

New Map of Life Domain Report – Early Childhood

Jonas Miller

Section 1: Introduction

Early childhood is a sensitive period for learning and brain maturation (Shonkoff et al., 2012). Children are particularly open to experiences and activities that help build social, emotional, and cognitive skills. Acquiring these skills sets the foundation for future learning, motivation, productivity, health, and resilience to the challenges faced over a long life (Knudsen et al., 2006). For example, young children who are kind, cooperative, and generous towards others show early signs of healthy biological functioning (Miller et al., 2015, 2016), and are protected against risk both for lower academic achievement in childhood (Armstrong-Carter et al., 2021) and for negative outcomes in the domains of education, employment, crime, substance use, and mental health up to 20 years later (Jones et al., 2015). Similarly, children's self-control, or their ability to delay gratification and manage emotions, predicts better physical health, less criminality, and greater financial stability in adulthood (Moffitt et al., 2011). On the other hand, difficulties in early childhood can lead to lifelong problems that have considerable personal and societal costs (Knudsen et al., 2006). Mental health disorders in childhood predict increased risk for mental health disorders and substance abuse in adulthood (Groenman et al., 2017; Reef et al., 2010), which in turn are associated with a variety of problems ranging from workplace absenteeism and reduced work performance (Plaisier et al., 2010) to increased risk for incarceration (Jordan et al., 1996). Although fewer than 10% of individuals in the population have conduct problems that start in childhood and persist over the course of life, they account for half of all convictions, 15% of emergency visits, and a quarter of social welfare services (Rivenbark et al., 2018). Thus, early childhood is a period of great opportunity as well as risk.

Fully realizing children's potential requires an appreciation that childhood is a developmental period that offers individuals with the time and space to learn, explore, and create. Although young children are not as skilled as older children and adults when it comes to tasks such as focusing attention and avoiding distraction, they are capable of rapid learning about their physical and social worlds. In fact, multiple studies have found that children outperform adults on some learning tasks, showing more flexibility and creative thinking (Gopnik et al., 2017; Lucas et al., 2014). Nonhuman research suggests that cultural innovations are often created and first adopted by younger animals (Aplin et al., 2015, 2017; Perry et al., 2017). But adults must create safe and nurturing environments to support children's well-being, their natural abilities for exploration-based learning and creativity, and their development of foundational skills that will lead to benefits over the course of a long life. Accomplishing these goals will require environments that help to slow or lengthen development during childhood, not to accelerate or shorten it, which is the current trend. For example, over the last 50 years, children have started puberty at increasingly younger ages, and children in the U.S., on average, currently experience the earliest onset of puberty worldwide (Eckert-Lind et al., 2020).

It is also important to note that children are the most physically active members of society (Sigmund et al., 2007). Physical activity in childhood sets the stage for lifelong engagement in physical activity (Malina, 2001), helping to prevent obesity (Moore et al., 2003) and cardiovascular disease (Sääkslahti et al., 2004) while also promoting healthy motor, cognitive, and social development (Burdette & Whitaker, 2005). Taken together, learning, creativity, and healthy physical activities come naturally to young children, often in the context of play. Indeed, research suggests that play, particularly outdoors, confers social, emotional, cognitive, and physical benefits for children (Burdette & Whitaker, 2005; Ginsburg, 2007). Unstructured play, in particular, provides children with opportunities to practice making compromises and cooperating with others, experiences that help to cultivate social and emotional skills that are crucial to healthy longevity, such as empathy and self-regulation.

Scientists in multiple fields have concluded that investing in early childhood is the most efficient strategy for improving future productivity, economic success, and health, and for reducing disparities, in our society (Knudsen et al., 2006). In this report we argue that we should be considering ways that early childhood can be extended or redesigned to take better advantage of our longer lives. Looking forward, the ideal state of childhood includes several cultural and environmental shifts. First and foremost, we need to have a greater appreciation for, and a stronger investment of resources towards, comprehensive care for children and families during the early years of life. Second, physical activity and play should be integral pieces of children's daily activities. Third, children would benefit from finding a more optimal balance between structured, pre-academic activities and unstructured, exploratory activities. And fourth, we must work to reduce the prevalence of and children's exposure to environmental threats to their health. These changes in early childhood would confer both direct and indirect benefits in terms of healthier habits, resilience, cognitive and social-emotional competencies, and protection from harmful social and physical environments.

In this report we aim (1) to promote awareness and appreciation for the role of early childhood in building a strong foundation for healthy, productive, century-long lives; (2) to guide future research in this area; and (3) to inform investments in creating safe and nurturing environments for children. There is no single solution for improving childhood as a stage in a new map of life; consequently, we argue for a multifaceted intervention approach that relies on a broad coalition of public and private sectors with a shared commitment to improving children's health and development for lifelong, intergenerational, and economic benefits.

Section 2: Current State of the Domain

Child health and well-being in the U.S. have improved over the last several decades. For example, between 1975 and 2015, life expectancy at birth increased by 7.5 years and infant mortality decreased 63% (*Mental Health Surveillance Among Children — United States, 2005–*

2011, n.d.). In the United States alone, routine childhood immunization has prevented an estimated 322 million illnesses for 78.6 million children born between 1994 and 2013, saving \$420 billion in direct medical costs and \$1.5 trillion in societal costs (*Benefits from Immunization During the Vaccines for Children Program Era — United States, 1994–2013*, n.d.).

Despite these positive developments, children today face a number of threats to their health and well-being. Mental health problems such as depression are becoming increasingly prevalent in youth in the U.S. (Weinberger et al., 2018). The CDC recently reported that 13-20% of children in the U.S. experience mental health disorders each year, with an annual cost of \$247 billion related to health care, use of services, and decreased productivity (Perou et al., 2013). In terms of physical health, over the past 60 years, rates of obesity have nearly tripled for young children in the U.S. (*Products - Health E Stats - Prevalence of Overweight and Obesity Among Children and Adolescents Aged 2–19 Years*, 2020); in fact, about 14% of preschool-age children are obese. Based on cardiorespiratory fitness measures, children today are less physically fit than children were 40 years ago (Hales et al., 2018). Over the past few decades, children's outdoor recreation has declined while sedentary, indoor activities have increased (Clements, 2004; Frost, 2010). In this context, it is noteworthy that rising rates of mental health problems coincide with the decline of children's free play (Gray, 2011).

A substantial number of children in this country experience socioeconomic disadvantage. About one in six children live in poverty, and nearly four in ten live in families that are considered low-income (*Children in Poverty*, n.d.). Children living in impoverished and low-income families experience disparities with respect to resources and opportunity across domains, including education, healthcare, nutrition, and exposure to environmental hazards and pollutants. For these children, disadvantage permeates nearly every aspect of their daily lives, affecting everything from the quality of food that they eat, to access to clean air and drinking water, to access to safe outdoor spaces.

In the U.S., children's social status, exposure to adverse experiences, physical environment, health, and education are all inextricably tied to race. Racial disparities in health and well-being can be traced back even prior to birth. For example, Black women are more than twice as likely as are White women to experience food insecurity during pregnancy, increasing their risk of maternal depression, gestational diabetes, and birth defects (Carmichael et al., 2007; Laraia et al., 2006; Seligman et al., 2007). These factors are associated with disease susceptibility and mental health in children (Franzago et al., 2019; Madigan et al., 2018) as well as more rapid physical aging in later life (Sayer et al., 1998); further, the effects may predispose multiple generations to metabolic problems implicated in obesity and diabetes (Saben et al., 2016). Indeed, whereas fewer than 15% of Non-Hispanic White children are obese, more than 20% of Black and Hispanic children are obese (Ogden et al., 2018). Children of color in the U.S. also experience profound educational disadvantages that emerge early in their lives. For example, by kindergarten, Black and Hispanic children are, on average, 7 to 12 months behind in math and reading skills compared to their White peers (Friedman-Krauss et al., n.d.).

Social and Physical Environments

Positive and adverse experiences in the home, school, and community are powerful determinants of well-being across the life span. Children who have reliable and supportive relationships tend to be healthier, more empathic and collaborative, have greater self-control, and do better in school than children who lack or have fewer of these experiences (Fay-Stammbach et al., 2014 ; Hastings et al., 2015; Martin et al., 2013; Schore, 2001). The benefits of positive experiences extend well beyond childhood. People who are exposed to more types of positive childhood experiences with parents, friends, and in school/the community are 72% less likely to develop depression and other mental health problems as adults than are those who had few positive childhood experiences (Bethell et al., 2019). Similarly, adverse childhood experiences, such as abuse, neglect, exposure to violence, and family dysfunction, account for almost half of childhood-onset psychiatric disorders and close to a third of later-onset disorders

(J. G. Green et al., 2010). In addition to being a major risk factor for mental health problems, adverse childhood experiences increase individuals' risk for age-related and chronic diseases, including heart disease, stroke, and diabetes (Gilbert et al., 2015). Adverse childhood experiences are also associated with accelerated cellular aging, pubertal onset, and neurodevelopment (Colich et al., 2020; Gee et al., 2013; Keding et al., 2021; Miller et al., 2020). Thus, from a biological perspective, there is accumulating evidence that early adversity shortens the duration of childhood. Researchers have posited that accelerated development signals an earlier reduction in neural plasticity, capacity for rapid learning, and sensitivity to important environmental input (Callaghan & Tottenham, 2016; Ho, 2019).

Unfortunately, adverse childhood experiences are quite common. In fact, the majority of children in the U.S. are exposed to at least one type of adverse childhood experience (McLaughlin et al., 2012), and two-thirds of children experience violence (physical abuse, sexual abuse, or witnessing domestic or community violence) by age 16 (Finkelhor et al., 2015). Further, different types of adversities are likely to co-occur (Burke et al., 2011; Felitti et al., 1998); consequently, more than a third of children experience exposures to multiple types of adversities (McLaughlin et al., 2012). Although these adverse experiences are highly prevalent, children living under conditions of poverty (approximately one-sixth of children in the U.S.) are at the greatest risk. According to data from the Center for Disease Control (*Adverse Childhood Experiences (ACEs) - Child Welfare Information Gateway*, n.d.), 42% of children in the child welfare system are exposed to at least four kinds of adverse experiences. These data provide but one example of how social gradients of health emerge in childhood.

Children are also affected by their physical environments. One-quarter of children in the U.S. live in a neighborhood that does not include a park; regardless of social and demographic factors, children in these neighborhoods are at increased risk for heightened physical inactivity, excessive screen time, inadequate sleep, obesity, and diagnosis of mental health problems such as attention deficit hyperactivity disorder (ADHD) (Reuben et al., 2020). According to the

U.S. Environmental Protection Agency (EPA), almost half of public schools have issues that contribute to poor indoor air quality (*Green School Buildings Are Better for Teachers and Students*, 2018). Children are also more vulnerable than are individuals in other age groups to the adverse effects of pollution and environmental toxins, given that their bodies and brains are not yet fully developed (Friedrich, 2018; Schwartz, 2004). For example, exposure to air pollution has been linked to children's aberrant brain development, accelerated biological aging, increased depression and anxiety, and impaired self-regulation (D'Angiulli, 2018; Margolis et al., 2016; Moslem et al., 2020; Yolton et al., 2019). The adverse effects of early exposure to environmental pollutants are long-lasting. Exposure to lead during childhood predicts lower IQ and socioeconomic status in adulthood, as well as elevated mental health problems across the life course (Reuben et al., 2017, 2019).

The Importance of High-Quality and Affordable Childcare

High-quality childcare not only helps children develop foundational skills for future success and well-being, but also helps parents pursue adult education, employment, and higher income (García et al., 2016). Increasing social mobility for families helps decrease children's exposure to adverse experiences (e.g., violence, neglect, and family dysfunction). Full-time childcare has also been found to improve math and reading ability, to increase the likelihood of graduating from college, and to decrease the likelihood of receiving public assistance and coming into contact with the justice system (Sparling & Meunier, 2019). Despite these benefits, however, fewer than half of children the U.S. aged three or younger are currently enrolled in childcare (*COE - Enrollment Rates of Young Children*, n.d.).

In the U.S., caring for young children has long been considered the primary responsibility of families rather than of the government. Publicly funded childcare has not been a priority for federal support. The programs that have received funding focus mostly on young children living in poverty rather than children in general. Certainly, other countries that are ahead of the U.S. in terms of both money spent on children and educational performance have

low-income children; however, they offer universal services rather than making income level a requirement for receiving care and services, such as childcare subsidies and extended parental leave (Kagan, 2019).

Increasing Emphasis on Academics and Neglecting Physical Activity

Early childhood is an important time for establishing healthy behaviors that contribute to disease prevention and that are foundational for lifelong engagement in physical activities (Malina, 2001). Current guidelines recommend that young children should be physically active throughout the day, and children ages 6 and older should engage in at least 60 minutes of moderate to vigorous physical activity per day (*How Much Physical Activity Do Children Need?*, 2021); nearly half of children do not meet these recommended guidelines (Tucker, 2008). Not surprisingly, perhaps, physical activity starts to decline at the same early age as children enter school (Lounassalo et al., 2019) and are required to spend more time sitting in a classroom environment. Physical education is also becoming a lower priority for schools; in fact, the median physical education budget for elementary schools is only \$460 school, per school year (*Shape of the Nation*, n.d.).

We are increasingly creating environments and daily activities for younger children that are similar to those of their older peers. Preschool environments increasingly limit children's physical activity and involve more time spent being sedentary (O'Dwyer et al., 2013). There is a growing emphasis on academics in preschool while cutting back on free play. Children in the U.S. living in the first half of the 20th century experienced what some researchers have referred to as the "golden age of play" (Chudacoff, 2007). In contrast, children now spend less time playing than did children in the recent past, declining 25% from 1981 to 1997 (Hofferth & Sandberg, 2001). Interestingly, the percentage of teachers who believe that children should start learning to read in kindergarten instead of in the first grade increased from 30% in 1998 to 80% in 2010 (Bassok et al., 2016). One potential cost of asking children to "perform" at increasingly younger ages is that it condenses early childhood as a developmental stage.

The key to improving childhood and, ultimately, the quality of long life, is to build social and physical environments for children that are safe and supportive. These environments should reduce children's exposure to adverse experiences and physical pollutants, increase the presence of stable, nurturing relationships, and encourage healthy lifestyle habits such as engagement in physical activity. At the same time, these environments should be designed to provide children with time and space to explore, create, and cultivate skills that have been established as critical for well-being across the life span. Creating these new environments will require adopting new practices and policies, philosophical shifts in how we think about and evaluate early childhood, and a comprehensive, multidimensional approach to supporting children, their families, and the individuals who work with them.

Section 3: Evidence for Alternative Approaches

Public policies that strengthen support for children and families are essential for improving the quality of our longer lives. Studies using random assignment and longitudinal data provide strong evidence that early intervention programs aimed at enriching children's environment have long-lasting effects on life success. One example of this type of evidence comes from research on the Perry Preschool Program – an intensive preschool program administered to Black children from disadvantaged backgrounds (Manning & Patterson, 2006). The program consisted of sessions each weekday morning for 2.5 hours. These sessions emphasized active learning; children participated in problem-solving and decision-making activities that, with adult support, they helped to develop and carry out. Teachers in the program also provided weekly 1.5-hour home visits designed to help families implement educational activities at home. Children in the program and children in a control group were followed up through age 40. Compared to children in the control group, those who received high-quality preschooling had higher educational attainment, higher income, and generally better life outcomes in adulthood. Figure 1 from Knudsen and colleagues (2006) shows the academic and

economic outcomes for children from the intervention group (red bar) and children from the control group (blue bar) at age 27.

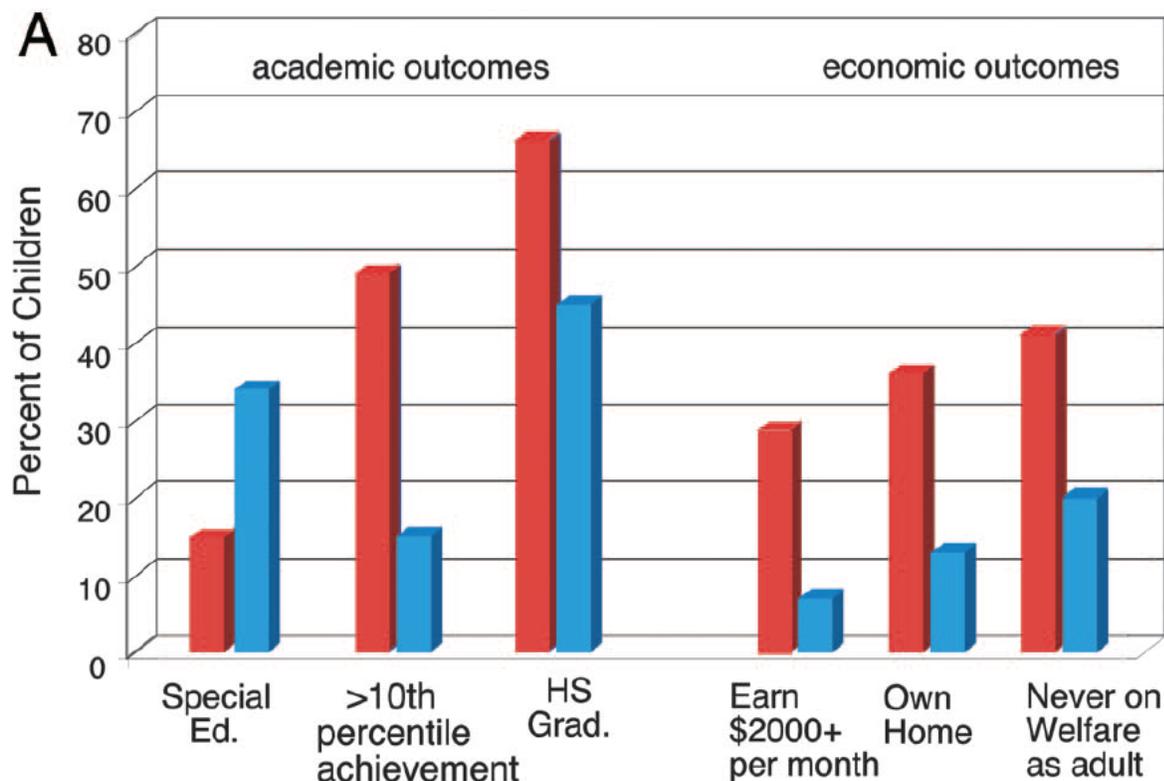


Figure 1. Knudsen et al. (2006)

Importantly, the benefits of the Perry Preschool Program extended to siblings of participating children, and were intergenerational (Heckman & Karapakula, 2019); children of individuals from the treatment group had better educational and employment outcomes than did children of individuals from the control group.

Economic models suggest that comprehensive, high-quality early education and childcare programs are excellent public investments, delivering a 13% annual return on every dollar spent (García et al., 2016). Further, programs that target the earliest years of childhood provide even stronger rates of return to investment in human capital than do programs that start at preschool-ages or later (see Figure 2; Heckman, 2008). The financial benefits are, in part, the result of a two-generation effect on education and workforce. High quality childcare helps

Returns to a Unit Dollar Invested

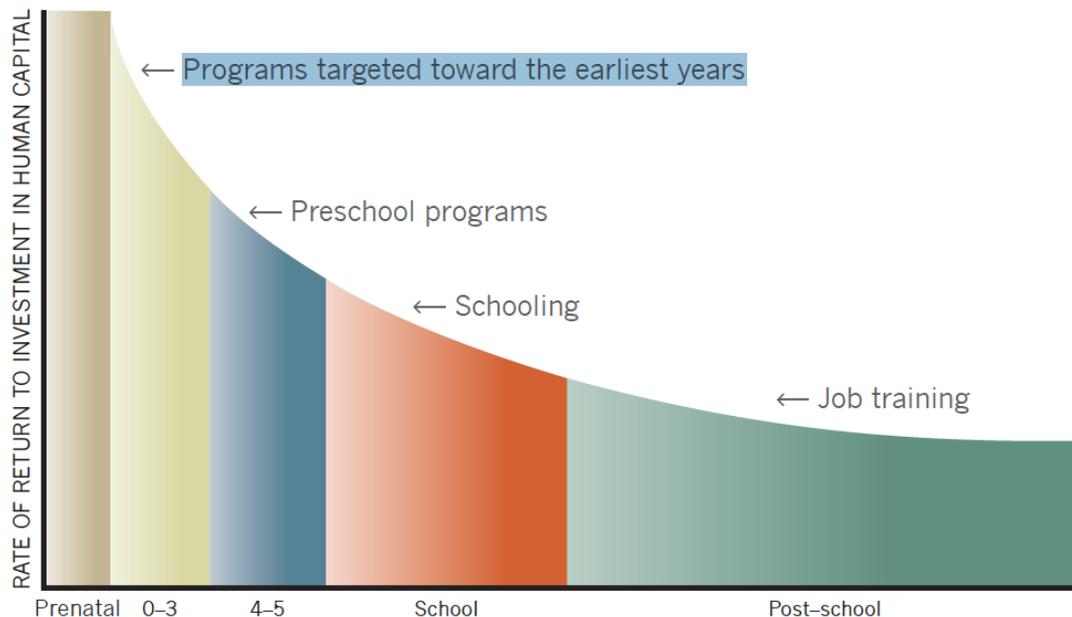


Figure 2. Heckman (2008)

children develop foundational skills for future success, well-being, and productivity in the workforce, but also helps parents, particularly single mothers, pursue adult education, employment, and higher income (García et al., 2017). Two-generation programs that offer services to children and parents at the same time provide benefits for the family system that, in turn, improve program effectiveness. For example, the Administration for Children and Families specifies that children in Head Start program should attend 85% of offered program days, yet the national average attendance rate is 75% (*1302.16 Attendance*. | ECLKC, n.d.).

CareerAdvance, a two-generation human capital program that integrates education and workforce training for parents of children enrolled in Head Start services, increases children's attendance rates in education programs (Sommer et al., 2020). Two-generation programs supplement standard support programs in Head Start such as home visits by teachers or staff, which have been linked to children's positive socioemotional and academic development (Cook et al., 2017) but are not effective in increasing attendance rates (Harden et al., 2012).

CareerAdvance parents are given financial incentives to attend school themselves; these

parents experience benefits in terms of higher rates of employment and improved self-efficacy and optimism (Chase-Lansdale et al., 2019, p.). Taken together, improving education, career development, and psychological functioning in parents provides benefits to children that are additional to those derived from their own participation in early education and childcare programs. Research suggests that when individuals experience poverty, concerns related to economic hardship consume mental resources that could be used for other tasks (Mani et al., 2013). Periods of financial instability contribute to stress and mental health problems in parents that interfere with their ability to engage in child enrichment activities (Osborne et al., 2012). Indeed, programs that improve financial stability of parents may allow parents to leverage financial, social, and psychological resources to overcome challenges to child enrichment activities.

These kinds of intervention programs aim to address early emerging achievement gaps between advantaged and disadvantaged children that start early and persist throughout life. Addressing this achievement gap is not simply a matter of providing more instruction in an effort to improve skills like literacy and language. Although these early education programs have positive effects on children's cognitive abilities and pre-academic skills (Magnuson et al., 2007; Ramey & Ramey, 2004), much of their success in the short- and long-run is related to their effectiveness in supporting children's development of noncognitive skills (Heckman et al., 2006). The combination of noncognitive skills, such as self-regulation and motivation, and cognitive skills contributes to individual differences in achievement in school and workplace settings (Heckman & Kautz, 2012). Social skills also help children to have positive interactions and develop positive relationships with peers and teachers that are essential for success in school. In this context, social and emotional learning (SEL) programs are a promising approach to improving competencies such as empathy, conflict resolution, recognition of emotion, stress-management, and decision making skills. SEL programs also improve academic achievement for children who may otherwise be at risk, such as those from socioeconomically disadvantaged

backgrounds (Durlak et al., 2011; Gregory & Fergus, 2017; Taylor et al., 2017). Many of the benefits produced by SEL programs are enduring; children who participate in SEL are more likely to graduate from high school and college, and are less likely to experience mental health problems or come into contact with the justice system (Taylor et al., 2017). In much the same way that two-generation human capital programs improve family systems, SEL programs improve the emotional climate of classrooms by providing teachers with skills to effectively manage children's challenging behaviors (Morris et al., 2013). In fact, economic models suggest that SEL programs provide an excellent return on investment, averaging an \$11 return for every dollar spent (Belfield et al., 2015).

Personal experiences in early childhood affect learning, behavior, and health across the life span. Adverse childhood experiences that involve excessive or prolonged stress can disrupt brain development and, as a result, influence behavioral outcomes, educational attainment, economic success, and health outcomes decades later and even in future generations (Shonkoff, 2010). Given the broad, long-lasting effects of childhood adversity, and the prevalence of these experiences in the U.S., clinical scientists have argued that organizations should adopt a trauma-informed approach to their delivery of services and care to help promote resilience (Oral et al., 2016). According to the Substance Abuse and Mental Health Administration (*SAMHSA's Concept of Trauma and Guidance for a Trauma-Informed Approach | SAMHSA Publications and Digital Products*, n.d.), adopting this approach involves three main principles - realizing the widespread impact of trauma and paths for recovery; recognizing signs of trauma in clients and staff; and responding by using knowledge about trauma to inform policies and practices and avoiding re-traumatization. Thus, trauma-informed care involves widespread organizational changes and sensitivity to the needs of children and families who have been exposed to adversity. Screening, assessing, and treating individuals following childhood adversity are essential components of trauma-informed care. Comprehensive screening and assessment also includes identifying the presence or absence of individual-

family-, and community-level resources related to resilience, assessment of behavioral and psychological functioning, and prior intervention experiences (Harris & FalLOT, 2001). Trauma-informed care is most likely to be effective when coupled with evidence-based strategies for treating children and families exposed to adversity. Research suggests that trauma-informed care improves healthcare delivery in terms of patient-centered communication, patient satisfaction, and improved client outcomes (Azeem et al., 2011; B. L. Green et al., 2015).

Trauma-informed care approaches are being extended from health care into children's broader environment. For example, Head Start Trauma Start is a partnership between mental health and education professionals that is designed to help children and families enrolled in Head Start (Holmes et al., 2015). Figure 3 from Holmes and colleagues (2015) shows the conceptual model of Head Start Trauma Start. In this program, clinical therapists offer training

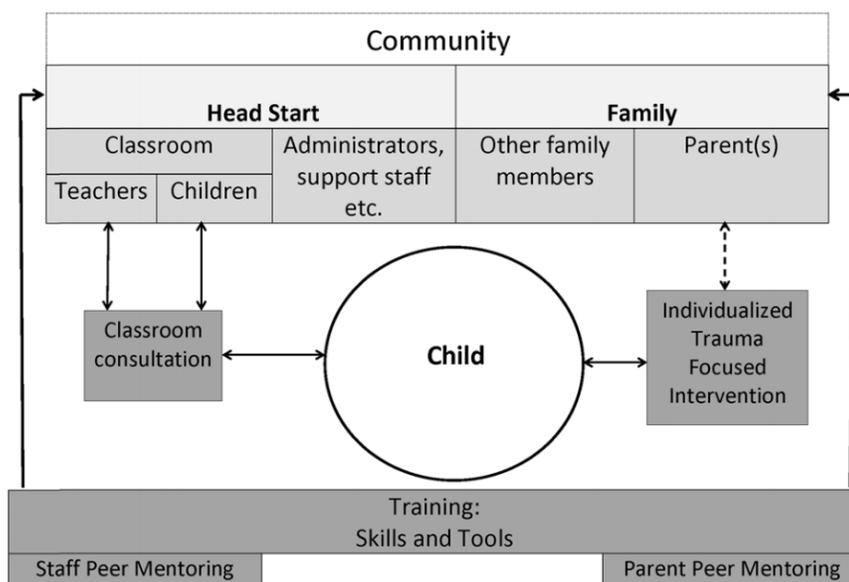


Figure 3. Holmes et al. (2015)

to Head Start staff (administrators, teachers, bus drivers, etc.), parents, and other adults in children's social network (grandparents, neighbors, day-care providers, etc.) with the goal of fostering a trauma-informed culture that is consistent across all parts of children's daily life. Based on screening of children's exposure to adversity and levels of behavioral and attentional

difficulties, evidence-based clinical interventions are made available for individual children and their parents, and are supplemented by weekly phone calls and messages to parents. In addition, peer mentorship programs for staff and parents are intended to help adults support and learn from each other. Children enrolled in Head Start Trauma Smart experience benefits in terms of reduced behavioral and emotional difficulties (Holmes et al., 2015), and these early outcomes increase the likelihood of positive developmental trajectories.

In addition to personal experiences, physical environmental factors significantly affect child health. Young children spend the majority of their time indoors at daycare, at home, and in school environments (Lupoli et al., 2009; Slezakova et al., 2015). Indoor environment factors such as low-quality buildings, lack of maintenance, and insufficient ventilation contribute to children's exposure to indoor pollutants that have been implicated in well-being (Annesi-Maesano et al., 2013). For example, poor indoor air quality has been negatively associated with children's cognitive development, academic performance, school attendance, and health (Haverinen-Shaughnessy et al., 2015; Sunyer et al., 2015). Children exposed to higher levels of indoor air pollutants such as fine and ultrafine particles are more likely to develop sensitivity to allergens and to have acute and chronic respiratory problems (Annesi-Maesano et al., 2013; Deng et al., 2015; Kim et al., 2015). Designed environments can improve children's health by improving indoor environment quality. For example, green school buildings strive to create physical environments that are optimized for learning and health. Low-cost interventions such as installing air filters, dehumidifiers, and doing minor repairs of structural integrity can significantly improve indoor air quality and health in children with asthma (Crocker et al., 2011). Building indoor environments with adequate ventilation and regulation of temperature may also help to raise children's academic performance (Haverinen-Shaughnessy & Shaughnessy, 2015).

Lastly, interventions and environments that promote children's physical activity and exploratory, active play also hold promise for improving children's health and learning. Engaging

in physical activity in early childhood has been found to be associated not only with early bone health, reduced adiposity, better cardiometabolic health, and physical fitness (Poitras et al., 2016), but also with improved cognitive and social-emotional development. Young children with higher aerobic fitness and motor skills exhibit better functioning on cognitive tasks assessing working memory and attention (Niederer et al., 2011). Children who spend more time playing outdoors receive higher scores on assessments of social skills (Hinkley et al., 2018). Active play in preschool-age children is associated with self-regulation skills that are important for early academic achievement (Becker et al., 2014). Taken together, increasing or maintaining time dedicated to physical activity and play appears to help rather than hurt children's academic performance and development. Children's physical activity can also be integrated with academic activities. Lesson plans that require children's motor actions can increase learning of concepts in math and science (Mavilidi et al., 2017, 2018), and require few resources or special equipment.

Section 4: Opportunities/Recommendations for changes to the status quo

Many of the interventions and programs described thus far have been designed for, and are currently restricted to, disadvantaged children and families. It is important to note that although factors that increase children's risk for poor health, such as childhood adversity and environmental pollutants, are disproportionately concentrated in marginalized communities, these experiences and exposures are prevalent across a wide range of demographics. In addition, many families in the U.S., not just those who live in poverty or are low-income, struggle to pay childrearing expenses. All children deserve access to programs that will benefit them, and supporting and improving healthy development in all children is clearly in the nation's interest. Increasing access to and enrollment in high-quality childcare and education programs would provide widespread benefits. Thus, the concepts of universality and broad distribution are

core to many of the public policy and private sector recommendations for changing the status quo in early childhood.

In terms of federal policy, several researchers have argued that reorganizing the structure of the Child Tax Credit into a universal monthly child allowance has the potential to dramatically reduce family poverty and income instability (Shaefer et al., 2018). Indeed, political support for universal child allowance is gaining traction. Recently, House Democrats unveiled and passed legislation to provide families with at least \$3000 per child, sent in \$250 per month increments, as part of President Biden's COVID-19 relief package. According to simulation analyses from Shaefer and colleagues (2018), a universal child benefit package of \$250 per month will reduce child poverty rates by 40% and effectively eliminate extreme poverty in families. Figure 4 presents a figure from Shaefer and colleagues (2018) showing the effects of a universal child allowance on different metrics of poverty. Monthly payments are an important component of the allowance that will help address monthly shortfalls commonly experienced by low-income families with children (Edin & Lein, 1997).

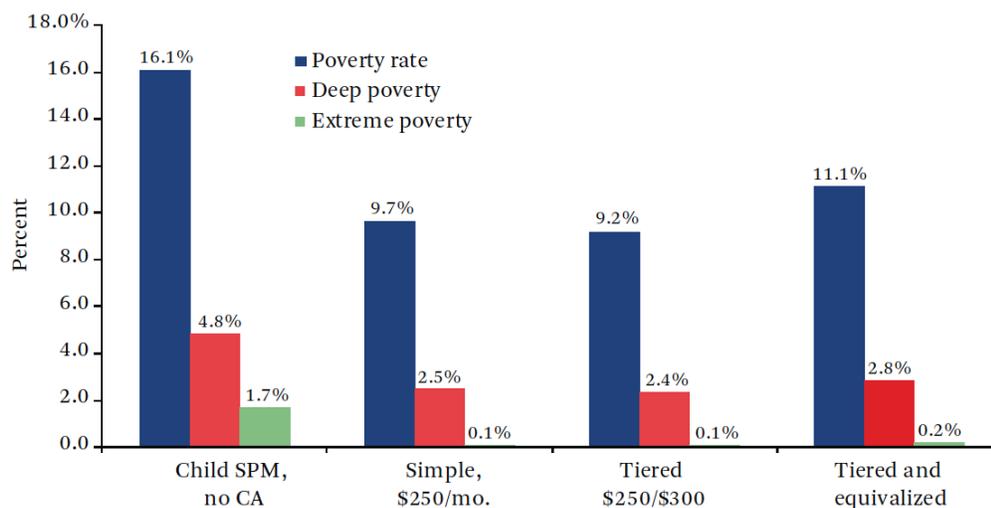


Figure 4. Shaefer et al. (2018)

At the state level, many states use Quality Rating and Improvement Systems (QRIS) to evaluate programs for children and families in terms of child/staff ratios, teacher training and

credentials, and teacher-child interactions (*Quality Rating and Improvement Systems (QRIS) - Early Learning - The Issues - BUILD Initiative*, n.d.). Challenges for QRIS include low participation and a disconnect between funding and ratings (*The Early Childhood Challenge for Philanthropists (SSIR)*, n.d.). Developing and administering a universal screening process for children and families would help to identify family-specific needs and vulnerable families, and would facilitate targeted intervention and prevention efforts. In addition, states can implement policies that have been linked to the well-being of families and children, such as increasing the minimum wage, strengthening collective bargaining, expanding Medicaid for low-income families, and supporting reproductive rights. In fact, states with these policies fare better across a number of indicators related to family well-being, including having lower divorce rates, lower infant mortality rates, lower birth rates among teenage women, and higher rates of children living with at least one parent (Robbins & Fremstad, n.d.). States could also subsidize training opportunities for child care providers to learn about and implement social-emotional learning programs.

At the local level, institutional leaders and administrators can take simple steps to redesign recess and other designated periods for play. Researchers recommend being more intentional in designing organized recesses and play periods that set up activities that children value, bring established protocols for conflict resolution into the play period, and offer opportunities for child leadership. School administrators can partner with community organizations that are experienced in organizing play periods. Increasing access to physical activity and outdoor play is particularly important for children of color who, on average, have less regularly scheduled access to these kinds of play activities than do White children (Barros et al., 2009). These kinds of actions have been linked to the development of social-emotional skills and positive peer relationships (London, 2019). Schools can also utilize afterschool physical activity programs, such as FITKids, that have empirical evidence for their effectiveness in improving children's brain functioning and executive control skills (Hillman et al., 2014),

The private sector plays a role in investing in early childhood and stands to gain from implementing family-friendly policies. Providing telehealth and in-person prenatal and parenting support, developing high-quality onsite childcare, and providing flexible working hours to accompany the schedules of working parents, are examples of cost-effective investments that help companies recruit talented employees, reduce turnover, and increase employee productivity and engagement (Menges et al., 2016; *Why Paid Family Leave Is Good Business*, n.d.). Family-friendly policies are associated with employees reporting stronger connections to and, overall, more positive perceptions of their organization; further, these associations have been found to extend to non-parent employees who do not themselves stand to benefit directly from family-friendly policies (Grover & Crooker, 1995).

In addition to these benefits experienced by organizations that support families, the development of future generations of skilled, flexible, and healthy workforces is, in the long run, in the best interest of the private sector. Major public health issues, including those facing families with young children, likely cannot be addressed by the public sector alone (Cannon, 2009). Public-private partnerships can be implemented at local, regional, and national levels, and have been shown to support innovation in public health (Yach et al., 2010). For example, in California, a public-private partnership aimed at improving maternal health developed a program that cut maternal mortality rate in half (Main et al., 2018). These success stories provide useful examples for partnerships in other areas of family well-being and early child development, but high-quality research and strong evidence for the effectiveness of public-private partnerships in public health are still largely missing from the literature (Parker et al., 2019). This is an important avenue for future research. In addition, future public-private partnerships would benefit from independent evaluations of their effectiveness (Parker et al., 2019).

Modern technology also offers tools for improving child development and family well-being. Technology-based platforms have been found to be effective for delivering healthcare interventions. For example, mobile phones are ubiquitous and provide healthcare providers with

the ability to improve the provision of important health services such as vaccination. Simple interventions delivered via mobile phones can positively affect children across demographics. Text-message reminders have been found to effectively increase vaccination rates in children in low-income, urban populations (Stockwell, Kharbanda, Martinez, Lara, et al., 2012; Stockwell, Kharbanda, Martinez, Vargas, et al., 2012), in contrast to traditional strategies for delivering reminders via mail and home telephone, that do not increase children's likelihood of getting vaccinated (Irigoyen et al., 2006). The COVID-19 pandemic has accelerated the implementation of telehealth services and interventions, especially those delivered over video-conferencing technology. However, more research is needed to assess the effectiveness of these technologies, their cost-effectiveness, their potential impact on quality of care, disparities in digital technology access, and potential privacy and security concerns (Badawy & Radovic, 2020; Baidal et al., 2020).

Beyond healthcare, technology can facilitate children's development of important skills. Virtual reality and video games are increasingly being utilized as a tool for supporting cognitive and motor development. Virtual reality provides immersive experiences for users that simulate real world situations. When virtual environments provide interactive rather than passive learning contexts, children can take information from these experiences and effectively apply it in the real world (Barab et al., 2010). Artificial intelligence can augment virtual reality and video game technologies by using computational algorithms to create experiences that are tailored to individual capabilities (Best, 2010). Exergames integrate these technologies with exercise to simultaneously stimulate cognitive development and provide healthy physical activity. Indeed, research suggests that exergames that continuously modify game demands based on performance can improve young children's brain functioning and their ability to deploy self-control skills that are critical for success and well-being across the lifespan; further, the benefits of exergames transfer to cognitive functioning in other learning contexts (Pocsai et al., n.d.). Exergames may be particularly useful for children from low-income backgrounds, who often lack

access to exercise equipment and safe outdoor space. Taken together, exergames are a promising technology-enhanced learning tool that could help to narrow disparities in health and education that emerge in early childhood and widen over the course of the life span. Exergames could be particularly useful for children in communities with a high pollution burden (e.g., traffic-related air pollution), and for children living in geographic regions that regularly experience poor air quality due to wildfires. Given that children are particularly vulnerable to the adverse effects of air pollution (Sacks et al., 2011), it is critical that we provide at-risk children with opportunities for indoor physical activity (in clean indoor environments).

Despite the potential benefits of some technological innovations for supporting child and family well-being, it is important to note that some technology-based interventions have failed. For example, distance learning on digital platforms is not a substitute for in-person education. Caregiving and educational environments outside of the home are sources of academic support for children, but they also provide crucial opportunities for social-emotional engagement that currently cannot be replicated online (Stites et al., 2021). Distance-learning also requires considerable parental involvement and is associated with elevated parental stress (Sonnenschein et al., 2021). Lastly, it is important to note that digital inequalities (e.g., differences in access to and/or quality of computers, tablets, and internet) likely exacerbate educational inequalities (Williamson et al., 2020).

Section 5: Summary

In the U.S., the nature of childhood has dramatically changed over the last several decades. Despite the many recent improvements to early childhood health and well-being, children growing up in the U.S today are, in many ways, older than children were in previous generations; children today start puberty earlier (Eckert-Lind et al., 2020), are less physically fit (Tomkinson et al., 2019), are engaging in less physical play outdoors (Gray, 2011), and are engaging in more academic activities at younger ages (Bassok et al., 2016). While the U.S. has

experienced an overall increase in life expectancy, one could make the case that childhood as a life stage is contracting. Extending childhood could help to leverage children's natural abilities for rapid learning, exploration, and creativity, that drive future life success. Here, we considered how early childhood in the U.S. can be redesigned to take advantage of our longer lives. In this report we outlined the current state of early childhood in the U.S., pointed to areas for improvement in children's environments and services, and highlighted evidence-based practices.

The majority of children in the U.S. are exposed to adverse experiences that have the potential to negatively affect their physical and mental health outcomes across the life span, and to shorten the duration of childhood by accelerating biological development. Compared to the recent past, children today experience higher rates of obesity and mental health problems that have significant personal, societal, and intergenerational costs. Children are also particularly vulnerable to the adverse effects of prevalent environmental pollutants such as air pollution. Children of color and those from socioeconomically disadvantaged families disproportionately experience childhood adversity, health problems, and exposure to environmental pollutants. Although high-quality child care confers a variety of short and long-term benefits for children and families, fewer than half of children aged 3 or younger are enrolled in these programs. Finally, despite children's natural inclination towards exploratory learning and play, children in the U.S. are currently experiencing declines in outdoor and free play activities that are important for physical and mental health, and for motor, cognitive, and social-emotional development. Indeed, young children are increasingly engaging in academic activities that are more similar to the activities of their older peers, and that are often sedentary.

In this report we identified several changes that must be undertaken to provide children more effectively with experiences, activities, and skills that are important for their health, life success, and longevity. Addressing widespread disparities related to poverty and financial instability will be crucial for improving the lives of all children. Providing children and families

with financial, social, and caregiving support is necessary for building resilience against the negative effects of childhood adversity. We need widespread appreciation of the fact that early childhood is a period of great opportunity, as well as a time of risk; further, we need more resources devoted to the development of children's foundational skills that drive life success, and the implementation of designed environments to help build children's resilience and limit their exposure to harmful contaminants. Finally, in this report we recommended that we engage in efforts to find a balance between early preparation for academics and providing young children with space, time, and activities that support play and exploration. Collectively, these changes will help set the stage for future generations to achieve high-quality, century-long lives.

Addressing these needs will require redesigning children's physical and social environments. This report outlined evidence-based practices and interventions that collectively contribute to safe and supportive environments that feature both academic enrichment activities and encouragement of play and physical activity. First, investing in high-quality, comprehensive early care and education programs provide significant returns in health, education, and productivity. Two-generation human capital programs contribute to healthier family systems, which further enhances the effectiveness of these programs. Second, early social and emotional learning programs foster children's empathy, conflict resolution skills, decision making, and abilities to manage stress. These skills beget future skills that help individuals overcome the challenges faced over a long life. Third, given the prevalence and profound effects of childhood adversity on well-being, there is a growing movement to provide trauma-informed care to children and families. Reorganizing health, childcare, and educational organizations using principles of trauma-informed care can provide safe and supportive environments that are integrated in all parts of children's daily life. Fourth, designed environments can improve children's health by improving indoor environment quality. Finally, increasing or maintaining time dedicated to physical activity and play confers physical, social, emotional, and cognitive benefits

for children and does not compromise their academic performance and development. In fact, integrating movement into academic activities can enhance their effectiveness in promoting learning outcomes. In this report we recommend universal access and support for making these benefits available to all children, which is in the nation's best interest. Adopting these evidence-based practices and interventions will serve to (1) improve short- and long-term outcomes that are important for living long and well; (2) maintain or lengthen early childhood as a developmental stage by limiting factors known to accelerate aging and maturation and by encouraging child-centered, exploratory activities; and (3) address disparities that emerge early, build across life, and ultimately affect how long and well people live.

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