Mindfulness Intervention in Education

Can we address cognitive and non-cognitive deficits of children in poverty at school?

Catherine McColloch

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Abstract

This paper investigates the emerging field of mindfulness-based stress reduction for children, examining current programs to assess potential integration into schools serving children from low socioeconomic status families. It explores existing evidence and considers costs and benefits to evaluate how mindfulness-based programs might empower children in poverty to overcome their disadvantages. The central conclusions are that (1) the current practice exhibits its feasibility with school-age children, (2) teaching mindfulness to disadvantaged children can be effective in reducing adverse reactions to stressors, improving psychological well-being, fostering cognitive skill formation and in enhancing socio-emotional skill and that (3) significant obstacles and costs of the program in the context of poverty exist, but the probable potential that this tool may effectively narrow the education gaps render future expansion of experimental practice critical.

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Introduction

Neurobiology has recognized an alarming connection between poverty conditions in childhood and brain development. Observing the striking research, which indicates that environmental deprivation and stressors alter neurodevelopment in children, Brandon Keim remarks that "poverty goes straight to the brain" (Evans and Schamberg 2009). For children in the United States, the consequences of living in poverty are dramatic and enduring; they appear to degrade areas of the brain associated with cognitive functioning and longitudinal studies suggest that these effects last into adulthood (Duncan, Ariel, and Ziol-Guest 2010). The high plasticity of brain development throughout early life may explain why childhood poverty effects impact lifetime capabilities . Children's brains are both sensitive and malleable. While the sensitivity of a child's brain structure to the environment renders many vulnerable to poverty conditions, the malleability of neurodevelopment during this period may enable early intervention to exert meaningful impact on lifetime capabilities.

Interventional strategies have been considered because of the wealth of evidence that establishes broadly that the experience of childhood poverty degrades cognitive development. Research exploring the various outcomes of childhood poverty conditions concludes that poor children have lower achievement scores, inferior educational outcomes such as dropping out of high school, behavioral problems, mental health problems and worse overall health (Magnuson & Votruba-Drzal 2009). Children at the low end of the socioeconomic status (SES) spectrum (low-income families with less educated parents) have inferior academic achievement and substantially worse educational attainment when compared with their higher SES peers. The deficits in

achievement scores and attainment outcomes among children from low income families with less educated parents are of great concern to society, as school achievement and attainment predict lifetime capability, productivity and well-being.

Studies linking childhood poverty experiences to education outcomes establish that early, deep, and chronic poverty experiences in particular are destructive to the formation of cognitive and non-cognitive skills. Though the causal pathways between poverty and specific outcomes remain blurry, research must explore methods that alter the course of these experiences in childhood. School-based interventions directly aimed at improving the well-being and self-efficacy of children in poverty merit the attention of research and randomized experimental study. Engaging in vigorous examinations of programs directly addressing poverty conditions and aiming to boost the capabilities of children in poverty may uncover mechanisms that reduce educational deficits.

Mindfulness programs account for evidence about the common burden of poverty experiences and seek to enrich the quality of lives and the learning capabilities of children. These programs teach mindfulness, which is most basically a skill of paying attention. One psychotherapist who treats stress-related illness describes mindfulness as:

> being in each moment as it is without judgment or striving and having a kind of [reaction] towards things. It's a relaxed state of awareness that observes both your inner world of thoughts, feelings and sensations, and the outer world of constantly changing phenomena without trying to control anything (Flowers 1).

When targeted at children in poverty, mindfulness aims to train the skill of paying attention to the present moment in order to alter children's responses to adverse environments. Mindfulness, adapted for children in poverty, strives to produce this mental change and seeks to liberate each child from adverse reactions to experience of cumbersome, persistent affliction generated by childhood poverty. This paper presents

the young field of school-taught mindfulness for children as a promising instrument and assesses its curative potential in the context of malleable, sensitive neurodevelopment and harmful poverty experiences. The following analysis explores the possibility of incorporating mindfulness-based programs into schools serving children from low SES families, evaluating existing evidence to determine the viability of mindfulness as a universal antidote that may heal, protect, and empower children in poverty.

Understanding Gaps in Education

Poverty conditions appear to affect education in a remarkable and enduring way. Since 1940s, research has determined that poor children and adolescents have consistently lower achievement and worse attainment outcomes relative to peers from higher SES families. The overall attainment gap equates to greater than one full year of school, and poor children are only a third as likely to complete high school (Duncan, Kalil, and Ziol-Guest 2008; Corcoran 2001). While the attainment gap is substantial in size, the persistent growth in the gaps between children from low and high SES families in reading and math test scores are alarming. An assessment tracking nineteen nationally representative studies measuring the achievement gap estimates that the achievement gap between children from families at the 10th percent of the income distributions and those from families at the 90th percentile has widened approximately 40-50% over the past 50 years. The gap's growth is quite meaningful because scholars because it has lasting repercussions, but also considering the magnitude of growth, as the size of the gap has grown from .75 to 1.5 standard deviations, (1 standard deviation representing roughly three to six years of a child's learning in middle or high school) (Reardon 2011).

Studies suggest that increasing income inequality contributes to the widening gap in achievement and attainment, but the substantial intensification in the link between family income level and academic achievement may explain much of the pattern of growth (Reardon 5). While it is unclear why differences in family income explain greater variance in education outcome, the related gap in education outcomes is evident, as are the consequences of these disparities.

The persistence of a considerable gap in educational achievement and attainment in the US engenders debate over potential causes of unequal outcomes. A large body of literature exploring the determinants of the persistent gap in school achievement communicates that poverty experiences inhibit learning. According to a wide array of evidence from neurobiology, psychology and economics, poverty experiences degrade educational opportunities, especially if they occur in early childhood years (Duncan et al 1998; Heckman 2007). While there are a multitude of proposed contributors to the gap, research uncovers the most probable family and societal factors to be parental education, family structure, financial insecurity, trauma, abuse, domestic and neighborhood violence, poor nurturing environment, and race (Lee et al 2002; Hart, B. & Risley, T. 1995). At school, children in poverty experience low teacher expectations, larger class size, less educated teachers, inadequate mental health resources, and often develop learned helplessness from accumulated deficits. While each of these factors have strong theoretical backing, empirical research points to the overriding significance of class size, race, mother's education, and family income in explaining school achievement (Kreuger 1999). Low-income children are significantly more likely to be minority status, grow up with less nurturing and interactive parenting, experience larger class sizes in school, and

suffer from resource scarcity. The adverse manifestation of educationally significant variables in these children's lives appears to hamper achievement and fuel the gap.

Each of these poverty-related circumstances at home and school produce an ongoing chronic stress burden that children carry throughout day-to-day experiences. As they ruminate about past troubles and anxiously anticipate future events, these children are much less capable of concentrating their attention in the classroom in order to process and retain information and concepts. Physiological strain and emotional turmoil from poverty degrades the development of both cognitive abilities and good "soft skills," which are both strong predictors of future success and well-being (Heckman 2007).

Evidently, children accumulate deficits in both cognitive and non-cognitive ability, two critical determinants of productive learning, development and educational success (Heckman 2011). Magnuson and Votruba-Drzal (2009) explore the consequences of childhood poverty and find that poor children on average struggle more with inadequate self-regulation, behavior problems, anti-social behavior and mental health problems. Teachers report that externalizing behavior problems are especially prevalent among these disadvantaged children. Considering the nature of their struggles, it appears that an intervention that fosters empathy, emotional regulation, attention, and self-efficacy may be an appropriate way to address the particular socio-emotional difficulties experienced by children in poor families.

A wealth of evidence indicates that while growing up in poverty, children accrue an encumbrance of stressors that degrades their capability to learn effectively at school. Children in poverty are born in low-income families with less educated parents who likely lack adequate resources to invest in their child's development and who are also

suffering from a multitude of stressors. In the absence of change or intervention, the gaps in achievement and attainment will persist and continue damaging capabilities into the future.

Closing the Gap: Past "Interventions"

As various leaders perceive the disturbing educational deficits, some have attempted addressing the widening income achievement gap with school-directed interventions. The US government aimed to reduce education outcome inequalities by standards-based education reform that increased school accountability, choice and flexibility with *No Child Left Behind* (NCLB). Part of the investment involved the Reading First initiative, an early reading program involving a program that identifies schools with a high number of children at risk for reading failure and provides these schools with an array of evidence-based reading programs to uncover effective methods for investing in early childhood literacy. While this particular program—as it seeks to directly enrich early capabilities and prevent deficits from emerging—demonstrates a small step in the right direction, preliminary evaluation of the central NCLB policies suggests that the core of the program does not directly operate to reduce the gap and may produce perverse incentives for schools and states. Assessing the early aftermath of NCLB policy changes demonstrates that federal strategies that fail to significantly alter the design, content, or quality of what is taking place inside the classrooms likely have ambiguous effects on the quality of learning in the classroom.

As agents in government and in the private sector hesitate to directly intervene inside the classroom, the gaps in education continue to corrode future human capability. Evidently, both individual and societal costs of the widening gaps are considerable and

long term. Beneath economic and societal concerns, the gaps most directly and permanently punish individuals who were by chance born into disadvantage. A strong collection of empirical work investigating the achievement gap demonstrates that it inflicts damages primarily during years when these ill-fated individuals lack a political voice (Heckman 2008). This achievement gap selectively degrades capabilities of those who neither influence their SES position nor control their fate in the policy realm.

Evidently, when a child is born in the US to a low SES family, he or she cannot expect a fair or equal opportunity to develop learning capabilities. Evidence suggests that the injustice starts even before birth when environmental and social factors associated with low SES affect maternal health and degrade the fetus' maturation in the womb, reducing future health and well-being. These effects often last into adulthood (Nagahawatte and Goldenberg 2008). As society considers intervention to avoid societal costs and to reduce suffering of underserved children, it is critical to understand that this requires effective investment that changes how poverty affects brain development.

Cognitive and Non-cognitive Deficits among Children in Poverty

To determine what type of intervention may alter the course of development during childhood poverty, it is necessary to review the particular needs and problems that these children face. As the gap in education outcomes exhibits, children in poverty have substantial cognitive skill deficits. In both reading and math, it appears that poor children have struggled to acquire skills deemed appropriate for their age. Research exploring the determinants of the achievement gap considers a wide range of potential causal factors. While it is not clear what exactly causes these deficits, it is relevant to note that these

cognitive deficits are sizable and that an intervention must actually work to improve student's learning abilities.

It is important to perceive that learning abilities are not defined by cognitive skills alone. Non-cognitive abilities such as motivation, effort, and attention also play a role in driving learning and achievement. Nobel laureate and prolific economist James Heckman analyzes the dynamics of skill formation and regularly notes that skill begets skill. His work establishes that early investment that builds initial abilities greatly enhances the productivity of skill formation (Heckman 2011). Heckman examines education outcomes as a product of cognitive traits, non-cognitive traits, parental investment in child, and the environment. Apparently, a lower cognitive skill base likely reduces motivation and self-efficacy, degrading child's learning ability. In the case of cognitive deficits among children in poverty, it is probable that worse cognitive skills decrease psychological well-being. Research suggests that cognitive and non-cognitive skill deficits together reduce the productivity of learning (Caprara and Scabini 2009, 420). An intervention aiming to directly close the gaps must address how both types of deficits interact and negatively impact learning capabilities.

While an individual child's inadequate performance at school likely hurts his or her motivation and effort to learn, economic factors and family structure may also deter beneficial learning behaviors. Parents who endure poverty conditions often exhibit behaviors that transmit to their children the view that they do not have control over life events (Ingrum 74). Indeed, when Coleman and Deleire (2003) examined these values among disadvantaged youths they found that the students who report multiple stressful experiences during their childhood are more likely to adopt the "no control over life"

mindset, reflecting low self-efficacy. Children who assume this perspective were significantly less likely to complete high school. Given these findings that expose the wide range of deficits prevalent among children in poor families, an intervention must specifically address cognitive development, psychological well-being, and less nurturing, more stressful family environments.

Mindfulness: Fit for Children in Poverty

Even with the preponderance of evidence from multiple fields demonstrating that poverty endows vulnerable children with harmful conditions that degrade their learning capabilities, education policymakers have not come to consensus to address causal factors related to poverty. They fail to effectively intervene in poverty-related circumstances that contribute to the gap. Whatever forces might be driving the deficits, the far-reaching consequences of the gaps in achievement and attainment render examination of fruitful strategies for intervention critical. Neurological evidence detailing the processes through which a broad range of experiences in childhood poverty impair lifetime cognitive capabilities calls research to aggressively pursue tools that have capacity to empower children to learn in the midst of turmoil (Farah et al 2006).

One unique instrument that scholars, teachers and scientists are currently collaborating to develop strives to directly interpose in how poverty circumstances affect children by building in them the capability to regulate their response to experiences. This tool, mindfulness, is generally understood as the learned skill of managing attention (Semple 219). Learning this skill strengthens attention networks and enables an individual to mindfully observe life and to "decenter," or separate, from his or her

automatic cognitive, affective, and physiological responses to stressors. Leaders in the practice have adapted mindfulness training to fit the developmental characteristics of children. In the past decade, several programs have emerged across the US that are shaping mindfulness to effectively reduce stress and improve attention among the general population of children. Several innovative programs are now beginning to test the feasibility and efficacy of mindfulness-based intervention for disadvantaged children in particular and are accumulating evidence to support winning strategies. Though the field remains fragmented and not fully directed by hard evidence, mindfulness for children in poverty is a unique and promising instrument that has great potential for altering the path of underserved children.

Adults and adolescents suffering from anxiety and depression commonly practice the useful techniques of Mindfulness-Based Stress Reduction (MBSR). Evidently, the basic tools of adult and adolescent mindfulness are exceptionally suitable to address the cognitive and non-cognitive deficits specific to low SES children. These children suffer greater instance of behavior problems, attention deficits, emotional instability, anxiety, and physiological wear from chronic stress. Mindfulness practice specifically trains attention skills, emotional regulation and fosters self-efficacy through greater school achievement and the transformative self-awareness of "in the moment" brain processes such as the stress response. Adapting modern mindfulness practices to treat children in poverty is a young but hopeful endeavor. A host of programs across the nation that are testing its efficacy supply a base of significant, positive outcomes in support of their strategies.

After considering the specific problems that poor children disproportionately face, it is clearer how mindfulness may directly enhance the learning capabilities and well-being of these children. While hundreds of schools currently experiment with mindfulness programs adapted for children, Buddhists and other spiritual groups that incorporate contemplative traditions have benefited from a similar practice of mindfulness that hones concentration skills, fosters compassion and cultivates self-knowledge for two and a half thousand years (Fronsdal, 2006). In the past three decades, however, scholars and teachers in the United States have exercised a secular form of mindfulness that this paper examines. While secular forms of mindfulness practices have proven effective in randomized clinical studies, mindfulness for children remains a pioneering movement in the scientific community. I will next describe mindfulness in greater detail and continue to unravel how the processes of mindful observation and reflection may empower children in poverty.

Exploring Mindfulness

Contemporary practitioners define mindfulness as the skill of focusing attention on moment-to-moment experiences with a quality of open, nonjudgmental awareness and a general acceptance of mental states and processes. Mindfulness meditation practices cultivate this skill by strengthening capacity to attend to the current moment in this particular fashion. Though meditation serves to strengthen the skill, practicing mindfulness in daily life simply involves paying attention to one's flow of thoughts, emotions and sensations throughout the day. Paying attention nonjudgmentally requires one to refrain from engaging in evaluation about thoughts, emotions, and sensory

experiences. By enabling an individual to refrain from attaching negative or positive judgments to experience, mindful observation allows the individual to perceive life with an orientation of curiosity and openness to new experiences. By "decentering" from the automatic reactions to experiences, one can practice and become skillful in separating experiences from the affective or physiological reactions that are otherwise conditioned and often destructive to cognitive development and psychological well-being.

This process in particular may be most helpful to children living in low SES families, who have likely endured traumatic or painful experiences in the past and likely suffer greater instance of anxiety about future events. Mindfulness may enable children in poverty to control their own physiological experience and psychological states. By self-regulating response to experience, these children might internally overcome circumstances that may otherwise trigger harmful physiological, affective, and cognitive reactions (Semple et al 220).

While this skill bolsters these constructive attitudes during a given moment, mindfulness also deepens awareness of what is actually happening inside the brain during each moment. Adults and children practicing mindful awareness often report a shift in their relationship to thoughts, emotions and sensations. While those practicing and teaching mindfulness provide insight and interpretation about these processes, the scientific understanding of mindfulness and the potential mechanics through which it operates to effect brain development are still of great focus of modern neurological research. By examining the small amount of evidence that has accumulated and by drawing knowledge from leaders currently implement mindfulness in schools, it is

possible to evaluate mindfulness as an intervention in the degrading forces of childhood poverty.

Recall that mindfulness instills an enhanced awareness of what is happening inside the brain and of how activities in the brain affect the body. Armed with this awareness of how internal response to experiences influences physiological processes, one can strategically responding to thoughts and feelings in a way that reduces psychological distress and damage from otherwise harmful experiences (Jones 2011).

Moreover, mindfulness may enable persons to essentially "train their own brain," as neuroscientists now understand that self-directed thought and emotion has the capacity to sculpt neural circuits. Research in brain development indicates that mindfulness-based stress reduction strengthens brain connectivity in the areas of attention, sensory perception, and reflective awareness (Kilpatrick et al 2011). Several similar varieties of mindfulness practice— which all exercise the ability to attend nonjudgmentally to the current moment with awareness and acceptance— prove to reduce stress, foster attention skills, and improve emotional regulation among adult and adolescent populations. For adults and adolescents, Mindfulness-based Stress Reduction (MBSR) is a robust tool that appears to systematically fortify attention, self-awareness, and emotional regulation in adolescents and adults.

Evidently, mindfulness targets the specific cognitive and non-cognitive deficits particular to children from poor families: attention and learning capabilities, self-efficacy and motivation, emotional regulation, mental health and social skills. Mindfulness practices typically first train attention with mindful awareness and meditation exercises. It then progresses to enhance awareness of bodily sensations, mental processes and the

environment. With these skills and knowledge, mindfulness focuses on developing compassion for self and others.

While developing attention skills directly enriches self-efficacy and the ability to acquire cognitive skills and knowledge, socio-emotional skills may enhance a child's ability to understand others and gain social support. Reflection and emotional regulation practice evokes understanding of the child's internal processes and advance that child's perception of these processes in others, thereby promoting empathy well-being and social support. Children growing up in low SES circumstances often possess lower self-efficacy and an external locus of control which is essentially a problematic perception that they do not have effective power to control or determine events. Mindfulness instills values of self-worth and self-efficacy, two fundamental beliefs that poor children often lack.

While mindfulness appears to address the appropriate needs and issues specific to children in poverty, a close assessment of the leading programs provides the preliminary substantiation of whether mindful intervention actually works and uncovers an array of critical requirements that may ensure the feasibility and efficacy of mindfulness as a school-based intervention.

Program Variations

MindUP™

In 2003, the Hawn Foundation founded MindUP™, a socio-emotional learning program for schools, with the concerted effort of cognitive neuroscientists, positive psychologists, educators, and researchers examining problems in the education world.

They designed a curriculum with the purpose of strengthening attention skills, fostering awareness about their sensations and the environment, and then building capacities for positive behaviors. The curriculum begins with teaching the children about their brains and how they can engage in mindful attention and awareness and next develops awareness of senses. Last, the lessons focus on perspectives, empathy and applying mindfulness to relationships. The Hawn Foundation promotes MindUP™ as easy for teachers to implement and to integrate into daily curriculum. This team created three levels of the program to fit the developmental qualities of different age groups, offering Pre-k through second-grade, third through fifth, and six through eighth grade. Though there are a number of grants to cover part of this fee, the curriculum and training workshop is priced at $5,000 per school. The Hawn Foundation supports each school and sends consultants after one year to insure that the objectives of the program are met.

Hawn recognizes that "stress blocks learning" and notes in her discussion with Dan Siegel about MindUP™ that when children experience stress, the midbrain is over activated, the prefrontal cortex or executive function that is central to cognitive processes is blocked and not open to learning (TEDMED 2009). These areas in the brain are vital to learning processes. By teaching children about their brain, fostering awareness of senses and by enriching perspectives, Hawn seeks to enable children to overcome stress, learn, and become more empathetic and optimistic.

As the program strives to effectively stimulate productive learning and cultivate well-being, the Hawn Foundation sponsors research and evaluation of the schools implementing the program. Compared with the control group, students who participate in MindUP™ exhibited greater regulation of cortisol levels, more prosocial behaviors,

increased optimism, and greater gains in reading and math achievement scores (Diamond Adele). After preliminary review, MindUP™ appears effective in reaching its goals. With over 200 schools participating in the US, this growing program can advance the field of mindful education for children in poverty by offering evidence to guide future program development.

Inner Kids Program

Susan Kaiser Greenland is a leader in the movement to develop secularized mindfulness practice for children and has contributed much to the field as founder of the Inner Kids program associated with the Mindful Awareness Research Center at UCLA. She began her work adapting her own practices for her children and then built the developmentally appropriate, secular Inner Kids program by drawing from established classical techniques and by incorporating knowledge from neuroscience and clinical psychology. Greenland proposes that, given the evidence from brain science and modern psychology about how the brain develop, a focus on reading and math in school does not enrich the development of the whole child. She proposes that we teach the new ABC's—Attention, Balance, and Compassion—in order to cultivate awareness and strengthen compassion for self and for others. The program targets children from Pre-Kindergarten to 12th grade. The program sessions are 30 minutes, twice per week for eight weeks for the younger children and 45 minutes, twice per week for ten to twelve weeks for the older children. Inner Kids was integrated in schools in Los Angeles starting in 2000, and has expanded to several other locations.

The program approaches teaching children to practice mindfulness first with attention training and awareness. It then engages children in activities that evoke self-

understanding of sensation and emotion awareness. Last, it develops compassion and an understanding of the interconnectivity of self and others. While Greenland and her team implement the program in several schools, she continues to improve and develop the program design. Though she provides no estimates of program costs, her insistence that teachers implement only what they already know and practice themselves, indicates that effective teacher training is a necessary cost and that the program may be more costly than MindUP™.

A randomized control study evaluated the effectiveness of this program for children ages 7-9 and measured improvements in behavior regulation, metacognition, and executive control among low executive function children participating in Inner Kids. Executive function is the critical neurocognitive system in the prefrontal cortex that directs cognition, goal-driven behavior, planning, and impulse control. Studies examining the neurocognitive correlates of SES demonstrate that low SES children have executive function deficits (Noble 2005, 75). The results from statistical analyses of teacher and parent reports specify that children with low baseline executive function before the program execution exhibit greater improvements in cognitive functioning. While the Inner Kids program has not been adapted to address the circumstances that children in poverty face, this preliminary evidence of its efficacy in treating the deficits most prevalent in populations of low SES children indicates Inner Kids probable potential to enrich their cognitive capabilities.

Mindsight

Neurbiologist Dan Siegel, M.D., contributes to the field of mindfulness a clear and science-based understanding of the power of self-directed attention to alter the structure of connections in the brain. In his innovative field of interpersonal neurobiology, Siegel integrates a diverse array of academic disciplines to inform Mindsight, his term representing skills that cultivate socio-emotional intelligence. Siegel proposes that intentional socio-emotional learning and reflection inherent in mindfulness programs integrate separately functioning sections of the brain to each other through the forging of synaptic connections. These connections are strengthened by self-directed skill development. He translates neurological understandings about how self-reflection and mindfulness can generate increases in synaptic connections allows the more complex, higher order thinking and learning to occur. He also explains how the "safety/danger" physiological response that originates in the brain can reduce cognitive functioning, referring to the natural reaction to danger (fight or flight activation) that systematically shuts off the areas of the brain where learning takes place. By "activating the 'safety' response within one's own experience," self-induced mindful attention may equip children to evade the consequences of stress from poverty and enables them to think clearly and learn.

Additionally, Siegel explores how becoming self-aware through mindful reflection can foster relationships and resilience. He informs us that mindful reflection exercises activate and strengthen the same region of the brain that governs compassion and the capacity to understand others' perspectives and feelings. By improving self-awareness through mindful observation and reflection, mindfulness and Siegel's

mindsight skill may contribute a constructive source of strength to children in poverty: ability to develop relationships and derive resiliency through social support.

While Siegel directs Mindsight to a large audience, it is clear that his system is incorporated in the self-awareness and reflection elements of MindUP™ and Inner Kids. Siegel's efforts to clarify neuroscientific understandings enable scholars from multiple fields to recognize how mindfulness and mindful reflection can strengthen synaptic connections in the brain. Siegel explains that while genetics determine the actual alignment of neural cells, experience establishes the neural communication networks that are vital to processes of the mind. Since a child's experience depends on his or her reaction to and perception of life events, mindful awareness and reflection may enable children in poverty to transform their reaction to adverse environments in order to facilitate educational success and to allow relationships to thrive.

Consensus: Critical Components

Siegel, Greenland, and Hawn's work all inform the field with their deep comprehension of the process by which the practice moves beyond the simple exercises in the program to help disadvantaged children. Essentially, mindfulness grows in influential power as it infiltrates the child's brain and life, as (1) mindful attention reduces harmful reactions and improves psychological well-being, as (2) this altered, safe perception fosters cognitive skill formation, and as (3) reflection stimulates empathy for others and enhances social skills. Each of the pioneers in the movement contributes key insights that, in concert, generate a more solidified view of mindfulness for children in poverty. I will first explore the consensus emerging from the structure of the programs

and their activities, then discuss what they agree on as critical elements that must be involved for a successful intervention.

All three programs focus first on building the capacity to regulate attention and introduce this objective with breathing exercises that seek to calm restless minds, reduce physiological arousal and foster open, receptive attitudes. Children's minds in the daily experiences of poverty are clouded by numerous environmental and social stressors that trigger the physiological arousal that impedes learning and the psychological distress that reduces well-being (Evans and English 2003, 1238). Greenland refers to these stressors as the "mental chatter" of anxious thoughts and explains that beneath the distress, a clear, peaceful natural state does exist. Breathing exercises enable a child to overcome anxiety responses and reach that state, primarily by focusing awareness on the breath and observing how the breath relaxes the body and mind (Greenland 70). These breathing practices also enhance the child's understanding of the connections between the brain and the body. In "The Mindful Child," Greenland offers helpful techniques that she uses to explain this process to children of different ages.

Greenland examines her direct experience in developing and improving her own program for children and recommends that teachers focus on simplicity and fun during activities. She also strongly suggests that teachers only instruct children on what exercises they already practice and know from direct experience" (Greenland 52). She supports teachers of any level of mindful practice to teach their children to the level of depth or complexity that they currently practice, even if it is only the breathing exercises.

Both Greenland and Siegel communicate that teachers of mindfulness programs must also themselves practice mindfulness. Essentially, the teacher's practice informs

their instruction and enables them to understand and gage how children are experiencing the practice. Additionally, teachers who practice the techniques may integrate forms of mindful awareness into their own curriculum. According to teacher reports from a school implementing MindUP™, incorporating mindful awareness techniques into the core curriculum improves their ability to engage students and appears to enhance productivity of learning in the classroom.

According to this review of the emergent programs and some preliminary empirical evaluation, mindfulness seems to directly serve children in poverty as it enriches cognitive development, enhances psychological well-being, increases optimism and beneficial social skills. Nevertheless, this field remains young and program costs and potential limitations are critical to address if we are considering further investment in program expansion and development.

Costs & Potential Obstacles

Given the extant accumulated evidence on efficacy of programs in the public school system in the US, further investment in the near future must employ a randomized method and establish mindfulness in a nationally representative series of public schools. Expanding experimental implementation of mindfulness programs at schools across the nation will require certain investments to maintain a similar level of efficacy as is measured in current treatment groups. Training teachers in the practice is likely the largest, most necessary cost of scaling these programs. Total teacher training costs will likely be roughly $125,000 if we extend a program like MindUP™ to 25 new schools.

The actual materials and curriculum for the programs are relatively inexpensive and various foundations and grants may cover full material costs.

Some costs are more difficult to quantify. One potential psychological cost associated with teaching children in poverty to practice mindful awareness is that physiological responses to traumatic or violent experiences may serve to protect children in the moment. Additionally, as mindfulness trains attention and self-awareness, it also fosters acceptance of life circumstances with the purpose of mitigating the internal conflict that arises when life is perceived as unjust. Considering the injustices endemic to childhood poverty experiences and the rising income inequality in the US, perceptions of injustice may be quite accurate and difficult to detach from and to "observe nonjudegementally."

Given these risks, developers in this field must design a tactical practice of mindful awareness to fit the realities of poverty. The programs must develop lessons that emphasize that mindful awareness fosters acceptance, but not powerlessness or helplessness during life circumstances. Rather, by freeing children from reactions, they may respond to situations with greater intention and effectiveness. Additionally, programs must train a child to differentiate between truly dangerous moments from those that mindfulness strives to ease- those moments filled with past trauma or future anxiety. Surely, the latter moments are prevalent enough that mindful awareness and meditation has valuable potential to alleviate the burden of past and future turmoil that often crushes the moment-to-moment experiences of poor children.

Key Benefits

A focus on developing soft skills through mindfulness programs generates three benefits. First, strengthening attention and socio-emotional skills likely increases the efficiency and effectiveness of learning in the classroom. Second, equipping children with abilities to regulate their responses to environments and building their skill level both contribute to greater self-efficacy. Finally, by cultivating greater socio-emotional skills and stronger attention networks, mindfulness programs may play a central role in shaping later life outcomes. A wealth of evidence demonstrates that soft skills are strong predictors of future labor market outcomes and also life outcomes such as involvement in crime and health status.

Teachers that build the program curriculum into their daily routine report that the lessons and practices, because they are relatively short and not disruptive, do not significantly detract from core curriculum instruction. MindUP™ teachers reflect that the enhanced attention and engagement from the daily activities and lessons on socio-emotional skills often increase the productivity of learning throughout the school day.

There are a large host of potential social, psychological, and cognitive benefits of an effective program targeting this population. These improvements stem from the process defined earlier by training attention in moment-to-moment experience, decentering from the reaction, and altering perception- which fundamentally will change the child's experience, experience that shapes the brain. Outlined below is the mechanism by which mindfulness may uplift and empower children in poverty.

The most basic and central skill that mindfulness cultivates is attention, and programs adapted for children strategically fortify this skill by shorter practice and increased repetition. Dr. Siegel has elucidated how this self-directed attention practice

can strengthen neural synaptic connections to rewire the brain. In review of early discussion, by activating the "safety" circuitry, a child is no longer disabled by the natural reaction to danger and can effectively enrich participation in learning activities at school. Considering its function, mindfulness has potential to intervene in the forces of poverty that disengage children from learning experiences. Ultimately, mindfulness appears a promising instrument for improving the cognitive capabilities of children at the low end of the gaps in education.

Another advantage that mindfulness may provide to children in poverty is social skills. The same circuitry that mindfulness activates and fosters with reflective awareness is essential circuitry in engaging in compassion for others in relationships. With reflection practice, kindness, empathy and compassion can actually be cultivated. For children in poverty, enhanced social skills and relationships may work to increase social support, which fosters resiliency.

Implications for Continued Practice & Assessment

Examining the current body of research, it is evident that early stress from poverty conditions directly impairs learning capabilities in childhood. Although experimental programs training attention and mindful awareness appear promising, one empirical study examining the influence of early attention skills on achievement in Kindergarten indicates that these skills do not contribute to cognitive skill formation among children at or below 185% of the poverty line (McColloch, 2012). The study also uncovers the overriding significance of mothers' education and attachment relationship, and finds that a great majority of children in poverty have less educated mothers and relatively lower

instance of secure, healthy attachment relationships with their primary caregiver. These results cast doubt upon the efficacy of mindful attention training as a singular intervention that will reduce educational deficits among children in poverty. Mindful interventions may necessarily incorporate parent-child workshops in order to successfully nurture learning capabilities among children in poor families.

While studies examining how attention and socio-emotional skills contribute to academic achievement offer mixed results, the small collection of empirical studies reviewed below suggests that mindfulness reduces stress and can produce valuable changes in cognitive and socio-emotional areas of a child's brain. However, these studies focus on specific cohorts of children in private or nonprofit school settings and do not generate strong implications for the general population of children in poverty who attend public schools across the nation.

While we cannot yet determine that current programs will effectively close the gaps in attainment and achievement, the existing research assessing mindfulness for children in poverty strongly supports program expansion and innovation. Both qualitative and quantitative analyses demonstrate that the students learning mindfulness are gaining valuable skills (Semple, 2009; Schonert-Reichl Lawlor, 2010). Personal experience with the research and also observational experience with mindfulness activities and lessons in the classroom motivates the author of this paper to suspect that these programs are indeed effective. At the J. Erik Johnson Community (JEJCS) in Dallas, Texas, I engaged in data analysis evaluating the implementation of their first session of MindUP™. Over just a six month period, children in the three year old class up to 5th grade exhibited significant gains in emotional control. The younger children

demonstrated the most meaningful improvements. One first grader attending JEJCS expresses in a reflection journal that, in response to stressors:

> You should take 3 deep breaths. If you want to feel happy you have to calm down. If you want to feel happy remember a thing that was a happy day. If you want to feel happy you have to remember something happy.[1]

This young child refers to a lesson on mindful reflection, where children learn that reflecting on joyful memories can trigger the release of dopamine in the brain that elevates feelings of happiness and fosters motivation for rewarding behaviors. When program leaders evaluate the large body of qualitative evidence from self-report data, they conclude that most young children do understand the power of mindful breathing and reflection. Although the observed outcomes from MindUP™ at JEJCS are encouraging, the non-randomized style of program implementation restricts the external application of the evidence.

While parent, teacher, and child report data are instructive, assessment that can establish program efficacy and guide policy implications likely requires quantitative investigations confirming educationally meaningful improvements in mindfulness skills among children representative of the general population of children in low SES families. Psychologists recently developed the Child and Adolescent Mindfulness Measure (CAMM,) an instrument that enables research to obtain quantitative evidence on program efficacy in fostering child age mindfulness skills (Greco, Baer & Smith, 2011). Armed with the tools for measuring mindfulness skill development, randomized control studies can in the future establish external validity of program evidence that may direct policy to extend effective mindfulness programs to children from low SES families.

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[1] Spelling corrected by Heather Bryant of JEJCS

All in all, mindfulness programs have great potential, as they harness revelations from neuroscience and psychology to intervene in the chronic stress experiences that impede learning among children in poverty. Evidently, mindfulness strives to directly alter the neurological consequences of childhood poverty by strengthening individual children who face adverse environments. As current literature exploring determinants of education gaps emphasizes, children in poverty face a multitude of challenging circumstances and they will likely struggle to grasp the tools of mindfulness without effective teaching. Evidence may uncover that child mindfulness programs as effective in concert with parent or teacher programs that enable children to practice mindfulness and truly exercise control over their moment-to-moment experiences. If future evidence supports the integration of mindfulness programs into schools serving children in poverty, these children can develop higher self-efficacy and an enhanced self-awareness. Children growing up in poverty may then confidently separate from turmoil endemic to poverty and achieve educational success, more positive future life outcomes, and greater well-being in the future.

Grade A- Catherine, you effectively set up the issue of the achievement and attainment gap and the possible causes of this gap. You note that the problem includes stressors and lack of self-efficacy in areas beyond cognition, thus making it possible that "mindfulness" might address the causes of the gap. You also explain the neurology and psychology in simple terms, and show "mindfulness" addresses it. You consider several programs, including one you personally experienced, that might be effective in addressing these problems. You see the need for empirical evidence, not just that "mindfulness" can make a positive difference for some children but that it can make a

difference for lower SES children and actually close the achievement and attainment gaps. You even consider in passing that the difference in the cohorts may be attributed to the home environment, which "mindfulness" might or might not be able to address with specialized communication and relationship with parents. The weakness of the paper come at the end where you do not set up the kind of empirical testing that you think needs to be done in order to measure the success of failure of "mindfulness" in closing the gap. It is not enough to say that it provides some benefits because you set up the entire paper to test whether it could close the gap. I think you might have identified the biggest problem for it and for all school reforms. How do they address effectively the home environment, a special and significant barrier to closing the achievement and attainment gap. Of course, any such randomized program would have to be longitudinal to get at achievement over time to evaluate attainment at all. Good paper. I have learned a lot. Think about how we might take that next step to set up randomized experiments that would really test your hypothesis.

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