

EMOTIONAL WELL-BEING

Emerging Insights
and Questions for
Future Research



Roundtable Meeting Report
April 3-4, 2018

**National Center for Complementary and Integrative Health
Office of Behavioral and Social Sciences Research**

National Institute on Aging

Eunice Kennedy Shriver National Institute
of Child Health and Human Development

National Institute on Drug Abuse

National Institute of Mental Health

Emotional Well-Being: Emerging Insights and Questions for Future Research

Report of a Roundtable Meeting

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Bethesda, Maryland

**National Center for Complementary and Integrative Health (NCCIH)
Office of Behavioral and Social Sciences Research (OBSSR)
National Institutes of Health (NIH)**

Background and Introduction

Emotional well-being has been defined as an overall positive state of one's emotions, life satisfactions, sense of meaning and purpose, and ability to pursue self-defined goals.¹ Elements of emotional well-being include a sense of balance in emotion, thoughts, social relationships, and pursuits. The relative importance of each construct will vary across subpopulations and developmental stages.

Longitudinal studies have demonstrated a strong correlation between overall emotional well-being and health. For example, emotional well-being has been shown to be associated with reduced risk of death from all causes by almost 20 percent among healthy people²; while having a sense of purpose in life reduces the risk of heart attack and stroke by 17 percent.³

Emotional well-being has been examined across the life course, from birth through older age. High school girls with high emotional well-being are 70 percent less likely to take up smoking than their peers⁴; and older adults with positive emotions are 36 percent less likely to develop mobility problems than their peers.⁵ Prevention studies, particularly in childhood and adolescence, have established that it is possible to intervene on risk and protective factors for children^{6,7}; and change developmental trajectories^{8,9} with long-term effects^{10,11} on a broad array of behaviors¹²⁻¹⁴, including behaviors not specifically targeted by the intervention¹⁵⁻¹⁷ and positively affecting neurobiological outcomes.^{18,19}

Interventions to promote emotional well-being are being explored in many ways, for example, to improve development across the life course, from early childhood through older adulthood, and to decrease burnout, stress, and mental health problems in at-risk populations. Examples include mindfulness-based interventions implemented to improve preparations for childbirth²⁰, improve social-emotional development in grade school children²¹, and reduce burnout and improve social emotional development in teachers.²²

Increasingly, interventions such as mindfulness practices, enhanced psychosocial supports, spiritual interventions, and meditative exercise are being explored as strategies to improve emotional well-being across the life span. Better understanding and implementation of the approaches for developing emotional well-being, both as a mediator of other health outcomes or as an end, can substantially affect public health.

Goals of the Roundtable

To gain a deeper insight into the existing research on the role of emotional well-being in health and the implications for public understanding, NCCIH and OBSSR, in collaboration with other NIH institutes, centers, and offices,¹ cosponsored a roundtable discussion with the goal of advancing research in this area. Its focus was on issues in developing, testing, and implementing intervention strategies to promote emotional well-being. Presentations focused on models of success, identified as follows:

Interventions that either produced better health outcomes through promotion of emotional resilience, including cases in which: (1) a component of emotional well-being is explicitly identified as the intervention target, or (2) a change in emotional well-being is found to be a mediator of change in health, or (3) interventions in which improvement of some aspect of emotional well-being itself was the desired outcome.

Roundtable participants were asked to discern common themes across the models of success with the goal of identifying research gaps and opportunities for NIH's consideration. (See Appendix A for a list of participants and Appendix B for the models of success selected for the deliberations.)

Proceedings of the Roundtable

Welcome and Introductory Remarks

David Shurtleff, Ph.D., Acting Director NCCIH
Emmeline Edwards, Ph.D., Director, Division of Extramural Research, NCCIH
William Riley, Ph.D., Director, OBSSR

Drs. Shurtleff, Edwards, and Riley welcomed participants and acknowledged the support and participation of other NIH institutes, centers, and offices.

Dr. Shurtleff referred to the NCCIH Strategic Plan, which focuses not just on disease prevention, but also on health promotion. One of its objectives focuses specifically on the need to advance understanding of the mechanisms through which mind and body approaches affect health, resiliency, and emotional well-being. This is especially critical to improving public health, as average stress levels in the United States are rising. According to the American Psychological Association's (APA's) 2017 annual stress survey, one in three Americans say that their stress had increased in the past year.²³ The scientific community can promote public health through advancing our understanding of the mediators of emotional well-being and how interventions across the lifespan can promote them.

Dr. Edwards emphasized the need for mechanistic research to build fundamental understanding of the components of emotional well-being at different ages and among key subgroups. This then

¹ National Institute on Aging, Eunice Kennedy Shriver National Institute of Child Health and Human Development, National Institute on Drug Abuse, National Institute of Mental Health

may facilitate the development, testing, and implementation of population-level interventions. Improved understanding and implementation of the approaches for developing emotional well-being, both as a mediator of other health outcomes or as an end, can substantially affect public health.

Dr. Reilly invoked the Vulcan greeting of Star Trek's Mr. Spock, "Live long and prosper," to make the point that NIH has historically focused on living longer, but not as much on prospering. There is an opportunity for all NIH institutes, centers, and offices to increase their focus on emotional well-being and quality-of-life issues as a critical component of health promotion and disease prevention.

Roundtable Concept – Goals and Discussion Framework

Roundtable Cochairs: Richard Davidson, Ph.D., University of Wisconsin-Madison, and Bruce McEwen, Ph.D., The Rockefeller University

Dr. Davidson reviewed the framework for the roundtable discussions, emphasizing the need to understand the science of emotional well-being. Reviewing models of success, the focus of this roundtable, can uncover the key elements, determinants, and features of emotional well-being or the lack thereof, such as positive and negative emotions, social connections, and sense of meaning and purpose. He encouraged participants to think about the core constituents of emotional well-being, from the molecular to the behavioral to the social levels. What are some of the proxies of emotional well-being and how can they be measured? What study designs can be used to isolate the active key ingredients of emotional well-being?

Dr. McEwen added that the brain is much more resilient and adaptable than previously believed. We know that adverse early life experiences can have long-lasting effects on brain development, learning, and memory, as well as on physical health. And while we cannot "roll back the clock" on these experiences, we can identify how interventions that reduce stress or improve emotional well-being affect the structural plasticity of the brain.

In sum, participants were encouraged to focus on the developmental perspectives and key elements of emotional well-being amenable to change at transition points across the lifespan.

What Do We Know About the Assessment of Subjective Well-Being and the Relationship with Emotion/Affect?

Arthur Stone, Ph.D., University of Southern California

In a plenary address, Dr. Stone noted that various groups have attempted to define "well-being." It has been broadly defined by the Centers for Disease Control and Prevention to factor in self-perceived health, longevity, healthy behaviors, mental and physical illness, social connectedness, productivity, and factors in the social and physical environment. The Organisation for Economic Development (OECD) also broadly defines well-being, to also include material conditions such as income and wealth. Sustaining well-being over time requires preserving various types of capital, such as human or social capital.

“Subjective well-being” is a component of well-being, and perhaps a convenience for summarizing the impact of all well-being factors—perhaps even as a direct measure of economic utility. It refers to how people experience the quality of their lives and includes both emotional reactions and cognitive judgments. It has three components: (1) eudomonia; (2) life satisfaction or evaluative well-being; and (3) hedonic or affectual or experiential well-being. The term “happiness” is confusing because it can either entail life satisfaction or hedonic well-being, or both.

The eudomonic approach to well-being emphasizes meaning, purpose in life, positive relationships, personal growth, social acceptance, autonomy, and environmental mastery.²⁴ In contrast, evaluative well-being focuses on reflective judgments of life satisfaction broadly. Hedonic or experiential well-being is concerned with people’s momentary emotional states. It is often further divided into positive experiences, which may be characterized by terms such as joy, contentment, and happiness, and negative experiences, which may be characterized by sadness or stress. It is best measured by momentary assessments over time, with the results aggregated.

Subjective well-being has received increasing attention in many areas of policy, for example, tracking quality of life in older age or understanding work environments, and has been increasingly assessed internationally and in public polls. The United Kingdom’s Office of National Statistics conducts public surveys on well-being, OECD has issued guidelines on measuring subjective well-being, and economists have increasingly considered its role in their analyses. NIH’s National Institute on Aging has supported development of subjective well-being measures in major surveys, such as the Health and Retirement Survey. These efforts are aimed at, among many things, helping governments improve policies, increasing productivity, and promoting more satisfying and healthy lives.

A 2013 U.S. National Research Council (NRC) report on subjective well-being reviewed the current state of research and evaluated methods for measuring self-reported hedonic (or experienced) well-being that are useful for monitoring, informing, and for policy analysis purposes.²⁵ The report authors concluded that experiential well-being is distinctive enough from overall life evaluation to warrant pursuing it as a separate element in surveys. Further, both positive and negative emotions must be accounted for in experienced well-being measurement, as research shows that they do not simply move in an inverse way. Gathering data on aspects of subjective well-being throughout the day and across the lifespan can reveal patterns and trends in happiness, fatigue, stress, pain, and sadness, which are all components of well-being.

The report recommends that capturing pain and suffering as part of the negative component of hedonic well-being would be useful. Suffering is not the absence of happiness or the presence of only negative experience, and the scale should reflect this in a way that suggests relevant classes of related policies. In addition, pain may be an important dimension of experienced well-being, given that it affects people’s ability to engage in day-to-day activities.

The NRC report recommended further study of the role of cultural effects on experienced well-being. For example, cultures differ in how they value high-arousal positive states versus low-arousal positive states, and there are both age and cultural differences in the acceptance of

negative states such as anger and sadness. This suggests that subpopulations experienced well-being differently. Moreover, adaptation cannot be characterized as a process that occurs uniformly; people adapt differently to different events and life changes, in some part due to norms and expectations.

The NRC committee recommended that subjective well-being should be measured as a national statistic. However, numerous unresolved methodological issues, such as mode and question-order effects, question wording, and interpretation of response biases need to be better understood before a module could be considered for implementation on a permanent large-scale basis.

Discussion

Several topics emerged during the discussion following Dr. Stone's presentation. The first concerns whether these concepts hold up across cultures. The concept of "the happy peasant" reflects that well-being is not necessarily based on what people have (their capital) but rather on what they think or feel, which will differ across cultures and the wealth of their country. How people adapt over time to their conditions must be considered at both the population and individual levels, as communities or individuals might change their common or internal standards of well-being over time.

A second topic focused on the limits and advantages of self-report, which by its nature is subjective. Regardless, subjective scales, such as for pain, have served us well. Because some people are better able to report their status than others, variance in introspection, recall, and cognitive heuristics among individuals must be considered when developing measures. This leads to questions about construct validity and how to measure it. For example, how do people rate life satisfaction and what do they look at when doing so? What are the frames of reference for reporting well-being and what types of comparison standards are needed?

Participants also emphasized the need to reconcile the terminology used in the current discussion of emotional well-being and how it relates to the well-established terminology in the subjective well-being literature. How do the terms subjective well-being, emotional well-being, mental well-being, and happiness relate, and how do these terms intersect and overlap? Dr. Stone recommended the three-part structure mentioned above and the overall term, "subjective well-being."

Finally, understanding more fully how people adapt to threats to well-being, for example, through longitudinal studies examining resilience or in examining intervention responses that promote well-being, will shine light on the common mechanisms of well-being. Some of the study designs that have been used for research on response to loss or trauma could be useful, but they would have to be fine-grained, especially if they included a physiological component. Although observational studies have been informative, they often do not establish causality.

Session I – Models of Success: Child/Family Focus

Family Spirit: An Indigenous Solution to Promoting Social, Emotional, and Behavioral Well-Being Across Two Generations

Allison Barlow, Ph.D., M.P.H., Johns Hopkins Bloomberg School of Public Health

Family Spirit is an evidence-based, early childhood home-visiting program designed by Johns Hopkins Center for American Indian Health to promote optimal behavioral health and emotional well-being for vulnerable Native American parents and their infants and toddlers. It is designed to be taught to younger mothers (< 22 years old) by culturally matching paraprofessional home visitors from pregnancy through the index child's third birthday. Parents gain knowledge and skills to achieve optimum development for their children across the domains of physical, cognitive, socio-emotional, language learning, and self-help. The program consists of 63 lessons taught from pregnancy up to the child's 3rd birthday. The program now reaches 105 communities across 17 states and involves 2 non-Native communities in Chicago and St. Louis.

The impetus for the Family Spirit Program grew from growing disparities in American Indian/Alaska Native youth and young adults' death rates, teen childbearing, substance abuse deaths, obesity/diabetes, suicide, high school drop-out, and unemployment rates. Parental stressors included adverse life events, domestic conflict, and unstable home environments. Family and community of origin risks included historical losses of parenting traditions and the accumulation of historical trauma. Based on Patterson's model of parent-child development²⁶, the intervention was designed to promote effective parenting, while assisting mothers in developing coping and problem-solving skills to overcome individual and environmental stressors—ultimately focused on promoting children's optimal emotional and behavioral development.

In designing the program, the communities at risk told the developers that the place to break the intergenerational cycle of early child neglect, poor school readiness, behavior problems, early substance abuse, drop-out, and ongoing substance abuse, was at the stage of unprepared parenthood. The intervention is designed to promote maternal emotional and behavioral health and competent parenting among vulnerable parents (young, poor, often single and isolated) beginning in pregnancy, a key time-period for behavioral redirection. The parenting instruction is focused on helping mothers' read and respond to their children's emotional cues and to develop positive behavioral routines relating to meals, sleep, diapering/toileting, and constructive play.

It took two decades of iterative work and three randomized trials to design and prove the value of the program. The last was a multi-site, randomized, parallel-group trial to test efficacy of the intervention for parenting and for maternal and child emotional and behavioral outcomes from 32 weeks of gestation to 36 months postpartum. Intervention impact was assessed in 3 domains: (1) parental competence, (2) maternal emotional and behavioral outcomes, and (3) children's emotional and behavioral outcomes at nine timepoints. In both study groups, 32 percent of subjects had elevated depression scores, and there were high rates of lifetime drug use. The group receiving the Family Spirit Program showed improvements on most measures of parenting. Mothers showed decreased depression, drug use, and risky behaviors. Children

showed fewer social, emotional, and behavioral problems through age 3 and lower clinical risk of behavioral problems over the life course.

Fidelity is insured by rigorous training of home visitors that requires passing written and observational tests before teaching; audiotaped home visits and quarterly quality assurance observations rated by supervisors with feedback given with intent to mentor and continuously improve quality; frequent knowledge tests with parents to understand if core content was comprehended; and key outcomes measures to understand if targeted changes were achieved.

Going forward, program leaders are: (1) exploring how to study the moderators of intervention impact; and (2) seeking to identify and test tailoring variables to match intervention components to mothers' and families' baseline and emerging emotional/psychosocial needs. The sample size was not large enough to dismantle mechanisms (mediators) of intervention impact on mothers' and children's emotional and behavioral outcomes. Longer-term follow-up could demonstrate the durability of emotional, social, behavioral effects in intervention groups and natural trajectories in control groups. Further study is needed to understand the differential effects of implementation in different settings to understand possible effects of cultural content.

During discussion of her work, Dr. Barlow clarified that no big differences in medical outcomes were detected between the two groups, to the extent those data were collected. She also emphasized the importance of the Native American paraprofessionals who provide the course support to the teens. Because of their familiarity with the culture they have been true agents of change. These professionals have been retained at high levels and are now training others in the program. A critical aspect of the program's success has been recognizing that coping and problem solving by the teens must come before they can focus on parenting. A dose response has been seen between the number of lessons completed and response to the intervention in terms of parental competence, maternal emotional and behavioral outcomes, and children's emotional and behavioral outcomes.

MindUp: Emerging Research in Promoting Children's Social, Emotional, and Cognitive Competence and Well-Being through a Mindfulness-Based Educational Program

Kimberly A. Schonert-Reichl, Ph.D., University of British Columbia

MindUp is a simple-to-administer manualized pre-K to 8th grade mindfulness-based social and emotional learning (SEL) program that grew out of concerns about risk factors in children, such as stress, lack of empathy, insufficient sleep, and bullying. The intention of the program is to move away from deploying interventions after damage occurs and more toward prevention—that is, to build a “life jacket” that can serve to boost resiliency through SEL. Middle childhood represents a critical developmental period in which important competencies are developed. MindUp focuses on integrating SEL with mindfulness, taking advantage of the explosion of mindfulness programs for children.

The program has been offered in British Columbia since 2005, and more than 1,000 teachers/educators have been trained in the program. It consists of 15 40-50 minutes lessons taught once a week. Each lesson incorporates mindfulness practices with activities that provide

children with opportunities to learn about their brain, understand how their thoughts and feelings affect their actions, and learn strategies to become a caring and altruistic person. The core practices consist of focusing on one's breathing and attentive listening to a single resonant sound. Children learn how training their focused awareness might affect their brain and nervous system, giving them a self-regulatory strategy to calm down when they are stressed or overwhelmed by emotions. Each component of the program builds on previous skills learned, moving children from focusing on internal experiences (e.g., mindful smelling, mindful tasting) to cognitive experiences (e.g., taking others' perspectives), to practicing gratitude, and ending with children enacting acts of kindness to others in their home, classroom, and community. Lessons are also aimed at changing the ecology of the classroom environment to one in which belonging, caring, collaboration, and understanding others is emphasized.

Also incorporated in the intervention model is an ecobehavioral systems orientation in which teachers generalize the curriculum-based skills throughout the school day and support children's use and internalization of skills to support a positive classroom environment. Three age-appropriate versions of the MindUP curriculum were created for different age groups: grades K-2, 3-5, and 6-8. Each manual was written to be calibrated to the developmental stage of the target age groups and includes detailed lesson plans that can be broken into 10- and 15-minute portions, as well as teaching scripts and worksheets to aid in implementation. The manuals contain myriad extension activities and literature suggestions that can be integrated into regular classroom curricula, including math, language arts, and science. They also link lesson themes to life outside of the classroom.

To date, several formative and experimental evaluations of the MindUp program have been conducted.^{21,27,28} A quasi-experimental study of 4th-7th graders in 12 classrooms found improved optimism, teacher-rated attention, and social-emotional competence, and reduced aggression and oppositional defiant behavior.

In a randomized controlled trial Schonert-Reichl and colleagues tested whether MindUP would lead to improvements in Executive Functions (EFs), stress regulation, social-emotional competence, and school achievement in 99 4th and 5th grade children. An active control group of children who received a business as usual (BAU) social responsibility program were used for comparison. Outcomes assessed at pre- and post-test included EFs (obtained via objective cognitive tasks), hypothalamic-pituitary-adrenocortical (HPA) regulation obtained via diurnal salivary cortisol, social-emotional competence (obtained via self-, peer, and teacher reports), and end-of-year math grades. Dosage was assessed by asking teachers to report the number of MindUP lessons completed and detail any omitted part(s) of each lesson. In addition, teachers were asked to track and record daily implementation of the core practices. Teachers implementing the Social Responsibility Program were also asked to report on the number of activities that they completed each week.

On EF tasks, at post-test children in MindUP had significantly shorter response times on average, while maintaining equal accuracy compared to BAU children on tasks that required inhibition, working memory, and selective attention. MindUP participants' diurnal cortisol patterns maintained a steep slope from pre- to post-test. Conversely, BAU children demonstrated changes from a steeper diurnal pattern to a flatter, blunter pattern. Analyses of child report data indicated

that after exposure to MindUP, participants had significant increases in optimism, emotional control, empathy, perspective taking, prosocial goals, and mindful attention, along with decreased depressive symptoms compared to BAU children. Peer-reported data showed that relative to BAU children, MindUp children increased in peer acceptance (or sociometric popularity) and were rated by peers as more prosocial (e.g., kind, helpful, trustworthy), and less aggressive.

MindUP participants had a significant increase in self-reported school self-concept (i.e., perceived academic abilities and interest and enjoyment thereof) and demonstrated a 15% gain in teacher-reported math achievement. A 24% gain was found in peer-nominated positive social behaviors from participation in the MindUP program, as was a gain of 15% in math achievement, a gain of 20% in self-reported well-being and prosociality, and a reduction of 24% in peer-nominated aggressive behaviors.

The Strong African American Families (SAAF) Program

Gene H. Brody, Ph.D., University of Georgia

SAAF is a family-centered preventive intervention designed to enhance supportive parenting and build competencies in low-SES African American preadolescents from the rural Southern United States. As children from low-SES families mature, they continue to experience health problems at rates that are substantially higher than those of their more advantaged peers. Low-SES youths show a heightened prevalence of obesity, insulin resistance, and asthma. When they reach the later stages of life, persons who grew up in low-SES families show excessive morbidity and mortality from stroke, coronary heart disease, some cancers, and chronic lung conditions. Despite these trends, not all low-SES children have, or go on to develop, health problems. Evidence suggests that a subset of youths develop resilience to the health consequences associated with low-SES environments if they receive high-quality parenting.

Prevention science has operated on the assumption that one inoculation, usually during preadolescence, is sufficient to deter initiation and escalation of drug use and risky behaviors. This has turned out to be an unsubstantiated assumption. The SAAF programs are designed to enhance developmentally appropriate protective caregiving and youth self-regulation over time. They were designed in collaboration with the rural African American community through an iterative process.

SAAF's active ingredients were derived from longitudinal, epidemiological research with the targeted population of families. Its central feature is promoting supportive parenting for rural African American preadolescents through emotional support, clear limits and rules for behavior, consistent discipline that is not harsh, predictable home environments, racial socialization, and strategies for dealing with racial discrimination. SAAF was designed for preadolescents to provide them with protective caregiving before they made the transition to middle school.

Participation in SAAF at age 11 had beneficial outcomes on indices of inflammation, biological weathering, and brain development during young adulthood. Participants in a trial included 667 African American families in rural counties in Georgia, living in small towns in which poverty

rates are among the highest in the nation. Families assigned randomly to the SAAF condition participated in seven meetings held at community facilities, with separate parent and youth skill-building curricula and a family curriculum. During the weeks when the intervention families participated in the prevention sessions, the control families received leaflets via postal mail that described adolescent development and provided tips for stress management and exercise promotion. SAAF demonstrated stress-buffering capacities for a range of psychosocial outcomes during adolescence, such as self-control, alcohol use, and conduct problems, as well as drug use and body mass index at age 25. A study of effects on cytokine levels at age 19 showed reduced inflammation in SAAF youth.²⁹ A 2017 study found that in control groups as the number of adverse childhood experiences increases so does the prevalence of prediabetes. In contrast, participants in the SAAF program showed an amelioration of the association between adverse childhood experiences and prediabetes.³⁰ Protective prevention effects have also been demonstrated with brain development.³¹

Finally, SAAF's fidelity was assessed and attained high levels. To date, it has been disseminated to 30 communities around the nation.

Session I Discussion

Discussant and Moderator: Mark Greenberg, Ph.D., Pennsylvania State University

Family Spirit focuses on a difficult population, in which it can be challenging to conceptualize and assess emotional well-being. In particular, what is mediating the effects? It could be the teen mothers having a sense of purpose, goals, and planning; the improved quality of their relationships both with their child but also with the home visitor; or the psychodynamic of a corrective emotional experience. The benefit comes from having a model individual who can help them, which suggests the value of attempting to measure the quality of the interpersonal context in which the program is focused. What measures should be developed to elucidate positive emotional well-being, including its physiological parameters? Qualitative findings can be important, for example, case reports provided by the intervenors documenting what is happening to who.

MindUp is unique for its multi-modal measurement model assessing EF, cortisol, empathy, depression, and peer measures. It is a small cohort in a setting where 84% of children have a two-parent family and the teachers are volunteers with more than 5 years of experience in the classroom. A next step would be to see how well the results generalize in other settings. Randomized cluster trials could be used to assess training needs and generalizable outcomes. Furthermore, SEL is broad and mindfulness in those in 5th grade or younger deserves more study. What is the mechanism by which mindfulness would make improvements, such as supporting attention?

One of the values of the SAAF program is the length of time it has been ongoing and under study, showing preventive effects. In looking for the main effects, heterogeneity is important. The positive parenting effects resulting from the program are a protective factor, contributing to future goal orientation, which mediates against risks such as alcohol use, and improves self-

regulatory capacity. Better measures are needed for these constructs as they come to play in teens in risky conditions.

Broader discussion with roundtable participants raised the “shift and persist strategy,” that is, when children, despite facing recurrent severe adversities in life, are nevertheless able to maintain good physical and emotional health. Better understanding of the psychobiological mechanisms involved in this trajectory, and what mediates them could identify malleable or modifiable targets for interventions. We need to understand how interpersonal relationships, such as role models, parents, or teachers positively influence children and youth to trust others, better regulate their emotions, and focus on their futures. Yet focusing interventions and measurement “outside the head” is challenging, especially when creating appropriate control groups.

Session II – Presentations of Models of Success: Adult Focus

ReSource Project: Training the Social and Compassionate Brain to Increase Well-being, Resilience, Prosociality and Health

Tania Singer, Ph.D., Max Planck Institute for Human Cognitive and Brain Sciences

The ReSource Project is a 1-year longitudinal mental training study aimed to induce plasticity in the social brain. It stresses the need for scientifically validated mental training programs focusing on the cultivation of compassion and altruism, which have the potential not only to help individuals to improve mental and physical health, but also to encourage the development of more sustainable and caring economic, social, and political systems.

The ReSource Project is a secular program developed by a team of experienced meditation teachers, scientists, and psychotherapists. As the name implies, the cultivation of compassion entails an accumulation of resources in various domains (e.g., cognitive, affective, motivational, social) and cultivation is understood as a process through which we tap into qualities and dispositions that are already present. The project consists of three consecutive modules: Presence, Perspective, and Affect.

The Presence module aims to sharpen attention to the present moment rather than to the past or future. It contains two core daily practices and others practiced in the weekly meetings with the teachers. One of the core practices involves awareness of the breath, that is, focusing attention on something (an object, the breath), and returning attention here whenever attention has gone elsewhere. The second daily core practice includes a body scan in which the participant mentally scans his or her body, focusing on the sensations in the various body parts.

The Affect module aims to cultivate emotional and motivational aspects of compassion; work with obstacles, such as fear, anger or sadness (“emotion acceptance”); and prosocial motivations. The two core practices include a loving kindness meditation to oneself or others, and an affect dyad, in which one partner speaks, and the other listens mindfully but without reacting verbally or through face mimic. Then the partners switch places.

The Perspective module focuses on the cognitive aspects such as gaining a meta-cognitive perspective on one's own thoughts and perspective-taking on self and others. It involves a sitting meditation on observing thoughts and a perspective dyad.

Studies of the project focused on the different effects of each module, including module sequence effect and practice type effect. About 320 participants, aged 20–55, who were inexperienced in meditation, were recruited and baseline data was obtained prior to training. Ninety subjects were selected as controls (they did not receive any training) and about 240 subjects were selected to undergo the training as part of one of three training cohorts. Each module lasted about 3 months and was comprised of instructional exercises and meditation practices. Training cohort 1 and 2 were trained in all modules but in a different order for the Affect and Perspective Module. Training cohort 3 was only trained in the Affect Module.

All modules began with a three-day retreat. Subsequently, participants met with a team of teachers (usually two) and their group for weekly sessions. Each module featured two core exercises that the participants were recommended to engage in on a daily basis, for a minimum time of 30 minutes. These exercises were designed to train the core processes of the module. Additional exercises helped to deepen and widen the targeted skills and dispositions and to foster their application in everyday life. The training at home was supported by a web platform and a smartphone app, where audio files (guided meditations) for the exercises could be started.

The interdisciplinary research team measured participants before, during, and after the training in areas such as subjective well-being, brain function, behavior, neuroendocrinological markers, and genetic aspects. A 5-week testing period to assess the respective measures occurred before and after each training module. During this time the participants continued to meet once a week and kept practicing their exercises. Finally, there was a follow-up testing period approximately 4.5 or 10 months after the last training module, during which the subjects were tested again in order to assess the longer-lasting effects of the training.

Results showed that MRI-based cortical thickness, when contrasting the training modules against each other, indicated spatially diverging changes in cortical morphology. Module-specific structural brain changes correlated with behavioral improvements induced by training in the domain-specific measures of compassion, attention, and cognitive perspective-taking, respectively. Structural brain plasticity was specific to the training module. Social stress responses on the cortisol level were mostly reduced by the social modules perspective and Affect containing dyadic partner exercises. In sum, the multiple findings show that it really matters what you practice as findings in the behavioral, brain, social skills, and health domain were found to be differential and module-specific. Furthermore, longitudinal findings show structural plasticity in well-known socio-affective and socio-cognitive brain networks in healthy adults based on targeted short daily mental practices, suggesting that higher level social skills such as compassion and perspective-taking on others can be trained in adulthood with rather easy and low-cost mental practices.

Health Enhancement Program (HEP): Mindfulness-Based Stress Reduction vs. Active Controls: What We've Learned About Studying Wellbeing-Promoting Interventions

Melissa Rosenkranz, Ph.D., University of Wisconsin - Madison

Mindfulness-Based Stress Reduction (MBSR) was developed by Jon Kabat-Zinn as a public health intervention to address physical and mental suffering³² and, to a large extent, continues to serve in this capacity today. Although its roots are firmly planted in ancient contemplative traditions, MBSR uses language, examples, and teaching forms that are accessible and relevant in a range of different environments. In its traditional and most prevalent form, MBSR training is delivered over 8 weeks in the context of weekly 2.5-hour in-person group meetings and one 6-hour intensive day of practice. At-home practice assignments vary among instructors and are commonly determined individually. Variations in this traditional form, including the use of digital platforms in place of in-person instruction, are now widespread.

The past 20 years have seen an exponential increase in the number of published scientific investigations on the efficacy of training in MBSR to improve function in a wide range of physical and psychological processes. The resulting body of work shows unequivocally that MBSR has salubrious effects across a broad range of outcome measures.^{33,34} MBSR stabilizes attention and reduces mind-wandering, which promotes positive mood. Awareness of mental content and physical experience aids in regulation, in some cases reducing the neural response to pain. Moreover, being in the moment reduces anticipation and rumination and speeds recovery from aversive experiences. Finally, acceptance reduces avoidance and negative affect. These constructs have been measured across many different modalities and in many different contexts, for example neuroimaging, psychophysiology, structured interviews, and second person reports.

How do we know that mindfulness is the active ingredient? The vast majority of the studies compared MBSR to wait-list controls or treatment as usual. While a good first step, this evidence base needs more rigorous research. In particular, studies that pit MBSR against active comparison interventions are greatly needed. The use of active comparison interventions enables one to test the specificity of skills trained in MBSR to produce change in outcome measures, as opposed to change related to factors common to many bona fide interventions (e.g., exercise, relaxation,) known to promote well-being that are not specific to any one intervention. These common factors include therapeutic alliance, social support/interaction, learning new skills, motivation and engagement, and belief that the intervention will produce benefit.

With this in mind, Rosenkranz and colleagues designed the Health Enhancement Program (HEP) to match MBSR in structural equivalence and common factors.³⁵ HEP consists of training in aerobic exercise, balance and agility, nutrition, and music therapy and is taught by experts in these domains. To date, HEP has been used as an active comparison to MBSR in three randomized control trials with a total of 241 participants. These studies have included measures of neural structure and function, psychophysiology (EEG, EMG, EDA, HRV), sleep, inflammation, HPA-axis function, cognitive function/attention, psychological and physical symptoms, pro-social behavior, and practice.

It is noteworthy that for many of the studies that comprise the evidence base for the efficacy of MBSR, this evidence is based on self-reported improvement in psychological symptoms, anxiety depression, and perceived stress. The three trials also saw improvement from pre- to post-training in these measures. However, when compared to participants randomly assigned to HEP, MBSR is often indistinguishable.³⁵ On the other hand, biological measures have distinguished MBSR from HEP. For example, in the context of a psychosocial stressor, the investigators found that those randomized to MBSR had a reduction in the inflammatory response following topical application of capsaicin cream.³⁶ This effect was also shown when comparing experienced meditators to non-meditating controls.³⁶ In addition, there was a pre- to post-training reduction in amygdala response to emotional pictures in those randomized to MBSR, relative to HEP, as well as increased functional connectivity between the amygdala and ventromedial prefrontal cortex – a region implicated in emotion regulation.

During discussion of her work, Dr. Rosenkranz noted that, in the future, it will be important to study a more representative study sample because the exclusion criteria could be contributing to the null effects. If the inclusion criteria were broadened to allow people who are suffering to engage in these practices, effects might be clarified. Further, more study is needed to investigate which contemplative practices are best for which individuals, in which case the mode and duration of practice could be personalized. Real-world testing is needed to assess reliability. Finally, while psychometric tests provide reliability and validity they are not as useful in elucidating mechanisms.

Session II Discussion

Discussant and Moderator: Tor Wager, Ph.D., University of Colorado Boulder

Dr. Wager observed that in the studies presented during Session II, the reliability of biological measures is presumed to be more stable across different settings, but there are challenges to brain measures as well. For example, cortical thickness varies across scanners, so maps will not be stable until large numbers of subjects have been studied. One strategy for addressing this is to take composite measures across different cohorts. Test/re-test can be used to assess the reliability of mechanistic measures.

Another challenge facing studies of well-being lies in the constructs being identified and how well-being is being operationalized. The ReSource Project showed operationalization of three different constructs, which permitted evaluation of specificity to discern specific effects. This highlights the need to think of novel measures and ask whether we have the right constructs for well-being embedded in a conceptual framework. Both the ReSource Project and the MBSR program included a rich set of measures, some of which are more or less important for different groups, depending on context. The challenge of having multiple measures, however, lies in organizing them conceptually. If many measures are collected from large studies, the community needs to learn from data science about how to take complex measures, split data, and develop additional measures that reveal patterns. Precise measures of well-being outcomes as well as of an intervention's mechanisms of action are needed; ideally, measures that are generalizable across studies can enable us to detect larger effect sizes. An additional challenge is linking across measurement levels, for example, measures of change in the amygdala and affect and behavior. Common well-being factors and mechanisms of action across interventions should be identified

to clarify whether different interventions work in similar, overlapping, or different ways and whether they exert their effects on similar, overlapping, or different aspects of well-being. A family of common factors or mechanisms could be viewed as potential mediators of an intervention's effects. All of this speaks to the need to identify, classify, and measure common factors or mechanisms of action.²

Other issues to consider are whether intensive and expensive types of measures are scalable, and whether social mechanisms of action or social components of well-being are being given enough consideration when measuring individual responses and understanding inter-individual response to interventions.

Roundtable discussion raised additional considerations:

- the need to study where mindfulness is naturally occurring in a community, perhaps as a cultural ritual or tradition;
- the utility of randomized encouragement trials, in which people can self-select the arm they choose to be in (the goal being that outcomes will be more reflective of the real world);
- recognize the value of observational studies;
- consider using a 2 x 2 design to determine specific and nonspecific effects of an intervention;
- contemplate the independent measures that would allow us to look at agency as a mediator of well-being;
- study the optimal “dosing” of mindfulness interventions.

Concluding Remarks: Day One

Cochairs Drs. Davidson and McEwen concluded the discussion for the first day with some observations and further discussion with participants.

Will predictive coding of the brain, as it advances, provide insight into active inference? That is, is the brain making inferences that determine emotion? If so, can we think of emotional well-being as a skill to be taught and would that advance it as a public health measure? Meditation research focuses on changing the predictive models and changing the perception of subjective well-being in somewhat the same way that we try to correlate objective pain with perceptions of pain. Can well-being be taught as a skill that normalizes experiences? And how can we better link well-being to improved health outcomes when the traditional funding mechanisms make it difficult to do so?

Some participants expressed concern about conceptualizing well-being as a skill because that then places the burden of response on the individual and could relieve adverse events or experiences of responsibility.

² Some of this work is currently being undertaken by the NIH Science of Behavior Change Common Fund Program, as well as by a committee on behavioral ontologies led by OBSSR.

Many of the projects presented over the course of the day centered on the concept of self-regulation, self-efficacy, and self-esteem, all capacities that are influenced by positive and adverse events and experiences. The growing body of research on well-being is elucidating how these components of well-being can be moderated by interventions, and in so doing, influence the plasticity of the brain.

Session III – Presentations of Models of Success: Older Adult Focus

Enhancing Healthy Cognitive Aging Through the Arts

Arthur Kramer, Ph.D., Northeastern University

Active experiencing is an intervention aimed at attenuating cognitive decline with mindfulness training through an immersive acting program. Wider use of effective therapeutic arts programs could enhance health and well-being of older adults. Multi-modal acting involves the mind, body, and emotions and has produced promising results in older adults with limited formal education.³⁷ Active experiencing has shown benefits in terms of word recall, memory span, problem solving, category fluency, and story recall. In a sense, it embodies mindfulness because the actor must be in the moment.

We, however, do not know how the intervention impacts cognition and whether the benefits will be generalizable across cognitive domains in the course of healthy aging. Kramer and colleagues addressed these issues in an intervention trial of older adults (N = 179; mean age = 69.46 years at enrollment; mean education = 16.80 years) assigned to an active experiencing condition (n = 86), or an active control group (i.e., theatre history; n = 93) for 4 weeks. The groups had no or little previous acting training or experience. Each group participated in two sessions per week, 75 minutes per session. Memorization of scripts in the active experiencing arm was not emphasized; thus, training was not targeted to memory. Both groups were educated and living independently.

A cognitive battery was administered before and after intervention, and again at a 4-month follow-up. Group differences in change in cognition were tested in latent change score models. In the total sample, several cognitive abilities demonstrated significant repeated-testing gains. Active experiencing produced greater gains relative to the active control only in episodic recall, with gains still evident up to 4 months after intervention. Intervention conditions were similar in the magnitude of gains in working memory, executive function, and processing speed. Episodic memory is vulnerable to declines in aging and related neurodegenerative disease, and active experiencing may be an alternative or supplement to traditional cognitive interventions with older adults.

It will be important to replicate this work in other cohorts to determine whether differences in socioeconomic status, education, age and independence contribute to effects. Other studies of participatory arts in older adults have shown promising cognitive and well-being effects and even some brain changes. Similar effects have been seen after physical activity and exercise interventions.³⁸ Yet little is known about the mechanisms, and it is difficult if not implausible and even undesirable to decompose multidimensional activities, such as acting. In interventions such as active experiencing there are many moderator and individual difference effects as well as boundary conditions to explicate.

During discussion, Dr. Kramer added that MRI/fMRI data gathered have not yet been analyzed but might provide clues as to why improved episodic memory is the most reliable benefit of this intervention. He also noted that the individuals in the study were high functioning; it would be useful to understand how less functional individuals respond to the intervention.

Baltimore Experience Corps Trial (Experience Corps[®]) Program Project

Michelle Carlson, Ph.D., Johns Hopkins Bloomberg School of Public Health

To promote meaningful (productive) lifestyle activity in real-world settings, Experience Corps[®] embeds cognitive and physical activity into generative volunteer service. It is an inter-generational, community-based program that leverages aging adults' generative desire to share their experience and wisdom with a younger generation through weekly volunteer service in nearby elementary schools. Volunteers seek to improve the academic performance of children in underserved urban areas, and in doing so, may improve their own health through increases in a variety of lifestyle activities.

Research by Carlson and colleagues has shown that taking 1,000 more steps a day is associated with a larger hippocampus, a brain region important to memory and dementia risk.³⁹ Even small increases in daily walking activity may help maintain plasticity in a brain structure important to spatial and verbal memory. Yet older adults in areas with low SES status have difficulties engaging in physical activities, such as walking.

In Experience Corps volunteers increase physical, social and cognitive activities simultaneously by traveling to and serving in teams in neighborhood elementary schools with teachers as mentors of children in grades Kindergarten-3 for 15 hours a week over an academic year to help children with reading literacy, library, mathematics support, and readiness to learn. The hypothesis was that generative roles might:

- Be a vehicle to attract and retain more – and more diverse - older adults than standard intervention programs
- Be intentionally designed to enhance physical, cognitive, and social activity, providing stimulating environments, generalizable activities
- Population-based approach to health promotion?

Carlson and colleagues further hypothesized that the whole is greater than the sum of its parts. Experience Corps participation increases physical, cognitive, and social activity, which in turn improves strength and balance, brain elasticity (executive function), and social integration. These improvements then show up on performance-based measures, such as falls, walking speed, frailty, memory, and psychosocial well-being. Pilot studies have shown that Experience Corps improves executive function and related prefrontal networks.⁴⁰ Seniors are often more motivated by helping others than merely helping themselves.

In the Baltimore Experience Corps Trial (BECT), 702 eligible adults 60 years and older were randomized to either 2 academic years of service in Experience Corps or referred to a low-

activity volunteer control. The outcomes measured at baseline, 1-year, and 2-year included: (1) Mobility and Cognition: Executive function, memory and processing speed; (2) Children academic outcomes; and (3) Psychosocial outcomes - social networks, psychosocial health, generativity. A nested Brain Health substudy included 120 subjects.

Women in Experience Corps maintained average steps/day over 24 months post-intervention while controls declined. Men had significantly higher baseline levels of daily physical activity than women and maintained these levels. Experience Corps also led to dose-dependent improvements in processing speed and changes in psychosocial health, specifically generativity. Men in the Experience Corps arm showed a 0.8-1.6% increase in total cortical and hippocampal brain volumes versus declines in controls. Women in Experience Corps also tended to exhibit modest gains of 0.3-0.54% by 24 months of exposure. Further, Experience Corps altered amygdala volume, a region important to socio-emotional memory and a biomarker for Alzheimer's disease risk. Volunteer-specific increases in amygdala were related to increases in generativity.

Experience Corps proves the value of a model of aging that capitalizes on what gets better with age to boost biological declines. It is an activity with a generative purpose, that is, giving back to others and having purpose, and may confer neurocognitive benefits equal to exercise. Further, it is giving back to children during their critical developmental window. It demonstrates that activity in complex, social contexts may provide neurocognitive benefits and that an aging society can share wisdom and compassion with a generation of younger minds.

During discussion it was noted that place matters. The Experience Corps sites were selected because they were in the direst neighborhoods of the Baltimore metropolitan area. It will be important to assess whether it is scalable outside the school-based environment and whether it can achieve generative purposes on different scales. It was noted that environment is a special agent in well-being and consideration is being given to creating a virtual environment that is a safe place to be physically active. Dr. Carlson added that colleagues are studying children's outcomes and have found a decrease in school office referrals and improved academic achievement.

Session III Discussion

Discussant and Moderator: Elissa Epel, Ph.D., University of California San Francisco

Active experiencing and Experience Corp focus on emotional well-being in aging, aiming for a positive balance of emotional states through social networks that become more positive in tone. These interventions result in evaluative well-being and life satisfaction, enhanced meaning and purpose in life, and greater ability to pursue self-defined goals.

Experience Corps was found to increase generativity and social engagement, with 71% of participants reporting increased confidence, 53% engaging in other volunteer jobs, and 40% pursuing social connections that led to new activities. In contrast, active experiencing did not change social engagement, although qualitative interviews might uncover that change. The mechanisms of the well-being interventions were social support, self-regulation, mindfulness,

and stress reduction. The challenges lie in sorting out the relationships among the different interventions, pathways, and outcomes. Because we do not have a fully agreed on measure of well-being, we tend to tie affective measures of well-being to physiology, but in aging, both well-being and physiology are constantly shifting.

In the Experience Corps intervention, as well as other models provided to the roundtable, such as MindUp, SAAF, ReSource, and MBSR versus HEP, social relationships are central to changes in well-being. This leads to questions about the specific components of social connections that matter, for example, common humanity, a sense of community with common values, changes in the social perception of others through attachment, and building one's social safety through trust and support. Does decreased social stress sensitivity then lead to improved health outcomes? If we need less cortisol, we are more fluid, and closer to allostasis. Studies in other contexts have highlighted the importance of social connectedness. For example, having a female peer mentor early in college increases women's academic experience and retention in male-dominated fields such as engineering, due to a greater sense of belonging and therefore greater confidence.⁴¹

The interventions described during the roundtable meeting have shown prevention of negative outcomes in high-risk groups (with enhanced well-being as a secondary benefit), and promotion of well-being in low-risk groups. We know that chronic stress affects the brain and body and many factors contribute to long-term and daily stressors. This combined allostatic load can be measured in systemic and cellular brain architecture. Understanding the science of behavior change is one approach in which one identifies a hypothesized mechanism driving behavior change, then develops measures of the target mechanism, with the goal to influence the target mechanism.

Future research designs should consider frequent measurement of positive and negative affective states and meaning (burst design) to better understand the average (without an evaluative component), and how one responds to stressors and positive events. Measures of physiological regulation that are not static are particularly relevant to aging and resilience in aging populations. Methodological considerations include the role of moderators, the need to match personal characteristics, use of trials encouraging choice, controlling for common factors, and more attention to the role of dosing on effect.

The central question revolves on the underlying mechanisms leading to well-being. As mentioned in earlier discussions, Dr. Epel referenced RDoC (Research Domain Criteria) as a potentially useful model for integrating many levels of functioning for better measurement and to help conceptual models. An RDoC of well-being would need to be multilevel and would not be helpful as a reductionistic set of components. In order to explore both more basic dimensions of well-being and global constructs such as spirituality that span the full range of human behavior from normal to abnormal, RDoC can also provide a useful model for examining the key constituents of well-being. Again, we need a more multilevel taxonomy for well-being that includes holistic qualities.

Session IV – Presentations of Models of Success: Services and Implementation Focus

Cultivating Awareness and Resilience in Education (CARE for Teachers)

Patricia Jennings, Ph.D., University of Virginia

Cultivating Awareness and Resilience in Education (CARE for Teachers) is a comprehensive system designed to reduce teachers' stress and promote and support teachers' social and emotional competencies over the course of one full school year. Following best practices in adult learning, CARE introduces material sequentially, utilizing a blend of didactic, experiential, and interactive learning processes. The program presents a structured set of mindful awareness and compassion practices, as well as didactic and experiential practices to promote emotion awareness and emotion regulation. CARE for Teachers is delivered in 30 hours over five in-person training days (6 hours each) between November and February. The breaks in between sessions give teachers an opportunity for practice, reflection, and application of the material to their teaching. Teachers typically receive coaching via phone to support this process.

CARE for Teachers is specifically designed to address teachers' social and emotional competencies as hypothesized in the CARE for Teachers logic model, which links the intervention in teachers to teacher and classroom improvement, which leads to student improvement. The program elements are posited to have a synergistic effect on the hypothesized outcomes such that no one single program element is hypothesized to have a unique and direct impact on any one outcome. Program elements are hypothesized to promote increases in adaptive emotion regulation, teaching efficacy and mindfulness, and reductions in psychological and physical distress, as well as improvements in classroom interactions that promote learning (e.g., emotional support and classroom organization). Furthermore, Jennings and colleagues hypothesized that students of teachers randomly assigned to the CARE for Teachers intervention would have higher academic competence after one school year compared to students of teachers in the control condition. Finally, they expected that exposure to CARE teachers would differentially benefit students at individual risk (i.e., low initial social skills) and/or contextual risk (i.e., low mindfulness teachers) relative to at-risk students of teachers in the control condition.

The efficacy of the program was assessed using a cluster randomized trial design involving 36 urban elementary schools and 224 teachers.²² Teachers were randomized within schools to receive CARE or be assigned to a waitlist control group. At pre- and post-intervention, teachers completed self-report measures and assessments of their participating students. Teachers' classrooms were observed and coded using the Classroom Assessment Scoring System (CLASS). Analyses showed that CARE had statistically significant direct positive impacts on teacher adaptive emotion regulation, mindfulness, psychological distress, and time urgency. CARE also had a statistically significant positive impact on the teacher emotional support domain of CLASS. CARE had direct impacts on 1 of 4 student outcomes, engagement in learning. Among students with low social skills at baseline, students of CARE teachers had higher reading competence at the end of the year than students in the control condition. Among

students with teachers low in mindfulness at baseline, students of CARE teachers had higher end-of-year motivation for learning and higher end-of-year reading competence than students of low mindfulness teachers in the control condition.

Two aspects of implementation were assessed: fidelity and quality. Fidelity was assessed by two trained fidelity coders for all CARE sessions using the CARE Daily Session Rating Forms, an observational measure that assessed the completion of program components and how well the participant learning objectives were met. Participant objectives were met at an adequate to exemplary level and interclass correlation ratings for “objectives met” were excellent. Overall, facilitators demonstrated a high level of positive and low level of negative facilitation skills. Interclass correlation ratings for facilitation skill were excellent.

There are several strengths of this model. It is attractive and valuable to many teachers, and it is feasible, that is, it can be successfully implemented with high fidelity. It is also relatively low cost (between \$616 and \$1,654 per teacher depending on the number of participants and facilitators).

Further, the teacher effects last for at least the 2-year follow-up period. Its limitations are that teachers in most need may not be attracted to such a program—it takes time to engage in, and it likely needs ongoing reinforcement. Facilitators require a unique skill set, which requires time-consuming training.

Further research is needed to understand: the effective dosage of the key ingredients; whole school implementation; costs and benefits; value added to SEL/mindfulness programs for students; and how to focus on high-risk teachers and distinctive environments such as special education and early childhood education.

The Impacts of Trauma Awareness Training on the Emotional Well-Being of Teachers Working with Preschool-Aged Children from Low-Income Families

Robert C. Whitaker, MD, MPH, Columbia-Bassett Program

Exposure to adverse childhood experiences, like abuse and neglect, is common and has lifelong impacts on mental and physical health. Preschool-aged children experiencing trauma have impaired self-regulation, often expressing negative emotions and disruptive behaviors that interfere with classroom learning. To develop the self-regulation required for success in school, children must have safe, stable, and nurturing relationships with adults. To form these relationships, the adults working in early childhood education programs, such as Head Start, must understand the role of trauma in the lives of children and themselves.

In a pilot study of 16 administrative and support staff working within Head Start in the School District of Philadelphia, Whitaker and colleagues evaluated the impacts of a trauma awareness professional development course, Enhancing Trauma Awareness (ETA), created by Lakeside Global Institute. ETA is a manualized course that provides participants with knowledge about the nature of trauma and its impacts on people’s emotions, behaviors, and biology. It provides skills for responding to those who might be impacted by trauma, whether the “helper” or the “client.”

ETA is delivered in groups of 15 participants by two trained facilitators, allowing participants to become aware of the impact of trauma on themselves and others, manage painful or frightening emotions in themselves and others surrounding trauma awareness, and change negative perceptions of themselves and others arising from experiences of trauma. The course has six sessions offered every other week over 12 weeks, with each session lasting 2.5 hours. The target populations are the “helping” professions, such as education, health care, human services, public safety, and criminal justice.

Whitaker and colleagues hypothesized that through ETA, staff attitudes and perceptions would be changed (e.g., increased empathy, emotion regulation, and dispositional mindfulness), leading to improved relationships (e.g., increased trust with parents and colleagues) and health and well-being (e.g., improved health-related quality of life, sleep duration and quality, and decreased burnout). These changes, in turn, would result in higher quality interactions among staff, children, and families, greater engagement with families, and ultimately increased school readiness among children.

Using a quasi-experimental, one-group pretest-post-test design, surveys were administered at baseline and follow-up to the 16 ETA course participants. The surveys contained established scales that served as outcome measures across three core domains): (1) attitudes and perceptions, (2) relationships, and (3) health and wellbeing.

After exposure to ETA, Head Start staff reported improved outcomes on 9 of 27 measures ($p < .05$), as follows:

- | | |
|-----------------------------|-----------------------------------|
| ↑ Greater empathy | ↑ Sleep quality |
| • better perspective-taking | ↓ Burnout |
| • more empathic concern) | • less exhaustion |
| • less personal distress | ↓ Negative affect |
| ↑ Emotion regulation | ↑ Health-related quality of life |
| • greater reappraisal | • fewer physically unhealthy days |
| ↑ Dispositional mindfulness | |

With regard to fidelity, trained group facilitators followed an ETA manual, which included a checklist for each session describing the topics, activities, and approaches to be used. Both facilitators completed this checklist and noted successes and challenges for each session. At monthly reflective supervision sessions, facilitators discussed challenges with a training supervisor. If time constraints prevented facilitators from getting through all items on the checklist during the session, the missing items were addressed at the next session. To preserve the safety and privacy of the group, external observers were not used to provide another assessment of fidelity.

Key findings from this model are that “client” outcomes in the “helping” professions are mediated through trusting and safe relationships. Emotional well-being contributes to (and results from) the quality of relationships. In the “helping” professions, increasing awareness of trauma may improve emotional well-being, the quality of relationships, and “client” outcomes. This points to the need to increase the emotional well-being of those working in the helping

professions. It also highlights the importance of addressing developmental trauma in promoting emotional well-being. Future research should consider the acceptability of self-reported data as the gold standard for research on emotional well-being.

Using the Research Base for Prevention/Promotion Science to Promote Emotional Well-Being Community Wide: Communities That Care (CTC)

Richard Catalano, Ph.D., University of Washington

Predictors of positive development include, among other things, education, success, self-efficacy, belief in the future, and spirituality. Longitudinal studies over the past 40 years have identified common risk and protective factors for behavioral health problems and uncovered overlap in these factors for different problems and positive development. Malleable risk and protective factors were addressed by preventive/promotive interventions and tested for impact. Because of these discoveries, more than 60 prevention/promotion programs and policies have been shown to prevent adolescent problems and promote positive development. Risk and protective factors show much consistency in effects across diverse groups and they emerge at multiple levels, from the individual to schools to family to the community. Both an individual's level of risk and level of protection influence behavioral health problems. Different communities/neighborhoods have different levels of risk and protection, and therefore may need different effective prevention/promotion programs and policies. Unfortunately, prevention/promotion approaches that do not work or have not been evaluated are more widely used than those shown to be effective. Thus, the challenge lies in how to build infrastructure to increase the use of tested and effective prevention/promotion policies and programs with fidelity and impact at scale, while recognizing that communities are different from one another and need to decide locally what policies and programs they use.

Communities That Care (CTC) is a community-based system to build prevention infrastructure to select, deliver with fidelity, and sustain evidence-based prevention interventions matched to community need. The community-based system was developed based on the Social Development Model and the findings of implementation and prevention science. Further, a theory of change or logic model guides implementation, testing and adaptation to community settings. Prior to testing, the system was developed over almost 15 years through piloting in many communities using community-based participatory research principles to gather input and change the program to meet community desires. It has been tested in a 24 community-based randomized controlled trial and a quasi-experimental study in Pennsylvania, and found to have effects on substance use, delinquency, and violence. In the quasi-experimental study, better academic performance and school engagement were also found. Further, CTC was found to increase protection community-wide.

The theory of change was used as a guide in assessing short and long-term outcomes including functioning of community coalitions, adoption of the science-based approach to prevention, support for prevention, and impact on risk and protection and youth outcomes.

CTC was developed to address the problem of the lack of uptake of evidence-based prevention programs. It assists communities in building prevention infrastructure to enhance community

capacity to: (1) build cross-sector prevention coalitions; (2) assess and prioritize risk, protection, and behavior problems through the use of the CTC survey in grades 6, 8, 10 and 12; (3) match priorities to evidence-based prevention interventions selected from the Blueprints for Healthy Youth Development Registry of effective programs; and (4) support/sustain quality implementation of efficacious preventive interventions to all those targeted. CTC's goal is to provide community coalition members with the tools to make science-informed decisions about which evidence-based prevention interventions meet community needs.

In response to questions, Dr. Catalano said that CTC leaves the decision of which developmental level(s) to focus on to the local community, based on their assessment of risk, protection, and outcomes. Efficacious preventive interventions are available from birth through age 18 in the Blueprints registry. Interventions chosen may focus on a developmental stage or focus cross development depending on coalition members' perception of fit and existing resources. CTC has identified effective programs for schools, after school programs, and families.

Session IV Discussion

Discussant and Moderator: Mark Greenberg, Ph.D., Pennsylvania State University

The multiple presentations illustrate the varied contexts in which emotional well-being can be promoted. Creating healthy contexts improves the health of individuals. CTC uses science to create healthy communities by paying attention to context. Studies conducted in universal populations are more likely to produce results that can change public health. How can we measure healthy context, such as schools or communities? Effect sizes are based on normative base rates, so if there are high-risk behaviors, the effect sizes will differ, which has to be considered when going to scale. The U.S. school population of students, teachers, and parents is enormous; thus, if effective school-based programs are disseminated, the public health impact could be quite large. Although Internet interventions can provide quick fixes, many of the models of success presented to the roundtable emphasized the value of social interaction as a mediator.

Three components of change illustrated by these interventions are: (1) practices that lead to skill changes; (2) shifts in one's world view or orientation; and (3) feeling a sense of community. These components must be considered together when designing interventions to improve well-being.

Roundtable Round Robin: Research Gaps and Opportunities

Participants were asked to briefly comment on key takeaway messages from the two-day meeting. The following issues were raised around five broad themes:

Measurement

- Social factors are driving a lot of these interventions, so we need to improve the measures of interpersonal and social processes and include these measures of these putative mechanisms of action deliberately in the interventions. The emotional well-being field

needs to connect with the social well-being field so common measurements and findings can inform policy.

- Although these models of success are complex, the data capture is low resolution. Focus deeply on a few key components.
- Increasing purpose and meaning is a feature of several of these interventions, suggesting that we need to adopt common approaches to measuring these constructs.
- In developing large-scale studies, we need to be careful not to overwhelm them with too many measures. Consider what measures and outcomes are already being considered and pay attention to what matters to given populations (e.g., burnout among teachers).
- Social bonding in the context of purposefulness is very powerful—how do we measure that?

Methodology

- Keep a systems perspective. The unit of analysis can be larger units, which can be expensive, but studying clusters of communities can lead to change at that level. Wearable devices are one strategy for collecting data on large populations.
- A plea was made to not use the term emotional well-being, but rather to use the nomenclature in the field of subjective well-being research that has been used for years, and in which measures of emotional processes and experiences already have a place.

Mediators and Mechanisms

- Focus on mediators of change in emotional well-being. Further develop them by studying their effectiveness and the underlying brain mechanisms that modulate behavior across the lifespan.
- Some mediators of interventions will be specific, but it would be useful to identify common mechanisms of action across multiple interventions. Their reliability depends on the measures used.
- It might be useful to deconstruct some of the components of emotional well-being in the same manner as RDoC so we can better understand the mechanisms in play in complex environments. Which aspects of the active ingredients of an intervention (the mechanisms of action) can we deconstruct through neuroscience with the goal of optimizing the intervention? On the other hand, some of these interventions are complex and affect many aspects of people's lives; deconstruction could render the intervention inactive.
- We need to know more about sex differences in response to these interventions.
- How can these interventions tell us more about the brain? We need to connect the data on behavioral, psychological, and social mechanisms and outcomes collected in these interventions with data about the biological and neurobiological mechanisms and processes.

Implementation/Outcomes

- The relational aspects of these interventions, in terms of connectedness and bonding, are critically important and provide opportunities for reinforcement. When scaling them up,

we need to ensure studies of sufficient power are conducted to determine whether interventions actually will work across different groups or in different settings.

- Which active ingredients shown to be effective can be scaled down, perhaps to deliver an intervention more efficiently and effectively in a mini-program (e.g., 5-minute sessions several times a day)?
- Although the interventions are often introduced in noisy environments, they show some effect, and are therefore worth scaling up.
- What is the primary or composite outcome of these interventions?

Culture/Health Disparities

- Remember the importance of culture when developing an intervention. Understand how emotional well-being is conceptualized and understood across cultures and be mindful of the latent cultural values that promote emotional well-being.
- Context is important, for example, is the intervention focused on caregivers, teachers, or some other unique group? Various attributes of those populations might be critical mediators of effect.
- The gradient between education and health is well known. To what extent do some of these interventions ameliorate the disparities related to low education and poor health?

Cochairs' Final Observations

Cochair Dr. Davidson offered his final observations, as summarized below.

- The meaning of a construct is defined by how it is operationalized and how it is being used in different research contexts. The field is using the same words but operationalizing them in many different ways. We need an index of well-being that crosses domains based on common measures, and not restricted to one particular domain. Related to this is how well-being is related to emotions. The right dimensional framework for emotion needs basic research as it relates to well-being.
- In many of the models of success, distal outcomes are being measured and represent desired outcomes, for example, health care use, absenteeism, or academic performance. Proximal measures are needed to identify the mediators, perhaps as proxies for the distal measures. Research should include both distal and proximal measures to understand their relationship.
- Better dosage data would provide guidance on whether an intervention can be divided into temporal segments.
- Meaning and purpose are based largely on self-report measures. Additional measurement development around these constructs would be useful.
- The role of intention and mindset can be studied by manipulating those variables to look at synergistic and independent effects at the individual and groups levels.
- There is a growing literature on reactivity, recovery, and regulation, but they need to be measured in many different systems (behaviorally and biologically) as they may be important for resilience. How do these operate across different timescales?

- Studying the qualities of the facilitators (e.g., elders, teachers) in these interventions can inform how they model, exemplify, and teach emotional well-being.
- Understanding individual differences could lead to precision well-being training, based on characteristics of the individual. Understanding the predictive factors of an individual could more rationally assign them to a more effective intervention.
- Recognize that some interventions do not show any effect for many years.

Cochair Dr. McEwen offered his closing observations, as summarized below.

- Just as one size does not fit all in drug effects, the same is likely true in interventions aimed at promoting well-being.
- Many of these interventions highlight the importance of brain plasticity and how it varies among individuals. The plasticity seems to last for a while. What behavioral features can we enhance to help sustain this plasticity? Self-esteem and self-regulation are key elements of brain changes.

Final Discussion: Recommendations

Wide-ranging discussion focused on recommendations for moving the science of emotional well-being forward.

- Studies should be positioned so individuals can be followed over time, incorporating constructs that one wants to see later in life (e.g., cognitive function, well-being).
- Many population-based studies are already collecting valuable longitudinal data that can be harvested for hypothesis generation.
- Prevention trials need to understand the life course of the control group, that is, is their condition getting worse over time?
- Studies need clear conceptual frameworks for outcomes.
- Embed trials within basic research studies to help elucidate the causal nature of the connections being made.
- The spiritual and cultural dimensions of well-being are important to understand. Certain cultural values frame and appreciate an innate spiritual sense. Relational awareness is a framework for spirituality. If spirituality is important and we leave it out of what we are measuring and acknowledging, we are ignoring an important component of well-being for some cultures. Understanding rituals and practices in some cultures can tell us about aspects of well-being that can be embedded in interventions.
- Emotional well-being interventions extend beyond the scope of individual level behavior change and the pharmacological model. They also encompasses culture and norms. Emotional well-being does not center just on skills development but rather on skills deployed within a supportive context and system. This is why randomized encouragement trials are needed on which we give people a choice to foster reward-based learning. The intervention has to have meaning and some enjoyment to promote adherence.
- Meaningfully aggregate data and revisit existing data with new knowledge to generate new hypotheses. For example, standardize passive measures and combine them with self-

report and GPS data to reconceptualize constructs and people's experiences. Also mentioned was the need to pool studies and then mine them for common elements. There are lists of publicly available databases containing brain and wearables data.

- The variability of affect might be significant to understanding well-being. People live in a wide dynamic range of emotions that can be appropriate or inappropriate. Several longitudinal studies have burst designs in which some data are collected daily. Mining these studies could provide insight on resilience, reactivity, and recovery and what might be predictive over time.
- Some components of NIH are developing better ways of coding the environment, for example, PhenX. Such efforts are needed to provide more standard measures of context and environment in well-being.
- Funding mechanisms are needed that allow one to target many mediators and many populations across the lifespan (acknowledging dyadic, triadic, and multi-dimensional relationships). Institutes that focus on child health, human development, and aging do fund intergenerational studies.
- Prevention and promotion are both important and require different measures. Is emotional well-being the outcome or are we using it as a means to buffer individuals from adversity? Promotion and prevention goals can be part of the same intervention. A network could develop the core constituents of well-being and describe how proximal measures are related to distal measures that are important to public health.
- Creation of a research network, or think tank, would facilitate approaches to more rapidly and effectively tackling some of the research questions discussed at the roundtable.

In sum, the models presented to the roundtable's participants target and assess some of the key elements of emotional well-being, building on neurobiological domains and constructs including: emotion regulation, psychological distress, cognition, social interactions, mindfulness, and physical and psychological functioning. Roundtable discussions focused on, among many issues, lifespan development, specifically key elements of emotional well-being that are particularly vulnerable or amenable to change at different periods of transition and across the lifespan, and what is known about the neurobiological processes relevant to various aspects of emotional well-being in childhood, adolescence/young adulthood, middle adulthood, and older adulthood.

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**Appendix B: Models of Success
Emotional Well-Being Roundtable**

Selected to Highlight Varying Interventions, Health Outcomes, Populations (Lifespan), and Stage of Development (Scalability)

Child/Family Focus

Intervention	Mechanism(s) of Action	Health Outcomes	Setting(s)	Target Population	Stage of Development	Author(s)
Family Spirit home visiting intervention using structured lessons to address behavioral health disparities such as teen pregnancy, substance use, suicide, school dropout	Parental competence (parenting knowledge, locus of control, stress, and behaviors); maternal behavioral problems that impede effective parenting; internalizing and externalizing behaviors and dysregulation.	Mothers had greater parenting knowledge and parental locus of control, fewer depressive symptoms and externalizing problems, and lower use of marijuana and illegal drugs. Children had decreased externalizing and internalizing and dysregulation.	Southwestern reservation communities	Expectant American Indian teens and children (mean age 18.1 years)	Multisite, randomized, parallel-group trial; optimized standard care or optimized standard care with intervention	Barlow et al. (2016, 2013, 2015); Frick et al. (1994); Patterson et al. (1989); Pettit et al. (2001); Walkup et al. (2009)
The MindUp Program. Mindfulness-Based School Program for Elementary School Children Social and emotional learning program involving mindfulness and caring for others	Stress, cognitive control, well-being, prosociality, peer acceptance, school outcomes	Improved cognitive control and stress physiology; reported greater empathy, perspective-taking, emotional control, optimism, school self-concept, and mindfulness; decreases in self-reported symptoms of depression and peer-rated aggression; more prosocial; increased peer acceptance (or sociometric popularity).	Educational settings	Elementary school students (grades 4-5)	Randomized controlled trial	Schonert-Reichl et al. (2010, 2015); Maloney et al. (2015, 2016)

Intervention	Mechanism(s) of Action	Health Outcomes	Setting(s)	Target Population	Stage of Development	Author(s)
<p>Strong African American Families Program (SAAF), a prevention intervention positing that regulated, communicative parenting causes changes in factors protecting youths from early alcohol use and sexual activity. Parenting variables included involvement-vigilance, racial socialization, communication about sex, and clear expectations for alcohol use.</p>	<p>Socialization through development of prosocial skills and self-regulatory abilities, which protect from engagement in the use of alcohol and other substances, early sexual activity, and antisocial behavior. Development of vigilance and ability to anticipate potentially dangerous events in their neighborhoods and schools. Deters the development of externalizing and internalizing behaviors.</p>	<p>Youth protective factors included negative attitudes about early alcohol use and sexual activity, negative images of drinking youths, resistance efficacy, a goal-directed future orientation, and acceptance of parental influence. Intervention-induced changes in parenting mediated the effect of intervention group influences on changes in protective factors over time.</p>	<p>Rural communities</p>	<p>African American families with a son or daughter in early adolescence</p>	<p>Randomized prevention trial(s)</p>	<p>Brody et al. (2004, 2006)</p>

Adult Focus

Intervention	Mechanism(s) of Action	Health Outcomes	Setting(s)	Target Population	Stage of Development	Author(s)
ReSource Project (plasticity of the social brain), cultivation of compassion and altruism through breathing meditation and body scan (the presence module), loving-kindness meditation and affect dyad (the affect module), and observing-thoughts meditation and perspective dyad (the perspective module)	Mental and physical health on individual levels, prosocial motivation, and increased levels of cooperation; subjective, behavioral, neuronal, and hormonal changes associated with mental training of socio-affective as well as cognitive capacities ranging from attention and mindfulness, empathy, prosocial motivation, and compassion to emotion-regulation and perspective taking on self and others.	Improved self-disclosure and social closeness, reduced stress, improved mental clarity, increased life satisfaction, resilience.	General	Adults	The ReSource Project was an 11-month open-label efficacy trial of three, 3-month secularized mental training modules.	Kok and Singer (2017a, 2017b); Böckler (2017)
Health Enhancement Program (HEP), using Mindfulness-Based Stress Reduction	Reduction in inflammatory and stress responses	Meditators showed lower Trier Social Stress Test (TSST)-evoked cortisol and perceived stress and smaller neurogenic inflammatory response. Higher levels of psychological factors associated with well-being and resilience.	Not applicable	Experienced meditators, adult, variable	Case control study	Rosenkranz et al. (2013, 2016)

Older Adult Focus

Intervention	Mechanism(s) of Action	Health Outcomes	Setting(s)	Target Population	Stage of Development	Author(s)
Active Experiencing Training for Episodic Memory Recall , mindfulness training via an immersive acting program	Episodic memory, cognition, well-being	Gains in episodic recall up to 4 months post-intervention	Community	Adults aged 60–89 years	Intervention trial	Banducci et al. (Kramer) (2017); Noice and Noice (2009)
Baltimore Experience Corps® . Volunteer intergenerational intervention involving adults 60 years and older and inner-city children: phonetics, literacy support, library support, violence prevention	<p><i>Adults:</i> Physical and psychological functioning; social connections and support, brain volume, generative desire, confidence, disability and mobility, frailty, falls, memory loss, prefrontal cortex plasticity, strength and energy, depression</p> <p><i>Children:</i> psychological and academic success (reading achievement, classroom behavior), school climate (teacher morale and retention)</p>	<p><i>Adults:</i> Increased social networks and connections and support; improved expectations about aging (Menkin et al. 2016) Declines in inactivity (e.g., increased steps/day) among women (Varma et al. 2016) Halted or reversed declines in brain volume (regions vulnerable to dementia) (Carlson et al., 2015) Increased generative desire and perceptions of generative achievement</p>	Inner-city elementary schools	Community-dwelling adults age 60 and older and elementary school children	Began in 1998. Each year, more teams of trained older adults are placed in elementary schools in Baltimore. Many volunteers return for the following year. Along with their role in the schools, the volunteers provide ongoing support and influence to the general operation of the program. Goal is to continuously expand. Cohorts are continuously studied.	Multiple, to include Carlson (see Health Outcomes Column)

Intervention	Mechanism(s) of Action	Health Outcomes	Setting(s)	Target Population	Stage of Development	Author(s)
		<p>(Gruenewald et al. 2016)</p> <p>Increased confidence, appreciation of organized activities, social connections (Morrow-Howell et al. 2014)</p> <p>Decreased disability in mobility and Instrumental Activities of Daily Living; decreased frailty, falls, memory loss; slowed loss of strength, balance, walking speed, cortical plasticity, executive function; increased social and psychological engagement (Fried et al. 2013)</p> <p>Immediate short-term gains in prefrontal cortex plasticity (Carlson 2011)</p> <p>Decreased depressive symptoms and functional</p>				

Intervention	Mechanism(s) of Action	Health Outcomes	Setting(s)	Target Population	Stage of Development	Author(s)
		<p>limitations; less decline in self-rated health (Hong and Morrow-Howell 2010)</p> <p>Increased strength and energy (Barron et al. 2009)</p> <p><i>Children:</i></p> <p>School climate improved but not sustained (Parisi et al. 2015)</p> <p>Improved reading achievement and classroom behavior; improved social climate, teacher morale, and retention (Fried et al. 2013)</p>				

Services and Implementation Focus

Intervention	Mechanism(s) of Action	Health Outcomes	Setting(s)	Target Population	Stage of Development	Author(s)
<p>Cultivating Awareness and Resilience in Education (CARE) for Teachers, a mindfulness-based professional development program. Involves emotional skills instruction, mindful awareness, stress reduction practices, caring and listening practices</p>	<p>Teachers' social and emotional competence, quality of classroom interactions, occupational stress, turnover</p>	<p>Direct positive effects on adaptive emotion regulation, mindfulness, psychological distress, and time urgency; positive effect on the emotional support domain of the Classroom Assessment Scoring System</p> <p>Decreased psychological and physical distress</p>	<p>Educational settings</p>	<p>K-5 inner city teachers</p>	<p>Cluster randomized trial</p>	<p>Jennings et al. (2016; 2017a,b,c); Doyle et al. (in press); Brown et al. (2017)</p>
<p>Enhancing Trauma Awareness Professional development course designed to provide skills for responding to those who might be impacted by trauma while allowing participants to become aware of the impact of trauma on themselves and others, manage painful or frightening emotions in themselves and others surrounding trauma</p>	<p>Potential mediating changes in attitudes and perceptions: ↑ empathy ↑ emotion regulation ↑ dispositional mindfulness ↑ attitudes about trauma-informed care ↑ trust with parents, other staff, supervisors ↓ perceived conflict with children in classroom</p>	<p>Proposed health and well-being outcomes: ↑health-related quality of life ↑sleep duration & quality ↑job satisfaction ↑compassion satisfaction ↓secondary traumatic stress ↓burnout ↑ positive affect ↓ negative affect</p>	<p>Educational settings</p>	<p>Adults working in early childhood education programs serving children from low-income households (e.g., Head Start)</p>	<p><i>Pilot study</i> completed with 16 Head Start supervisory and support staff. <i>Randomized trial</i> underway with 96 classroom teachers working in preschools serving children from low-income households (e.g., Head Start) NCT03303482</p>	<p>Whitaker et al. (2014); Whitaker et al. (2015)</p>

Intervention	Mechanism(s) of Action	Health Outcomes	Setting(s)	Target Population	Stage of Development	Author(s)
awareness, and change negative perceptions of themselves and others arising from experiences of trauma.						
<p>Communities That Care (CTC), based on a social development mode that creates opportunities and recognition for prosocial involvement and interaction in youths' daily lives and by ensuring that youths learn the skills needed to succeed in these involvements and interactions, and by targeting risks and risk factors.</p>	<p>Prosocial/antisocial behavior (e.g., substance use, delinquency, and violence)</p>	<p>Significantly higher levels of overall protection in CTC than control communities in the community, school, and peer/individual domains, but not in the family domain. Significantly higher levels of opportunities for prosocial involvement in the community, recognition for prosocial involvement in school, interaction with prosocial peers, and social skills. (Kim et al., 2015)</p> <p>CTC is a cost-beneficial, community-based approach to preventing initiation of delinquency, alcohol use, and tobacco use (Kuklinski, et al., 2015).</p>	<p>Community-based</p>	<p>Adolescent youth (grades 5-12)</p>	<p>At scale, following randomized controlled efficacy trial in 7 states and 24 communities for 9 years</p>	<p>Kim et al. (2015); Kuklinski et al. (2015); Oesterle et al. (2015) (Catalano)</p>

Intervention	Mechanism(s) of Action	Health Outcomes	Setting(s)	Target Population	Stage of Development	Author(s)
		<p>Sustained long-term effects of CTC on continued abstinence from delinquency through age 19, particularly among males. Young men in CTC communities continued to show greater abstinence overall from all substances and delinquency through age 19 as well as greater abstinence from cigarette smoking. Sustained long-term effects were not found for females (Oesterle et al., 2015).</p>				