfulness practices have different effects on adolescents and adults—for instance, they enhanced internal locus of control among adults, but several of the studies reviewed here showed they have no effects on adolescents. Simply transferring adult-oriented theories of mindfulness onto adolescent populations may therefore be methodologically inappropriate. This body of research would benefit from more in-depth qualitative studies aimed at investigating the unique experiences of adolescents undertaking Mindful Awareness Practices, and developing mindfulness models specifically adjusted to adolescent populations.

A particular strength of the research is that study findings tend to show similar trends across highly diverse cultural contexts—including at-risk teenagers in Tehran, schoolchildren in India, war-affected Kosovar youth, adolescent girls in California's juvenile detention system, and ethnically diverse urban youth affected by HIV/AIDS. Additionally, many of the studies selected sample populations from students with learning disabilities, mental health issues, or trauma. This may be especially effective for revealing trends in resilience. One downside, however, is that boys are more likely to be diagnosed with learning disabilities or externalizing disorders, and therefore the studies on special education students tend to have mostly male subjects. This is a weakness in the research, because there is some evidence that adolescents experience gender differences in the effects—for instance, Barnes, Bauza, & Trieber (2003) found that Mindful Awareness Practices reduce trait and state anger in adolescent females but not in males. On the whole, the overwhelming majority of the reviewed research was conducted with youth in adversity; about half of the interventions were implemented in a school setting, sometimes by the students' classroom teachers, suggesting

transferability of these techniques into educational practice.

Only a few studies surveyed directly addressed the relationship between mindfulness and resilience; those that do are primarily correlational, examining the relationship between trait mindfulness and resilience, rather than the effects of mindfulness-based interventions. However, the remaining studies address relationships between Mindful Awareness Practices and factors that enhance personal resilience. For instance, resilience is closely interrelated with academic achievement, planning ability, concentration, and ability to delay gratification (Marsten et al., 2005). Eight studies showed that Mindful Awareness Practices had a positive impact on adolescents' capacities for attention, executive function, and academic achievement. This suggests that Mindful Awareness Practices have effects on resilience that are mediated by their effects on executive function. Other factors that increased resilience included personal qualities such as temperament and intelligence, ability to regulate emotion, personal spirituality, social and community support, connectedness, and self-esteem (Goldstein & Brooks, 2005). Reviewed studies indicated that Mindful Awareness Practices tend to increase emotional stability and self-regulation in several ways, which implies gains in resilience as well. These interventions tended to decrease state anxiety, trait anxiety, stress, and trauma-related responses such as hypervigilance and intrusive thoughts. Mindful Awareness Practices also tended to decrease anger and aggression and increase flexibility of response in stressful or potentially hostile situation. Finally, there is evidence that Mindful Awareness Practices positively affected the development of psychological well-being in adolescents: they are moderately associated with gains in self-awareness, strongly associated with the development of social and emotional

literacy, and tentatively associated with gains in psychological well-being.

Positive Effects on Attention and Executive Function

Concentrative meditation may improve adolescents' resilience by improving attention and executive function; several important factors for resilience are academic achievement, planning ability, concentration, and delaying gratification. Baijal et al. (2011) found that adolescents who meditated regularly developed stronger attention and improved executive functioning compared to either non-meditators or their own scores at pretests. Researchers measured executive function and attention by task performance for either academic work or tests of executive functioning and attention, and bolstered by interviews, parental surveys, and measures of EEG coherence. Similarly, Grosswald et al. (2008) found that Transcendental Meditation improved executive functioning on two task measures, EEG coherence, attention, and observed behavior self-regulation among adolescents with ADHD. Manjunath & Telles (2001) found that daily yogic meditation improved executive functioning for adolescent females, but did not test effects on attention. Redfering & Bowman (1981) found that meditation techniques also improved executive functioning in male adolescents with learning disabilities and behavioral disturbances, as measured by decreases in observed non-attending behavior and impulsivity/externalizing behavior. One interesting finding was that relaxation and meditation both reduced impulsivity, but only meditation increased attention; another study found that improved attention mediated impulsivity. This study found that meditation did not affect students' locus of control. Kratter &

Hogan (1982) also found that meditation had no effect on adolescent special education students' locus of control. This study found that while both meditation and relaxation improved classroom behavior and decreased impulsivity for students with ADHD, only concentrative meditation improved these students' attending behaviors or time on task. Similarly, Semple et al. (2010) found that Mindfulness-Based Cognitive Therapy for Children improved attention and behavior among adolescents with reading disorders, some of whom were also English Language learners, by reducing these adolescents' levels of state and trait anxiety.

There were also a few findings specifically about cognitive ability and academic performance. Manjunath & Telles (2004) found that yoga practices improved adolescents' spatial memory but not their verbal memory, and Nidich et al. (2011) found that daily Transcendental Meditation significantly improved math and reading standardized test scores for low-achieving middle-school students, about half of whom had a learning disability, and nearly all of whom lived in poverty.

Attention and Executive Function

Baijal et al. (2011) investigated the influence of regular concentrative meditation on tests of adolescents' attentional processes though a correlational study comparing adolescent Indian students who had received a year of Concentrative Meditation Training at school with students whose (comparably-funded) school had no meditation program, and found a positive correlation between practicing CMT and higher scores scores on attentional alerting, conflict monitoring, and reactive control attention tests, but no correlations between practicing CMT and higher scores on attentional orienting

tasks.

To investigate the effects of regular concentrative meditation on adolescents' attention, Baijal et al. recruited 13-15 year old subjects from two public schools in Allahabad, India. In the experimental group, 44 were male and 35 were female, and in the control group, 60 were male and 16 were female. Both schools were of similar socioeconomic status, which the study did not specify, but one school taught concentrative meditation as part of its regular academic curriculum and the other school taught no form of meditation. In the school that taught concentrative meditation, 13-year-olds had already had a year of relaxation training as a precursor to learning concentrative meditation, while the 14-15 year olds had 1-2 years of Transcendental Meditation and pranayama breathwork training.

Researchers administered the Attention Network Test to subjects from the two public schools. This test was a computerized task designed to measure alerting, monitoring, and conflict monitoring aspects of attention. Subjects had an initial practice session with this program, then completed 312 repetitions of the task. Researchers then analyzed this data for percentage of correct responses and for the reaction time for correct scores.

An ANCOVA test for attentional alerting revealed a main effect that meditating adolescents had shorter reaction time [$F(1,143)=4.22, p<0.05$] and more accurate responses [$F(1,143)=6.21, p=0.01$]. An ANCOVA test revealed that meditation did not affect reaction time or accuracy for attentional orienting tasks. ANCOVA testing revealed that older students had better response time [$F(1,143)=5.86, p<0.05$] and accuracy [$F(1,143)=8.37, p<0.01$] on conflict monitoring tasks, but that meditating

students also had better response time [$F(1,143)=5.51, p<0.05$] and accuracy [$F(1,143)=4.01, p<0.05$] on conflict monitoring tasks. Results suggested that both meditation and developmental maturation improved adolescents' conflict monitoring, and that meditating adolescents experienced greater gains with developmental maturation than non-meditating adolescents.

This study had moderately strong internal validity. It used a robust sample size, and had a rigorous statistical analysis of the results. Researchers were clear about how they collected and analyzed data. The study was clear about how and why it selected its subjects, it checked for baseline differences between the experimental and the control group, and it stratified subjects by age as well as group so as to control for developmental factors. Overall, these factors increased the study's objectivity, because they made its results more auditable—not for quantitative—use the word replicable by outside groups. The most significant challenge to the study's internal validity was that the 13 year olds and the 14-15 year olds received training in different meditation techniques. If the meditation techniques affected the adolescents' attentional processes differently, this could create a confounding variable that altered the effects of developmental maturation.

The finding that regular meditation exercise, particularly concentrative meditation, improved adolescents' attention has strong external validity. Redfering & Bowman (1981) found that meditative-relaxation exercises reduced incidence of non-attending behaviors in behaviorally disturbed adolescents, Kratter & Hogan (1982) found that concentrative meditation improved attention in adolescents with ADHD, Grosswald et al. (2008) found that Transcendental Meditation decreased adolescents' symptoms of

ADHD, and Semple et al. (2010) found that Mindfulness-Based Cognitive Therapy significantly improved attention for adolescents with reading disorders. However, this is the only study in the literature to measure specific attentional processes such as alerting and orienting, so it is impossible to assess the external validity of these specific findings.

Redfering & Bowman (1981) used a pretest-posttest quasi-experimental study to investigate the effects of Meditative-Relaxation exercises on the incidence of non-attending behavior among students with behavioral disturbances and found that compared to the control groups, students practicing Meditative-Relaxation exercises had a lower incidence of non-attending behaviors and time off task. The subjects were 18 8-11 year old public school students of average or slightly above average intelligence with diagnosed behavioral disturbances. Fourteen subjects were male and four were female. Subjects were from mixed socioeconomic backgrounds, and the study did not gather information about their race or ethnicity.

To gather baseline data, the students' special education teacher and a teacher's aide sampled the students' behaviors for a half hour at the same time each day for five days, coding incidence of attending versus non-attending behavior and using this data to calculate students' time on task. Attending behavior was defined as having their faces oriented toward their work, and finishing their assigned tasks. Reliability checks indicated that the teacher and the classroom aide were in agreement 98% of the time about whether students were attending or non-attending during a three-minute sample period. The teacher calculated the percentage of time for each day that each student was non-attentive.

The researchers separated subjects into two randomized groups of nine. Both

experimental and groups were given an hour-long relaxation session daily for five days in a dimly lit classroom free of noise and disturbances. Researchers played a tape recording of Benson's meditative-relaxation exercises for the experimental group (8 males, 1 female), while the control group (6 males, 3 females) listened to a tape recording of non-meditative "resting" exercises. After a week of practicing the exercises, the teacher and classroom aide assessed students' percentage of non-attending behaviors using the same behavioral sampling technique used to gather baseline data. Researchers then used a t-test to determine whether the meditating group's change in mean percentage of attending behaviors was significantly different than that of the control group.

The t-test showed that the Meditative-Relaxation group had mean non-attending behavior 19.1% of the time before treatment, and 8.4% of the time the week after treatment. The mean changed -10.7%. The Rest Group had mean non-attending behavior 18.8% of the time the week before treatment, and 15.6% of the time after treatment, for a mean change of -3.2%. The Mean Change Difference was -7.5%, the t-score was 4.79, and the p-value was <.001. This showed that the meditation condition significantly lowered the percentage of time students spent on non-attending behaviors, and therefore increased time on task.

Several factors supported this study's internal validity. It used a randomized control group that had equitable breaks. It used time on task to assess students' attention, rather than self-reports or subjective teacher assessments. The study ensured reliability by comparing teachers' and aides' assessment of students' attending versus non-attending behaviors. The finding that meditation improved time on task was

extremely statistically significant. However, these study strengths are undermined by significant challenges to internal validity. The study had only 18 students, and only nine per group, well short of the necessary 30. The study also had no way to assess whether students were actually meditating during the treatment.

However, the finding that meditation exercise improved adolescents' attention has strong external validity. Baijal et al. (2011) found that concentrative meditation improved attentional alerting and conflict monitoring, Kratter & Hogan (1982) found that concentrative meditation improved attention in adolescents with ADHD, Grosswald et al. (2008) found that Transcendental Meditation decreased adolescents' symptoms of ADHD, and Semple et al. (2010) found that Mindfulness-Based Cognitive Therapy significantly improved attention for adolescents with reading disorders.

Kratter & Hogan (1982) used surveys and the Matching Familiar Figures Test in a pretest-posttest quasi-experimental design to measure the effects of twice-a-week meditation on attention, impulsivity, locus of control, and behavior among adolescent students with ADHD, compared the results to control groups from the same sample doing progressive muscle relaxation or no intervention at all, and found that while both meditation and relaxation groups both reduced impulsivity and externalizing behaviors, meditation but not relaxation increased attention, and neither meditation nor relaxation affected locus of control.

To investigate the effects of meditation on impulsivity, locus of control, attention, and externalizing behavior, the researchers recruited 24 male students aged 7-12 who were diagnosed with hyperactive-subtype ADHD, free from comorbid disorders, and of average or above-average intelligence. The study randomly assigned students to

Meditation Training, Relaxation Training, or Waiting List Control for four months; groups met twice a week. In Meditation Training, the researcher guided subjects in twenty minutes of mantra meditation followed by 15-20 minutes of sitting quietly, gradually increasing concentrative meditation exercise periods from two to eight minutes. The Relaxation Training used a technique of progressive muscle relaxation. The control group had no intervention during the treatment period, but they participated in Meditation Training after the study ended.

The study used four major assessments. Researchers measured reflection-impulsivity with the Matching Familiar Figures Test (MFFT), which had short-term test-retest correlations for latency and errors at .72 and .82, respectively, after four weeks, and .78 and .62 after eight weeks. They assessed students' selective attention with the Fruit Distraction Test (FDT), and students' locus of control with the Nowicki-Strickland Locus of Control Scale (LCS), with an internal consistency of .63 (estimated with the split-half method) and reported test-retest reliabilities of .63 and .66, six weeks apart. Researchers assessed students' hyperactivity with the Abbreviated Parent-Teacher Questionnaire, which Sprague & Sleator (1973) found to be reliable for assessing the effects of drugs on children's behavior. The study assessed students' activity level through the Werry-Weiss-Peters Activity Scale (WWPAS), which has a correlation of .90 between raters has been reported. Researchers analyzed the differences between pretest and posttest using a two-factor split-plot ANOVA for each dependent measure.

An ANOVA performed on MFFT pretest and posttest scores showed that both Meditation Training ($p<.01$) and Relaxation Training ($p<.05$) decreased impulsivity and

increased reflection, compared to the control group, though Meditation Training had a stronger effect ($F(2,21) = 7.16$, $p=.004$). Researchers analyzed FDT data using separate ANOVA, found a statistically significant difference between experimental and control groups ($F(2, 21)=3.89$, $p=.037$), and used a Tukey's HSD procedure to conclude that only the Meditation Training group had statistically significant improvements in selective attention ($p<.01$), not the Relaxation Training group or control group. Neither Meditation Training nor Relaxation Training had any statistically significant effects on Locus of Control, as evidenced by an ANOVA performed on the LCS pre- and post-tests. An ANOVA and subsequent Tukey test performed on WWPAS scores revealed that both Meditation Training ($p<.01$) and Relaxation Training ($p<.01$) decreased incidence of students' problem behaviors ($F(2,21)=6.78$, $p=.005$), but that there was no change in the control group.

Several features supported the internal validity of the study. It used a no-intervention control group, used a relaxation treatment group to ensure the study was distinguishing the effects of concentrative meditation from relaxation skills, and randomized assignments of students to groups. The study ensured students had sufficient time to experience effects of either relaxation or concentrative meditation before administering post-tests. It used performance tasks to corroborate self-report surveys and teacher assessments of behavior. The WWPAS measure had strong test-retest reliability, and the MFFT measure had adequate but marginal test-retest reliability. Features that undermined the validity of the study were inadequate test-retest reliability on the Locus of Control Scale, as well as a small sample size. Two factors that undermine the generalizability of this study were the failure to collect race or

socioeconomic class data and the inclusion of only males in the sample.

The finding that concentrative meditation but not relaxation improved students' selective attention has moderate external validity, especially since a corroborating research used a subject sample from India. Baijal (2011) found that Indian adolescents who practiced concentrative meditation had better attention than those who didn't. Grosswald et al. (2008) found that Transcendental Meditation reduced symptoms of ADHD, and Redfering & Bowman (1981) found that meditation reduced incidence of inattentive behaviors and time off task for adolescents in special education. The finding that relaxation and meditation both decreased impulsivity is corroborated by a study by Mendelson et al. (2010), but undermined by a study by Ramadoss (2010) that found yoga did not change impulsivity for adolescents. Both interventions decreased incidence of problem behaviors, a finding corroborated by Barnes, Bauza, & Trieber (2003), Harris (2010), Singh et al. (2011), and Singh (2007).

The finding that meditation does not affect locus of control is corroborated by Redfering & Bowman (1981), who found that meditation practice did not affect special education students' locus of control. Similarly, Ramadoss (2010) reported that yoga practice didn't affect incarcerated female adolescents' locus of control. However, Parto & Besharat (2011) found that mindfulness increased personal autonomy.

Semple et al. (2010) used a pretest-posttest quasi-experimental design to investigate the effects of mindfulness-based cognitive therapy on attention, state anxiety, trait anxiety, and behavior among adolescents with reading disorders, and found that compared to wait-listed control groups, students in the experimental group had significantly reduced attention problems and behavior problems at posttest, and

significantly reduced numbers of subjects with clinically elevated levels of depression and anxiety among students.

Subjects were 20 English-speaking children, ages 9-13, who were enrolled in a university clinic-based remedial reading tutoring program. Eight were male and 12 were female. Thirteen were Latino, two were Caucasian, and five were African-American. Four came from families who spoke little or no English in the home. This study did not collect socioeconomic class status information for the sample. Researchers used a power analysis to determine the number of participants needed to reasonably detect significant mean group differences, and found the necessary sample size to detect significant differences at alpha = .05 and a power of 80% was nine participants per group. Researchers matched participants by age and gender, randomly assigned them to one of four independent groups, and concealed the randomization from staff and participants to create a double-blind study.

Researchers used a pretest-posttest randomized trial of a two-group design. Students in the experimental groups participated in Mindfulness-Based Cognitive Therapy for Children (MBCT-C), a 12-week program with weekly 90-minute sessions in which trained therapists guided children in games, movement exercises, visualization strategies, writing and drawing, body scans, and 3-10 minute mindful awareness exercises. Therapists also taught simple sensory exercises to heighten non-judgmental awareness of perceptual experiences and intrapsychic events such as thoughts and emotions. The control groups were wait-listed and given MBCT-C treatment after posttests.

Pretest-posttest assessments included the State-Trait Anxiety Inventory for

Children (State Anxiety $\alpha=.82$ for boys and .87 for girls, Trait Anxiety $\alpha=.78$ for boys and .81 for girls) the Multidimensional Anxiety Scale for Children ($\alpha=.87-.89$) and the Child Behavior Checklist: Parent Report Form, with subscales including an Internalizing Problems Scale (separated into withdrawal, depression, and somatic complaints), an Externalizing Problems Scale, and a Total Problems Scale.

Researchers found significant reductions of attention problems between pretest and posttest [$Z (n = 20)$, 3.179 , $p = .001$]. At pretest, five subjects scored with clinically elevated attention problems on the Child Behavior Checklist (T-score C70), and two had ADHD diagnoses. At post-assessment, one subject had a clinical elevation of attention problems on the CBCL. Among the experimental group, researchers found significant reductions in attention problems [$t (4)$, 3.884 , $p = .018$] and CBCL total behavior problem scores [$t (4) = 3.819$, $p = .019$]. Researchers found a significant relationship between changes in CBCL attention problems and changes in CBCL behavior problems ($r = .678$, $p < .01$). Reductions in attention problems accounted for 46% of the variance in the reduction of behavior problems.

A one-tailed paired samples t-test between pretest and follow-up showed significant reductions in mean State Anxiety as measured by the STAIC [$t (24) = 2.46$, $p = .02$, Cohen's $d = .38$]. At pretest, six children reported clinically elevated anxiety (T-score C70) on the STAIC, the MASC, or the CBCL anxiety/depression subscale at pretest, whereas only three children reported clinically elevated levels of anxiety at posttest. Subjects with clinically elevated anxiety reduced total behavior problem scores on the CBCL between pretest and posttest [$t (5) = 2.657$, $p = .045$], but there was no significant decline in problem behavior for children without clinically elevated anxiety

(Cohen's $d = .27$). A one-group, paired samples t-test of the pooled pretest and follow-up data found significant reductions in behavior problems over the course of the study with a medium effect size [$t(24) = 4.35$, $p < .001$ (two-tailed), Cohen's $d = .44$].

Executive Function

Grosswald et al. (2008) used a pretest-posttest control group design using EEG measures, parent and teacher reports, and performance on executive functioning tasks to investigate the effects of daily in-class Transcendental Meditation on ADHD symptoms for adolescents diagnosed with both ADHD and a comorbid language-based learning disability. The researchers found that the experimental group experienced statistically significant decreases in theta/beta difference scores, increases in EEG coherence, improved executive functioning as measured by a verbal fluency task, reduced stress and anxiety, and increased parental reports of better schoolwork, organization, independent work, happiness, and sleep.

To test the effects of Transcendental meditation on adolescents' ADHD, the researchers recruited eighteen 11-14 year old subjects (13 male, 5 female) with ADHD from an independent school for children with language-based disabilities. Of the eighteen students, one had comorbid Obsessive-Compulsive Disorder, three had Autism, three had General Anxiety Disorder, and ten were on psychopharmaceutical medication.

Researchers stratified subjects by age and ADHD subtype, then randomly drew names to assign subjects to the immediate-start experimental group or delayed-start control group by random drawing of names. During the intervention, a certified

TM teacher trained the experimental group in four daily one-hour instruction sessions, and gave biweekly follow-up meetings to discuss students' experiences and monitor meditation technique. Students practiced TM at the beginning and end of the school day with a classroom teacher who'd been trained in the technique. Researchers pretested both groups, post-tested both groups after the three-month intervention period, and then tested again after the control group finished their TM training.

Researchers used EEG tests during a paired-choice reaction time test to measure students' neurological coherence patterns, which are positively associated with executive function, and cognitive interference, which is negatively associated with executive function. Researchers tested executive function with the Delis-Kaplan Executive Function System (D-KEFS) verbal fluency test, a standardized research tool which includes an Alternate Form to reduce practice effects at posttest. To test executive function and higher-order problem-solving, students also performed the Tower of London test, which has a reliability coefficient of .80. At pretest, researchers found no statistically significant differences between the experimental and control groups on the D-KEFS or Tower of London (all Wilk's Lambda $F(12, 5) < 1.0$), suggesting a valid control group. To corroborate evidence from these tests, subjects' parents used an 11-point Likert Scale to rate their children's changes in ability to focus on schoolwork, stay organized, work independently, be happy, and sleep. Researchers also conducted an exploratory analysis using a single group design at the third post-test, comparing the changes between baseline and third post-test for students in the delayed-start group, who'd been meditating for three months, versus changes in the students in the immediate start group, who'd been meditating in school for six months.

To analyze the EEG measures, Grosswald et al. (2008) conducted an ANCOVA of theta/beta ratio difference scores, covarying for pretest scores. The ANCOVA of Theta/Beta difference scores, covarying for pretest scores, showed significant decreases of theta/beta ratios of EEG in the TM group at 3-month post-test ($F(1, 17) = 4.7$, $p=.05$, $n2=.24$), but a slight increase in the control group; both groups declined significantly between the 3-month and 6-month posttest, when they were both doing TM practice. This indicated that TM reduced students' cognitive interference, a finding corroborated by a MANOVA indicating increased EEG coherence for frontal, parietal, and anterior/parietal brain areas (Wilks' Lambda $F(3, 14) = 4.70$, $p=.018$ $n2=.50$).

Pretest-posttest data indicated that Transcendental Meditation improved adolescents' executive function as measured by the D-KEFS verbal fluency tests, but that the Tower of London task did not improve executive functioning or higher-order planning. The omnibus repeated-measures MANOVA with 10 variates, four measures from the D-KEFS and six from the Tower of London, yielded significant measure x group interactions, Wilk's Lambda $F(10, 7)=3.7$, $p=.041$, $n2=.84$, indicating that TM practice improved executive function for these adolescents. However, a repeated measures MANOVA on the Tower of London tests revealed that both experimental and control groups improved performance from pretest to posttest (Wilk's Lambda $F(1, 16)=17.7$, $p=.001$, $n2=.52$), but that there was no statistically significant difference between the two groups' performance gains ($F(1,16)<1.0$), indicating that significant learning effects skewed this data. The repeated measures MANOVA with the D-KEFS measures indicated that the experimental group significantly improved verbal fluency (Wilks' Lambda $F(3, 14)=4.2$, $p=.025$, $n2=.48$) through an increase in letter fluency, ($F(1,$

$15)=7.7$, $p=.017$, $n2=.34$), but experienced no improvements in other components of verbal fluency. Parents corroborated findings that TM improved executive functioning and decreased ADHD symptoms by reporting positive gains in their children's ability to focus on schoolwork, stay organized, work independently, be happy, and sleep since beginning to meditate. Subjects also corroborated these findings, and reported TM practice was enjoyable and reduced stress and anxiety. Researchers concluded that reductions in stress and anxiety reduced cognitive interference, and this improved cognitive coherence and executive functioning.

Overall, this study had strong internal validity because it compared multiple measures of executive function, including EEG data, performance on standardized tasks, and surveys from parents, teachers, and subjects. Findings from EEG tests, the D-KEFS, and parents' survey-reports showed that TM improved executive function. The Tower of London task did not indicate that improvements in executive function were related to TM practice, because both groups showed significant learning effects from pretest to posttest. However, the D-KEFS tests came with alternate forms that reduced learning effects, and they did indicate improvements in executive function. Despite the conflict between the two tests' findings, one should accept the D-KEFS test results because the test controls for learning effects, and because the D-KEFS results are corroborated by EEG findings and parental reports. The corroboration of parental reports also increased the study's reliability.

In general, this was a methodologically sound study, which used a control group and randomized selection. Stratifying selection groups by age and ADHD subtype ensured a valid control group, and researchers confirmed this validity by pre-testing

experimental and control groups. This allowed researchers to control for significant challenges to internal validity such as history, maturation, testing, instrumentation, selection, and regression. However, a challenge to this study's internal validity comes from its sample size, which was under 30 subjects. Additionally, males were overrepresented in the subject sample, which may have skewed the results since (Research) indicates gender differences in adolescents' responses to Mindful Awareness Practices.

This study's findings have moderate external validity. As in this study, Semple et al. (2010) found that meditation improved adolescents' attention and executive function by decreasing cognitive interference due to anxiety and depression. Baijal et al. (2011) found that concentrative meditation improved various aspects of attention and executive functioning among adolescents, and Referring & Bowman (1981) found that meditative-relaxation exercises increased students' attending behaviors and time on task while decreasing students' off-task behavior.

Majunath & Telles (2001) also found that meditation increased executive function among adolescents. However, Majunath & Telles (2001) reported that the Tower of London test indicated that concentrative meditation improved executive function in adolescent girls, whereas Grosswald et al. (2008) found no differences between experimental and control groups' improvements from pretest to posttest. This discrepancy may indicate that the Tower of London test was ineffective for the population Grosswald et al. (2008) studied, that concentrative meditation and mindfulness meditation have differing effects, or that the meditation practices had different effects due to population differences—for instance, gender, culture, and

learning disabilities.

Whereas this study indicates that regular meditation increases verbal fluency performance for adolescents with ADHD, Majunath & Telles (2004) found that meditation had no significant effects on verbal memory. However, Nidich et al. (2011) found that Transcendental Meditation improved low-achieving adolescents' academic achievement on standardized English tests. Because of the strength of Nidich et al.'s (2011) findings, and because Nidich et al. (2011) used a similar sample population, Nidich et al.'s findings offer some support for Grosswald et al.'s (2008) study.

Grosswald et al.'s (2008) findings that meditation increases executive function have sufficient corroboration from other sources to support their external validity. Grosswald et al.'s (2008) results from the Tower of London test call into question its validity due to test-retest learning effects, and indicates that studies using the Tower of London test to assess executive functioning should control for these effects. Grosswald et al.'s (2008) findings that meditation improves verbal fluency require further study due to contradictory evidence from other studies. In particular, future research should address whether meditation has stronger effects on the verbal abilities of adolescents with learning disabilities.

Manjunath & Telles (2001) investigated the effects of a month of daily yogic meditation practice on adolescent girls' executive functioning, as tested by the Tower of London task, and found statistically significant improvement in executive functioning among girls in the yogic meditation group and no improvement among girls who'd done physical education instead of yoga. The researchers randomly selected 20 10-13 year old female subjects from 34 girls of the same age in a residential school in India.

Researchers did not collect information about students' academic achievement, intelligence, or socioeconomic status. They randomly assigned ten students to the experimental group and ten students to the control group using a random number table. Researchers then pretested all 20 subjects using the Tower of London task to assess their executive functioning before the intervention.

Students in the experimental group participated in a school-based yoga training program for 15 minutes a day, every day of the week, for one month. During the same time each day, students in the control group participated in a physical education class. The yoga intervention included yoga instruction, guided relaxation, physical poses, and coaching in awareness of physical sensations, breathing exercises, devotional singing, meditation, and internal cleansing practices known as *kriyas*.

The researchers then assessed changes in subjects' executive functioning over the course of the intervention using the Tower of London task as a post-test. Researchers reported that the Tower of London has been used by other studies as a reliable test of executive functioning, and has strong test-retest reliability. This study found that the experimental group showed a significant decrease in planning time for both 2-moves ($T = 3, T.02 (2), 10 = 5, p < 0.02$) and 4-moves ($T = 1, T.01 (2), 10 = 3, p < 0.01$); in execution time for both 4-moves ($T = 3, p < 0.02$) and 5-moves ($T = 0, T.001 (2), 10 = 0, p < 0.001$), and in the number of moves in the 4-move task ($T = 1, p < 0.01$). The control group showed no change in the Tower of London test. From this evidence, Manjunath & Telles (2001) concluded that daily school-based yoga instruction caused a statistically significant improvement in adolescent female students' executive functioning.

This study has marginal internal validity. Two significant strengths of the study

were the use of a control group and an intervention design that had students practice 15 minutes a day, 7 days a week. Regular practice may be important for efficacy of Mindful Awareness Practices, so this study is more likely to show the effects of the practices than, say, a study that had a once-a-week hour-long program. Another strength is that it used actual task data to assess outcomes, rather than assessing outcomes using surveys or self-report measures. A potential weakness is that, although The Tower of London task has been assessed in other peer-reviewed contexts as a reliable test for executive functioning, Grosswald et al. (2008) found it was uncorrelated with other measures of executive function in an adolescent sample. Another strength is that the study carefully described the mindfulness practices in the intervention, so we can tell what subtypes of practices they belong to. Counterbalancing that, however, is the fact that the study assessed multiple subtypes of Mindful Awareness Practices were assessed at the same time, so it's difficult to tell which ones are having the effect, whether there are synergies, and whether some of the practices work at cross-purposes.

Further limitations of the study were an inadequate sample size, failure to randomize samples, failure to conduct a double-blind study, failure to conduct follow-ups, and failure to collect socioeconomic class status data. Additionally, subjects were entirely female. This is more a limitation than a weakness, since there may be gender differences in the effects of Mindful Awareness Practices on adolescents.

This study has strong external validity, because its finding that meditation improved executive functioning aligns closely with studies by Baijal et al. (2011), Redfering & Bowman (1981), Grosswald et al. (2008), Kratter & Hogan (1982), and

Semple et al. (2010).

Memory

Manjunath & Telles (2004) investigated the effects of yoga practice (including poses, meditation, and breathwork) on adolescents' performance on verbal and spatial memory tests, compared them to the effects of fine arts enrichment on adolescents' verbal and spatial memory, and found yoga practices significantly improved spatial memory but not verbal memory, while fine arts enrichment improved neither spatial nor verbal memory. Researchers recruited 90 11-16 year old subjects, 30 of whom (13 female, 17 male) attended a ten-day yoga camp, 30 of whom (16 female, 14 male) attended a ten-day fine arts camp, and 30 of whom (14 female, 16 male) were in a control group not attending any camp.

Researchers used pretests and posttests to assess all subjects on verbal and spatial memory tests before and after the intervention. The spatial memory test consisted of projecting ten simple line-drawings on a screen for 10 seconds each, asking subjects to do a multi-step math problem, then asking subjects to draw as many of the 10 images as they could remember in 60 seconds. Researchers used the same method, using three-letter nonsense words instead of line drawings, to test subjects' verbal memory.

Researchers analyzed this data using a multivariate analysis, for which the Between Subjects factor was the group (Yoga, Art, Control), and the Within Subjects factor was the assessment (Verbal pre-assessment, Verbal post-assessment, Spatial pre-assessment, Spatial post-assessment). The test of Between-Subjects Effects

showed significant differences between pre- and post-tests for the yoga group [$F(3,116) = 5.569, P = .001$], but not for the fine arts group [$F(3,116) = 2.230, P = .088$] or the control group [$F(3,116) = 0.727, P = .538$]. A post-hoc analysis using the Tukey test revealed a significant difference between spatial memory pre-test ($M=4.0$, std dev= ±1.9) and post-test scores ($M=5.7$, std dev= ±1.9) for the yoga group ($p=.002$), but not for either the fine arts group (Pre-test $M=4.4$, std dev= ±1.9 ; Post-test $M=5.6$, std dev= ±2.6) or the control group (Pre-test $M=3.9$, std dev= ±1.6 ; Post-test $M=4.3$, std dev= ±2.0).

This study had marginal internal validity. Several factors supported its internal validity. The study used of two control groups, one without any intervention, and one whose subjects studied Fine Arts. Since both Yoga and Fine Arts camps involved physical activity and spatial reasoning, this helped researchers determine whether concentrative meditation in the yoga group was a causal factor, rather than exercise or visual-spatial enrichment. Researchers relied on task performance rather than self-reports or subjective assessments, improving its objectivity. The study used adequate sample sizes, though these were not randomized samples and there was recruitment bias. The study had statistically strong findings ($p=.001$).

Challenges to internal validity include the tests chosen to measure verbal and spatial memory. These had not been used in other studies, and their reliability was unproven. In particular, one should be cautious about using nonsense-syllable tests to assess verbal memory, since verbal memory is explicitly encoded with meaning. One might argue that this task assessed auditory rather than verbal memory. Additionally, ten days might not be a long enough treatment time to create readily-assessed changes

for participants, even though it was an intensive program. Addressing these factors may lead to more significant results. Unfortunately, there are no other studies in the literature assessing the impact of Mindful Awareness Practices on adolescents' verbal or spatial memory, so it is impossible to determine the external validity of these findings at this time.

Academic Achievement

Nidich et al. (2011) used a pretest-posttest quasi-experimental study to investigate the effects of daily Transcendental Meditation on English and Mathematics standardized test scores for an ethnically diverse sample of low-achieving urban middle school students, and found statistically significant improvements in English, Mathematics, and Composite Academic standardized test scores for the meditating group compared to the control group.

To examine the effects of daily Transcendental Meditation on low-achieving adolescents' standardized test scores, this study selected 189 6th-8th grade students from an urban middle school serving primarily low-SES students and racial/ethnic minority students. Researchers placed 125 6th-7th grade students into an experimental group practicing Transcendental Meditation, and placed 64 8th grade students were in the control group. All students selected for experimental and control groups were performing below grade-level standard in either English or mathematics on the California Standards Test. 60% of these students were male, 97% students of color, 76% were classified Title 1, and 59% came from a family that spoke a language other than English at home.

Certified TM instructors gave all 6th -7th grade students in the school instruction and practice in a standardized seven-step TM course. Sessions occurred for 12 minutes at the start and end of every school day for three months before taking their standardized tests, as well as for three minutes before taking the California Standards Test (CST). Students in the 8th grade received no instruction. Researchers selected students performing below grade level on the CST for inclusion in the experimental or control group, depending on whether they'd received TM instruction.

Researchers compared experimental group students' baseline and posttest scores on the CST after students had completed the program, using analysis of covariance (ANCOVA). Researchers used chi square tests to examine between-group differences of students who improved at least one performance level on English and math standardized tests. Researchers conducted further analysis on a matched-control subgroup of 100 students, 50 each from the experimental and control groups, matched on both math and English scores at the pretest.

ANCOVA tests indicated that students in the experimental condition significantly improved their composite Math and English scores on the CST (adjusted mean change = $+9.90 \pm 24.78$) compared to control-group students (adjusted mean change = -9.88 ± 23.36 ; $F(1, 160) = 25.24$, $p < 0.001$). Composite scores for eighth grade students in the control group decreased significantly from pretest to posttest (mean change = -11.35 ± 23.36 ; $F (1,52) = 12.51$, $p < 0.001$). In the analysis of matched-control pairs, researchers found significant improvement in composite math and English scores for students in the experimental group compared to students in the control group ($F(1, 97) = 21.12$, $p < 0.001$). Students in the experimental condition improved their English scores

(adjusted mean change = $+7.31 \pm 26.53$) compared to students in the control condition (adjusted mean change = -4.91 ± 24.84 ; $F(1, 186) = 9.61, /? = 0.002$). Within the experimental condition, 40.7% of students improved by one or more performance levels on the math portion of the CST, compared to 15.0% of control-group students ($\chi^2 = 12.15, /? < .001$). Within the experimental group, 36.8% of students improved by one or more performance levels on the English portion of the CST, compared to 17.2% of control-group students ($\chi^2 = 1.13, p = .005$).

There were several strengths in this study that improved its internal validity. This study's use of a control group helped control for demographic factors, factors such as school climate, student learning and maturation, and students' improvement on tests during re-testing. Additionally, this study relied on test achievement as a measure, rather than self-report scales or teacher evaluation. This study used statistically rigorous methods of analysis, ensuring robust sample sizes and conducting multiple tests on data to confirm findings. This study used a diverse sample population, including English Language Learners, low-income students, and students of color, which increases the generalizability of the findings.

The most significant challenge to the internal validity of this study was the use of 8th grade students as the control group for an experimental intervention on 6th-7th grade students. This doesn't allow the researchers to control for factors like developmental differences between 6th and 8th grade. Additionally, the eighth grade class didn't get equitable 12-minute breaks in their school day. Therefore, the study didn't control for the possibility that simply taking a break for "quiet time" between arriving and school and starting to learn may have a salutary effect for academic achievement. It is difficult to

determine the external validity of this study. There is only one other study in the literature on the effects of meditation practices on students' academic achievement. Barnes, Bauza, & Treiber (2003) found that Transcendental Meditation decreased adolescents' negative school behaviors but did not affect grades.

Summary

Emerging evidence indicates that concentrative meditation improves adolescents' attention and executive function, which should in turn improve resilience by supporting planning ability, concentration, delay of gratification, and academic achievement. The literature presents conflicting evidence about whether regular mindfulness practice increases adolescents' academic achievement. Evidence about the effects of meditation on memory for adolescents is weak and inconclusive.

Overwhelmingly, the strongest finding in these studies was that meditation improved adolescents' attention and executive function. In a methodologically strong quasi-experimental study that corroborated multiple kinds of evidence, Baijal et al. (2011) found that adolescents who meditated regularly developed stronger attention and improved executive functioning. A methodologically adequate study by Grosswald et al. (2008) found that Transcendental Meditation improved executive functioning on two task measures, EEG coherence, attention, and observed behavior self-regulation among adolescents with ADHD. These studies both had adequate external validity supporting their findings as well. A study with moderate internal validity by Manjunath & Telles (2001) found that daily yogic meditation improved executive functioning for adolescent females. A study with moderate internal validity by Redferring & Bowman

(1981) found that meditation techniques also improved attention, executive functioning, and time on task for male adolescents with learning disabilities and behavioral disturbances. These studies both had only moderate external validity. A methodologically adequate study by Kratter & Hogan (1982) found that while both meditation and relaxation improved classroom behavior and decreased impulsivity for students with ADHD, only concentrative meditation improved these students' attending behaviors or time on task. This study had stronger external validity.

In a study with moderate internal validity but strong external validity, Semple et al. (2010) found that Mindfulness-Based Cognitive Therapy for Children improved attention and behavior by reducing anxiety among adolescents with reading disorders. These findings came exclusively from quantitative studies, but they were conducted among ethnically diverse populations in India and the United States that included language learners, adolescents with different learning disabilities, youth living in poverty, and youth affected by HIV/AIDS. Overall, then, there is general agreement in the literature that meditation practices improve attention and executive functioning for diverse populations of adolescents, especially adolescents dealing with adversity.

The specific studies of the effects of meditation on adolescents' cognitive ability and academic performance indicated inconclusive or conflicting findings. In a methodologically problematic study with weak external validity, Manjunath & Telles (2004) found that yoga practices improved adolescents' spatial memory but not their verbal memory. A methodologically strong study by Nidich et al. (2011) found that daily Transcendental Meditation significantly improved Math and Reading standardized test scores for low-achieving middle-school students. However, this finding was directly

contradicted by another methodologically strong study by Barnes, Bauza, & Treiber (2003), which found that Transcendental Meditation decreased adolescents' negative school behaviors but did not affect grades. These are two areas of the research that require further study.

Mindfulness practices reduce stress and anxiety

Mindful Awareness Practices improve resilience by both serving as a buffer against negative life events and reducing internal state anxiety, trait anxiety, stress, and hypervigilance. Meditation and Mindful Awareness Practices significantly reduced stress, state anxiety, and trait anxiety for a wide range of adolescents, including youth in poverty, youth of color, youth with HIV infection, and youth with learning disabilities. There is evidence that Mindful Awareness Practices reduce rumination, and that rumination is a risk factor for life stressors causing depression and anxiety. Marks, Sobanski, & Hine (2010) found that trait mindfulness was negatively correlated with dispositional rumination, and that trait mindfulness served as a protective factor against anxiety and depression. Similarly, Mendelson et al. (2010) found a reduction in both rumination and intrusive thoughts for adolescents who participated in a school-based Mindful Awareness program. Kerrigan et al. (2011) found that Mindfulness-Based Stress Reduction decreased the effects of life adversity on the degree of anxiety, stress, and depression experienced by low-income urban youth, likely due to decreased rumination. Ramadoss (2010) found that regular yoga practice in school decreased adolescents' stress, but not their impulsivity or self-control, and that students who

attended more classes per week had more significant reductions in stress. Terjestam, Jouper, & Johansson (2010) found that regular school-based qigong practice decreased adolescents' stress and psychological distress, and served as a protective factor stabilizing their psychological well-being at school while that quality declined for their classmates in the control group. This finding further emphasizes the potential benefits of Mindful Awareness Practices as protective factors against stressful or adverse conditions.

One of the most conclusive findings in the research is that mindfulness-based interventions decrease both state anxiety and trait anxiety. Sinha & Kumar (2010) found that Mindfulness-Based Cognitive Behaviour Therapy significantly reduced anxiety, depression, and academic stress among Indian adolescents whose parents had HIV/AIDS. Elder et al. (2011) found that daily Transcendental Meditation at school significantly reduced adolescent students' state and trait anxiety. Beauchemin (2008) found that when teachers included five minutes of mindfulness meditation at the beginning of every academic class, students with learning disabilities experienced significant reductions in state and trait anxiety, and their teachers assessed significant academic and behavioral improvement.

Mindful Awareness Practices affect more severe manifestations of fear as well. For instance, both Mendelson et al. (2010) and Gordon et al. (2008) found that Mindful Awareness Practices decreased hypervigilance and intrusive thoughts among trauma-exposed adolescents. In addition, Gordon et al. (2008) also found that war-exposed Kosovar adolescents who participated in a mind-body mindfulness skills program experienced ongoing statistically significant decreases in hypervigilance and

PTSD symptoms for over a year after finishing the group, whereas PTSD symptoms increased for the students who did not participate. These findings are important to the study of resilience because lowered stress and anxiety levels affect executive functioning, attention, anger, psychological well-being, and self-regulation.

Stress

Marks, Sobanski, & Hine (2010) used a correlational study of high school students to investigate the relationship between dispositional rumination or trait mindfulness and resilience, and found that while “life hassles” were positively correlated with stress, depression, and anxiety for youth, dispositional rumination amplifies this correlation, while dispositional mindfulness (trait mindfulness) decreases the relationship between “life hassles” and stress, depression, and anxiety.

To study the relationship between resilience and dispositional rumination or trait mindfulness, researchers recruited 317 subjects (154 male, 163 female) ages 14-19 from a private high school in Australia. Though researchers did not collect demographic or socioeconomic class data, private school attendance indicates a higher socioeconomic class among subjects. Subjects completed four self-report scales under the supervision of a teacher and a researcher. These scales were the Inventory of High School Students' Recent Life Experiences (Cronbach's $\alpha=0.93$), Ruminative Thoughts Style Questionnaire (Cronbach's $\alpha=0.94$), Mindful Attention Awareness Scale (Cronbach's $\alpha=0.87$), and the Depression Anxiety Stress Scales-21, which measured depression (Cronbach's $\alpha=0.88$), anxiety (Cronbach's $\alpha=0.79$), and stress (Cronbach's $\alpha=0.85$). Researchers determined that severe stress, anxiety, and depression were

defined as scores two standard deviations above the sample average. Researchers analyzed correlations between data from each scale using moderation analyses.

This study found that 14% of students experienced severe depression, 20% experienced severe anxiety, and 14% experienced severe stress. "Life hassles" measured by the Inventory of High School Students' Recent Life Experiences survey were directly correlated with the depression, anxiety, and stress, as measured on the Depression Anxiety Stress Scales-21. Moderation analyses showed that ruminative cognitive styles (as measured in the Ruminative Thoughts Style Questionnaire) amplified this effect, while mindful cognitive styles (as measured in the Mindful Attention Awareness Scale) protected students against this effect.

This study's strengths included a high sample size and use of measures with strong Cronbach's alpha scores. These factors improved its internal validity. Kerrigan et al. (2011) found that Mindful Awareness Practices were a buffer against life stressors for adolescents; if Mindful Awareness Practices increase trait mindfulness as well as state mindfulness among adolescents, this supports the external validity of this particular study. This study is part of a larger body of research by Grosswald et al. (2008), Semple et al. (2010), Kerrigan et al. (2011), Terjestam, Jouper, & Johansson (2010), Sinha & Kumar (2010), Beauchemin (2008), Ramadoss (2010), Gordon et al. (2008), Harris (2010), Singh et al. (2011), and Singh (2007), and Coholic (2011) that overwhelmingly indicates that mindfulness decreases stress and anxiety among adolescents.

The most serious weakness in this study is that it did not collect data on students' ethnicities or socioeconomic status. This is a threat to the transferability of this study's

findings. However, the strongest corroborating study (Kerrigan et al., 2011) was conducted among an ethnically diverse sample of urban youth. This provides limited evidence of transferability of the findings across racial, cultural, and socioeconomic contexts.

Kerrigan et al. (2011) used qualitative in-depth interviews to investigate the potential effects of a Mindfulness-Based Stress Reduction program for urban youth of color living in poverty, and found that subjects reliably reported the practices were a buffer against life stressors, and also reported a broad spectrum of positive responses to the program, ranging from reframing daily hassles to radical personal transformation.

To investigate the potential effects of a Mindfulness-Based Stress Reduction program for urban youth of color living in poverty, researchers recruited 59 13-21 year old subjects from 8000 low-income recipients of health care at the Johns Hopkins Medical School clinic in a poor East Baltimore neighborhood. Of the participating youth, 51% reported that their parents were unemployed, 20% reported that they were at imminent risk of becoming homeless, and 85% were enrolled in Medicaid. Of the ten students selected for in-depth interviews, eight were female, all were African-American, none lived with their biological fathers, five lived with their mothers and the other five with other relatives, four were in families that received food stamps, and four were living with HIV that they'd contracted at birth from their mothers.

These youth participated in an eight-week MBSR class, which covered didactic material related to mindfulness; experiential meditation, yoga, and body awareness practices; and group discussions on the applications of the skills to everyday life. A certified and experienced MBSR instructor delivered the program like a standard MBSR

program (designed for adults) in all respects but two: he altered the program for the group's logistical needs, and simplified and concretized the program's standard instructional language. Four weeks into the program, researchers purposively recruited 10 students within the 59-subject sample, and gave each of them a one-hour semi-structured interview in an open-ended, exploratory manner. The interview covered the topics of daily stressors and coping strategies prior to MBSR participation, perceptions of and experiences with the MBSR program, and changes in thinking, experiences, and behavior related to MBSR participation. With the subjects' informed consent, researchers audio-taped and transcribed these interviews in their entirety. The first author coded each interview for key domains of interest based on the original field guide questions as well as additional domains identified after several readings of the transcripts, and also developed memos summarizing the main points of each interview. Researchers used content analysis to identify themes in the interviews, and used comparative study of each interview to find both common themes and divergent experiences. Researchers then selected representative quotes and illustrative case studies to communicate the findings of the study.

In the in-depth interviews, participants described their lives as containing high levels of stress, including parental incarceration, recent maternal deaths, frequently moving, living with relatives due to deceased or absent biological parents, concerns about keeping grades high enough to finish high school, frequent peer conflict, and high levels of violence and crime at school and in their communities. Several participants reported somaticised symptoms of stress and/or depression, two had involuntary body tics due to stress, and none of them reported having anyone they could talk to about

their stress, anxiety, or depression. Participants reported trying to “tune out” the stressors in their lives through TV, video games, oversleeping, and stress-eating. Participants also reported varying degrees of anger and hostility, mostly expressed through verbal hostility, though a few reported throwing things or hitting people. Participants described mindfulness as “getting to know [their] environment,” being present with the moment, learning not to “zone out,” and becoming more aware of their breath and bodies. They used terms like “open-mind” and “un-judging” to describe their experiences of mindfulness.

All participants believed the MBSR techniques to be valuable, but emphasized that they were not “easy” responses to stressors; additionally, most participants reported difficulty finding a quiet place to meditate in their daily lives. Though all interviewees reported a shift in perspective or “reperceiving” of themselves and their environments due to the practices, the degree of perspective shift varied widely between participants. Only two participants found the techniques to be truly transformational. One 19-year-old interviewee, whose presenting complaint was anger management problems, practiced the MBSR techniques every night, and came to regard them as being “as helpful and necessary” as taking his HIV medication. He reported a radical shift in perspective regarding his disease, increases in calmness and hope, and decreases in anger and stress. Another participant also meditated daily, despite initially finding some of the techniques “weird.” She described the practice as “helpful,” and reported becoming more aware of her thoughts and feelings, less likely to be stressed out, and able to take new perspectives more easily.

This study has strong credibility, because the authors clearly explained

processes of gaining entry to the subjects, gathering data, and making decisions about what information to include and exclude in the study. The authors gave thorough descriptions of the data analysis procedures and the derivation of coding categories, and gave sufficient examples of responses from each category for readers to have a clear idea what was and was not included in each set. There was triangulation between researchers, with different researchers taking the interviews and others coding categories or writing the summaries of each interview; they then cross-checked one another's coding work.

This study also has reasonably strong dependability, especially among other qualitative case studies. Its findings about the wide spectrum of responses to a mindfulness-based program, as well as the importance of practice and implementation, are consistent with Huppert & Johnson's (2010) findings that the degree of effect experienced by students in a mindfulness program was directly correlated with regularity of practice, and with Ramadoss's (2010) finding that yoga reduced stress most for subjects who came to the class regularly. This study's particular results had some overlaps with other qualitative studies, most notably Rosaen & Benn's (2006) findings that African-American adolescents participating in Transcendental Meditation reported increased states of restful awareness, metacognition/ self-awareness, and flexibility of response. Like the adolescents Franklin (2010) and Coholic (2011) interviewed from arts-based mindfulness programs, this study reported participants' gains to emotional literacy and interpersonal attunement. Finally, like the South African adolescent interviewed in Dellbridge & Lubbe's (2009) case study, participants in this study reported increasing awareness of how they "tuned out," and the struggle to learn

to “tune in” again. This research has reasonably strong transferability to other youth in adversity, including youth in poverty, youth of color, and youth infected with HIV/AIDS.

This study's biggest weaknesses were with its confirmability. The study didn't mention whether there was member checking, or whether they had to revise findings on the basis of further interviews. Additionally, researchers only interviewed participants *after* completing the intervention, so there was no baseline information collected. This is one of the issues with taking a purposive sample of subjects to interview, even if that purposive sample was representative of the results. It's difficult to know how much change occurred, because there's nothing to compare it against. It would have also been a stronger study if there were follow-up interviews with the participants after the end of the program, to see what kind of “staying power” the program had. Finally, this study didn't mention whether its data collection and analysis were auditable by an outside party. Researchers recorded and kept transcripts from the interviews, but it's left unclear whether these are available for analysis by a third party.

That said, I would be inclined to accept this as strong qualitative research, both because it is well-corroborated by other qualitative (and several quantitative) studies, and because it was so explicit about its data-gathering procedures. Furthermore, it supplies important information in a body of research that often neglects qualitative research of adolescent experiences of mindfulness. It focuses on adolescent females, whereas most of the research about mindfulness and resilience is conducted with male groups. This is also one of only four studies to address “best practices” for culturally-responsive mindfulness instruction.

Ramadoss (2010) used a quasi-experimental pretest-posttest design in a pilot

study investigating the effects of in-school yoga exercise and meditation classes on stress and self-control among ethnically diverse high school students, and found that participating students reported significant decreases in stress, with greater decreases in stress for students who attended more classes per week, but no statistically significant changes in self-control or impulsivity for any students.

To investigate the potential benefits of regular pranayama, dhyana, and asana practice for high school subjects, this study offered a daily yoga meditation program to 472 students from a large urban high school in California. Ramadoss (2010) also recruited 85 students from the same school who did not attend any yoga classes to serve as a control group for the study. In this high school, 35.6% of students were African American, 23.7% were Hispanic, 17.2% were Asian, 16.7% were Caucasian, and 2.5% were Filipino. One third qualified for free or reduced-price lunches. The experimental group was 48.8% male and 51.2% female, while the control group was 61.2% male and 38.8% female.

For the eighteen-week treatment period, qualified yoga teachers from Niroga Institute instructed gave students in the experimental group 15 minutes of daily instruction in a yoga routine that included sun salutations, an asana pose, pranayama breath practices, and dhyana sitting meditation. Students attended 1-5 days per week, at their own discretion. In the experimental group, 12.5% attended one class per week, 24.1% attended two classes per week, 35.2% attended three classes per week, and 12.5% attended five classes per week. Subjects in both groups completed self-report surveys before, during, and after the program. The study assessed changes in student stress with the Perceived Stress Scale (PSS-10) (Cronbach's $\alpha=0.75$), and changes to

self-control with Tangney's Self-Control Scale (TSCS-13) (Cronbach's $\alpha=0.745$). The researcher than analyzed survey data with T-tests and ANOVA to compare experimental and control groups, and to measure change over time for the experimental group.

T-tests revealed that stress significantly decreased for students in the experimental group from pre-intervention ($M=29.9$, $SD=6.8$) to mid-intervention ($M=28.95$, $SD=5.96$, $t = 2.985$, $p = .003$), from mid-intervention to post-intervention ($t = 2.029$, $p = .044$) and from pre-intervention to post-intervention ($M=28.57$, $SD=6.32$, $t = 3.124$, $p = .002$). A one-way ANOVA indicated that students who attended yoga classes 5 times per week experienced significantly stronger stress reduction at mid-program assessments ($F = 3.088$, $p = .03$) and at post-test ($F = 2.633$, $p = .05$) than students who attended 1-3 times, though there were no significant differences between these groups at pretest.

T-tests indicated that yoga practice did not affect the subjects' self-control or impulsivity ($t=-.34$, $p=.74$), and that experimental group's TSCS-13 scores did not change significantly from pre-test ($M=40.63$, $SD=8.1$) to post-test ($M=40.76$, $SD=7.8$). A one-way ANOVA confirmed that class attendance did not influence changes in self-control for students in the experimental group ($F = .52$, $p = .67$).

This study has adequate internal validity, strengthened by its robust sample size, selection of scale measures with adequate reliability scores. This study included a control group, which strengthened its internal validity by controlling for history and maturation effects, but the author was unclear about the method for selecting the control group, which weakened the study's internal validity. This study also collected data on

regularity of participation in yoga classes, controlling for this variable in ways that other studies did not. The finding that the stress reduction effects of this program varied with how often students attended the class seems to have some external validity, since it fits neatly with Huppert & Johnson's (2010) finding that Mindful Awareness Practices had the most efficacy for adolescents when they practiced the techniques more than three times a week. Overall, however, this study's internal validity was adequate and the balanced gender proportions and diverse ethnicity of sample subjects increased the generalizability of its findings.

This study's finding that regular Mindful Awareness Practice decreased adolescents' stress and anxiety has robust external validity. Similar findings come from studies by Grosswald et al. (2008), Semple et al. (2010), Marks, Sobanski, & Hine (2010), Kerrigan et al. (2011), Terjestam, Jouper, & Johansson (2010), Elder et al. (2011), Sinha & Kumar (2010), Beauchemin (2008), Gordon et al. (2008), Harris (2010), Singh et al. (2011), Singh (2007), Coholic (2011). This corroborating research, both qualitative and quantitative, has been conducted with ethnically and culturally diverse populations in Australia, Kosovo, Sweden, India, and the United States.

To investigate the effects of scheduled qigong practice on adolescent students' stress and psychological well-being, Terjestam, Jouper, & Johansson (2010) recruited two schools in Sweden with similar student body demographics to implement a school-based qigong program. The subjects for this study were 156 of these schools' 7th grade students between 13 and 14 years old, 77 of whom were male, and 79 of whom were female. Researchers assigned 71 of the subjects to the control group and 85 to the experimental group. Students in both groups filled out self-report surveys as a

pretest: the Well-Being at School scale (item homogeneity was $\alpha=0.74$; this scale is correlated with standardized tests also used in this study, and is currently being evaluated in an ongoing validation study); the Psychologic Distress scale (Cronbach's alpha for the five items was 0.78); the Self-Image test (has high test-retest coefficients at a 2-year interval, and lower scores on this test strongly predict children whom teachers categorize as diffident, withdrawn, or "problem-children"); and a general stress scale (developed for this study, no psychometric properties currently available). Researchers found two significant differences were found between pretest scores for the experimental and control groups: the experimental group scored lower (pre $M=0.82$ $SD=0.51$) than the control group (pre $M=0.94$ $SD=0.44$) on self-image and higher on stress (pre $M=2.2$ $SD=0.71$) than the control group (pre $M=2.0$ $SD=0.61$) at the baseline. Subjects were excluded from the analysis if they failed to answer both pre- and post-test questions, or if they attended fewer than 8 qigong classes.

Students in the experimental group practiced "Peace Power Qigong" for 25 minutes twice a week in school. The exercise included a few minutes of relaxation, five sets of movements, and self-massage. Students in the control group simply went around their daily activities at school. After eight weeks of treatment, researchers administered the same five scales used in the pretests as post-intervention posttests to both the intervention and the control group. The surveys also asked subjects in the experimental group an open-ended question about whether the qigong practice had affected their lives.

Researchers used Pearson's bivariate correlation to identify significant correlations between variables and conducted a stepwise multiple regression analysis

to find the variable that had the strongest impact. Researchers then tested the effects of qigong training with analysis of variance (ANOVA) of repeated measures within-subject design. Researchers also tested the differences between the research and the control group at precondition with a one-way ANOVA, and Bonferroni adjusted the differences to reduce risk of type I errors because of multiple tests, resulting in an a significance level of $p<0.013$ ($0.05/4$).

Researchers found that after Bonferroni adjustment, differences between pre- and post-tests were “more of a tendency and significant on a 10% level.” Measures of well-being in school declined significantly for students in the control group (pre $M=3.53$ $SD=0.33$; post $M=3.42$ $SD=0.48$; $F 1.65 < 0.02$) but remained stable for students in the experimental group (pre $M=3.47$ $SD=0.52$; post $M=3.46$ $SD=0.50$). Repeated measure of ANOVA showed a significant decline in psychological distress for the experimental group (pre $M=2.2$ $SD=0.62$; post $M=2.0$ $SD=0.63$; $F 1.52 = 4.75$, $p < 0.05$), but showed no statistically significant change for the control group (pre $M=2.0$ $SD=0.62$; post $M=2.0$ $SD=0.65$). Repeated measure of ANOVA showed a significant improvement in self-image in the experimental group ($F 1.51 = 3.24$, $p=0.078$). Repeated measure of ANOVA showed a significant reduction of stress in the experimental group (pre $M=2.2$ $SD=0.71$; post $M=2.0$ $SD=0.73$; $F 1.52 = 5.44$, $p < 0.02$), and no significant change in the control group (pre $M=2.0$ $SD=0.61$; post $M=2.0$ $SD=0.65$). Tests of gender differences in the experimental group showed that girls (pre $M=2.3$, $SD=0.66$; post $M=2.1$, $SD=0.59$; $F 1.28 = 6.63$, $p<0.02$) but not boys (pre $M=2.0$, $SD=0.51$; post $M=1.9$, $SD=0.69$) reported significantly less psychological distress. There were also gender differences for stress reduction: boys (pre $M=2.1$, $SD=0.60$; post $M=1.8$, $SD=0.76$;

F1.23 5.91, $p<0.02$) but not girls (pre $M=2.4$, $SD=0.76$; post $M=2.2$, $SD=0.67$) reported lower stress after exercise. Researchers found no gender differences in the experimental group's levels of well-being at school and self-image.

Thirty-one of 53 (59%) students in the experimental group reported positive effects of their qigong training, with 18 reporting that they felt calmer, 14 that they felt more alert and awake, 11 reporting that it was fun, eight reporting reduced headaches, four reporting increased concentration, and one reporting that it helped her to close her eyes and think of qigong practice when her life got "messed up." Eighteen subjects (34%) reported no effects of qigong practice and wrote that they were not motivated to practice, and four subjects were uncertain whether there were any effects. A correlation analysis showed that well-being at school was a dependent variable that correlated significantly with self-image ($r=0.65$, $p<0.01$) and stress ($r=0.35$, $p<0.01$). A stepwise multiple regression of self-image and stress revealed that positive self-image ($R^2=0.47$) predicted increased well-being at school. Psychological distress was a dependent variable that had a negative correlation with self-image ($r=0.42$, $p<0.01$) and a positive correlation with stress ($r=0.56$, $p<0.01$). A stepwise multiple regression of self-image and stress revealed that stress ($R^2=0.29$) predicted increased psychological distress at school.

One significant strength of this study's internal validity was its relatively high sample size. It also included a randomized assignment to treatment and control groups; the control group was especially important because those students showed diminishing well-being at school over the course of the study, suggesting perhaps a historical factor or a contextual condition that was creating some mild adversity in these students' lives.

The qigong-based intervention may have insulated the experimental group from the effects of these factors, but that effect wouldn't have been visible without the data about the control group's diminishing well-being at school. Another strength to this study's internal validity is that there was a certain degree of triangulation in this study, because the students' subjective reports of their experiences seemed to confirm the changes in stress, distress, self-image, and well-being at school reported in the scale measures. A strength of the study's reliability is that it included equitable numbers of girls and boys, which was important because this study found the program had slightly different effects on girls' and boys' degrees of stress reduction. This is consistent with Sibinga et al.'s (2011) finding that Mindful Awareness Practices may have different effects on male and female adolescents. A strength of the study's objectivity is that the researchers were explicit about which methods of statistical analysis they used; they were explicit about the survey measures they used, provided reliability scores for them, and addressed the measures' shoddy Cronbach's alpha scores in their discussion.

This study had two major internal validity issues. First, the intervention period in this study was relatively short, lasting only eight weeks, and may not have been of sufficient duration or intensity to create changes for students. The control condition may not have been valid as well, since that group they had no exercise activity arranged for them as a break in the school day, and the experimental-group students' lowered stress levels might therefore be a result of the physical activity, rather than the technique itself or any mindfulness practice they did during the movement. Another issue with the control group is that the experimental group scored lower than the control-group on self-image and higher on stress at the baseline, which could exaggerate the findings. One of

the significant challenges to this study's reliability was its reliance on self-report surveys, some of which were still being tested during the survey. The others had marginal Cronbach's alpha scores. It could have been a better study if it had used more rigorous scales or if it had collected corroborating data such as interviews or teachers' observations. The challenge to the study's objectivity is that it wasn't a double-blind study.

However, this study didn't have serious challenges to its external validity. Its findings on stress reduction for adolescents are consistent with those of Ramadoss (2010), Kerrigan et al. (2011), Harris (2010), and Sibinga et al. (2011). Its finding that Mindful Awareness Practices improved adolescents' self-image are consistent with the research findings of Kerrigan et al. (2011), Harris (2010), Franklin (2010), and Coholic (2011). One could interpret its findings to mean that qigong practice "buffered" stress at school for the experimental group, while the control group experienced diminishing well-being at school; such an interpretation would be consistent with Marks, Sobanski, & Hine's (2010) finding that mindfulness is a protective factor against increased stress, anxiety, or depression in response to "life hassles." However, the authors emphasized that self-image was strongly correlated with well-being at school, so perhaps the protective factor against diminishing well-being at school wasn't mindfulness as such, but rather the experimental group's improvements in self-image. On the whole, this study should be treated as corroborating evidence for more methodologically robust studies, but educators shouldn't base policy or practice on it without the other studies to confirming its findings.

Anxiety

Elder et al. (2011) used a quasi-experimental pretest-posttest design with a four-month follow-up to investigate the effects of daily Transcendental Meditation at school on ethnically diverse middle school students' psychological distress, state anxiety, and trait anxiety. The study found statistically significant decreases in all three groups for the students practicing daily Transcendental Meditation compared to a randomly selected control group of students who merely read and relaxed during that "quiet time." Subjects were 106 secondary students (68 meditating and 38 non-meditating) from urban public schools across the country; 48% were male and 87% were students of color, with the three largest minority groups represented being African American (25%), Hispanic (26%), and Native American (19%).

Participating students volunteered for a Transcendental Meditation program taught in a 7-step course by certified TM teachers, and then practiced the technique for 10-15 minutes at the beginning and end of every school day. Students in the control group did not participate in the TM program, but they did get the same "Quiet Time" at the beginning and end of every school day. Students filled out self-report surveys before beginning the program, and after four months of participating in it. Researchers measured trait anxiety using the Spielberger State-Trait Anxiety Inventory for Children, psychological distress using the Strengths and Difficulties Questionnaire (SDQ), and overall mental health and depressive symptoms using the Mental Health Inventory (MHI)-5. Researchers compared changes in outcome variables between experimental/control group and ethnicity, using a 2x4 multivariate analysis of variance (MANOVA).

The two (treatment group) x four (ethnicity group) MANOVA showed that TM significantly reduced levels of psychological distress, as measured in the SDQ self-report

tool [$F(1, 97) = 6.94, p = 0.010$], and trait anxiety, as measured in the Spielberger State-Trait Anxiety Inventory for Children [$F(1, 98) = 4.53, p = 0.035$]. However, the test showed no statistically significant change in depression, as measured by the MHI-5 [$F(1, 97) = 0.74, p = 0.392$]. There were no significant differences between ethnic groups in their outcome variables, and there were no interaction effects between treatment condition and ethnicity. Within-group analysis showed that between pretest and posttest, TM students showed a significant improvement in SDQ emotional symptoms ($M = -1.26 \pm 2.10; t(66) = -4.93, p < .001$), trait anxiety ($M = -4.91 \pm 6.73; t(67) = -6.01, p < .001$), and depression as measured by the MHI-5 ($M = +1.76 \pm 4.60; t(66) = 3.13, p = .003$). The control group also showed a decrease in trait anxiety between pretest and posttest ($M = -2.42 \pm 4.61; t(37) = -3.24, p = .003$).

This study had strong internal validity because it used randomized selection to assign students to experimental and control groups, which allowed researchers to control for history, maturation, selection, and mortality. Testing and instrumentation did not seem to be relevant threats to internal validity in this case. Researchers ensured a valid control group by comparing pretests from both groups and by giving the control group equitable “quiet time” to relax before starting the school day. The study had adequate sample sizes, and study results are statistically significant with a strong level of confidence ($p < .001-.003$). The study's objectivity may be limited by its exclusive reliance on self-report questionnaires without other corroborating evidence such as parent and teacher reports. However, this challenge may be mitigated that the study mentioned that one of these survey tools was tested and found equitably effective as a similar assessment tool filled out by parents and teachers.

Another strength of this study was its transferability to different populations; it selected subjects from diverse ethnic groups and urban and rural schools, and it ensured equitable numbers of males and females. It found no significant differences in program efficacy between different ethnic groups, between schools, or between urban and rural settings. Two weaknesses to the transferability of study findings are that it did not assess the socioeconomic status of its subjects, and it did not analyze possible differences by gender.

This study has strong external validity. Its finding that Mindful Awareness Practice significantly reduced anxiety and psychological distress for adolescents is corroborated by studies by Grosswald et al. (2008), Semple et al. (2010), Marks, Sobanski, & Hine (2010), Kerrigan et al. (2011), Terjestam, Jouper, & Johansson (2010), Sinha & Kumar (2010), Beauchemin (2008), Ramadoss (2010), Gordon et al. (2008), Harris (2010), Singh et al. (2011), Singh (2007), Coholic (2011).

Sinha & Kumar (2010) used a pretest-posttest no-control pre-experimental design to investigate the effects of mindfulness-based cognitive-behavior therapy with emotionally disturbed Indian adolescents whose parents had HIV/AIDS, and found that after the program, these youth experienced significant decreases in depression, anxiety, hopelessness, internalization of problems, and academic stress, as well as significant improvements in social and emotional skills. Subjects were 12 13-15 year old Indian adolescents, 7 male and 5 female, whose parents were HIV-positive. All subjects' scores on the Youth Self-Report (YSR) and Children's Depression Inventory (CDI) indicated they had psychological disturbances, and parents' and teachers' reports corroborated this diagnosis.

At pre-intervention pretest and a posttest conducted twelve weeks after the intervention, researchers measured subjects' internalization and externalization of problems with the Youth Self-Report (test-retest reliability of 0.89 and construct validity of 0.92), depression with the Children's Depression Inventory (0.87 internal consistency reliability and 0.82 test-retest reliability and high validity), anxiety through Revised Children's Anxiety Scale (reliability coefficient 0.87 and validity coefficient 0.85), hopelessness through the Hopelessness Scale for Children (internal consistency – alpha=.97, test-retest reliability – r=.52), social skills through the Interpersonal Competence Scale (inter-rater reliability ranges from 0.80-0.88, developmental validity includes significant prediction of later school dropout and teenage psychological problems), and perceived academic stress through the Scale for Assessing Academic Stress (good psychometric properties, has been used in many studies in India). Researchers used t-tests to analyze this data. Clinical psychologists also completed pre- and post-intervention assessments of the clients without knowledge of the baseline assessments or the therapeutic interventions.

During the intervention, subjects were divided into two groups according to gender, and each group had a same-gender mindfulness trainer and a clinical psychologist. Both groups had 12 weekly sessions of MBCBT that lasted for 85 minutes apiece. The first 20 minutes of each session was devoted to mindfulness practice, guided meditation, self-awareness exercises and self-control/equanimity exercises. Subjects then had a 5-minute break followed by a one-hour session of group psychotherapy and cognitive-behavioral therapy administered by a clinical psychologist. Ethnographic field notes from therapy sessions offered evidence that most subjects complied with instructions and homework, expressed interest in mindfulness practice, gave positive feedback

about the program, and practiced both mindfulness and CBT techniques on their own.

The t-tests of the YSR revealed that MBCBT produced a clinically significant reduction in depression (Pre-test Mean=63.56, Posttest Mean=51.26, Clinical Significance=75.00%, Reliability=83.33%), withdrawal (Pre-test Mean=64.82, Posttest Mean=46.80, Clinical Significance=91.66%, Reliability=91.66%), somatic complaints (Pre-test Mean=64.33, Posttest Mean=55.64, Clinical Significance=91.66%, Reliability=91.66%), social problems (Pre-test Mean=62.46, Posttest Mean=48.76, Clinical Significance=66.66%, Reliability=91.66%), attention problems (Pre-test Mean=58.94, Posttest Mean=44.38, Clinical Significance=75.00%, Reliability=91.66%), clinical anxiety (Pre-test Mean=64.82, Posttest Mean=52.85, Clinical Significance=75.00%, Reliability=83.33%), and ADHD symptoms (Pre-test Mean=59.08, Posttest Mean=45.72, Clinical Significance=75.00%, Reliability=91.66%). The treatment produced no statistically significant effects on rule-breaking (Pre-test Mean=43.53, Posttest Mean=42.87), aggressive behavior (Pre-test Mean=45.66, Posttest Mean=45.55), conduct problems (Pre-test Mean=45.76, Posttest Mean=45.18), or Oppositional Defiant symptoms (Pre-test Mean=44.33, Posttest Mean=45.18). T-tests of CDI scores corroborated the findings that MBCBT reduced depression symptoms (Pre-test Mean=64.82, Posttest Mean=57.12, Clinical Significance=91.66%, Reliability=91.66%) and anxiety symptoms (Pre-test Mean=42.25, Posttest Mean=33.68, Clinical Significance=83.33%, Reliability=91.33%).

Additionally, t-tests of the Scale for Academic Stress scores found that the intervention significantly reduced subjects' perceived academic stress, and that this reduction was clinically significant in 58% of subjects with 83% reliability. T-tests of the ICS-T

found that the intervention significantly increased students' academic achievement (Pre-test Mean=2.39, Posttest Mean=4.62, Clinical Significance=66.66%, Reliability=91.66%) and interpersonal competence (Pre-test Mean=3.09, Posttest Mean=3.83, Clinical Significance=66.66%, Reliability=83.33%).

This study had moderate internal validity. This study's greatest strength was that researchers compared changes to depression and anxiety scores across different measures, and further corroborated these findings with direct ethnographic observation of therapy session and pre- and post-intervention assessments from clinical psychologists unaffiliated with the research project. Researchers also chose measures with strong reliability.

Several factors limited this study's internal validity, however. It used a sample size under 30, limiting its determination of statistical significance. The study also didn't use a control group, which limits its external validity by failing to control for history and maturation. Another serious issue is that this study mixed Mindful Awareness Practices and cognitive-behavioral therapy; while this was clearly an effective combination for the participants, the study could not report which treatment effects came from mindfulness interventions, which came from cognitive-behavioral therapy, and what synergistic effects the two components might have. One cannot guarantee that *any* of the observed effects were influenced by the mindfulness component, rather than simply the therapies.

Most of Sinha & Kumar's (2010) findings had strong external validity. Semple et al. (2010) found that mindfulness-based cognitive therapy significantly reduced attention problems, depression, and anxiety among an ethnically diverse group of American adolescents with reading disorders. This is important corroborating research because it

included a control group, and found similar results to Sinha & Kumar (2010), suggesting that the latter study's results may have been unaffected by factors such as maturation and history. Sinha & Kumar's (2010) finding that mindfulness practice decreased depression and psychological distress has strong external validity because it is corroborated by findings from Terjestam, Jouper & Johansson (2010), Elder et al. (2011) Parto & Besharat (2011), Coholic (2011), and Sibinga et al. (2011). Sinha & Kumar's (2010) finding that mindfulness practice decreased anxiety and stress is corroborated by findings from Kerrigan et al. (2011), Terjestam, Jouper, & Johansson (2010), Ramadoss (2010), Elder et al. (2011), and Coholic (2011). The finding that mindfulness practice improves attention is supported by studies by Baijal et al. (2011), Redfering & Bowman (1981), Grosswald et al. (2008), and Kratter & Hogan (1982). Grosswald et al. (2008) also corroborated Sinha & Kumar's (2010) finding that mindfulness practice reduces symptoms of ADHD. Sinha & Kumar's (2010) finding that mindfulness practice increased interpersonal competence was corroborated by studies by Coholic (2011) and Sibinga et al. (2011). The finding that mindfulness practice increased academic achievement was corroborated by Nidich et al. (2011), Beauchemin (2008), and Rosaen & Benn (2006), but contradicted by Barnes, Bauza, & Treiber (2003).

Sinha & Kumar's (2010) research found that MBCBT had no effect on rule-breaking, defiance or aggression, which contradicted the findings of other studies. Barnes, Bauza, & Treiber (2003) found that regular mindfulness practice decreased disciplinary referrals and absenteeism among urban middle school students. Grosswald et al. (2008) found that in-class meditation decreased in-class misbehavior for

adolescents with ADHD and comorbid language disabilities, and Beauchemin (2008) also found that mindfulness practice decreased in-class rule-breaking among adolescents with learning disabilities. Harris (2010), Singh et al. (2011), and Singh (2007) found that Mindful Awareness Practices decreased aggression for incarcerated female adolescents, adolescents with Asperger Syndrome, and adolescents with Conduct Disorder, respectively. Because these other studies were all conducted in the United States, this may indicate that the effects of mindfulness practice on rule-breaking and aggression change with culture. Alternatively, this may indicate something about how MBCBT was implemented in Sinha & Kumar's (2010) research, and what therapy goals were prioritized during treatment. Nonetheless, this forms a limitation to the study's external validity.

Beauchemin, Hutchins, & Patterson, (2008) used a pretest-posttest quasi-experimental design to investigate the effects of mindfulness meditation at the beginning of every academic class on anxiety, social skills, and academic performance among adolescents with learning disabilities. Subjects were 34 secondary school students, aged 13-18 years old, from a private residential school in Vermont that specialized in serving students with learning disabilities. Seventy-one percent of subjects were male and 29% were female. 53% had prior experience with either meditation or relaxation training. All students in this study returned consent forms from their parents. This study did not collect data about the students' socioeconomic, racial/ethnic/cultural, or educational background.

This study measured subjects using a pre- and post-test model before and after a school-based mindfulness meditation intervention; due to ethical considerations, there

was no control group in this study. In the intervention, students who returned consent forms first completed pretests, then received forty-five minutes of mindfulness meditation training from a qualified meditation instructor. This instructor also gave the teachers in the school a two-hour mindfulness meditation training intensive. In this training, teachers and students both learned to focus on breathing and the physical sensations of breathing, to allow this focus to calm and relax them, and to begin simply observing thoughts and emotions as they arose. After the initial training, the classroom teachers led students in 5-10 minutes of mindfulness meditation at the beginning of every academic class, five days a week, for five consecutive weeks.

The pretests and post-tests assessed social skills, academic performance, and prosocial behavior using the Social Skills Rating System, a standardized measure using a multi-rater approach that compares student, teacher, and parent ratings to national norms compiled from a national sample of over 4000 children. This study assessed state and trait anxiety through the adult version of Spielberger et al.'s State-Trait Anxiety Inventory, which has been designed and tested for norm groups that include high school students.

Researchers analyzed information from these measures using a series of related sample t-tests, with an alpha level of .05. The study also asked participating students to complete informal, anonymous post-intervention questionnaires with three Likert-scale questions assessing their own focus in class, rating their enjoyment of the intervention, and assessing the likelihood of practicing the mindfulness meditation exercises on their own. This questionnaire also had two open-ended questions about what, if anything, students liked or would change about the mindfulness meditation exercises.

The pretest-posttest data revealed significant decreases in state anxiety and trait anxiety, and significant improvements in social skills, prosocial behavior, and academic achievement. Trait anxiety scores decreased significantly between the pretest ($M=42.56$) and the post-test ($M=39.68$), $t(33)=2.88$, $p<0.05$; state anxiety scores also decreased significantly between the pre-test ($M=38.21$) and the post-test ($M=32.59$), $t(33)=4.88$, $p<0.05$. Student SSRS showed significant improvements in social skills from pretest ($M=95.68$, percentile rank=31) to posttest ($M=100.06$; percentile rank=43.5), $t(33)=3.11$, $p<.05$. Teacher ratings of students on the SSRS showed social skills gains from pretest ($M=86.65$; percentile rank=18.5) to posttest ($M=94.41$, percentile rank = 55.5), $t(33)=3.35$, $p<.05$. Teacher ratings of students' problem behaviors showed significant improvement from pretest ($M=116.06$; percentile rank =85.5) to posttest ($M=105.74$; percentile rank=66), $t(33)=4.95$, $p<0.05$. Teacher ratings of students' academic achievement showed significant improvements from pretest ($M=87.56$; percentile rank=28.6) to posttest ($M=92.68$; percentile rank=33.6), $t(33)=4.84$, $p<0.05$.

This study concluded that it was feasible to teach mindfulness meditation in school to adolescent students with learning disabilities. Mean student response to Likert scale question whether they enjoyed the meditation and relaxation training was 1.5 (between strongly agree and somewhat agree). Of the 88.4% of students who responded to the open-ended question about what they enjoyed about the meditation program, 100% reported positive feelings of calm, quiet, relaxation, and peacefulness. Of the 73% who responded to the open-ended question about what, if anything, they would change about the program, 64% said they would change nothing, 20% said they would make the sessions longer, and 16% reported that they would make the sessions

shorter.

Beauchemin, Hutchins, & Patterson (2008) theorized that mindfulness meditation reduced cognitive interference such as distractibility and negative thoughts, which caused the reductions in state and trait anxiety and increases in academic achievement. This is a well-documented process among adults, but the field has not assessed whether it is also true for adolescents. However, this study did not use EEG measures to directly assess cognitive interference due to financial costs. To better assess the influence of cognitive interference, future research could use either EEG testing or quantitative self-report measures tailored specifically to assess intrusive thoughts. Beauchemin, Hutchins, & Patterson (2008) also expressed the desire to do more in-depth qualitative research using structured and unstructured interviews in future studies.

The strengths of this study were its internal and external validity. This study used measurements with high validity, and the more subjective measurement of social skills had multi-rater agreement between students and teachers, though teachers reported greater student gains in social skills than the students did. Student responses to open-ended questionnaire responses overwhelmingly reported relaxation and calming effects of the meditation, which corroborated the STAI results of lowered state and trait anxiety, supporting the internal validity of the study. Furthermore, the findings in this study corroborated research by Sinha & Kumar's (2010) and Elder et al (2011) that found Mindful Awareness Practices reduce state and trait anxiety, which adds to its external validity.

One challenge to internal validity was that the quantitative analysis only used significance levels of $p < .05$, increasing the likelihood of Type 1 errors. Additionally, this study used no control group due to ethical considerations. Future research that incorpo-

rates a wait-list control group and/or a relaxation training control group will improve researchers' ability to assess confounding variables such as natural maturation over the time period. Additionally, this study could be challenged on the grounds of its generalizability, because it did not collect or assess socioeconomic class and ethnic data for this study sample. Furthermore, students in this sample were mostly male, which is an issue with many studies assessing students with learning disabilities. This is a study limitation because there is some evidence that Mindful Awareness Practices affect male and female adolescents differently across certain domains—for instance, males reporting lowered hyperactivity and females reporting lowered anger. Thus, the gender imbalance in the sample may have influenced the social skills outcomes measured on the SSRS.

Hypervigilance and Intrusive Thoughts

Mendelson et al. (2010) used a pretest-posttest control-group quasi-experimental study to investigate the effects of a school-based mindfulness intervention on middle school students' social and emotional well-being, and found that compared to a control group that simply attended a health class, students in the mindfulness program had statistically significant reductions in intrusive thoughts, rumination, and negative emotional arousal, but experienced no improvements in positive emotions or relationships with teachers and peers. The experimental group also showed a statistically insignificant trend toward decreased impulsivity, depression, and involuntary stress responses.

Researchers selected 97 subjects from a randomized sample of 4th-5th grade volunteers from four urban public schools in Baltimore, and then randomly assigned 51

students to the experimental group and 46 students to the control group. In the sample, 59 (60.8%) were female, and 38 (39.2%) were male. Of the subjects, 81 (83.5%) self-identified as African-American, 4 (4.1%) as Latino, 4 (4.1%) as White, 7 (7.2%) as mixed-race or other, and 1 (1.0%) did not report a race or ethnicity. Four days a week for twelve weeks, participants in the experimental group attended 45-minute classes in yoga and Mindful Awareness Practices taught by trained instructors of similar ethnic background to the students. Participants in the control group had a health class instead. Supervised by research assistants who read questions aloud, subjects completed self-report surveys before and after the intervention.

The study assessed students' involuntary stress responses through the Responses to Stress Questionnaire and the Involuntary Engagement Coping Scale (pretest internal reliability: Cronbach's $\alpha=0.79$), which has five subscales: Rumination, Intrusive Thoughts, Emotional Arousal, Physiological Arousal, and Impulsive Action (pretest internal reliability for subscales: Cronbach's $\alpha=0.52-0.61$). The study assessed subjects' positive and negative emotions with the Emotion Profile Inventory, relationships with peers and teachers with the People In My Life survey (pretest internal reliability for subscales: Cronbach's $\alpha=0.62-0.76$), depression symptoms with the Short Moods and Feelings Questionnaire – Child Version (pretest internal reliability: Cronbach's $\alpha=0.82$).

Researchers used ANOVA tests for continuous variables and Chi-Square tests for categorical variables to compare experimental and control groups for baseline differences in age, grade, gender, and pretest scores, and found the mean age in the experimental group was younger ($M=9.8$ years, $SD=0.77$) than in the control group

($M=10.3$ years, $SD=0.89$); $p<0.01$). Having established that there were no other significant baseline differences, researchers used ANOVA tests for continuous variables and Chi-Square tests for categorical variables to measure differences between pretests and posttests, and to measure differences between intervention and control groups on all survey measures.

Compared to the control group, the experimental group reported significant improvements in ability to manage involuntary stress responses on the Involuntary Stress Coping Scale ($p<0.001$). The experimental group showed significant improvements in three subscales on the ISCS: Rumination ($p<0.01$), Intrusive Thoughts ($p<0.01$), and Emotional Arousal ($p<0.01$). CMFQ-C responses indicated that at posttest, the experimental group had fewer depressive symptoms than the control group (a mean of 7.02 vs. 7.62), and less negative affect (28.80 in the intervention group vs. 29.93 in the control group), but these differences were not statistically significant at $p<0.05$. There were no significant differences in positive affect or in peer and teacher relationships.

This study had moderate internal validity. It used a randomized sample of participants and a control group to account for factors such as history, maturation, testing, and mortality. It had an adequate sample size. It used multiple tests to assess depression, stress, and negative affect. The most significant challenge to the study's internal validity was that there was a certain recruitment bias—the program took the first 25 students who volunteered, and they were more likely to be more excited about the program, which may have influenced the results. Another potential challenge to internal validity was that the study used scales with marginal reliability. However, the

researchers clearly reported the Cronbach's alpha scores, required stronger evidence of statistical significance ($p<0.01$), and excluded data from scale items with Cronbach's alpha scores under .50.

These factors also supported the study's objectivity. The two most significant challenges to the study's objectivity were the exclusive use of self-report measures without further corroboration such as teacher reports or ethnographic field notes, and the fact that it wasn't a double-blind study.

The finding that Mindful Awareness Practices diminish students' negative emotions, rumination, and intrusive thoughts has emerging external validity, though this conclusion would benefit from further study. Harris (2010), Coholic (2011), and Gordon et al. (2008) all found that Mindful Awareness Practices reduce symptoms of hypervigilance and intrusive thoughts for adolescents in adversity. However, these authors also found that regular mindfulness practice reduced involuntary stress responses, a finding not shared by Mendelson et al.'s (2010) study. Mendelson et al.'s (2010) finding that mindfulness practice reduced rumination is consistent with research by Marks, Sobanski, & Hine (2010), that in a sample of adolescents, mindfulness and rumination were inversely correlated, mindfulness and stress were inversely correlated, and rumination and stress were positively correlated.

Gordon et al. (2008) investigated the effects of a school-based mind-body mindfulness skills program on war-exposed Kosovar adolescents using a pretest-posttest quasi-experimental design, and found that students who completed the three-month program experienced significant reductions in PTSD scores that continued to decrease for over a year afterward. The subjects were 181 Kosovar secondary

students between 12 and 19 years old, most of whom were 16 to 19 years old. Because 42 of the subjects had missing data due to incomplete questionnaires, the study used the remaining 139 students, 75 of whom were male and 64 of whom were female, and discarded subjects with incomplete data. The study did not collect gender or socioeconomic data for the sample. The study also did not conduct a screening process to assess subjects for Post-Traumatic Stress Disorder, because all subjects had been heavily exposed to trauma. The program began four months after the ceasefire and all students had been directly exposed to war atrocities, 90% had had their homes destroyed, and all had friends or family members killed. Participation in the program was strictly voluntary, and about 40% of the students in the school where the study was conducted volunteered to participate.

To investigate the effects of a mind-body mindfulness skills program on war-exposed adolescents' PTSD symptoms, this study used the PTSD Reaction Index to pretest for symptom severity, and to posttest after the intervention and at follow-up testing months later. Researchers recruited Concentrative Mind-Body Meditation faculty to train teachers from a Kosovo secondary school in a five-day intensive program. The teachers then facilitated a mind-body skills program for their students during three-hour sessions on six consecutive Saturday mornings. Sessions included didactic lessons on PTSD and mindfulness, small-group sessions that focused on relaxation techniques, guided imagery, autogenic training, quiet and active meditation, biofeedback, group therapy "check-ins," and art projects to express feelings and thoughts one project included genograms to explore/illustrate the strengths and weaknesses of their own families. Three different student groups participated in the program over a nine-month

period. Researchers selected these groups randomly from volunteering participants, and used the cohorts that hadn't yet participated in the intervention as control groups, pretesting and post-testing them at the beginning and end of the intervention to control for the effects of time after the trauma.

To investigate changes to PTSD symptoms over the course of the study, researchers measured PTSD using the PTSD Reaction Index, which evaluates symptoms such as hypervigilance, intrusive thoughts, difficulty sleeping, nightmares, and negative affect. The PTSD Reaction Index has a correlation of .91 with confirmed PTSD diagnoses in children; the internal consistency coefficient for its baseline measurements, calculated using the Kuder-Richardson formula, is .69. Teachers administered the PTSD Reaction index to all participants at baseline before the intervention and immediately after the program ended, to one of the cohort groups ($n=30$) at a nine-month follow-up, and to one of the cohort groups ($n=30$) at a fifteen-month follow-up. The differences in measuring at follow-up were due to graduation rates; the oldest students had graduated and moved away by that time, and only the youngest group was around for the fifteen-month follow-up. Researchers analyzed the data with repeated measures of ANOVA, and measured pairwise differences using a paired t-test with a Bonferroni correction. The adjusted Cronbach's alpha was $\alpha=.05/3=.017$. Researchers presented the program and study findings for review and confirmation by a committee that included the school principal, a local pediatrician, and a district school psychologist.

All three cohort groups had students with mild to severe PTSD, as rated by the PTSD-RI (no PTSD is <7, mild PTSD 7-9, moderate PTSD 10-12, and severe PTSD

12+). Group I ($M=8.3$, $SD=3.9$) had significantly lower baseline levels when compared with Group II ($M=10.8$, $SD=2.4$), $t(86)=-3.57$, $p<.001$, and group III ($M = 11.4$, $SD=2.4$), $t(90)=-4.62$, $p<.001$. Researchers found significant decreases in PTSD scores in all three groups between the pretest and the posttest ($p<.001$). For Group II, follow-up PTSD scores were significantly lower than either pretest or posttest scores ($p<.001$). Follow-up PTSD scores for group I were significantly lower than pretest scores ($p<.001$) but did not reach statistical significance $t(29)=2.48$, $p<.05$ when compared to the posttest scores. Measurements of effect sizes (using Cohen's d) were .06 for Group I, 2.1 for Group II, and 2.4 for Group III, indicating moderate clinical difference ($d=0.5$) for group one and large clinical differences ($d=0.8$) for Groups II and III. In Group I, 66% of students had pretest scores indicating mild to severe PTSD, whereas in Groups II and III, 96% had scores in this range; these measures dropped to 44%, 38%, and 35%, respectively, at the posttest. At baseline, pretest scores for severe PTSD were 17% for Group I, 32% for Group II, and 35% for Group III; none of the students in Groups I or III had severe PTSD at posttest, only 2% of students in Group II had severe PTSD at posttest, and none of the students had severe PTSD at the follow-up.

Participating students also reported in the open-ended questions that helpful program experiences included the arts component, knowing that what was happening to them was a normal response to traumatic events, gaining social support from peers in the program, and knowing that the teachers facilitating the program cared about them. They reported that the groups helped them feel that they were "not alone," and that they felt closer to each other because of participating.

Overall, this was a methodologically strong quantitative study. There was a high

overall sample size, and each cohort sample had at least 30 students, which supports the internal validity of the study. The PTSD Reaction Index also had a strong (.91) correlation with confirmed clinical diagnosis with PTSD. The findings were not only statistically significant but clinically significant. It used a randomized sample and control groups. The study controlled for historical/developmental factors with the cohort model: Groups II and III started several months later, but they did not have lower PTSD scores, which led researchers to conclude that neither developmental maturation nor passage of time since the ceasefire were significant factors in reducing posttest PTSD scores. Rather, PTSD levels at baseline were higher for the groups starting later, which may indicate the effects of the war intensified over time; or, researchers speculated, students with more severe problems may have been initially avoidant of the intervention, but became encouraged to try it out after the initial success of Group I. Finally, the researchers also submitted the findings for review by a panel that included a local clinical psychologist and the school principal, which provided triangulation for the study's findings.

Study limitations included a lack of gender and socioeconomic data for the sample, which created a challenge to generalizability. Additionally, the program was implemented by teachers rather than meditation instructors. There were also a few potential challenges to internal validity, including a failure to conduct follow-ups at the same time for different cohort groups, which meant the follow-up data couldn't be used to corroborate one another. Additionally, the different cohorts had widely varying levels of PTSD and of response to the program. This may have been an effect of age differences, but researchers did not collect specific age data for each cohort. The

variance between different cohort results may prove a challenge to internal validity.

Overall, however, the data indicate that this intervention significantly reduced PTSD symptoms for war-exposed adolescents, though the data varies about the degree of effect. Mendelson et al. (2010), Coholic (2011), and Harris (2010) also found that mindfulness interventions reduced hypervigilance and increased feelings of safety for adolescents who had experienced trauma. Additionally, students in this study reported the helpfulness of arts therapy components in the intervention, a finding shared by Coholic (2011), Harris (2010), and Franklin's (2010) research.

Summary

The strongest finding in the literature, supported by nine methodologically strong studies, is that Mindful Awareness Practices promote resilience by reducing adolescents' stress, anxiety, and hypervigilance. In effect, Mindful Awareness Practices serve as a buffer against negative life events for a wide range of adolescents, including youth in poverty, youth of color, youth with HIV infection, youth with learning disabilities, and youth suffering from war trauma. Multiple authors theorized that mindfulness-associated stress reduction directly improves attention and executive functioning, two other important factors promoting resilience, by decreasing cognitive interference.

For instance, there is emerging evidence that mindfulness reduces rumination (Marks, Sobanski, & Hine, 2010) and intrusive thoughts (Mendelson et al., 2010; Gordon et al., 2008), which in turn reduces the correlation between adolescents' life stressors and anxiety (Kerrigan et al., 2011). This is an especially strong finding for

students with ADHD. For instance, Beauchemin (2008) found that when teachers included five minutes of mindfulness meditation at the beginning of every academic class, students with learning disabilities experienced significant reductions in state and trait anxiety, and their teachers assessed significant academic and behavioral improvement.

Evidence for the link between Mindful Awareness Practices and resilience comes from three studies that found such practices to mitigate PTSD symptoms for trauma-exposed adolescents. In a study with adequate internal validity, Mendelson et al. (2010) found that movement-based mindfulness practices decreased symptoms of hypervigilance and intrusive thoughts for adolescents living in poverty, findings confirmed by Gordon et al.'s (2008) research in Kosovo. In a methodologically strong quasi-experimental study, Gordon et al. (2008) found that war-exposed adolescents who participated in a mind-body mindfulness skills program experienced ongoing statistically significant decreases in hypervigilance and PTSD symptoms for over a year after finishing the group, whereas PTSD symptoms increased for the students who did not participate. A methodologically weak qualitative study by Harris (2008) also found that yoga reduced hypervigilance and post-traumatic symptoms for adolescent girls in the juvenile justice system. These studies have emerging external validity, since they are the only research in the literature on the power of mindfulness practices as a protective factor against PTSD. However, if future research continues to confirm this finding, it will serve as powerful evidence of the important role mindfulness plays in resilience.

Mixed Results on Reducing Anger and Aggression

Self-reports and interviews showed mixed results about whether Mindful Awareness Practices reduced anger and hostility. Two studies in this literature review—Sibinga et al. (2011), and Barnes, Bauza, & Treiber (2003)—found significant reductions in anger, but Kerrigan et al. (2011) found that Mindful Awareness Practices did not affect anger. Barnes, Bauza, & Treiber's (2003) study showed that only females scored lower on reported state and trait anger after working with Mindful Awareness Practices, whereas males experienced no reduction in anger. Interestingly, as explained in earlier sections, the research shows mixed results about whether Mindful Awareness Practices reduce impulsivity or improve self-control.

Mindfulness-based interventions for adolescents with behavior problems helped these adolescents to have fewer disciplinary incidents and reduce aggressive behavior. Harris (2010) found reductions in aggressive and violent behavior, increases in feelings of safety, and increases in flexibility of response among incarcerated female adolescents who participated in yoga and arts program. These findings are in alignment with findings by Mendelson et al. (2010) and Gordon et al. (2008) that Mindful Awareness Practices reduced symptoms of hypervigilance and PTSD. Singh et al.'s (2011) case studies with adolescents with Asperger's Syndrome and with Conduct Disorder (Singh, 2007) both concluded that a qigong-based mindfulness technique helped these students reduce aggressive behavior and enhance non-reactivity and flexibility of response. Overall, the relationship between mindfulness and reduced aggressive behavior may be mediated by the Mindful Awareness Practices' impact on

internal stress and anxiety. In this respect, it may be more an effect of increasing resilience, rather than a cause.

Anger

Sibinga et al. (2011) used both quantitative survey measures and in-depth interviews to investigate the potential effects of Mindfulness-Based Stress Reduction on an ethnically diverse sample of youth, including youth living with HIV/AIDS, and found reductions in anger/hostility, emotional discomfort, and physical discomfort scores between pretest and posttest surveys, as well as perceived improvements (expressed in interviews) in academic achievement, concentration, attention spans, stress reduction, conflict reduction, physical health, and healthier relationships.

To evaluate the effects of Mindfulness-Based Stress Reduction on an ethnically diverse sample of youth, this study recruited 33 African-American youth ages 13-21 to participate in an 8-week MBSR program. Researchers recruited subjects from an urban tertiary care clinic that served primarily clients in poverty (80-90%), 51% of whom were in danger of homelessness. Of the 26 subjects who completed the MBSR program, 11 were infected with HIV, and the other 22 were classified “at-risk youth.” Twenty of the subjects who completed the program were female (77%), and six were male. Their average age was 16.8 years old. Due to ethical concerns, this study took all volunteers, did not take random samples, and did not assign anyone to control group conditions.

Before and after the MBSR intervention, the study tested subjects' physical and psychological discomfort through the Child Health and Illness Profile—Adolescent Edition (CHIP-AE) and the Symptom Checklist 90-Revised. The 8-week MBSR program

included didactic instruction about mindfulness, instruction in meditation and yoga techniques, and a group discussion debriefing the experience. There were four program cohorts, and during the first two cohorts the facilitators adjusted the MBSR program's logistics and language to adapt it to this population. After all four cohorts completed the intervention, researchers selectively sampled ten subjects for in-depth interviews.

At posttest, subjects' responses on the CHIP-AE and the Symptom Checklist 90-Revised revealed statistically significant reductions in hostility ($p=0.02$), general discomfort ($p=0.01$), and emotional discomfort ($p=0.02$). The ten subjects selected for in-depth interviews reported perceived improvements in academic achievement, greater concentration, longer attention spans, stress reduction, conflict reduction, improved physical health, and healthier relationships. Subjects also reported using mindfulness techniques before tests or homework to reduce stress and improve concentration.

This study has several strengths. Recruiting an ethnically diverse sample increased the transferability of its findings. Using a mixed methodology allowed in-depth interviews to corroborate and elaborate on quantitative findings. Additionally, this study's findings that Mindful Awareness Practices decrease psychological discomfort and negative emotional arousal for adolescents in crisis are consistent with findings from studies by Gordon et al. (2008), Mendelson et al. (2010), Sinha & Kumar (2010), Terjestam et al. (2010), and Parto & Besharat (2011). This indicates strong external validity for this study finding. This finding also has strong cross-cultural transferability, since it's consistent across studies from New Zealand, India, Iran, Kosovo, and the United States.

The finding that Mindful Awareness Practices reduce anger and hostility was

partially confirmed and partially challenged by Barnes et al. (2003), who found that meditation for stress reduction significantly decreased anger for female but not male adolescents. This study had more female than male participants, but did not control for gender factors, so its findings about anger reduction may be gender-specific.

There were several significant methodological weaknesses for this study. Its small sample size reduced the internal validity of the quantitative analysis. This study also lacked a control group. The authors noted that the lack of control group made it difficult to distinguish whether intervention effects were strictly related to the MBSR program itself, or emerged from other group factors. The most serious threat to the internal validity of this study is that without a control group, there's no way to distinguish the effects of the program from natural maturation processes among the adolescent subjects. This study's findings were also skewed by participant attrition, and by selective sampling of interview subjects.

Barnes, Bauza, & Treiber (2003) used a quasi-experimental nonequivalent control group design to investigate the effects of school-based daily Transcendental Meditation practice on negative school behavior in an ethnically diverse sample of high school students. Researchers found statistically significant decreases in absenteeism and disciplinary actions for the experimental group but statistically significant increases for the control group, decreases in anger for female participants but not males, and no changes in academic achievement for either experimental or control groups.

Researchers recruited study subjects from two demographically similar inner-city high schools. Subjects were 45 low-SES African-American adolescents aged 15-18 with high systolic blood pressure. In the experimental group, 19 students were male and 6

were female, while in the control group, 13 were male and 7 were female. Though the experimental and control groups went to different schools, pretests showed that the groups did not significantly differ demographically or anthropometrically.

Subjects in the experimental group received instruction in Transcendental Meditation and met daily for four months for fifteen minutes of group practice. Students also had “homework” to practice Transcendental Meditation for 15 minutes every evening, and twice daily on weekends. In the control group, students met for 15 minutes each day for a brief health education class. Attendance was monitored in both the intervention and control groups, and students had to fill out practice logs for their meditation at home. To control for differences between the schools, the experimental groups were counterbalanced, with each school receiving both TM training and the health class by the end of the intervention.

Before, during, and after intervention, participants completed the Spielberger Anger Expression Scale, as well as measures for lifestyle and environmental stress. Researchers also analyzed the differences between suspension rates in the four months before the program and the four months during the program, number of disciplinary infractions in the four months before and the four months during the program, the number of days tardy and the number of days absent in the four months before and the four months during the program, and the grade percentage achieved in the four months before and the four months during the program.

Researchers assessed the comparability between the experimental and control groups using a 2 (control or experimental group) by 2 (pre- and post-test) repeated measures ANOVA with time as the repeated measure. They used the same statistical

tests to analyze the absentee periods, days suspended, days absent, days tardy, and grades. Researchers measured gender differences in changes to anger levels using a 2 (sex: male and female) by 2 (control or experimental group) by 2 (pre- or post-test) repeated measures ANOVA with time as the dependent variable.

Transcendental Meditation reduced rule-breaking and suspensions for the experimental group, but did not affect grades. The TM group exhibited a mean total reduction of 0.1 rule infractions over the four months of intervention compared to an increase of 0.3 infractions in the control group ($F_{1,38} = 5.4$, $p < .03$). There was a mean total reduction of 0.3 suspension days due to behavior-related problems in the TM group, but an increase of 1.2 suspension days in the control group ($F_{1,39} = 4.7$, $p < .04$). Changes to grades were not statistically significant.

ANOVA tests also indicated a gender by group by time interaction, revealing that females practicing TM had greater reductions in anger, while anger for females in the control group increased slightly. Neither TM nor the control condition had any statistically significant effect on anger for males.

This study had adequate internal validity. Its strengths included using a control group, comparing demographic and pretest data from experimental and control groups to ensure it was a true control, and using data from student records rather than self-reports or reports of teachers. The control group allowed the study to account for maturation, testing, instrumentation, mortality, and selection. Its weaknesses included sample sizes under 30 and using subjects from a separate school as a control group rather than using a randomized sample. Though experimental and control groups did not significantly differ at pretest, using samples from separate schools made it

impossible to control for history specific to each school, such as administrative decisions, policy changes, or events such as fire drills or games.

Barnes, Bauza, & Treiber's (2003) finding that Transcendental Meditation reduced rule-breaking and negative school behavior has adequate external validity. Grosswald et al. (2008) found that in-class meditation decreased in-class misbehavior for adolescents with ADHD and comorbid language disabilities, and Beauchemin (2008) also found that mindfulness practice decreased in-class rule-breaking among adolescents with learning disabilities. However, Sinha & Kumar's (2010) research found that mindfulness-based cognitive behavior therapy had no effect on rule-breaking. Nonetheless, other research in the literature more closely supports the conclusion that meditation and mindfulness techniques reduce adolescents' misbehavior in school.

Barnes, Bauza, & Treiber's (2003) finding that Transcendental Meditation did not affect academic achievement has limited external validity. It directly contradicts findings by Nidich et al. (2011) that Transcendental Meditation significantly improved academic achievement on standardized tests among inner-city adolescents with learning disabilities. Sinha & Kumar (2010) found that mindfulness-based cognitive-behavioral therapy significantly improved academic achievement among emotionally disturbed adolescents. Qualitative research from Rosaen & Benn (2006) found that adolescents practicing mindfulness meditation report improved academic performance, and Beauchemin (2008) found that teachers reported in-school meditation improved academic performance for students with learning disabilities.

One study supports the external validity of Barnes, Bauza, & Treiber's (2003) findings on anger reduction, and one study undermines its external validity. In a study of

mostly female inner-city adolescents, Sibinga et al. (2011) found that Mindful Awareness Practices significantly reduced anger. However, Kerrigan et al. (2011) found no such reduction in anger among inner-city youth practicing MBSR techniques. This indicates doubt in the literature about the effects of Mindful Awareness Practices. Taken together, these findings tentatively suggest gender differences in the effects of mindfulness and anger in adolescents, and indicate that further studies on this topic should control for gender as a variable.

Aggression and “Acting Out”

Harris (2010) used an analysis of post-intervention surveys and interviews to investigate the potential effects of a daily yoga and creative arts curriculum for incarcerated female adolescents, and found decreases in violence, increases in feelings of safety, relaxation and positive emotions, and gains to flexibility of response. Subjects were adolescent females, ages 12-17, incarcerated in the California Juvenile justice system. The study did not collect socioeconomic class and ethnicity/race information for the sample. Facilitators reported that a majority of the subjects had been sexually abused, came from violent and/or dysfunctional households, and were gang-affiliated. The study collected information from the self-report evaluations that participants filled out at the end of sessions, yoga teachers' notes on participants' statements during in-program emotional “check-in” discussions, and yoga teachers' notes recording their own observations of participants' behavior over the course of the program. Teachers did review the data, but the study did not mention other triangulation. Because this report was a feasibility study, the program collected data from many cohorts of participants

over about seven years, but did not collect precise numbers or how long the interviewed participants were involved with the program.

Yoga instructors conducted each intervention program as part of the participants' daily routine for six to twelve weeks, with each session running about 100-115 minutes long. During the rest of the year, participants had access to a weekly yoga class. Participation was strictly voluntary, and subjects could enter and leave at any time during the sequence, a necessity because of varying sentencing lengths. This also created difficulties with conducting follow-up research. Each program consisted of check-ins; instruction in meditation, guided imagery, Mindful Awareness Practices, relaxation techniques; a sequence of physical yoga poses; relaxation in "corpse pose;" de-briefing about the mindfulness practices; and an expressive art project followed by short group therapy and a closing ceremony.

Participant responses indicated the importance of creating "safe space" during program implementation, especially when that "safe space" was maintained by supportive female teachers. Several quoted participants noted that yoga class was the place in the detention facility where they felt safest, and one reported that the teachers were the ones making class "safe." The Supervising Juvenile Judge noted that the program was especially effective for reducing violence in young women with histories of abuse. A quoted participant noted that meditation helped her gain control over feelings of anger and sadness, and that she learned to use the techniques outside of class when she was feeling overwhelmed, instead of just reacting. Students also reported feeling more positive, flexible, and peaceful after completing the program. Program staff observed that participants usually learned to self-regulate and delay reactions,

specifically through breathing techniques.

The study used the popularity of this voluntary program and the positive participant responses to post-assessment questions to argue that combined yoga, art, and group therapy programs were helpful for incarcerated female adolescents, and to argue for methodologically rigorous future studies to evaluate particular effects. Harris (2010) further theorized the necessity of creating gender-responsive interventions within the juvenile justice system, since incarcerated female adolescents tend to have experienced more violence than males, have strong needs for mentoring from older females, and respond more to empathy-building group therapy interventions than males do.

The greatest strength of this study was the detailed descriptions of the program procedures and techniques. Wherever possible, this program made an effort to incorporate evidence-based techniques into program design. It did make a strong case for feasibility of this intervention, and explicitly called for more research. Furthermore, it highlighted the importance of gender-responsive interventions, which many mindfulness studies about adolescents neglect. There is currently a paucity of research about the effects of Mindful Awareness Practices on female adolescents in adversity, and this study offers tentative findings while making a compelling case for future research.

However, this study also has considerable limitations. The researcher didn't collect data about how many subjects participated, didn't monitor how long participants spent in the intervention, and didn't collect follow-up data. Huppert & Johnson's (2010) research indicates that duration and regularity of practice is important for the efficacy of Mindful Awareness Practices for adolescents, as indicated by Huppert & Johnson's

(2010) research, this is a substantial weakness in the study. Aside from review by the yoga instructors, who were also collecting the data, there was little triangulation. Harris (2010) interviewed a judge and a correction officer about the program, but did not indicate whether these officials had an opportunity to look at program data. Given these limitations, there is little to stop this study from cherry-picking charismatic evidence from seven years of data collection. Finally, in a qualitative study such as this one, there needed to be much stronger incorporation of participant responses, feedback, and interviews.

This study makes a compelling case for future research, but its methodological weaknesses render it insufficient evidence to inform teaching or policy decisions. Its findings align with research by Singh et al. (2011) and Singh (2007) that Mindful Awareness Practices can be effective interventions to help adolescents reduce aggressive and violent behavior. Harris's (2010) findings also align with research by Barnes, Bauza, & Treiber's (2003) indicating that mindfulness practices decrease anger for adolescent females. As in Harris's (2010) study, Mendelson et al. (2010), Coholic (2011), and Gordon et al. (2010) also found that mindfulness interventions reduced hypervigilance and increased feelings of safety for adolescents who had experienced trauma. Finally, participants in this yoga intervention reported the helpfulness of arts therapy components, a finding shared by Coholic (2011), Gordon et al. (2010), and Franklin's (2010) research. These similar findings indicate that this study has adequate external validity, and that its tentative findings were likely "on the right track;" this suggests that more in-depth and methodologically robust studies may better illuminate the benefits of mindfulness-based interventions on adolescent females in adversity.

Singh et al. (2011) used in-depth interviews, corroborated by triangulated behavioral reporting by both subjects and parents, to investigate the effects of daily qigong meditation on three adolescents with Asperger Syndrome and previously identified aggressive behavior, and found these adolescents reduced aggressive behavior from 2-6 times per week to 0 times per week, and kept the number at 0 for four years, because they'd learned to pause, shift attention from the object of their anger, and observe angry thoughts without reacting to them.

To investigate the effects of qigong meditation on aggression in adolescents, researchers recruited three male adolescents aged 13, 15, and 18 who had all been diagnosed with Asperger Syndrome and had a history of violent behavior. All three had a history of pharmacological treatment, but were not on medication during the study or at follow-up assessments. Trained instructors trained subjects' mothers in the use of a qigong-derived Mindful Awareness Practice called Meditation on the Soles of the Feet. The mothers then instructed the subjects in use of the technique for 15 minutes a day during the first five days of treatment. Subjects practiced the technique twice a day with their mothers, and their parents prompted them to use the technique when they felt a rise in negative emotions such as anger. Guided qigong practice continued until each subject had achieved three weeks without an incident of physical aggression, which took 17, 22, and 24 weeks.

Researchers used a multiple-baseline design across participants, counting incidents of each adolescent's physical aggression at baseline, during mindfulness practice, and at follow-up. During the follow-up, subjects' parents continued to collect data on the subjects' physical aggression for another four years after they'd finished the

treatment phase. Researchers assessed the reliability of parents' data collection about physical aggression by asking subjects, their parents, and their siblings to collect data. Researchers calculated the percentage of inter-rater agreement by dividing the number of parent-sibling agreements by agreements plus disagreements and multiplying by 100; agreement for each subject was 100%. Researchers then compared the mean number of weekly incidents of aggression for each subject at baseline (pre-treatment), during treatment, and at follow-ups after treatment. After the treatment phase ended, researchers conducted unstructured interviews with subjects to investigate their subjective experiences of the technique.

Incidents of aggression decreased both during the treatment and at follow-up. At baseline, each subject had a mean of 2.67, 2.50, and 3.17 incidents provoking physical aggression in the five weeks before the study was conducted. At baseline, none of the subjects responded to such incidents with self-control. During treatment, there were 2.12, 2.77, and 2.17 incidents per week that would have provoked aggression, but actual aggression responses dropped to an average of 0.94, 1.09, and 0.75, with the subjects instead opting for a self-control response during the other instances. At follow-up, parents reported no instances of aggression or incidents that would provoke aggression for four years in a row after treatment.

Adolescents reported that during treatment, they didn't learn not to have angry thoughts, but they learned how to "not react" to their angry thoughts. All three reported that they didn't realize they could observe their anger without reacting before learning the technique. One subject reported that "automatic" aggressive responses slowed down considerably by the end of treatment.

Strengths of this study included the detailed description of study methodology, as well as the inter-rater reliability created by the triangulation between subjects' and parents' reports of aggressive incidents. Additionally, the study collected qualitative data from interviews to corroborate the quantitative data about incidence of aggression. These factors improved the study's reliability. The study's generalizability is supported by other studies' similar findings. Harris (2010) and Singh (2007) also found that Mindful Awareness Practices could decrease incidence of aggression in adolescents. Harris (2010) and Rosaen & Benn (2006) found that Mindful Awareness Practices could increase flexibility of response.

The greatest weakness of this study was its small sample size. Though this was a mixed-methodology study, one primary finding was the quantitative reduction in incidence of aggression. It's difficult, however, to find out what those numbers mean without a sample size larger than three. Furthermore, this study had no way to account for maturation as a variable; subjects may have outgrown their aggressive behavior, and developmental factors may have reduced incidence of aggression as much as intervention effects.

Singh (2007) used interview-based case studies, corroborated by disciplinary records, to investigate the effects of teaching a qigong meditation technique to three adolescents with conduct disorder, and found that after learning the technique, the adolescents significantly reduced instances of aggression, bullying, impulsivity, and problem behavior such as fire-setting and animal cruelty, while also reporting increases in relaxation, calmness, and better sleep.

The subjects were three White seventh-grade students with Conduct Disorder.

The study did not collect socioeconomic class status information. "Ricky" had an IQ of 105, comorbid learning disabilities, had seven prior hospitalizations for psychiatric problems, set fires, and exhibited 10 of 15 criterion for Conduct Disorder. "Kent" was in his fourth foster home, had an IQ of 110, was frequently cruel to animals and aggressive to peers, and exhibited 8 of 15 behavioral indicators of Conduct disorder. "Libby" had an IQ of 115 and a history of physical abuse; she frequently ran away from school and was aggressive with other students, and she showed 7 of 15 behavioral indicators of Conduct Disorder. All three students were referred for treatment because their middle school had decided to expel them for future incidents of aggression or destruction of property.

The study retrospectively collected baseline data on the pre-intervention frequency and severity of these students' aggression from school disciplinary records. In an unrelated study, the school's reliability for collecting retrospective baseline data was 96%; the school's reliability on the data collected for this study averaged 94.4% across the three adolescents. Researchers collected data on aggressive behavior and other indicators (fire-setting, destruction of property, etc.) from student reports to their therapists during the training phase of the study, during the practice phase, and at follow-up a year later. During the training phase, each student met privately with a therapist three times a week for a month and received instruction in a 15-minute qigong technique called "meditation on the soles of the feet." During this time, they reported any aggressive behavior to their therapists. Then, students practiced the technique independently, and met once a month with a therapist to discuss their training in mindfulness and their behavior at school, which the therapist put into the report. At the

follow-up, students' school records were accessed to determine whether they had been expelled, or whether they had been able to curb their aggressive behavior.

None of the students were expelled for aggressive behavior within a year of receiving training in this meditation technique. All three students practiced only sporadically at first, but then began to use the technique more as they experienced its collateral benefits. Reported collateral benefits included feeling calmer, relaxation, sleeping better, reduced impulsive behavior, better focus on what they were doing, and better self-control over behavior. All three students were able to successfully practice the techniques independent from instruction. For all three students, the frequency of their bullying and aggressive behavior decreased minimally during the training period and substantially during the practice period. Ricky's fire-setting decreased 52% during the practice period, but did not decrease further during the training period. Kent's animal cruelty decreased 18% during the practice period, but did not decrease further. Libby's noncompliance decreased 4% during the practice period, and did not decrease further.

This study has minimal credibility because it included no member-checking, and no triangulation to develop inter-rater reliability. This was a serious issue because the study relied primarily on self-reports from adolescents with Conduct Disorder, a disorder characterized by remorseless lying, to collect data about incidence of aggression. The closest this study came to fact-checking this data was accessing student records at follow-up to ensure that the students had not, in fact, been expelled. This study also did not indicate whether its data was available for outside review, limiting its confirmability.

That said, this study had adequate dependability. The adolescents' self-reports of collateral benefits such as relaxation and improved attention were corroborated by

studies of other adolescents coping with adversity. These included research by Rosaen & Benn (2006) Sinha & Kumar (2010), Kerrigan et al. (2011), Elder et al. (2011), Harris (201), Ramadoss (2010), Coholic (2011), Beauchemin (2008), and Sibinga et al. (2011). Adolescents' self-reports of increased flexibility of response are also consistent with qualitative research by Rosaen & Benn (2006) and Harris (2010). The dependability of this study's finding that Mindful Awareness Practice decreased incidence of aggression is enhanced by Harris's (2010) research findings that yoga decreased aggression among incarcerated female adolescents and and Singh et al.'s (2011) research findings that the same qigong meditation technique used in this study decreased aggression among adolescents with Asperger's Syndrome. Overall, then, Singh (2007)'s research may be taken as evidence that this body of research about Mindful Awareness Practices is transferable to adolescents with Conduct Disorder. However, this study is not methodologically rigorous enough to inform policy or teaching practice.

Summary

Decreasing anger and improving control over aggressive behavior would enhance adolescents' resilience by mitigating unpleasant emotions, diminishing amygdala activation, and reducing further exposure to negative life events. However, research on the effects of Mindful Awareness Practices on adolescents' anger and aggression remains inconclusive. There is an emerging controversy over whether Mindful Awareness Practices reduce anger and hostility. Sibinga et al. (2011) conducted a methodologically adequate qualitative study comprised of in-depth interviews with primarily female subjects, and found Transcendental Meditation reduced anger for

adolescents in adversity. Barnes, Bauza, & Treiber (2003) conducted a methodologically strong quantitative study that showed Mindful Awareness Practices reduced state and trait anger for female but not male adolescents. Mindful Awareness Practices did not affect anger. Barnes, Bauza, & Treiber's (2003) study showed that only females scored lower on reported state and trait anger after working with Mindful Awareness Practices, whereas males experienced no reduction in anger. However, a methodologically strong qualitative study by Kerrigan et al. (2011) found that Mindful Awareness Practices did not affect anger for adolescents. These mixed findings indicate the need for further study, and especially research into gender differences.

Three qualitative studies, two of which had serious methodological weaknesses limiting their predictive power, found that mindfulness-based interventions were effective for reducing adolescents' aggressive behavior. A methodologically weak qualitative examination of a gender-responsive yoga program for incarcerated females found reductions in aggressive and violent behavior, increases in feelings of safety, and increases in flexibility of response (Harris, 2010). Singh et al.'s (2011) case studies with adolescents with Asperger's Syndrome and with Conduct Disorder (Singh, 2007) both concluded that a qigong-based mindfulness technique helped these students reduce aggressive behavior and enhance non-reactivity and flexibility of response. However, Singh et al.'s (2011) three case studies of adolescents with Asperger's Syndrome had only moderate methodological strength, and Singh's (2007) case studies of adolescents with Conduct Disorder was too methodologically weak to be taken as evidence. In the absence of stronger corroborating studies, there is not sufficient evidence at this time to conclude that Mindful Awareness Practices reduce adolescents' aggressive behavior.

Positive Effects on Psychological Well-Being

The reviewed literature found relationships between mindfulness and three dimensions of psychological well-being: self-awareness, social and emotional literacy, and autonomy/leadership. Qualitative studies found that psychologically normal adolescents experienced increased self-reflection and self-awareness (state and trait) as a result of Mindful Awareness Practices and meditation. Rosaen & Benn (2006) found that students they interviewed about their experiences with Transcendental Meditation reported increased states of restful awareness, energy and concentration, metacognition/ self-awareness, flexibility of response, and academic achievement. Huppert & Johnson (2010), Rosaen & Benn (2006), and Dellbridge & Lubbe (2009) all found a theme of increasing openness to experience among their subjects. Huppert & Johnson (2010) found only slight gains to adolescents' well-being and resilience, but found stronger gains for those students who practiced the techniques regularly. All three studies strongly suggested the developmental nature of mindfulness and the importance of regular practice. Thus, studies that use a weekly program for their intervention condition may be less indicative of a technique's effects than techniques that use daily short practice. Dellbridge & Lubbe (2009) reported the tendency towards perfectionism and worrying about meditating correctly as an impediment to the experience of mindful awareness. Two arts-based mindfulness interventions for deeply troubled adolescents—one group in institutional care for mental health problems (Franklin, 2010), the other for foster children with significant trauma (Coholic, 2011)—

found that arts were an effective way of developing mindfulness skills for adolescents who may not be developmentally ready for more traditional meditation techniques, and that arts-based mindfulness interventions improved emotional literacy, emotional regulation, social skills and interpersonal attunement, hope, and self-esteem. Finally, the research found a relationship between mindfulness and overall psychological well-being (Parto & Besharat, 2011; Ishwar & Nishad, 2010). Additionally, Parto & Besharat (2011) found that trait mindfulness was correlated with psychological well-being, autonomy, and self-control, with autonomy and self-control further serving as mediating variables increasing the effect of mindfulness on psychological well-being. Ishwar & Nishad (2010) found that adolescent students who practiced yogic concentrative meditation experienced gains to both psychological well-being and leadership skills.

Mindfulness and Self-Awareness

Huppert & Johnson (2010) used an experimental pretest-posttest control group design to investigate the effects of school-based mindfulness training on middle school students' social and emotional well-being, and found that compared to the control group, the experimental group experienced marginally significant gains to psychological well-being and openness to experience. However, students in the experimental group who practiced mindfulness techniques more than three times a week experienced significant gains in mindfulness and psychological well-being. Subjects did not experience gains to resilience.

To evaluate the effects of a mindfulness-based stress reduction class in school,

this study offered four weekly 40-minute MBSR sessions in religious studies classes in fee-paying British schools. The subjects were 173 14-15 year old boys, 95% of whom were British whites and 5% of whom were from Hong Kong, whose parents consented to their participation in the class and inclusion in this study. The MBSR classes in the treatment condition taught somatic awareness, mindful breathing, walking meditation, acceptance of experience, and “understanding the transient nature of thoughts.” Students received a CD with three 8-minute guided meditations to practice regularly for homework. Researchers used students in their usual religious studies classes as a control group.

Before and after the MBSR program, both the intervention group and the control group took online surveys, which researchers used to evaluate changes in mindfulness, resilience, and psychological well-being. Researchers measured mindfulness with the Cognitive and Affective Mindfulness Scale-Revised (which included items of attentional self-regulation, awareness of experience, orientation towards present experience, and acceptance of experience), resilience with the Ego-Resiliency Scale, and psychological well-being with the Warwick-Edinburgh Mental Well-being Scale.

Researchers compared the intervention and control groups' pretest and posttest scores on these scales using ANOVA tests for the pretests, and a residualized difference measure for the posttests. The intervention group experienced marginally significant increases in psychological well-being ($B=0.15$, $p < 0.10$) and openness to experience ($B=0.174$, $p < 0.10$), and no changes in resilience or mindfulness.

Researchers also compared the scores of students from the intervention group who practiced mindfulness techniques outside of class; 33% practiced more than three

times a week, 34.8% practiced 1-3 times a week, and 32.7% practiced less than once a week. Researchers normalized the highly skewed practice variable using a square root transformation, and compared these three subgroups to one another using standard multiple regressions. Practice outside of class predicted significant improvements in mindfulness ($B=0.245$, $p<0.05$) and well-being ($B=0.23$, $p<0.05$), but not resilience.

Study strengths included its large sample size and pretest-posttest control group design, which accounted for threats to internal validity such as history, maturation, instrumentation, testing, regression, and mortality. This study's findings that Mindful Awareness Practices increased psychological well-being, especially with practice, are consistent with findings by Parto & Besharat (2011), Harris (2010), Coholic (2011), Sibinga et al. (2011), and Kerrigan et al. (2011). This indicates external validity for this study. This study used an ethnically heterogeneous sample, which is a significant weakness to the study, so its transferability is supported by similar findings among at-risk adolescents from Tehran (Parto & Besharat, 2011), a female juvenile detention center in California (Harris, 2010), ethnically diverse foster children in Australia (Coholic, 2011), and ethnically diverse urban youth from Baltimore (Kerrigan et al., 2011; Sibinga et al. 2011).

The methodological weakness of this study was that students were not randomly assigned to experimental or control groups. Rather, classes as a whole were assigned to experimental or control groups. The study mitigates this challenge to its findings by comparing pretests from the experimental and control groups, and concluding that the two samples did not differ significantly at the outset of the study.

However, the study did not compare pretest scores for students who practiced

mindfulness techniques at different rates. This creates the possibility for selection bias to challenge the internal validity of the findings about the importance of practice. However, this study's finding that regularity of practice increases the effects of mindfulness-based interventions is consistent with numerous studies on MBSR in adult populations, including studies by Carmody & Baer (2008), Bowen & Kurz (2012), and Rosensweig et al. (2010). This indicates external validity for this finding, despite the problem with internal validity.

This study found that Mindful Awareness Practices did not increase resilience in this sample, which contradicts findings by Harris (2010), Coholic (2011), Sibinga et al. (2011), and Kerrigan et al. (2011). This calls into question the external validity of this finding. The studies which found that Mindful Awareness Practices increased resilience were all qualitative or mixed-methodology, whereas this study is quantitative and has a strong experimental design. The qualitative studies may have inflated the effects of mindfulness on resilience, or resilience may be a trait that is more accurately assessed in adolescents through interviews. Additionally, the studies which found that Mindful Awareness Practices increased resilience were all conducted with adolescents in adversity, including youth with HIV-AIDS, foster children, or youth in the juvenile justice system, whereas this particular study was conducted with a relatively privileged sample population. The effects of Mindful Awareness Practices on resilience may be more pronounced among youth in adversity.

Rosaen & Benn (2006) used qualitative in-depth interviews to investigate the subjective experiences of Transcendental Meditation among ten randomly selected African-American middle school students who had meditated daily at school for over a

year, and discovered that interviewed students reported increased states of restful awareness, energy and concentration, metacognition/ self-awareness, flexibility of response, and academic achievement.

Subjects were ten African-American seventh-grade students (ages 12-14) from a Detroit charter school who had practiced TM for at least one year. Half the subjects were male and half were female; students at this school had been taught TM in sixth grade, and the students who still practiced were separated by gender, and then five subjects were selected at random from each gender cohort.

Data collection consisted of two thirty-minute sessions immediately after morning meditation on two different days. In the first session, subjects completed an art project, writing assignment, and questionnaire in small groups. In the second session, the researcher met with each student for a semi-structured nine-item interview. The first author transcribed and analyzed the interviews through a process of open coding. Using a qualitative research software program, Atlas-ti, coded student responses were grouped associatively to allow patterns to emerge. The second researcher consulted with the first to verify the validity and reliability of the themes. Researchers used subjects' art projects, writing assignments, and questionnaires to corroborate findings from the in-depth interviews.

Students reported their year of TM practice leading to an increasing state of relaxed alertness: more energy, calmness, concentration, and focus. One student reported simultaneous gains in energy and concentration: "They (friends) should probably take it (meditation) if they are always tired and cannot concentrate on one thing." The students also believed meditation had also improved their academic

performance. One student reported improvement from B's and C's to A's and B's.

Students also reported improved social and emotional skills—increased self-control, empathy, tolerance, forbearance with adult requests, and diminished anger and frustration. One student reported that TM relaxed her, and the relaxation improved her ability to listen to other people and to make friends.

Researchers proposed that the inner calmness produced by meditation enabled students to listen better both inwardly and outwardly, resulting in an increased capacity to connect to their internal states. This improves emotional intelligence and provides the opportunity for building greater self control and greater response flexibility in challenging situations. This, in turn, may improve both academic skills and subjective well-being for adolescent meditators.

This study has adequate credibility; its interview methodology is rigorous, and researchers took care to triangulate findings between two observer. This study also corroborates interview findings with students' art projects, writing, and questionnaires. However, the authors themselves caution that subjects' developmental maturation is a factor that they did not account for in this study. The greatest drawback to this study's credibility is that it did not include member-checking with subjects, their teachers, or their parents. This study also has unclear confirmability, since it is unclear whether the collected data are available for outside audit or review. However, this study does have strong transferability, since corroborating studies drew subject samples from a diverse range of racial, cultural, socioeconomic, and psychological groups.

This study's finding that Transcendental Meditation promoted states of restful awareness in adolescent students has adequate dependability, because it is consistent

across multiple studies that used diverse methodologies. This finding is almost identical to studies by Grosswald et al. (2008), Semple et al. (2010), and Beauchemin et al. (2008), who found that mindfulness and meditation practices improved attention by decreasing anxiety and cognitive interference. The state of restful alertness described by youth in Rosaen & Benn's (2006) study is strongly corroborated by descriptions of mindfulness practice collected in qualitative in-depth interviews with a South African 17-year-old (2011).

Rosaen & Benn's (2006) finding that meditation improved self-awareness, metacognition, and emotional literacy is consistent with findings by Sinha & Kumar (2010), Dellbridge & Lubbe (2009), Franklin (2010), and Coholic (2011). The finding that Mindful Awareness Practices promoted flexibility of response is consistent with research by Harris (2010), Singh (2007), Singh et al. (2011), and Gordon et al. (2008).

This study's finding that Transcendental Meditation improved academic achievement has adequate dependability, though there is one dissenting study elsewhere in the literature. Nidich et al. (2011) found that Transcendental Meditation significantly improved academic achievement on standardized tests among inner-city adolescents with learning disabilities. Sinha & Kumar (2010) found that mindfulness-based cognitive-behavioral therapy significantly improved academic achievement among emotionally disturbed adolescents. Beauchemin (2008) found that teachers reported in-school meditation improved academic performance for students with learning disabilities. However, Barnes, Bauza, & Treiber's (2003) research had a contradictory finding: that Transcendental Meditation did not affect academic achievement. The finding that meditation improves academic achievement among

adolescents should be tentatively accepted, but submitted for further research.

Dellbridge & Lubbe (2009) investigated a female South African adolescent's subjective experiences of mindfulness meditation instruction using in-depth interviews and field notes, and found the subject experienced increased self-awareness (both internal and external), sensory sensitivity, and awareness of awareness, but that the subject's task-oriented anxieties about practicing mindfulness "correctly" decreased her experience of this awareness.

Researchers conducted the case study through multiple sessions giving one-on-one Mindfulness-Based Stress Reduction instruction to a seventeen-year-old subject chosen for above-average metacognition and verbal ability. They collected data through field notes and participant observation, and one researcher conducted in-depth unstructured interviews to allow the subject to fully explore the subjective experiences of MBSR techniques. The other researcher transcribed these interviews, conducted a preliminary exploratory analysis to find emerging themes, and examined time trend data from the field notes, interview transcripts, session transcripts, and artifacts. Researchers used a qualitative technique called crystallization to extract themes from these sources, coding transcript data according to five categories: 'present-centered awareness and attention', 'self-regulation', 'attitude and heart qualities', 'universalism', and 'mindlessness'. Then the researchers read the transcripts again to identify secondary themes. They shared the major themes with the subject, who confirmed the findings.

The subject described primary themes such as present-centered attention and awareness, attitude and heart qualities, and self-regulation. Self-regulation themes included her interest in learning mindfulness skills, the effort required for meditation, the

need for silence to practice, and improvement of her practice as she's realized what awareness "really is." Present-centered attention and awareness themes included enhanced sensory awareness, strong development of both internal and external awareness (as well as the ability to distinguish between the two), and task-orientation (worrying about what she "should" be doing or focusing on during the task, which interfered with her awareness). The two largest themes emerging in this study were the persistence of task-oriented meditation (and how it obscured awareness and/or caused stress) and the subject's personal growth over the course of the study.

This study has strong credibility because it thoroughly described data gathering procedures, included rigorous coding of field notes and interview transcripts, and involved triangulation between the two researchers and member-checking with the subject. The finding that Mindful Awareness Practices increased the subject's self-awareness had strong dependability, because it corroborated qualitative research by Rosaen & Benn (2006), Franklin (2010), and Coholic (2011). As in this case study, Kerrigan et al. (2011) found that mindfulness practice facilitated adolescents' personal growth, occasionally producing radical change.

These findings have strong transferability because they hold true across multiple cultural contexts, including teenage boys in a psychiatric hospital, foster children in Australia, African-American middle school students, and ethnically diverse urban youth coping with HIV. The most significant weakness in this body of literature is that the corroborating research used to assess dependability is all coming from qualitative case studies. This finding would be stronger with corroborating evidence from other methodologies.

Emotional Literacy and Social-Emotional Development

Franklin (2010) used a qualitative case study to investigate the impact of a mindful empathic art program on adolescent males in psychiatric care for depression, and, through field notes, interviews, and group therapy responses, concluded that the adolescents experienced gains in mindfulness, interpersonal attunement, intrapersonal attunement, emotion regulation, and emotional literacy over the course of the intervention.

Mindful Empathic Art is an intervention based in art therapy in which the facilitator makes art to represent the felt states communicated by clients, clients pay attention to internal states and make art representing them, clients discuss the internal states their art represents with one another and the facilitator, and both clients and the facilitator make new art symbolically representing the discussion. It is specifically designed to scaffold emotional literacy, and to improve mindfulness and “intrapersonal attunement” by developing the prefrontal cortex through increased non-judgmental attention to internal states. Additionally, mindful empathic art give clients the opportunity to empathize with one another, both verbally and through the “isomorphic congruence” or “isomorphic resonance” of the imagery in one another’s art.

To explore the effects of a mindful empathic art intervention, Franklin (2010) implemented and collected extensive field notes from a five-week mindful empathic art program in a locked psychiatric ward with seven male adolescents, ages 14-17, who were all diagnosed with depression. The study did not collect information on subjects' race, culture, or socioeconomic background. Field notes indicated that at the outset of the study, some of the adolescents seemed suspicious and withdrawn, others seemed

lethargic, and all displayed disdain or resistant to staff and to therapeutic treatments.

Over a five-week period, Franklin (2010) implemented weekly two-hour sessions of mindful empathic art curriculum and group therapy. Throughout the intervention, the study collected data through field notes, art generated within the intervention, and transcripts of group therapy sessions. The study left unclear whether this data has been available for outside review. Additionally, there was no triangulation or inter-rater reliability; the researcher did, however, present tentative findings to the subjects, which they agreed seemed accurate.

The study found that the mindful empathic art intervention improved subjects' interpersonal attunement, intrapersonal attunement, and emotional literacy. The study had inconclusive findings on the effects of the intervention on subjects' state and trait mindfulness, or on their emotional regulation. During the intervention, subjects responded to empathic art by making their own art, engaging more with the staff member implementing the program, and participating more in group therapy. During this five-week period, subjects' participation increased in all therapy, not just art therapy, which the researcher ascribed to the salutary effects of the mindful empathic art intervention. During their participation in this intervention, the subjects communicated greater empathy with one another, closer attention to internal states, greater capacity to articulate emotional states, and feeling "understood" and empathized with by the staff member implementing the program. Additionally, subjects' art and group therapy responses offered tentative evidence that some of the adolescents experienced gains in self-compassion.

A serious weakness of this study is that it had no triangulation. It would have been more methodologically sound to tape or record the sessions, or write down subject

responses, and have another researcher look over the data and/or do the initial analysis of themes. Additionally, the study would have benefited from more in-depth interviews with participants, and with follow-up data collection.

The other serious failing of this study is that it did not have strong methods for assessing changes in mindfulness or in emotional regulation. It did find that subjects began to pay closer attention to their own and others' internal states, but did not have conclusive findings about mindfulness, though interpersonal and intrapersonal attunement is typically an important aspect of mindfulness. This study did not give enough nearly information about how the intervention directed subjects to to pay closer attention to internal states, so it's difficult to tell whether it was explicitly teaching mindful awareness skills.

The methodological strength of this study is that it included artistic artifacts in the evidence; these were the strongest pieces of auditable evidence, as field notes and group therapy transcripts remained confidential. Because the subjects struggled with verbalizing their emotions, they were better able to express themselves and to feel empathized with through a visual arts medium. The subjects also indicated that they agreed with Franklin's (2010) verbal interpretation of their artistic imagery. This may be a useful technique for collecting evidence among study populations with limited ability to verbalize emotions and internal states.

This study's methodological weaknesses render its conclusions somewhat suspect. I would not accept its findings as a basis for decision-making without confirmation from more methodologically rigorous studies. However, this study's finding that arts-based mindfulness interventions increase emotional literacy among adolescents in ad-

versity has been re-affirmed by Coholic's (2011) findings with adolescents in foster care and Harris's (2010) findings with incarcerated female adolescents. As a result, I would accept Franklin's (2010) study as evidence of the transferability of Coholic's (2011) and Harris's (2010) findings. Franklin's (2010) study may also provide theory and rationale for funding and conducting more in-depth studies of mindful empathic art interventions for youth in adversity.

To investigate the effects of a mindfulness-based arts program on adolescent foster children's self-awareness and resilience, this study recruited 50 volunteers ages 8-15 referred by either a child protection agency or a children's mental health center. Coholic (2011) did not use stringent criteria for inclusion in this study, but did select subjects who had low self-esteem, willingness to attend, and an ability to function in the group. Forty-five of the children were white and five were aboriginal; two of the facilitators were also aboriginal, and shared cultural teachings and arts activities. The children were in single-sex 4-child groups with two adult instructors; for the six-week programs, seven groups were girls ages 8-12, six were boys ages 8-12 (mean age 10 yrs), and four groups were with girls ages 13-15 (mean age 14 years). For the twelve-week programs, two groups were with girls ages 8-12 (mean age 10), and one with boys ages 8-12 (mean age 10).

Forty of the subjects were in foster care for reasons including abuse, abandonment, domestic violence, parent-child conflict, and parental substance abuse. Most of the children had a history of loss or trauma, and program facilitators observed that the subjects lacked characteristics of resilience such as positive self-esteem, self-awareness, hopefulness, emotional expression, interpersonal problem-solving, and emotional

management. Clinical practitioners assessed that among the children, 12 had low confidence/self-esteem, 10 were aggressive/angry, 10 had no behavioral concerns identified, 9 exhibited hyperactivity or ADHD, 8 had poor social and coping skills, and 7 were defiant/manipulative.

Subjects met in single-sex groups of four with 1-2 adult facilitators for two hours every week. Most of the groups met for six weeks, but later groups met for 12 weeks. The program's primary focus was teaching young people how to be aware of, tolerate, understand, and not judge their feelings. Many of the mindful awareness skills were taught in a shorter and more sensorial active method than in other mindfulness groups geared towards non-traumatized children, and reinforced through arts projects. Movement practices such as qi gong were also frequently used. Many of these exercises built skills in relaxation, listening, paying attention, focusing, and observation. Facilitators found arts components particularly useful because many of the children entered with significant difficulty verbalizing emotions, sitting still, closing their eyes, etc. in ways that made more traditional meditation techniques difficult to teach. After each 6-12 week session concluded, researchers individually interviewed 31 participating children and 18 of their parents/foster parents, recorded and transcribed the interviews, and coded and organized data from the interviews into categories using the qualitative data analysis program NVivo 8. Researchers didn't interview all subjects because some subjects and their guardians declined the interview.

Recurring themes in the data included that the experience was "fun" and enjoyable for participants, that participants found it helpful to meet other young people going through the same struggles, that participants became more self-aware, made friends,

felt better about themselves, and learned emotional regulation and healthy expression of feelings. Participants also reported making more friends at school, standing up for themselves against bullying, feeling calmer and more relaxed, being more attentive to internal and external experiences, feeling happier, and tolerating others' "annoying" behavior better. One subject reported she learned she was "beautiful inside." Parents and guardians reported children's improved behavior, initiative, better coping in school, better listening skills, increased helpfulness and empathy, and increased communicativeness about feelings. Parents, guardians, social workers, and facilitators speculated that the "fun" nature of the group, typically neglected in trauma interventions, actually facilitated the growth of self-esteem, emotional literacy, and social-emotional coping skills.

This study had moderately strong credibility. Strategies for ensuring rigor in analyzing the qualitative data included sampling adequacy, analytic stance, rigorous coding techniques, and saturation of interview themes. Researchers took over 30 interviews, not just a few. Saturation was evident by the replication of categories in the data. Data was kept available for auditing by outside parties, increasing the study's confirmability. However, there were also a few limitations to this study's credibility. There wasn't inter-rater analysis (triangulation); researchers both collected and analyzed the data. Findings were not reviewed with children or parents for member-checking. This study did not have a way to distinguish between the effects of mindfulness practice, arts components, and group therapy, nor did it explore synergistic effects between components. This is an issue for further study.

This study had moderate transferability. It particularly explored the use of mindfulness techniques for children in high need, and discussed the possible

differences between this group and other studies conducted among children who were not high need; the particular findings may not be fully transferable to children not in high need, but likely informs mindfulness program efficacy for children who are. In particular, there were findings about improvements in listening skills, attention, making friends, and emotional literacy that haven't been studied among children who aren't in high need because those children already had sufficient mastery of such skills.

This study's findings are highly dependable. Numerous other studies also found that Mindful Awareness Practices improve children's abilities for relaxation and emotional self-regulation, including research by Grosswald et al. (2008), Semple et al. (2010), Marks, Sobanski, & Hine (2010), Kerrigan et al. (2011), Terjestam, Jouper, & Johansson (2010), Sinha & Kumar (2010), Beauchemin (2008), Ramadoss (2010), Gordon et al. (2008), Harris (2010), Singh et al. (2011), and Singh (2007).

Autonomy, Leadership, and Psychological Well-Being

Parto & Besharat (2011) investigated the impact of trait mindfulness on psychological well-being and psychological distress in at-risk adolescent males from Tehran, found that trait mindfulness was inversely correlated with psychological distress and directly correlated with improved autonomy, self-control, and psychological well-being. Due to correlations between autonomy, self-control, and psychological well-being, the researchers theorized that trait mindfulness improved psychological well-being and decreased psychological distress by improving autonomy and self-control, which were mediating variables, and proposed this as a theoretical framework for future experimental research.

Researchers administered four self-report scales to 717 “high risk” male high school students in inner-city public schools in Tehran. Mean subject age was 17.3 years, with a standard deviation of .56. Researchers used the Philadelphia Mindfulness Scale (Cronbach's $\alpha = .69$), measuring two subscales of awareness and acceptance on a Likert scale; authors discarded five “malfunctioning items,” four in the awareness subscale and one in the acceptance subscale. They also used the Autonomy Scale (Cronbach's $\alpha = .71$), a combination of the autonomy subscale (32 items) from the Adolescent Self-Determining Inventory (ASDI; Wehmeyer & Lopez, 2003) and autonomy subscale (7 items) of Basic Psychological Needs Inventory (BPNI; Deci & Ryan, 2000). They used The Self-Regulation Inventory (Cronbach's $\alpha = .74$) (SRI -25; Ibanez et al., 2008), and the Mental Health Inventory (MHI-28; Besharat, 2009); adequate psychometric properties of English and Farsi versions of the scale were reported for the MHI-28 (Cronbach's $\alpha = .89$ for Psychological Well-Being, Cronbach's $\alpha = .83$ for Psychological Distress), but not the other scales.

Researchers conducted a path analysis of LISRAEL in SPSS Version 15 to test the direct relationships between mindfulness and autonomy, mindfulness (Philadelphia Mindfulness Scale) and self-regulation (The Self-Regulation Inventory), mindfulness and psychological well-being (Mental Health Inventory), autonomy (Autonomy Scale) and psychological well-being, and self-regulation and psychological well-being. Additionally, they conducted a path analysis to test the correlations between mindfulness, self-regulation, autonomy, and psychological distress.

Researchers found a direct correlation between mindfulness ($M=33.37$, $SD=7.99$) and autonomy ($M=58.15$, $SD=9.80$) (Correlation=.24, $p<.01$), between mindfulness and

self-regulation ($M=86.41$, $SD=11.14$) (Correlation=.27, $p<.01$), and between mindfulness and psychological well-being ($M=50.69$, $SD=10.84$) (Correlation=.26, $p<.01$).

Researchers found an inverse correlation between mindfulness and psychological distress ($M=37.76$, $SD=12.68$) (Correlation=-.22, $p<.01$). Additionally, autonomy mediated the relationship between mindfulness and psychological well-being $\{\beta=.23$, $t=6.44$ & $\beta=.24$, $t=6.96\}$ and psychological distress $\{\beta=.23$, $t=6.44$ & $\beta= -.25$, $t= -6.80\}$. They found no direct relationship between self-regulation and psychological well-being, and no significant direct relationship between self-regulation and psychological distress $\{\beta= -.01$, $t= -.20\}$. However, self-regulation did mediate the relationship between mindfulness and psychological well-being $\{\beta=.23$, $t=6.36$ & $\beta=.20$, $t=5.70\}$. The researchers' model of the five different constructs accounted for 19% of the variance in psychological well-being and 11% of the variance in psychological distress among at-risk high school students.

This study had strong internal validity because it used a very large sample size, accounted for language barriers by re-testing Cronbach's alpha scores on translated test measures, selected survey measures with adequate reliability, and explored mediating variables. Its internal validity may be compromised somewhat because in the discussion session of the paper, the authors proposed a causal relationship between correlated factors. However, the authors were clear that they were proposing a hypothesis for future research. The study's generalizability was limited by its failure to collect socioeconomic class data, to define "youth at risk," and to include females in the sample.

The study's finding that mindfulness was positively associated with well-being

and negatively associated with psychological distress has strong external validity. Studies by Semple et al. (2010), Marks, Sobanski, & Hine (2010), Terjestam, Jouper, & Johansson (2010), Elder et al. (2011), Sinha & Kumar (2010), Sibinga et al. (2011), Harris (2010), Huppert & Johnson (2010), Coholic (2011), and Ishwar & Nishad (2010) corroborate this finding.

The study's finding that mindfulness was positively associated with autonomy and self-control has weak external validity. This finding is supported by a methodologically weak study by Ishwar & Nishad (2010) and by three qualitative case studies by Singh et al. (2011), whereas it is directly contradicted by methodologically strong studies by Kratter & Hogan (1982) and Ramadoss (2010). One possible reason for this discrepancy is an interaction effect between mindfulness and developmental maturation. The research by Kratter & Hogan (1982) and Ramadoss (2010) sampled young adolescents in middle school, whereas Singh et al. (2011) and Parto & Besharat (2011) studied older adolescents who were about seventeen years old. Ishwar & Nishad (2010) conducted the study with 13-19 year olds. Mindfulness may increase autonomy for older adolescents, but not affect autonomy or locus of control for younger adolescents.

Ishwar & Nishad (2010) investigated the impact of 30 minutes of daily manomaya kosh-sadhana (yogic concentrative meditation) on adolescents' mental health and leadership capacities, and found statistically significant improvement in mean mental health and leadership capacity after 90 days of practice. To investigate the effects of yogic concentrative meditation on adolescents' mental health and leadership capacities, researchers used quota sampling to select 30 female adolescents between 13 and 19

years old from a high school in Uttarakhand, India. Researchers did not collect information about subjects' mean age or socioeconomic status.

Researchers then gave unspecified pre-tests to assess the subjects' mental health and leadership skills. During the 90-day intervention, subjects spent the first thirty minutes of their school day conducting three different kinds of concentrative meditation, including meditation on a candle flame, mantra meditation, and contemplation of the yoga lineage's guru. After 90 days, students were post-tested with the same unspecified measurements to assess mental health and leadership skills.

Mental health pretest scores had a mean of 64.56 and a standard deviation of 7.00, and the post-tests showed a mean of 70.10 and a standard deviation of 6.38. The r-value was 0.41, SEd was 1.4, t-score was 4.15, and significance level was p=0.01. The experimenters rejected the null hypothesis, that there was no effect on mental health, because the t-value was 4.14 (higher than the critical t-value at df=29). The differences in pre- and post-tests for leadership skills showed a t-value of 12.30 (higher than the critical t-value at df=29), so the researchers rejected the second null hypothesis that there was no effect of the meditation practice on adolescents' leadership skills. They concluded that meditation improved adolescents' leadership skills in a statistically significant way (p=0.01).

Due to the overwhelming methodological weaknesses in this study, I would disregard its findings. The best that can be said about this study's methodological rigor is that researchers conducted their statistical analyses correctly. During the intervention, students meditated every day for a set period of time, which improved the likelihood that the intervention would produce representative results, since regularity of practice affects

the efficacy of mindfulness practices (Huppert & Johnson, 2010). However, the researchers did not give any information about the pretests and posttests used to assess students' mental health and leadership ability. The study didn't report alpha-scores, other studies demonstrating the validity of the measures, measure subscales, or even the names of the measures. Without such basic information on the measures, it's impossible to know their accuracy. Furthermore, this study had no control group, which made it impossible to control for historical or developmental effects in the findings

Insufficient information about quantitative measures used in this study also creates obstacles to comparing these findings to others in the field. For instance, without knowing what measure this study used for mental health, it's impossible to know whether this study was measuring improved positive affect or decreased stress and anxiety, so it's difficult to compare its findings with other studies. Thus far, I have not encountered literature in the field that presented findings on the effects of meditation practices on adolescents' leadership abilities. Because I cannot compare these findings to other studies, and because of the methodological limitations of the study, my assessment is that this study produced inconclusive evidence to argue that concentrative meditation might improve adolescents' mental health and leadership abilities.

Summary

Mindful Awareness Practices may increase resilience by improving adolescents' self-awareness and emotional literacy, but evidence that these practices improve

adolescents' autonomy or leadership capabilities remains inconclusive. Additionally, the finding that Mindful Awareness Practices improve adolescents' self-awareness and emotional literacy comes almost entirely from qualitative studies, most of which had small sample sizes. Two of these studies are methodologically adequate, one is methodologically weak, and one is methodologically strong, which supports the credibility of their findings, but corroborating quantitative studies will improve the overall strength of these findings.

A methodologically strong quasi-experimental study by Huppert & Johnson (2010), a methodologically adequate qualitative study by Rosaen & Benn (2006), and a methodologically adequate case study by Dellbridge & Lubbe (2009) all found that Mindful Awareness Practices improved psychologically normal adolescents' openness to experience, self-awareness, and relaxed concentration. Huppert & Johnson (2010) found only slight gains to adolescents' well-being and resilience, but found stronger gains for those students who practiced the techniques regularly. All three studies strongly suggested the developmental nature of mindfulness and the importance of regular practice.

Arts-based mindfulness interventions for deeply troubled adolescents found that arts were an effective way of developing mindfulness skills for groups that may not be developmentally ready for meditation techniques (Franklin, 2010; Coholic, 2011; Harris, 2008). These studies found that arts-based mindfulness interventions improved troubled adolescents' self-awareness, emotional literacy, social skills, and hope. However, while Coholic's (2011) study was methodologically strong, its two corroborating studies by Franklin (2010) and Harris (2008) were methodologically inadequate. Therefore, these

findings have only limited external validity for adolescents in crisis, and require corroboration from more methodologically robust sources. However, the finding that Mindful Awareness Practices improve self-awareness has some external validity because it is in alignment with the studies about mindfulness in psychologically normal adolescents.

Two studies found that adolescents' mindfulness was correlated with autonomy or leadership qualities, as well as overall psychological well-being (Parto & Besharat, 2011; Ishwar & Nishad, 2010). However, one of these studies was methodologically weak, and the other had limitations to its external validity, indicating that evidence for this link is inconclusive at this time. Parto & Besharat's (2011) methodologically strong correlational study found that trait mindfulness was positively correlated with psychological well-being, autonomy, and self-control, and inversely correlated with psychological distress. However, methodologically strong quasi-experimental studies by Kratter & Hogan (1982) and Ramadoss (2010) found that Mindful Awareness Practices had no effects on adolescents' self-control, limiting the external validity of this finding. One possible explanation is developmental differences due to the different ages of the sample groups; however, this hypothesis is impossible to evaluate without further study. Ishwar & Nishad's quasi-experimental study (2010) found that adolescent students who practiced yogic concentrative meditation experienced gains to psychological well-being and leadership, but it did not report on the measures it used or the reliability of those measures. Its findings were therefore too weak to be used as evidence in this matter. Therefore, evidence for a relationship between Mindful Awareness Practices and adolescents' autonomy remains inconclusive at this time.

Summary

The research in this literature review has examined four possible ways that Mindful Awareness Practices may affect adolescents' resilience: improving attention and executive function, reducing stress and anxiety, reducing anger and aggressive behavior, and promoting self-awareness and emotional literacy.

Improved executive function increases resilience by supporting planning ability, concentration, and delay of gratification. It may also improve academic achievement. The literature found that Mindful Awareness Practices improved executive function and memory for ethnically diverse samples of students, though male adolescents were often over-represented in the study samples. Mindful Awareness Practices improved executive function for students with and without learning disabilities, and there was emerging evidence that it mitigated the severity of ADHD symptoms. However, the literature presented conflicting evidence about whether regular mindfulness practice increases adolescents' academic achievement. Evidence about the effects of meditation on memory for adolescents remains weak and inconclusive.

Reducing stress and anxiety improves resilience by diminishing distressing thoughts and emotions, and it *may* improve attention and executive function by reducing cognitive interference. Mindful Awareness Practices promote resilience by reducing adolescents' stress, anxiety, and hypervigilance. In effect, Mindful Awareness Practices serve as a buffer against negative life events for a wide range of adolescents, including youth in poverty, youth of color, youth with HIV infection, youth with learning disabilities,

and youth suffering from war trauma. They may also mitigate the effects of severe trauma, protecting adolescents against PTSD, though this requires stronger corroborating research.

Decreasing anger and improving control over aggressive behavior would enhance adolescents' resilience by mitigating unpleasant emotions, diminishing amygdala activation, and reducing further exposure to negative life events. However, research on the effects of Mindful Awareness Practices on adolescents' anger and aggression remains inconclusive. There is an emerging controversy over whether Mindful Awareness Practices reduce anger and hostility, with the strongest studies indicating that mindfulness only lowers anger for female adolescents, not males. Additionally, due to methodological weaknesses in the existing research, there is not sufficient evidence at this time to conclude that Mindful Awareness Practices reduce adolescents' aggressive behavior. These are questions that require further research with methodologically robust study designs.

Mindful Awareness Practices may increase resilience by improving adolescents' self-awareness and emotional literacy. Emerging evidence in the research indicates that Mindful Awareness Practices improve self-awareness and emotional literacy for adolescents who face trauma and adversity as well as adolescents who don't. This finding is consistent among male and female samples, samples of older and younger adolescents, and ethnically diverse sample populations from South Africa, Australia, Great Britain, and the United States. While qualitative evidence is fairly strong for this finding, there is a paucity of quantitative evidence to indicate the strength of the effect. Additionally, evidence that Mindful Awareness Practices improve adolescents'

autonomy or leadership capabilities remains inconclusive at this time. Further research is required to confirm or deny this finding.

The two strongest findings in the literature are that Mindful Awareness Practices enhance adolescents' resilience by improving executive function and reducing stress and anxiety. Additionally, these two factors may be mutually supportive. Authors theorized that mindfulness-associated stress reduction directly improves attention and executive functioning by decreasing cognitive interference such as rumination, distraction, and negative thought patterns. It should be noted, however, that effect strength varied widely between studies—perhaps due to differences in the exact practices used, the age and gender of the sample population, and the severity of adversity that participants faced in their lives. Qualitative evidence suggests that Mindful Awareness Practices also support adolescents' self-awareness, emotional literacy, and psychological well-being, but further quantitative study is necessary to determine the strength of this effect.

Ultimately, regular mindfulness practices are likely to enhance students' resilience by reducing stress, improving executive function, and enhancing self-awareness. It is important to interpret these findings with caution, however, because the research currently available does not give stable predictions for *how much* adolescents are likely to benefit from a particular practice.

CHAPTER 3: CONCLUSION

Introduction

This paper explored the question of how mindfulness affects resilience and academic achievement for secondary students, particularly secondary students in adversity. This paper has defined mindfulness as sustained, non-judgmental attention on both abstract internal experiences and concrete sensory experiences as they unfold in the present. It has defined resilience as a person's capacity to recover or thrive in the presence of stress, change, or adverse life events.

Chapter 1 explained the rationale for examining this question. It proposed that both mindfulness and resilience are important processes for citizens to cultivate because they mediate the capacity to respond meaningfully and effectively to issues of bias, prejudice, and injustice in society. Mindfulness may be a powerful tool for teachers, educators, and students working to address educational inequality, academic underachievement, and rigid schemas. This chapter addressed the history and controversies in the field, most notably the debate between Kabat-Zinn, who defined mindfulness as a form of sustained attention, and Siegel, who operationalized it as a relational process of interpersonal and intrapersonal attunement. The chapter explained the limitations of the study and proposed to investigate the effects mindfulness had on resilience and academic achievement for middle school students (5th-8th grade) and high school students (9th-12th grade), with a particular focus on students coping with adversity.

Chapter 2 was a critical review of the literature on this topic. There was little research on how mindfulness affected academic achievement for secondary students,

and the two methodologically strong studies on the topic had contradictory findings, leading to the conclusion that the evidence about that relationship remains inconclusive and requires further study. As a result, Chapter 2 focused predominantly on the relationship between mindfulness and resilience in adolescents. The chapter investigated four major ways that mindfulness may improve resilience for secondary students: improving attention and executive function, reducing stress and anxiety, reducing anger and aggressive behavior, and enhancing self-awareness and emotional literacy. It found that there was strong evidence that Mindful Awareness Practices reduced adolescents' stress and anxiety, and improved their attention and executive function. There was also emerging evidence that mindfulness enhanced self-awareness and emotional literacy. Studies about the effects of mindfulness on anger in adolescents indicated an emerging controversy in the field, and remain inconclusive at this time. There was not sufficient evidence in the literature to conclude that mindfulness reduced adolescents' aggressive behavior, improved autonomy, reduced impulsivity, improved memory, or affected locus of control. Additionally, the literature review noted the difficulty of determining the strength of the effects mindfulness had on executive function, stress, and self-awareness, due to the differing strength of effect in the quantitative studies and the absence of quantitative studies on certain topics.

Chapter 3 discusses overarching patterns in the research on the effects of mindful awareness practices on adolescents' attention and executive function, stress and anxiety, anger and aggression, and self-awareness. It will then explain how this research should affect classroom practice, particularly for teachers serving youth in adversity. The chapter concludes with suggestions for further research, including better

controls for population variables. This paper proposes more research into the effects of gender, developmental maturation, and adversity level; cultural competence in implementing mindful awareness programs; and best practices for teaching mindfulness in the context of meaningful academic curriculum.

Summary of Findings

Positive Effects on Attention and Executive Function

In the first portion of Chapter 2, the strongest finding was that meditation improved adolescents' attention and executive function. This was corroborated by methodologically strong quantitative studies by Baijal et al. (2011), and methodologically adequate research by Manjunath & Telles (2001), Grosswald et al. (2008), Redfering & Bowman (1981), Semple et al. (2010), and Kratter & Hogan (1982). Overall, the combination of adequate internal validity, diverse sample populations, and strong external validity render trustworthy the finding that meditation improved adolescents' attention and executive function.

Two studies on the effects of meditation on adolescents' cognitive ability and academic performance indicated inconclusive or conflicting findings. The greatest problem with both of them was a failure to acquire adequate external validity; both require more study. Manjunath & Telles (2004) found that yoga practices improved adolescents' spatial memory but not their verbal memory; however, this study was inconclusive because it did not report on the validity and reliability of its memory measures, and because it had no other studies to compare results with. A

methodologically strong study by Nidich et al. (2011) found that daily Transcendental Meditation significantly improved low-achieving middle school students' academic achievement, but another methodologically strong study by Barnes, Bauza, & Treiber (2003), found that Transcendental Meditation had no effect on middle school students' academic achievement.

All studies in this section were quantitative and quasi-experimental. All but two of these studies drew their conclusion from task performance data and EEG measures, rather than surveys. Baijal et al. (2011) and Grosswald et al. (2008) both used EEG measures to test for executive function, and found more of it. Grosswald et al. (2008) and Manjunath & Telles (2001) both used the Tower of London test as an indicator of executive function, but while Manjunath & Telles (2001) found it was an adequate test, Grosswald et al. (2008) found that the control group tested too high on it at posttest, indicating an instrumentation problem. However, both studies' main findings agreed with one another. There was a particular lack of qualitative survey data, but this may have been a function of the way they defined the research questions—how many eighth graders, after all, have the wherewithal to reflect meaningfully on their executive functioning? That said, this section's main finding is supported by qualitative data elsewhere in the study. For instance, eighth grade students interviewed by Rosaen & Benn (2008) described Transcendental Meditation as inducing a state of “relaxed concentration.”

These studies primarily used youth of middle school age as sample populations. Students came from diverse ethnic and socioeconomic backgrounds in India and the United States. Samples included students without learning disabilities, students with

behavioral disorders, students with ADHD, students with reading disorders, and academically low-achieving students.

Mindfulness practices reduce stress and anxiety

The strongest finding for the second section of Chapter 2 was that mindfulness promotes resilience for adolescents by reducing adolescents' stress, anxiety, and hypervigilance. This was supported by strong to adequate studies by Marks, Sobanski, & Hine (2010), Kerrigan et al. (2011), Ramadoss (2010), Terjestam, Jouper, & Johannson (2010), Elder et al. (2011), Sinha & Kumar (2010), Beauchemin (2008), Mendelson et al. (2010), and Gordon et al. (2008). This finding is trustworthy because it has nine studies with decent internal validity supporting it, because the research had multiple research designs (including correlational, quasi-experimental, and qualitative in-depth interviews), and because the studies were conducted across diverse populations in India, Sweden, Kosovo, and the United States. Overall, these factors support this finding's external validity.

There were a few studies by Marks, Sobanski, & Hine (2010), Elder et al. (2011), and Sinha & Kumar (2010) that found mindfulness also reduced depression symptoms. Not as many researchers examined this question or measured changes to depression, however, so this finding has somewhat weaker external validity. Mendelson et al. (2010) found a statistically insignificant trend toward decreased depression.

Studies by Mendelson et al. (2010) and Gordon et al (2008) found that Mindful Awareness Practices mitigate PTSD symptoms for trauma-exposed adolescents. These studies had adequate and strong internal validity, respectively, and are further

corroborated by a methodologically weak qualitative study by Harris (2008). These studies have emerging external validity, since they are the only research in the literature on the efficacy of mindfulness practices as a protective factor against PTSD for adolescents.

The studies in this section included correlational, quasi-experimental, and qualitative in-depth interview designs, though quasi-experimental studies were, again, in the majority. The most significant repeating test in this section was the Spielberger State-Trait Anxiety Inventory, with similar results in each study. The sample populations included ethnically diverse populations from India, Sweden, Kosovo, and the United States. Studies from the United States disproportionately focused on youth of color and youth living in poverty. Only three studies were conducted with youth who were not living with significant adversity, such as acute poverty, HIV/AIDS, or war trauma. Beauchemin (2008) specifically studied youth with learning disabilities.

Mixed Results on Reducing Anger and Aggression

The third section of Chapter 2 found that there was inconclusive evidence about what effects, if any, Mindful Awareness Practices have on adolescents' anger and aggressive behavior. There is an emerging controversy over whether Mindful Awareness Practices reduce anger between Sibinga et al. (2011), who found they did, Barnes, Bauza, & Treiber (2003), who found these practices reduced anger for adolescent girls but not boys, and Kerrigan et al. (2011), who found no effect on anger. All three studies were methodologically strong and had solid internal validity, so these conflicting findings indicate the need for further research. At present, it's too close to tell.

Three qualitative studies by Singh et al. (2011), Harris (2010), and Singh (2007) found that mindfulness-based interventions were effective for reducing adolescents' aggressive behavior. However, the studies had weak internal validity, and cannot be taken as sufficient evidence that Mindful Awareness Practices reduce adolescents' aggressive behavior.

The majority of studies in this section were qualitative, with only Barnes, Bauza, & Treiber (2003) conducting a quantitative study about the impact of mindfulness on adolescent anger. The qualitative studies all used in-depth interviews, ethnographic field notes, and other forms of evidence, but there were not consistent tests used among these studies. This cluster of studies focused more on older adolescents, with only Singh (2007) focusing on middle school students. However, all of these studies were conducted with youth in adversity, including incarcerated female adolescents (Harris, 2010), youth affected by HIV/AIDS (Sibinga et al. 2011), youth living in poverty (Barnes, Bauza, & Treiber, 2003), young men with Asperger's Syndrome (Singh et al., 2011), and adolescents with Conduct Disorder (Singh, 2007). These studies used ethnically diverse samples. While Singh (2007) and Singh et al. (2011) did not collect socioeconomic data, the other three studies were conducted with youth in poverty.

Positive Effects on Psychological Well-Being

The strongest finding in the fourth section of Chapter 2 was that Mindful Awareness Practices might increase resilience by improving adolescents' self-awareness and emotional literacy. A methodologically strong quasi-experimental study by Huppert & Johnson (2010), a methodologically adequate qualitative study by

Rosaen & Benn (2006), and a methodologically adequate case study by Dellbridge & Lubbe (2009) all found that Mindful Awareness Practices improved psychologically normal adolescents' openness to experience, self-awareness, and relaxed concentration. Arts-based mindfulness interventions for deeply troubled adolescents were an effective way of developing mindfulness skills for groups that may not be developmentally ready for meditation techniques, and that developing mindfulness improved these adolescents' social skills, emotional literacy, and self-awareness (Franklin, 2010; Coholic, 2011; Harris, 2008). All studies but Franklin (2010) and Harris (2008) were methodologically strong, so the internal and external validity of these findings is encouraging. However, all but Huppert & Johnson's (2010) study were qualitative, so it's difficult to tell the strength of the effect reported. Huppert & Johnson's (2010) research reported only slight, though statistically significant, gains.

Evidence that Mindful Awareness Practices improve adolescents' autonomy or leadership capabilities was inconclusive. These were the findings of two problematic studies. Ishwar & Nishad (2010) offered a methodologically weak quantitative study that did not mention which measures it used, or their validity or reliability, making its results difficult to judge. Parto & Besharat's (2011) methodologically strong correlational study found that trait mindfulness was positively correlated with psychological well-being, autonomy, and self-control, but this finding was directly contradicted by methodologically adequate quasi-experimental studies by Kratter & Hogan (1982) and Ramadoss (2010).

This section's research on psychological well-being was conducted almost entirely through qualitative studies, including in-depth interviews and a case study, with

only one quantitative study corroborating the findings. While this does not invalidate the research, it does make the strength of program effects difficult to determine. The research into the relationship between mindfulness and autonomy involves two quantitative case studies, one of which was correlational and one of which was quasi-experimental. Again, there is not a lot of overlap between tests used, due to the high proportion of qualitative studies in this particular section.

The research in this section comes from ethnically diverse sample populations from South Africa, India, Iran, Great Britain, and the United States. Socioeconomic class data was not collected for most of the studies in this sample. Age ranges included both younger and older adolescents. This was the one section of the study that didn't have a high proportion of studies using students with learning disabilities as the sample population.

Classroom Implications

Mindfulness tends to improve adolescents' resilience by promoting executive function, stress reduction, and self-awareness. The literature reviewed in this paper indicates that school-based mindfulness programs are feasible, applicable for students with diverse learning needs, and can be effective in diverse cultural contexts. That said, the findings from this literature review suggest care and consideration in implementing a school-based mindfulness program. There is no consensus in the literature about the effect strength of Mindful Awareness Practices; this makes it difficult to compare mindfulness-based interventions with other options. Additionally, the efficacy of these

practices may vary widely with implementation, cultural appropriateness, particular practices taught, and students' developmental readiness for the program as implemented. It should be noted that the research found only mixed evidence that Mindful Awareness Practices improved academic achievement. Mindfulness is not a panacea, but one tool of many for addressing adolescent learners' diverse needs. It may be that in a particular situation, twenty minutes of deep instruction in study skills may be more beneficial than twenty minutes of qigong practice for 6th grade student with ADHD. In a learning environment where every minute is precious, it's important for teachers to weigh instructional decisions carefully, be clear about learning goals, and adjust implementation as necessary.

That said, the research does offer several important findings for anyone seeking to incorporate mindfulness-based techniques into classroom practice. First, regularity of practice appears to be more important than duration of practice (Huppert & Johnson, 2010; Ramadoss, 2010). In other words, fifteen minutes of daily mindfulness practices during homeroom period is more likely to prove beneficial to students than an hour of meditation in a weekly health class. This would have the added benefit of giving students structured "downtime" to transition into their school day; movement-based practices provided the additional benefit of brief exercise (Elder et al., 2011). Additionally, Coholic (2011), Beauchemin (2008), and Grosswald et al. (2008) noted the developmental nature of mindfulness practices; they recommended beginning with short exercises and building duration gradually. These authors found statistically significant effects with as little as three minutes of Mindful Awareness Practices per day.

Perhaps one of the most surprising findings in this literature review is the diverse

array of practices that support mindfulness. They include cooperative games, art and writing projects, creative visualization exercises, movement practices, somatic awareness exercises, and empathic listening, among others (Harris, 2008; Coholic, 2011; Franklin, 2010; Gordon et al., 2008). In short, tasks that require students' sustained, non-judgmental awareness of internal and/or external experiences offer the opportunity for deep practice with mindfulness skills. Furthermore, some of the programs that showed the strongest effects on adolescents were programs that mixed mindfulness techniques with arts interventions (Coholic, 2011), groupwork and team-building (Semple et al., 2011), and mentoring (Kerrigan et al., 2011). Mindfulness may in fact have synergistic effects with other techniques for promoting resilience; while this is problematic for the research quality, it's good news for anyone attempting to implement mindfulness-based interventions.

Early studies in this field took a rigid definition of Mindful Awareness Practices, and implemented them through sustained concentrative meditation exercises (Redferring & Bowman, 1981; Kratter & Hogan, 1982). However, emerging evidence indicates that this may not be developmentally appropriate for children or adolescents. Young children, for instance, learn mindfulness skills most effectively by experiencing adult attunement and empathy (Siegel, 2010). Semple et al. (2011) noted the importance of adjusting mindfulness strategies for young adolescents by emphasizing the use of creative imagination, visualization exercises, and sensory awareness exercises, rather than using concentrative techniques geared towards adults such as mantras or counting breaths. Coholic (2011) noted that the adolescent foster children in her study often entered at a developmentally "younger" stage, and benefited from using techniques

geared toward younger children such as games, dance, arts, and creative imagination. These children were also exquisitely sensitive to the group leaders' interpersonal attunement. Both studies indicated that breathing exercises and somatic awareness exercises were effective and developmentally appropriate for a wide range of children. There is some indication in the literature that movement-based practices may be more successful for young adolescents, particularly boys (Ramadoss, 2010) and adolescents with trauma (Harris, 2008), and that concentrative techniques and sitting meditation may become more developmentally appropriate with older adolescents, especially once they have developed skills with somatic awareness (Kerrigan et al., 2011). As an added complication, the literature indicated certain gender differences in adolescents' responses to mindful awareness practices (Barnes, Bauza, & Treiber, 2003), and called for gender-responsive interventions adjusted to meet the unique struggles and developmental needs of different genders (Harris, 2008).

For a teacher, these studies offer a few important principles for implementing mindfulness-based instructional decisions. First, it is imperative to broaden the schema of Mindful Awareness Practices. A teacher who gets stuck on the image of serene saffron-robed monks is hardly likely to teach developmentally appropriate, culturally responsive mindfulness strategies. There is a broad spectrum of Mindful Awareness Practices available, and particular practices may be more or less appropriate for adolescents' developmental needs. The literature does not indicate much rigorous study on adolescents' developmental readiness for particular mindfulness practices, much less best practices for teaching mindfulness techniques to this population. The information that is available comes from researchers who adjusted programs in

response to adolescents' needs (Coholic, 2011; Harris, 2008; Semple et al., 2011; Kerrigan et al., 2011).

Tentative evidence indicates that strong techniques for teaching mindfulness to young adolescents include arts-based interventions, games, movement practices, somatic awareness, breath exercises, groupwork, and creative imagination. These may also be helpful for older adolescents who are not developmentally more adult-oriented Mindful Awareness Practices. This is quite valuable information for a teacher, because it opens up new opportunities to teach mindfulness alongside and integrated with academic content. An English Language Arts teacher, for instance, may teach breathwork and somatic awareness exercises as part of a lesson on public speaking skills. Somatic awareness or movement practices may be valuable "warm-ups" to theater lessons. Creative visualization may be well worth the class-time for students developing creative writing pieces. Techniques for de-centering from anger or reactivity may be very valuable for students involved in a debate or heated class discussion. Sustained, non-judgmental observation skills are valuable assets across multiple academic domains, from laboratory science to ethnographic observation to visual arts to expository writing. Concentrative observation skills may be taught in any of these contexts as mini-lessons that enhance students' experience of the curriculum.

There are several potential advantages to integrating Mindful Awareness Practices with the regular academic curriculum. If implemented correctly, they may increase students' opportunities for "deep practice" honing academic skills. They are likely to increase students' attention and time on task, and may create states of "focused relaxation" conducive to academic work. Teaching the skills this way also makes them

immediately relevant to students. Instead of worrying about whether mindfulness skills are transferable to academics, teachers can explicitly *teach* students to make that transfer. In short, the aim is to provide culturally relevant, developmentally appropriate mindfulness techniques that enhance students' social/emotional development, resilience, and academic acuity. If a mindfulness mini-lesson can't provide that to students, teachers would be well-advised to use a different instructional strategy for that situation.

Is there a place for concentrated exercise? The research seems to indicate the answer is *yes, sometimes*. As explained in Chapter 2, decontextualized mindfulness practices offer the opportunity for focused skills practice, they improve attention and executive function, and they reduce stress and anxiety for adolescents. However, it's important to be clear with students that these are opportunities for deep practice and focused improvement, and slips in attention are a normal part of the process. A focus on "getting it right" is generally counterproductive (Dellbridge & Lubbe, 2003). It's also important for a teacher to have clear intentions about choosing to incorporate additional mindfulness training. For instance, a teacher choosing to practice Transcendental Meditation with a middle school class during homeroom may help students reduce stress, but is unlikely to help their students learn to control anger or impulsivity that way. If the goal is to help students control anger and impulsivity, another technique may be warranted. It's important to remain attentive to what, precisely, a practice is teaching or developing—more so because the differences between particular techniques have not been evaluated with adolescent samples.

The research indicated another important dimension to mindfulness in the

classroom: the role of the teacher. Harris (2008), Coholic (2011), and Gordon et al. (2008) all emphasized the role of mentoring as a critical part of program efficacy. Siegel (2010) indicated that children learn mindfulness through adults demonstrating sane and mature interpersonal and intrapersonal attunement, and this may remain an important pathway for adolescents to learn mindfulness as well. From this perspective, one of the most effective things teachers can do to help students improve their mindfulness is to cultivate and model mindfulness and attunement.

Having reviewed the research available, I plan to develop mindfulness in the classroom by integrating it with academic work as one more set of strategies students can use to help master the curriculum. Mindfulness techniques have the potential to be a powerful complement to metacognition, since they are shown to increase self-awareness in diverse populations of adolescents. My proposal is to weave mindfulness into the regular curriculum in much the same way a good teacher weaves in metacognition, content literacy, and social-emotional development. Teachers should also be forthright with students about what they're teaching. Integrating Mindful Awareness Practices with the curriculum isn't about hiding them—it's about teaching them in a culturally, developmentally, and academically appropriate way. It's important for students to know what a technique is, what it does to the brain, and why a teacher's choosing to teach it. Students also need the reflective metacognition skills to evaluate a technique's effects on their own learning and decide when it's an appropriate strategy to deepen their own learning.

Suggestions for Further Research

Further research into the effects of mindful awareness practices on adolescent learners would benefit from more methodologically robust studies and a broader variety of qualitative and quantitative studies corroborating major findings. Future studies can be better designed by controlling for several factors researched in the existing literature: frequency and duration of mindful awareness practice, type of mindful awareness practice used, developmental appropriateness, levels of adversity faced by the sample population, and gender. Ultimately, this field needs to begin research into cultural competence in teaching mindful awareness practices, and best practices for teaching mindful awareness practices in the context of meaningful curriculum.

A majority of the research in this literature review focused on pilot studies or feasibility studies with small sample sizes. While these studies demonstrate interesting trends deserving of further research, what the field needs now are more methodologically robust studies with diverse populations, control groups, more randomized sampling, and large sample sizes. Additionally, many of the quantitative studies relied on self-report questionnaires with minimal corroborating evidence. The best among them measured traits such as anxiety or physical discomfort using multiple scales, and compared the reliability between scales. However, further corroboration from parent and teacher reports, task performance, in-depth interviews, artifacts, or field notes would strengthen these studies. There are several serious problems with relying solely on self-report surveys for adolescents, not least of which is reporting bias. Moreover, samples that include youth with learning disabilities, youth in poverty, and youth learning English may have unrecognized content literacy barriers to reading and

understanding the instruments. This is an important issue for the validity and reliability of the measures as they're implemented in context.

Overall, the field would benefit from a more balanced proportion of qualitative and quantitative research designs. For instance, four of the five studies on the effects of mindfulness on anger are qualitative, and all the studies on the effects of mindful awareness practices on self-awareness are qualitative. By contrast, all the studies on the effects of concentrative meditation on attention and executive function are quantitative. Findings that mindful awareness practices reduce adolescents' stress and anxiety, however, are corroborated by a wide range of qualitative, quantitative, and mixed-methodology studies.

The literature offers several findings that are important for designing future studies. Mindful awareness practices tend to have stronger effects for adolescents when practiced regularly (Huppert & Johnson, 2010; Ramadoss, 2010). However, adolescents experience benefits with as little as 3-8 minutes of practice per session (Ramadoss, 2010). This indicates that studies will more accurately assess the impacts of mindful awareness practices with short daily practice sessions than hour-long weekly programs.

Additionally, there is a host of diverse mindful awareness practices, ranging from mindful empathic art to Transcendental Meditation to qigong, and they may well have different effects on adolescents. Concentrative meditation and guided relaxation, for instance, have different effects on adolescents with ADHD (Kratter & Hogan, 1982). This is well-documented in research on adults, but has not been studied in depth for adolescent populations. Different practices may be better suited to adolescents in

different developmental phases (Baijal, et al., 2011; Coholic, 2011; Semple et al., 2010). Future research should compare the effects of different techniques to one another, and should assess the developmental appropriateness of particular techniques for the sample's target age group. Studies should measure the interaction of developmental effects by teaching the same techniques to different age groups, and analyzing outcome data against age-stratified control groups. Researchers should also exercise caution in using students from a different age group as a control population.

Many of the studies in this literature do not control for other program factors which may also affect participants. For instance, program aspects such as mentoring, short break time from classes, arts components, physical movement, groupwork, or counseling will likely have salutary effects on students' resilience, social/emotional development, or school performance. One way to control for these factors is to have have a no-intervention control group, a group with just an arts-based component, a group practicing just a mindful awareness technique, and a group with an arts-based mindfulness intervention. This would help researchers tease apart the effects of mindful awareness practices and other program components, and research possible synergistic effects between mindfulness and other program factors.

Some of the limitations in this field of research are a matter of study populations. Much of this research has been conducted with youth handling adversity—affected by war, HIV, acute poverty, incarceration, emotional disturbances, or learning disabilities. This is both a strength of the research in the field and a weakness. It is a strength because it shows, in many cases, consistency of findings across diverse populations; and because it highlights the ways mindful awareness practices may benefit resilience.

However, there is limited research on the effects of mindful awareness practices on youth who aren't in adversity. This is an issue because in this literature review, high-quality studies conducted with youth in adversity are reporting stronger effects of mindful awareness practices than high-quality studies conducted with youth who aren't in adversity. In order to better assess the transferability of current findings, more studies need to be conducted with adolescents who aren't in adversity. All studies should collect and report socioeconomic status information for sample populations. Also, studies that measure subjects' stress and/or adverse life circumstances at baseline and sort subjects by stress level can use this information as a variable like gender, race, and age, in order to compare the effects of mindful awareness practices on youth in adversity and youth who aren't. Overall, the literature reveals only a little research into potential positive benefits, most of which is qualitative and exploratory. This should be a much larger focus of research.

A substantial proportion of the quantitative research in the literature was conducted with all-male or mostly-male subject samples. This is because males are over-represented in special education, and many of these studies were conducted with adolescents with learning disabilities. Nonetheless, this complicates the transferability of findings, since there is some evidence that male and female adolescents have somewhat different responses to mindful awareness practices—for instance, it reduces anger for females but not for males (Barnes, Bauza, & Treiber, 2003). Future research should ensure equitable gender representation in the sample by quota sampling, and should analyze gender as a variable when interpreting study results. Additionally, the field would benefit from research into gender-specific programs, and from research into

best practices for gender-responsive programs for teaching mindful awareness practices.

Finally, the research on mindful awareness practices is notably silent on two issues that are vital to teachers: cultural competence and teaching mindfulness in context. Only Coholic (2011) and Kerrigan et al. mention adjusting program delivery and language for the cultural background of the students, but they offer only limited descriptions of how they did it. The literature has not yet developed best practices for ensuring cultural competence in teaching mindful awareness practices. This is a significant oversight, because culturally inappropriate implementation may well be the most significant barrier to student buy-in or institutional implementation.

The literature is also silent on the topic of teaching mindfulness in context. Targeted practice in qigong, observing the breath, or observing physical sensations may build important skills for adolescents, but these skills become valuable in the context of real application. For instance, students could learn breathwork techniques as an integral part of music education, mind-body awareness skills to enhance dance or athletic performances, sustained concentrative skills to improve scientific observation, non-judgmental observation of internal and external phenomena in order to enhance creative writing, or MBSR relaxation techniques for handling emotional flares during in-class debates. Additionally, mindfulness may be a powerful complement to metacognition for adolescent learners. These sorts of applications offer the best opportunities for culturally relevant, developmentally appropriate mindful awareness practices—yet they are, as yet, unmentioned and unstudied in the literature. Future research should pioneer and evaluate in-class applications in order to develop best

practices for teaching mindfulness in context.

Conclusion

This paper explored the question of how mindfulness affects resilience and academic achievement for secondary students, particularly secondary students in adversity. Chapter 1 proposed that this was an important question to study because mindfulness and resilience help citizens to respond meaningfully and effectively to issues of bias, prejudice, and injustice in society.

Chapter 2 offered a critical review of the literature on this topic. While the literature review uncovered little research on the relationship between mindfulness and academic achievement, it uncovered four major research claims about ways that mindfulness affected resilience. The studies reviewed in Chapter 2 presented strong research supporting the claim that mindfulness improves adolescents' attention and executive function, and strong research that mindfulness decreases adolescents' stress and anxiety. There was conflicting and inconclusive evidence that mindfulness reduces anger and aggressive behavior for adolescents. The literature review found that there was emerging evidence from qualitative research that mindfulness improved adolescents' self-awareness and emotional literacy. Chapter 3 began by examining overall patterns in the research, including the demographics of sample populations and patterns in what kind of research studies were conducted. It compared the strongest findings—that mindfulness improved resilience by reducing stress and anxiety—with weaker findings, such as the finding that mindfulness reduced aggressive behavior. It

discussed implications of the research in Chapter 2 for classroom practice of teachers, beginning with words of caution about the limitations of Mindful Awareness Practices and the limitations of the research about them. It discussed overarching principles from the research for implementing effective mindfulness instruction in the classroom, such as the importance of daily practice and developmentally appropriate techniques, and it proposed ideas about ways to integrate Mindful Awareness Practices into the standard core curriculum. Chapter 3 concluded with suggestions for future research on mindfulness in adolescents to examine the effects of gender, developmental maturation, and adversity level; cultural competence in implementing mindful awareness programs; and best practices for teaching mindfulness in the context of meaningful academic curriculum.

Ultimately, this paper proposes expanding the idea of Mindful Awareness Practices to include any exercise that helps people to develop sustained, non-judgmental attention on the unfolding of internal and external phenomena. There is already strong evidence that Mindful Awareness Practices improve adolescents' resilience by reducing stress, improving executive function, and enhancing self-awareness. I have further proposed that teaching mindfulness in context may well improve metacognition and enrich the learning experience for secondary students, particularly for students in adversity. The goal of mindful education is to develop students' resilience, compassion, self-knowledge, and capacity to experience the world more richly.

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