



Assets, economic opportunity and toxic stress: A framework for understanding child and educational outcomes

Trina R. Williams Shanks ^{a,*}, Christine Robinson ^b

^a University of Michigan, United States

^b Stillwaters Consultation, United States

ARTICLE INFO

Article history:

Received 31 May 2012

Received in revised form 16 November 2012

Accepted 20 November 2012

Keywords:

Assets
Children
Education
Risk
Toxic Stress

ABSTRACT

A large body of evidence indicates that socioeconomic status (SES) is a strong predictor of school achievement, college graduation and child outcomes in general. Better developmental and health outcomes are strongly associated with family assets, income and education. We introduce a model incorporating a range of theoretical and empirical literature about the relationships between a household's socio-economic position, household interactions, and child educational outcomes. The intention is to illustrate how these frequently cited factors are exacerbated and aligned by stress or difficult environments which cause long-term challenges for children in high-risk circumstances. Finally, we modify the model to illustrate the dynamic nature of these relationships, highlighting how the developmental trajectory of a child who lives with toxic stress might differ from a comparable child with social supports in a situation of low or tolerable stress.

© 2012 Elsevier Ltd. All rights reserved.

1. Introduction

A large body of evidence indicates that socioeconomic status (SES) is a strong predictor of school achievement, college graduation, and child outcomes in general. Better developmental and health outcomes are strongly associated with family assets, including greater wealth, more income, more years of education, steady professions, or residency in neighborhoods rich with services and supportive networks. Child health, educational attainment, and family socioeconomic status are inextricably linked. We introduce a model that ties together research drawn from the fields of economics, education, psychology, sociology, medicine, epidemiology, neuroscience, public health, and biostatistics. Organized around an integrated conceptual paradigm of environmental, economic, familial and psychosocial pathways, we demonstrate various ways SES alters the performance of biological systems, thereby

affecting family interaction, stress, school success, and child outcomes.

In the United States, where there are high levels of child poverty and a limited safety net, the benefits of economic security can be monumental while the consequences of economic distress can be devastating. Detailed assessments illustrate how childhood poverty influences developmental outcomes (Brooks-Gunn & Duncan, 1997a, 1997b; Evans, 2004; McLoyd, 1998). Nobel laureate Heckman (2006) even argues that investing in disadvantaged children “is a rare public policy initiative that promotes fairness and social justice and at the same time promotes productivity in the economy and in society at large (p. 1902).” He recommends investing more in the early years where there is the highest payoff, although these early outlays must still be followed by ongoing investment to maximize value (Heckman, 2006).

Our paper contributes to this literature in two ways. First, we summarize how asset poverty contributes to child outcomes rather than just emphasizing income poverty. We then go on to describe the dynamic interaction

* Corresponding author. Tel.: +1 734 764 7411; fax: +1 734 763 3372.
E-mail address: trwilli@umich.edu (T.R. Williams Shanks).

between assets, income, and education as a more complete picture of household SES. Wealth disparities are one of the most important barriers facing U.S. families today and assets may be the more appropriate marker for economic opportunity across childhood – which also highlights the prominent influence of continued racial gaps in wealth. Second, we show how assets and overall economic opportunity combined contribute to an environment of either tolerable stress or toxic stress. By introducing emerging research on toxic stress, it is possible to demonstrate how persistent economic insecurity leads to biological shifts in brain functioning that have long-term consequences on a child's ability to thrive and attain appropriate cognitive, social-emotional, and health outcomes.

Four core concepts provide a foundation for this work. *There are multiple pathways by which SES may affect developmental outcomes.* Potential pathways include access to and quality of education and social supports, health care and health-related behaviors, individual psychosocial processes, and physical and social environments. The initial physical and social environmental determinants, the resulting mediating role of the psychosocial processes, and the balance between resources and demands in each stage of development, are all shaped by socioeconomic forces (Bronfenbrenner, 1979). For example, poverty, environmental degradation, and vulnerability are interrelated. Poverty impacts health and education because it defines how many resources poor people have for basic needs thereby influencing the amount of environmental risks they will be exposed to in their immediate surroundings (Olden, 1998). Educational attainment among adults is linked inextricably with children's health as well (Eide & Showalter, 2011). Beginning early in life, babies of more-educated mothers are less likely to die before their first birthdays and children of more educated parents experience better health (Low, Low, Baumler, & Huynh, 2005; Ross & Mirowsky, 1999).

Child development is a dynamic process that unfolds from birth to early adulthood (Bronfenbrenner, 1979; Bruer, 1999; Furstenberg, Kennedy, McCloyd, Rumbaut, & Settersten, 2003; National Institute of Mental Health, 2001; National Research Council & Institute of Medicine, 2000; Sameroff, 2010; Thompson, 2004). Social-emotional, cognitive functioning, and health status are highly interrelated (National Research Council & Institute of Medicine, 2009a, 2009b). Their basic foundation is formed early, even prenatally. The architecture of the brain is intricate; higher-level abilities are built upon the layers of neural circuits developed initially. MRI's, biopsychology, and cognitive neuroscience demonstrate that adverse circumstances interrupt healthy brain and physical development. Although the early childhood years (birth to 5) are very important, it is still possible for adaptive interventions to take place later in life (Arnett, 2000; Casey, Getz, & Galvan, 2008; Dahl, 2004). Remedial interventions, however, often require greater effort to overcome initial delays, and typically at greater expense (Heckman, 2006). Yet, nurturing environments for all children (those that are safe, stable, stimulating, and responsive) strengthen

developmental trajectories across all phases of child and adolescent development.

Families and communities play the central role (and bear most of the costs) in providing the supportive relationships and positive experiences that young children need for healthy development (Bronfenbrenner, 1979). Interacting factors including household assets and social supports provided by neighborhood and community of residence, along with responsible care-giving, are perhaps the most salient indicators of optimal child development (Bronfenbrenner, 1979; National Research Council & Institute of Medicine, 2000, 2004). Unfortunately, one's street address or neighborhood can also be a primary indicator of disadvantage. The physical environment and neighborhood of residence is an important source of how SES influences child outcomes (Evans, 2006). Where you live affects your health, your options, and your opportunities (Leventhal & Brooks-Gunn, 2000; Rubinowitz & Rosenbaum, 2000; Sampson, Raudenbush, & Earls, 1997). Numerous researchers are investigating child outcomes through an ecological lens (Brooks-Gunn, Duncan, & Aber, 1997a, 1997b; Ludwig, Duncan, & Hirschfield, 2001; Morris, Jones, & Smith, 2003). It is clear that place matters. Additionally, health impact assessments (HIA) point to numerous disparities among low income populations and communities of color (Bullard, Johnson, & Torres, 2011).

Household level variables mediated by social support are critical elements in the mix. *Loving and nurturing relationships in a household environment provide the context for a child to learn, grow, and thrive* (Bronfenbrenner, 1979). These are typically initiated at birth and the most sustained interactions that a child has early in life. Multiple transactional theories outline how a parent (or caregiver) and child interact with one another and their environment over time (Sameroff, 2009). In general, if the parent or child has a difficulty that compromises positive interactions, dysfunctional patterns can emerge (Sameroff & MacKenzie, 2003). Depression and mental health issues are an underlying concern in more than 25% of US households, affecting millions of children and families. Furthermore, households with few socio-economic resources are frequently situated in disadvantaged neighborhoods with overcrowded and/or questionable educational and child welfare systems, environmental and other toxins, and inadequate social safety nets – exacerbating negative effects (Wilson, 1987). Thus, ensuring adequate social support in the most difficult circumstances is a real challenge.

1.1. Stress

A central concept in our thesis is the role of stress in the life of the child and family. The positive, tolerable, and toxic stress framework has been extensively developed by Jack Shonkoff and his colleagues at the Center for the Developing Child at Harvard University (<http://developingchild.harvard.edu/>). There are several key implications that come from this work. Recent scientific advances in the biological and neurological sciences emphasize evolving evidence that illustrates the physiological disruptions caused by excessive adversity early in life – and their

long-term manifestations as impairments of learning, behavior, and both physical and mental health (Shonkoff, Boyce, & McEwen, 2009). Stress is any perceived adverse situation that upsets a child, parent, or household ranging from a homework assignment to a death in the family. Stress is a condition of the mind and a factor of expression that differs among individuals and reflects not only major life events but also the realities and pressures of daily life that elevate physiological systems. This burden reflects not only the impact of life experiences but also genetic variations, individual life-style habits – such as diet, exercise, sleep, and substance abuse – and epigenetic modifications in development and throughout life that set life-long patterns of behavior and physiological reactivity through both biological embedding and cumulative change.¹

Model overview: Our purpose in this document is to provide general models that are relevant to all families, incorporating the best empirical literature about the relationships between a household's socio-economic situation, household interactions, and child educational outcomes. The intention is to illustrate how these frequently cited factors are exacerbated and aligned by stress or difficult circumstances which cause long-term difficulties for children in high-risk situations. All relation-

ships take place within a larger cultural framework, so at times demographic factors such as race, ethnicity, and family structure become more salient defining factors with an exponential effect on developmental outcomes. In addition, the quality of public systems and services as well as environmental toxins are frequently related to geographic setting and may have a stronger or weaker influence on the particular risks and opportunities experienced by a child. Finally, we modify the model to illustrate the dynamic nature of these relationships, highlighting how the developmental trajectory of a child who lives with toxic stress might differ from a comparable child with social supports in a situation of low or tolerable stress.

The models have four main components. Each will be introduced here and then described in more detail in subsequent sections. The first set of relationships is the household's socio-economic status (SES) and the way that status plays out in a particular cultural framework. The second component is household-level interactions mediated by social support – which are influenced by household SES, but also take on their own dynamic based on particular characteristics of the parent/caregiver, family configuration, and the focal child. The third component is what is sometimes called the wider ecological system – characteristics of the residential neighborhood, community resources, and systemic influences from schools, child welfare, public health, and other key public systems/institutions, and policy.

All three of these components contribute to a set of risk and protective factors that result in the overall environmental stress context faced by a child, the fourth component. When stress is positive or tolerable, all the components work together in predictable ways to influence child developmental outcomes over time. When multiple risk factors exist with few protective relationships, the stressors faced by a child and household can reach toxic levels. High levels of stress are often exacerbated by a range of social and environmental factors in economically disadvantaged neighborhoods. When stress is persistently high and sustained at toxic levels, a child's neural circuitry and physical health are impacted which can lead to problems in physical, social-emotional and cognitive development. (Fig. 1)

2. Detailed description of model components

2.1. Household SES in cultural context

At the far left of the figure in blue are the core areas of household socio-economic status (SES). We note income, which is total household income from all sources. We note education, which summarizes the highest educational attainment of the child's parents or primary caregiver. And finally, we note assets, which are typically measured as net worth – the total value of everything the household owns minus any debt or liabilities the household owes. However, some prefer to focus on specific assets, such as home ownership, business ownership, or financial wealth (liquid assets that could be easily converted to cash if needed), while others suggest measuring asset poverty and asset

¹ Measurement

Checklist measures of major life events.

Major stressful life events instruments ask respondents to report which of a list of events (ranging from 10 to 200) happened to them in a specific time line, usually the last year. The events on the list are supposed to be representative of the population of major stressful life events that occur in people's lives. Examples of events include: death of a loved one, loss of a job, being divorced, moving, and going to court. Some scales make explicit assumptions about the underlying cause by weighing events on certain dimensions instead of just counting the number of events. Examples of such dimensions include: the amount of adaptation required as determined by objective judges and the negative impact of each event as weighted by the respondent or in some cases by judges. Weighting schemes, no matter what their underlying assumptions may be, have not proven to add substantially to the prediction of either mental or physical health outcomes.

Measurement of Stress: Many of the studies of stressful life events and health have used the Schedule of Recent Experiences, an instrument developed in the mid 1950s, or the Social Readjustment Rating Scale, an elaboration of this instrument developed by Holmes and Rahe in the mid-1970s. These instruments are not considered state-of-the-art at this time. A detailed history of the evolution of major stressful life event scales can be found in Cohen, Kessler, and Underwood-Gordon (1995, chap. 1) and Turner and Wheaton (1995). There are a range of complex questions involved that cannot be addressed in this paper.

There is no life event instrument that is appropriate for all populations or one that is generally accepted in the field. An instrument often used in large general population surveys is the PERI life events scale (Dohrenwend et al., 1984). Lists of major life events scales designed specifically for various populations, e.g., children, adolescents, adults, and the aged, are provided by Turner and Wheaton (1995). An appropriate scale is supposed to have items that represent the population of events that occur in the population under study. This raises questions about the sensitivity (appropriateness) of any of the standard life events instruments for those studying lower SES, specific ethnic populations and young children.

However, the concept of allostatic load or "the price the body pays over long periods of time for adapting to challenges," can be documented and measured (Evans, 2003; McEwen, 1998). Empirical measurements of allostatic load provide well-respected scientific documentation to the effects of stress over time.

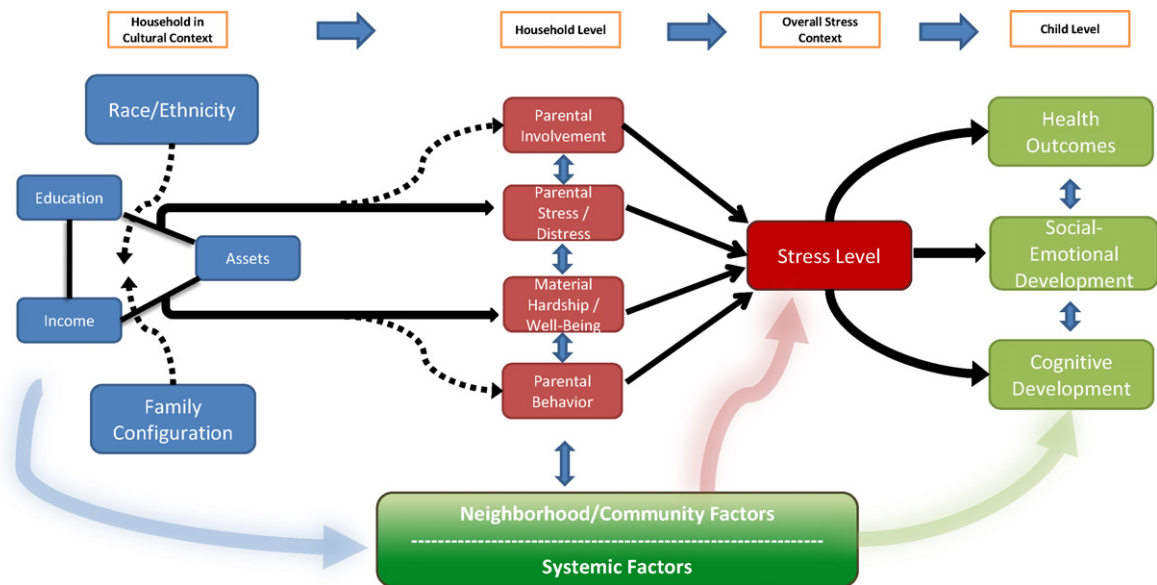


Fig. 1. General overarching framework.

thresholds, a point above which a higher level of economic functioning and status becomes possible (Nam, Huang, & Sherraden, 2008). Research noting the direct relationship between household SES and developmental outcomes are summarized below, but given the importance of overall economic security in household interactions and as a potential source of stress, this section also will emphasize how various aspects of SES interact.

a. Importance of assets for child outcomes

Many studies show that low/uncertain income is associated with the least desirable child outcomes (Brooks-Gunn and Duncan, 1997a, 1997b; Corcoran & Chaudry, 1997; Guo, 1998; Haveman & Wolfe, 1995; Holzer, Schanzenbach, Duncan, & Ludwig, 2008; McLoyd, 2011; Taylor, Dearing, & McCartney, 2004; Weinger, 1998; Wells, Evans, Beavis, & Ong, 2010). There is emerging evidence of a similar influence of assets or wealth on child outcomes (Conley, 1999; Elliott, Destin, & Friedline, 2011; Lovenheim, 2011; Shanks, 2011; Williams Shanks, Kim, Loke, & Destin, 2010). Wealth is a significant determinant of socio-economic status insofar as a lack of wealth can prohibit individuals from climbing the SES ladder. Households with few or no assets are less likely to have the financial resources (and often the social capital and knowledge to navigate these resource systems) necessary to provide their children high quality early education, college tuition, or inheritances relative to households with accumulated assets (Shanks, 2011; Shapiro, 2004).

Assets and/or child savings seem to be at least as important a predictor of outcomes as income, especially when considering academic attainment (Elliott & Beverly, 2011). Conley (2001) finds, for example, that a doubling of assets is associated with an 8.3% increase

in the probability of college attendance after high school graduation and a 5.6% increase in the likelihood that a college-enrolled individual graduates. Acknowledging the influence of household wealth on child outcomes is essential not only based on the strength of empirical evidence, but also because asset poverty is more prevalent than income poverty. Over half of all families with children in the United States are asset poor when considering liquid wealth (Aratani & Chau, 2010).

b. Dynamic nature of income, education and assets

Although income, education, and assets can be measured separately, in these models they are seen as a dynamic triangle, expanding or declining across a lifetime and generations. Examining SES across the life cycle, there are typically stages of scarcity and abundance. For example, most young adults (or couples) start out with very little. However, if they complete a postsecondary degree and increase their educational attainment, they then have a greater likelihood of earning a higher income over their lifetime. Similarly, if someone earns a higher income and/or works for an organization that offers some sort of a matched retirement plan, they will have more resources to invest in building assets or further education. And if someone has high net worth and low debt, they have a nest egg that can be used to pay for further education and training or to fall back on in a time of unemployment or reduced income.

For example, young adults with a bachelor's degree earned more than twice as much as young adults without a high school diploma or its equivalent, 50% more than young adult high school completers, and 25% more than young adults with an associate's degree (Aud et al., 2011). More years of schooling increases the probability of holding financial assets given that asset levels rise significantly with income, age, and education

(Shapiro & Wolff, 2001). Additionally, individuals from a higher-income background are consistently found to have more years of schooling relative to low-income individuals; rates of high school and college matriculation diverge on these grounds as well (Bowen, Kurzweil, Tobin, & Pichler, 2006). And finally, a family's likelihood of owning assets is significantly influenced by the asset ownership of the parents' parents—possibly by teaching the value of financial investments. Thus, asset accumulation and financial literacy is intergenerational, influenced by the condition of past generations (Chiteji & Stafford, 1999).

Moreover, although there are a number of dependent and interacting variables comprising SES, household assets are a good marker of overall economic security. If parents have inherited a home this may be an asset that the family lives in or one that could be sold to provide funds for a range of supports that enhance educational and developmental outcomes such as tutoring, lessons, access to quality health care, private school, or college tuition. The dynamic interaction among a range of indicators – education, income flows, liquid assets, home ownership, business ownership, and retirement savings – provides an increasingly supportive economic environment for the child born into asset-rich circumstances.

c. Prominent role of race and ethnicity

Given the strong influence of household SES on both family dynamics and child outcomes, it is crucial to note that economic security is not similarly distributed across racial and ethnic groups. In the U.S. context, a person's race and ethnicity often influences educational opportunity, employment, general health, life expectancy, where one lives, where one worships, and how one is treated by law enforcement and other important institutional systems. It is hard to neatly summarize the role of race in the United States, but structural and institutional inequities result in persistent disparities and a racialization of outcomes (Powell, 2012). This report highlights recent empirical data showing the association between race/ethnicity and household SES.

Whites are significantly more likely to graduate high school or go on to attain higher education than are Blacks and Hispanics. Whites are twice as likely to have attained a Bachelor's degree relative to Blacks and three times as likely relative to Hispanics (Ryu, 2009). Among the major race and ethnic groups, median weekly earnings for black men working at full-time jobs were \$673 per week, 79.2% of the median for white men (\$850). The difference was less among women, as black women's median earnings (\$592) were 84.0% of those for white women (\$705). Overall, median earnings of Hispanics who worked full time (\$565) were lower than those of blacks (\$623), whites (\$770), and Asians (\$872) (BLS, Department of Labor, 2011). Median income for Black and Hispanic households was \$32,068 and \$37,759 respectively in 2010, compared with \$54,620 for non-Hispanic white households and \$64,308 for Asian households (U.S. Census Bureau, 2011). In 2009 20% of all U.S. children lived in poverty – 12% of non-Hispanic White children, 13% of

Asian and Pacific Islander children, 31% of Hispanic children, 35% of American Indian children, and 36% of Black children (Annie E. Casey Foundation, 2011). The most recent poverty statistics indicate that the number of children in poverty increased between 2009 and 2011, rising to 21.9% of all children less than age 18 – and to 38.8% of Black and 34.1% of Hispanic children (DeNavas-Walt, Proctor, & Smith, 2012). Considering family structure, 24% of non-Hispanic White children grew up in a single-parent household in 2009. This rate is 40% for Hispanic children, 53% for Native American children, and over two thirds, 67%, for Black children (Annie E. Casey Foundation, 2011).

As has been noted, there are substantial racial and ethnic disparities in wealth. In 2007, the average white household had 15 times as much total wealth as the average African-American or Latino household. If home equity is excluded from the calculations, the ratios for financial wealth are in the neighborhood of 100:1 (Domhoff, 2011). Moreover, these racial wealth gaps have been increasing. A study by the Pew Research Center finds that whites now have 20 times the amount of wealth Blacks have, and 18 times that of Hispanics. Minority assets have eroded most since the economic downturn of 2008, with Hispanics being hit hardest by the housing market meltdown (Kochhar, Fry, & Taylor, 2011). There are many explanations offered for this reality including that non-Hispanic white households hold more varied investment portfolios that earn higher returns or that non-white households have a smaller likelihood of receiving an inheritance (Shanks, 2011; Shapiro & Wolff, 2001). Several books provide a detailed historical perspective on how discrimination, biased policy choices, and a sedimentation of disadvantage impact racial wealth inequality, highlighting the intergenerational aspects of this issue, and also offer empirical data on the racial wealth gap among various racial and ethnic groups in the United States (Lui, Robles, Leondar-Wright, Brewer, & Adamson, 2006; Nembhard & Chiteji, 2006; Oliver & Shapiro, 1995).

It is possible to make the case that some of the disparities attributed to race are actually class differences defined primarily by wealth. Using Panel Study of Income Dynamics (PSID) data to measure the adult outcomes of children, Conley (1999) analyzes differences in net worth, high school graduation, college graduation, rates of repeating a grade, labor force participation, wages, welfare receipt, and pre-marital childbearing (for daughters). He finds that racial differences are either no longer significant or dramatically less so once parental wealth is added to the equation. He argues that to understand the life chances of children, it is necessary to take into account accumulated wealth, which would include property, assets, and net worth. Shapiro (2004) makes a similar case using qualitative interviews to demonstrate how parents use either personal wealth or money inherited from their parents' wealth to create transformative opportunities for children, particularly via enrollment in better schools. He argues that families and communities use economic resources to create advantages that benefit themselves, often leaving a more

disadvantaged public infrastructure for everyone else by default.

Racial and ethnic minorities not only have fewer economic resources themselves, but due to residential segregation patterns are also more likely to live and interact in communities that are also income and asset poor. Even affluent Blacks and Hispanics tend to live in poorer neighborhoods than the average for Whites (Logan, 2011). Consequently, exposure to environmental toxins is highest in low-income minority communities (Bullard et al., 2011; Landrigan et al., 1998). A recent Pew study found that Black children are more likely to live in high-poverty neighborhoods throughout childhood and that living in such neighborhoods increases the chances of downward mobility by 52% (Sharkey, 2009). Fewer assets in a community typically mean less entrepreneurial development, fewer businesses providing employment opportunities, and lower incomes.

Levels of income and education, both strongly related to health, vary across racial or ethnic groups. Disparities in both access to and quality of medical care play an important role in racial and ethnic disparities in health (Escarce, 2007). Although medical care is important, an accumulating body of evidence suggests that racial or ethnic differences in living and working conditions that affect health may be even more important in determining who will be healthy or become sick (Braveman & Egerter, 2008). Less frequently measured modifiable social factors – including income, education, wealth, and neighborhood socioeconomic conditions, both current and earlier in life, are likely to be more important in explaining health differences by race or ethnicity (Braveman et al., 2005). Increasing evidence also suggests that chronic stress related to overt or subtle experiences of racial or ethnic bias may significantly contribute to disparities in health among racial or ethnic groups, over and above differences in living and working conditions and differences in medical care (Williams & Mohammed, 2009). In addition, findings from studies have found that perceived racial/ethnic bias makes a contribution to racial or ethnic disparities in health after income and education are considered (Williams, Neighbors, & Jackson, 2003). Race and ethnicity are not malleable factors; however, due to the historical legacy and policies that have fueled the racial wealth gap, it is essential that race be included in the general framework due to its salient significance in the lives of Americans.

d. Moderating influence of family configuration

Similar to race and ethnicity, family configuration is also closely linked to SES and can have a strong influence on family dynamics and developmental outcomes. How many adults live together in a household, their relation to one another, and the total number of children are all relevant factors in how young people are provided for and nurtured. As a practical matter, limited resources must stretch further when there are more people to support. In addition, children who reside with both their biological parents fare much better on a range of outcomes. One reason suggested for this is that mothers

who enter co-residential relationships with biological fathers reported lower levels of parenting stress than mothers who remain single (Cooper, McLanahan, Meadows, & Brooks-Gunn, 2009). Findings from the Fragile Families study note that in the wake of a non-marital birth, marriage is correlated with an increase in fathers' earnings and mothers' income and health; separation reduces both outcomes. Family structure is found to be extremely important for father involvement, while for mothers family structure and stability are important influences on parenting. Again, it will not be possible for this report to neatly summarize the dynamic nature of family formation in the United States, how family composition is influenced by economic resources, or all the issues being faced (e.g., working moms, stay-at-home moms, teen moms, marriage, separation, divorce, child support, foster care and adoption, grandparents raising grandchildren). It is important to note that all of these circumstances have implications for family economic security and child outcomes. However, we will simply summarize recent general empirical data showing some of the relationships between family configuration and household SES.

In 2007, children living in households headed by single mothers were more than five times as likely as children living in households headed by married parents to be living in poverty – 42.9% compared with 8.5% (U.S. Census Bureau, 2008). Single mothers and fathers are economically disadvantaged in terms of wealth accumulation compared to adults without children; single mothers fared worst in household wealth accumulation (Yamokoski & Keister, 2006). Specifically, single Black and Hispanic women have a median wealth of \$100 and \$120 respectively; the median for single White women is \$41,500 – which is a quarter of the median wealth for married or cohabiting White households (Chang, 2010). Low levels of personal wealth are also associated with relatively later entry into marriage (Schneider, 2011). Generally, having more children in the household can mean greater material hardship and lower asset accumulation because “siblings strain material and nonmaterial resources during childhood and decrease adult home ownership, stock ownership, and total assets” (Keister, 2004). Although safe, reliable child care is essential to working parents, its high cost is especially challenging for low-income families. When low-income working families pay for child care, “they purchase less expensive care than higher-income families, but pay a much larger share of their income for it” (McLoyd, 2011).

Thus, in summary, what we are calling *household SES in cultural context* attempts to precisely acknowledge a household's economic circumstances and how these might influence child outcomes while also describing how historical and structural realities pattern which families are most likely to be economically vulnerable. The term ‘cultural context’ is used because although specific group labels such as race, ethnicity, and family configuration might serve as an effective proxy for important societal realities, how these realities lead to economic disadvantage may differ from place to place and

across time. The observations made about urban poverty by William Julius Wilson and Elliott Liebrow are important contributions but may not be best used to explain academic achievement gaps among suburban children. Lessons learned from rural white communities by Rand Conger and Gary Evans are also important, but may miss the reality of spatial segregation in larger cities. Similarly, insights about the children of unmarried parents born around 1998 obtained through the Fragile Families study provide valuable information, but may not say much about how single-parent households fared after the 2008 Recession.

When considering a particular time and place, factors such as demographic shifts, legal history, and the current political backdrop are forces to which families must respond. Thinking about the interplay between assets, income and education, local dynamics that influence real estate options, mortgage rates, employment opportunities, community college offerings, and how these intersect with race, ethnicity, and family configuration, are highly relevant. These can all be considered part of the 'cultural context.' In addition, socio-economic status and how it intersects with race, ethnicity, and family configuration strongly influence our next two components – household level interactions and neighborhood/community/systemic factors. This is why assets and overall economic opportunity within a cultural context logically lead to the other variables in the model.

2.2. Household level interactions

In the center of the figure in red are the core areas of household interaction. Material hardship, parental stress and parental involvement are heavily influenced by socioeconomic status. Each specific component is described below.

In general, the research literature and public policy have set forth a range of definitions and measures of parental involvement; the following areas are commonly accepted (Hoover-Dempsey & Sander, 1995; Jeynes, 2012). (a) *Meeting the child's personal needs*: prepare meals, provide clothing, home, a clean and healthy environment, meet material needs; (b) *Engage in meaningful social communication*: eat meals with parents; talk with parents; parent facilitates activities; (c) *Cultural communication*: discussion of books, films, or TV; discussions on politics or social issues; (d) *Educational involvement*: help with homework; volunteering or other involvement at school; conferences; communication, etc.; (e) *General investment in child's growth and development*: has/buys cognitively stimulating materials; plans and supports active engagement with the child in activities outside of the home (church, sports, community service, etc.), engaged in planning and decision-making; provides and is attuned to the quality of out of home care.

Moreover, social, emotional, and cognitive development are strongly influenced by *parental behavior*. The stability of family life and the capacity to be an involved parent as outlined above is strongly determined by the general warmth and supportiveness of the home

environment, parental mental health,² physical health, substance use/abuse, violence in the home, and/or illegal activity (Aber, Jones, & Cohen, 2000; Bronfenbrenner, 1986; Henrich, Schwab-Stone, Fanti, Jones, & Ruchkin, 2004; Pearce, Jones, Schwab-Stone, & Ruchkin, 2003).

Family dynamics are further complicated by the level of *parental stress* which is often determined by employment status, household economic security, parents' ability to consistently meet normal obligations, parental marital status and the quality of the marriage or partnership, and the parent's joy and sense of competence in the role of parent (Beyers, Bates, Pettit, & Dodge, 2009; Bronfenbrenner, 1986; Conger & Donnellan, 2007; Gabarino, 1995; McLoyd, 1998).

It is apparent that *material hardship/well being* has a direct impact on parents' ability to provide consistent ongoing material support: housing, food, utilities, clothing, and supplies needed. Furthermore, material hardship often results in dislocation, disruption, and mobility which lead to adverse educational and developmental outcomes. Material hardship can be defined as: family paid at least 1/2 of its income for housing or more than 2 people per bedroom, lack of health insurance, food insecurity, no telephone in the household, receipt of public assistance or difficulty paying bills (Beverly, 2001; Ouellette, Burstein, Long, & Beecroft, 2004; Short, 2005).

These factors are all interrelated. As with SES, these household-level interactions can have direct effects as well as work together to provide an overall positive and reinforcing – or a more difficult and detrimental – home environment for children.

2.3. Neighborhood/community/systemic factors

At the bottom of the figure in shades of green, we attempt to summarize non-familial environmental factors. In the United States neighborhoods have great spatial differentiation, with some geographic areas having high concentrations of poverty or affluence as well as a range of public and private resources that contribute to a young

² Depression affects millions of U.S. adults over their lifetime, many of whom are parents with children. In a given year an estimated 7.5 million adults with depression have a child under the age of 18 living with them. It is estimated that at least 15 million children live in households with parents who have major or severe depression (20%). The burden of depression and the barriers to quality of care for depressed adults are increasingly well understood, but the ways in which depression affects parenting, and children's health and psychological functioning, are often ignored. Many factors are associated with depression, including co-occurring medical and psychiatric disorders (such as substance abuse), economic and social disadvantages, and conflicted or unsupportive relationships. These factors typically amplify stress and erode effective coping. For many depressed adults (30–50%), depression becomes a chronic or recurrent disorder in a vicious cycle of stress and poor coping that exacts sustained individual, family, and societal costs. Effective screening tools and treatments for adult depression are available and offer substantial promise for reducing the negative consequences of the disorder. However, not everyone benefits from even the treatments associated with the strongest evidence base, and individual, provider, and system-level barriers decrease access to these treatments. These institutional and sociocultural barriers both cause and sustain existing disparities in care for depressed adults (National Research Council & Institute of Medicine, 2009b).

person's actual and perceived opportunity structure (Casciano & Massey, 2008; Galster & Killen, 1995; Massey, 1996). In general, lower-income communities of color tend to be exposed to more formidable ongoing stressors, for example, job insecurity, unpaid bills, inadequate child care, underperforming schools, dangerous or toxic living conditions, crowded homes, and noisy streets. They are also less likely to have access to the money, status, knowledge, social connections, and other economic resources they need to gain control over the many challenges that threaten to upset their lives. Environmental racism³ creates unhealthy environments in which a disproportionately large share of poor people and people of color live (Bullard et al., 2011; Hamilton, 1995; Landrigan et al., 1998). Moreover, the systems in many disenfranchised communities are under-resourced, slow to respond, and frequently do not meet the needs of residents. There have been entire volumes published on neighborhood poverty and its potential effect on developmental outcomes (e.g., Brooks-Gunn et al., 1997a, 1997b) in addition to recent research that focuses on environmental toxins and disparities. This paper, however, will focus on whether community and systemic factors are likely to provide a set of supports and resources that mitigate the stress experienced by a child or by contrast contribute additional risk factors.

The extra-familial environment is important for all households, but it may be a source of support of last resort for households facing multiple disadvantages (Burchinal, Follmer, & Bryant, 1996; Dahlem, Zimet, & Walker, 1991; Holahan & Moos, 1983). Social support refers to the various types of support (i.e., assistance/help) that people receive from others and is generally classified into two (sometimes three) major categories: emotional support and instrumental (and sometimes informational) support (Langford, Bowsher, Maloney, & Lillis, 1997; Malecki & Demaray, 2003). Emotional support refers to the things that people do that make us feel loved and cared for, that bolster our sense of self-worth (e.g., talking over a problem, providing encouragement/positive feedback); such support frequently takes the form of non-tangible types of assistance. By contrast, instrumental support refers to the various types of tangible help that others may provide (e.g., help with childcare/housekeeping, provision of transportation or money). Informational support represents a third type of social support (one that is sometimes included within the instrumental support category) and refers to the help that others may offer through the provision of information. Support is found to ameliorate stress (Cohen & Wills, 1985). Parents with lower education rates tend to be less aware of research on child development and ways to apply it. In many poor neighborhoods there is no computer in the home, and

rural poverty makes technology access extraordinarily challenging. In short, social capital is often in short supply in the very communities where it is most needed.

The strongest associations between social support (particularly emotional support) and developmental outcomes are seen in relation to psychological well-being. A large literature documents lower risk for depression and for psychological distress more generally for those who enjoy greater social support (for review see George, Blazer, Hughes, & Fowler, 1989 and more recently Stansfeld, Head, and Marmot, 1997). In addition, trust, as measured by social capital is related to increased educational attainment (Dincer, 2011).

2.3.1. Social and environmental factors

Highly correlated with socioeconomic status is the range of social and environmental factors which have a significant impact on social, emotional, cognitive, and physical child development. There is a strong relationship between living in a chaotic environment and socioeconomic status as posited in the work of Gary Evans (Evans, 2004; Evans et al., 2010). Some of the most relevant are: residential segregation, concentration of poverty, crowding, noise, establishment of routines and rituals, residential relocation and mobility, school relocation, and maternal partner changes.

The contributions to a child's social environment made by school is thought to be less positive for low SES children relative to those for more affluent children; low SES children are more likely to attend schools that lack quality teachers, resources or rigor (Guarino, Brown, & Wyse, 2011; Kishiyama, Boyce, Jimenez, Perry, & Knight, 2009). The negative environmental features faced by low SES children are not limited to school characteristics; environmental toxins also are likely to be much more prevalent. Additionally, low SES children are exposed to a relatively greater degree of violence, with U.S homicide rates being highest in the most impoverished areas (Bowen & Bowen, 1999; Hannon, 2005; Jones, Forehand, Brody, & Armistead, 2002; Sampson et al., 1997). In general, children growing up in these environments encounter fewer positive role models than children that do not. These factors place low SES children at a higher risk for psychosocial difficulties (McLoyd & Wilson, 1991; McLoyd, 1998; U.S. Department of Housing & Urban Development, 2000).

2.4. Overall stress context

Given that stress and its ramifications is a key mediator in our models and a relatively new concept that is not as well known, this section will attempt to flesh out the importance of a child's overall stress context, which is the fourth and final component of our models (noted in red in the middle of the figure). This concept has been extensively developed by Jack Shonkoff and his colleagues at the Center for the Developing Child at Harvard University (Shonkoff et al., 2004a, 2004b; Shonkoff et al., 2007a, 2007b).⁴

³ Environmental racism refers to intentional or unintentional targeting of minority communities or the exclusion of minority groups from public and private boards, commissions, and regulatory bodies. It is the racial discrimination in the enactment or enforcement of any policy, practice, or regulation that negatively affects the environment of low-income and/or racially homogeneous communities at a disparate rate than affluent communities (Environmental Racism Law & Legal Definition, 2012).

⁴ <http://developingchild.harvard.edu/>.

Stress is any perceived adverse situation that upsets a child or parent (Shonkoff et al., 2009). Their interactional system becomes stressed by the situation. For children this could be an immunization, going to school for the first time, preparing for a test, a fall on a bike, the death of a pet, or moving to a new home. The stressful indicator is less important than learning how to cope with adversity, which is a vital component of healthy child development. It is important to note that the overall stress context as experienced by the child is what is being emphasized here (which may be indicated by the number and intensity of adverse events), not simply a negative emotional or mental state.

Hormones associated with chronic stress protect the body in the short-run and promote adaptation, but, in the long run, the burden of chronic stress causes changes in the brain and body that lead to disease and have a deleterious effect on educational and developmental outcomes. Brain circuits are plastic and remodeled by stress so as to change the balance between anxiety, mood control, memory and decision making. Such changes may have adaptive value in danger but their persistence and lack of reversibility can be maladaptive (McEwen & Sapolsky, 1995; McEwen, 1998, 2008; Shonkoff et al., 2005).⁵

Although the causes of the gradients in child outcomes are very complex, they are likely to reflect, with increasing frequency going down the SES ladder, the cumulative burden of coping with limited resources, toxic environments, and negative life events, as well as differences in life style, and result in chronic activation of physiological systems involved in adaptation (Brooks-Gunn, Duncan, & Britto, 1999; Shonkoff et al., 2007a). *SES gradients can be seen in pre-disease indicators, such as cortisol patterns* (Shonkoff et al., 2007a). This may reflect the wear and tear on the body of exposure to stressors and lifestyle factors associated with lower SES. Research indicates that summary scores of these indicators appear to be strong predictors of toxic stress and related negative developmental outcomes (Shonkoff et al., 2007a). All individuals face some stress; this is normal and helps a child mature and build resiliency to deal with life challenges (McEwen, 2008). When we are threatened, our bodies prepare us to respond by increasing our heart rate, blood pressure, and stress hormones, such as cortisol. The definition of overall stress includes the physical, emotional, intellectual, and material deprivations experienced *directly* by children as a result of household poverty (e.g., inadequate nutrition, lack of heat, lack of cognitive stimulation) and neighborhood poverty (e.g., environmental hazards, brownfields, violence, inadequate schools and/or social services). These direct stressors experienced by children of any age can have lasting physiological consequences.

When a child's stress response systems are activated within an environment of supportive relationships with adults, these physiological effects are buffered and brought back down to baseline. Tolerable stress represents those

factors that are difficult, but manageable in the context of a nurturing parental/familial relationship. This type of stress includes events such as a death in the family, a car accident, or severe illness of a family member. Toxic stress, however, is distinct – caused by extreme, prolonged adversity in the absence of a supportive network of adults to help the child adapt. *The stressful experience itself is not the problem, but how the child's body responds.* When it occurs, toxic stress can actually damage the architecture of the developing brain, leading to disrupted circuits and a weakened foundation for future cognitive, social, emotional, and physical development (McEwen & Sapolsky, 1995; McEwen, 1998, 2008; Shonkoff et al., 2007a).

Three different types of stress as defined by Shonkoff and colleagues are further outlined below:

Positive stress refers to moderate, short-lived stress responses, such as brief increases in heart rate or mild changes in the body's stress hormone levels. This kind of stress is a normal part of life, and learning to adjust to it is an essential feature of healthy development. Adverse events that provoke positive stress responses tend to be those that a child can learn to control and manage well with the support of caring adults, and which occur against the backdrop of generally safe, warm, and positive relationships. The challenge of meeting new people, entering a new child care setting, going to the doctor, and overcoming a fear of animals all can be positive stressors if a child has the support needed to develop a sense of mastery. This is an important part of the normal developmental process.

Tolerable stress refers to stress responses that could affect brain architecture but generally occur for briefer periods that allow time for the brain to recover and thereby reverse potentially harmful effects. In addition to their relative brevity, one of the critical ingredients that make stressful events tolerable rather than toxic is the presence of supportive adults who create safe environments that help children learn to cope with and recover from major adverse experiences, such as the death or serious illness of a loved one, a frightening accident, or parental separation or divorce. In some circumstances, tolerable stress can even have positive effects. Nevertheless, it also can become toxic stress in the absence of supportive relationships.

Toxic stress refers to strong, frequent or prolonged activation of the body's stress management system. Stressful events that are chronic, uncontrollable, and/or experienced without the child having access to support from caring adults tend to provoke these types of toxic stress responses. Studies indicate that such stress responses – particularly when they are sustained over time – can have an adverse impact on brain architecture (Lupien et al., 1998; McEwen & Sapolsky, 1995). In the extreme, such as in cases of severe, chronic abuse, toxic stress may result in the development of a smaller brain. Less extreme exposure to toxic stress can change the stress system so that it responds at lower thresholds to events that might not be stressful to others, thereby increasing the risk of stress-related physical and mental illness. Examples include prolonged poverty, homelessness, being raised by a parent with a mental illness, or food insecurity.

⁵ Many have been researching in this area lately (See summary papers from Center on the Developing Child at Harvard University and Nelson, 2007; Nelson et al., 2009; Shonkoff et al., 2009).

The lasting, neurobiological effect on young children (who, along with infants, have particularly malleable neural circuits) that experience toxic stress leads to a far greater likelihood of anti-social behavior, lower achievement in school and at work, and poor physical and mental health – all of which society addresses at great cost (Loman & Gunnar, 2010; Sapolsky, Romero, & Munck, 2000; Zhang, Parent, Weaver, & Meaney, 2004). Persistent poverty is but one risk factor for toxic stress and its long-term consequences. However, poverty is often the indicator for several aligned stressors including inadequate housing, food insecurity, neighborhood violence, and parental unemployment. Depression in mothers has been demonstrated to exacerbate some of these stressors (Dawson & Ashman, 2000). *The greatest harm comes from the cumulative burden of multiple risk factors, including neglect, abuse, parental substance abuse or mental illness, and exposure to violence* (National Center for Children in Poverty, 1999). With each additional risk factor, the odds of long-term damage to brain architecture increase (Shonkoff et al., 2004a, 2004b, 2007a).

In nearly all cases, environmental deprivation exerts a powerful influence on the course of brain development. It must be underscored, however, that the specific effects of deprivation, and the severity of those effects, will vary with the degree, timing, and duration of the deprivation. Individual responses to the deprivation will also vary, and this variation will likely have to do with an individual's genetic makeup and experiential history. There is a visible difference between the effect of an enriched environment and an environment of deprivation on the human brain (Nelson, 2007; Nelson, Furtado, Fox, & Zeanah, 2009).

In some cases, the cumulative burden of multiple risk factors early in life may limit the effectiveness of later interventions, thereby making it impossible to completely reverse the neurobiological and health consequences of growing up poor and exposed to toxic environments (Kuh & Ben-Shlomo, 2004). Children from lower socioeconomic backgrounds show heightened activation of stress-responsive systems (Lupien, King, Meaney, & McEwen, 2000), and emerging evidence suggests that differences in parenting related to income and education – as mediated through parent–child interaction, exposure to new vocabulary, and stability of responsiveness – can alter the maturation of selected brain areas, such as the prefrontal cortex (Farah et al., 2006).

3. Common pathways and indirect effects

Others have tried to create theoretical models to show how various SES and household factors interact with one another. Although not identical to our proposed model, the ideas noted in this section are complementary and could represent common pathways that underlie parts of our overall framework. The *Family Stress Model* highlights that economic hardship (low incomes, high debts/assets ratios, negative financial events) results in “economic pressure” on the family such as unmet material needs (e.g., of food and clothing), inability to pay bills or “make ends meet,” and the necessity of cutting back on critical expenses like health insurance or medical care. High economic pressure

increases parental risk for emotional distress and behavioral problems through areas such as increased marital conflict and reduced marital warmth; parental involvement and nurturing suffers as a result. Moreover, poor quality parental involvement translates to poorer cognitive and social-emotional development of children, reflected in lower quality social interactions and worsened academic performance (Conger & Conger, 2002, Conger & Donnellan, 2007).

The *Family Investment Model* highlights that parents of higher SES have greater access to financial, social, and human capital relative to lower SES parents. Thus, higher SES parents can make significantly greater investments in the development of their children which may translate to more learning materials available at home, direct parental support (the quality of which may be enhanced by tutoring or training), a higher standard of living (all needs met), and the ability to live in a safe environment that encourages healthy child development. The existence (or lack) of these investments by parents significantly influences child social and cognitive development in ways that facilitate the well-being of their offspring from childhood into the adult years (Conger & Donnellan, 2007).

More recently, *Interactionist Models* combine aspects of stress and investment in various ways. In these, parental SES influences both the tendency and the ability to invest in children (Conger & Donnellan, 2007). There are often reciprocal relationships between SES and parental behavior. Being stressed about money and financial concerns can lead to reactions that might otherwise be less harsh under better circumstances. One example of an interactionist model is described below in the three pathways of family poverty identified by Gershoff, Aber, and Raver (2003).

3.1. Effects of family poverty and material hardship

Gershoff et al. (2003) describe three pathways by which poverty affects child brain development. The *first* is the parent investment pathway, where the relationship between poverty and children's cognitive development is mediated by the quality of the home environment, which is represented by the amount of cognitively stimulating material in the home (such as books and CDs) and how often parents take their children to stimulating places (such as museums and libraries).

The *second* is the parent behavior and stress pathway, where the parents are considered to be under high levels of stress because of their economic difficulties and the occurrence of stressful life events for which they have insufficient resources to cope effectively. This parental stress can lead to increased levels of parental depression and interparental conflict, which in turn leads to problems in parenting, including withdrawal from the children, hostility, more frequent use of corporal punishment, and, at extreme levels, maltreatment. Each of these factors has been found to relate to higher levels of internalizing and externalizing problems among children.

The *third* pathway involves the neighborhood and community in which poor families are more likely to live. Poor neighborhoods and schools are less likely to have the resources that promote healthy child development and are

more likely to be settings that expose children to additional risk factors, such as violence, the availability of drugs and alcohol, environmental toxins, poor air quality, inadequate housing, and outdoor play spaces. Sansani (2011) posits that a significant predictor of the health of a population is school quality. Gershoff et al. (2003) also describe policy- and program-level interventions that may be effective in reducing the negative effects of poverty on children. For example, universal Early Head Start focuses on improving child development, family development, and staff and community development.

Research on the income–achievement gap as a formidable societal problem and the neurocognitive and biological mechanisms that might account for income-related deficits in academic achievement is emerging (Evans, 2009). Such data show that childhood poverty is inversely related to working memory in young adults and that this prospective relationship is mediated by elevated chronic stress during childhood.

Again, these are complex sets of relationships that are difficult to summarize briefly, but there is empirical data that begins to suggest how some of these various components work together. Low SES households are more likely to have features that impede healthy child development than affluent ones. Material hardship, of course, is much more prevalent among impoverished households (Danziger, Corcoran, Danziger, & Heflin, 2000; Short, 2005). However, other factors play a significant role as well; parental educational attainment, for example, is generally lower in poorer households, which results in a less cognitively stimulating environment for children (Davis-Kean & Sexton, 2009; Davis-Kean, 2005; Guo & Harris, 2000). Different explanations exist for the lower quality of parental involvement in poor households. Whether rooted in stress, economic hardship, or some combination thereof, however, the trend exists that low SES parents are less successful at maintaining a high quality home environment and are less able to exert social control over their children (McLeod & Shanahan, 1993; Sampson & Laub, 1994).

4. Dynamic models that incorporate overall stress context

To demonstrate the dynamic nature of our proposed models and illustrate a few key points, we shift the figure to contrast two households, one in a situation of tolerable stress and the second in a situation of toxic stress. In Figs. 2 and 3, we attempt to note the probable distinctions between a tolerable stress household and a toxic stress household. A description of these follows.

In a tolerable stress household (Fig. 2), parental education, income, and assets are relatively stronger; this translates to less severe levels of material hardship and an increase in the degree of parental involvement. As a result, the overall stress context is not particularly severe to begin with, and the effects on the child(ren) of any stressful circumstances that exist are mitigated by protective relationships and resources that are available due to the presence of assets or greater overall SES. There is also a strong correlation between positive neighborhoods and

systems and assets. Concomitantly, neighborhood/community/systemic factors are generally more supportive and engender positive child development. All of these things combined lead to a situation where a child has the possibility of living up to its highest potential and to reach young adulthood with multiple positive options.

In households where children experience toxic stress levels (Fig. 3), education, income, and assets are all likely to be at much lower levels. As such, material hardship and parental distress are less manageable; parental involvement is less frequent or of lower quality and there is a greater occurrence of mental health issues or poor parental behavior like substance abuse. Neighborhood and local systems are generally more likely to have few beneficial resources and allow exposure to harmful influences, such as violence and negative role models (or, equally bad, the child experiences frequent relocations, including bouts of homelessness). The overall stress context is therefore extremely high and children, in the absence of protective relationships, face direct neurological consequences. Social-emotional and cognitive development suffer in turn.

The model is a substantial explanation of early developmental gaps between poor and non-poor children, providing a fundamental generic framework illustrating the salience of income, assets, and education on developmental outcomes. However, as stated above, the household level variables are significant as well and can have a profound impact on child outcomes. For example, the literature on the effects of maternal depression on developmental outcomes is compelling. Yet, even depression may be exacerbated by lack of economic security.

5. Major implications

Building upon the models outlined in this document, there are several implications that follow.

Communities need a better way to identify children and households at risk and intervene with respect to the most malleable factors. Then, once identified, they need to be offered a variety of options for enrichment and support with several alternate entry points. In addition to screenings and diagnostic tools within local communities, better ways to measure risk factors and provide sustained interventions are required. Presently the most relevant policy lever is the threat of removing a child from their home of origin and the termination of parental rights. This may be necessary in extreme circumstances of abuse and neglect. However, in general, this policy is destructive to the child and the parent. When poverty or mental illness is the primary issue, a less traumatic option and aligned system of supports and interventions would be beneficial, such as sustained early intervention programs – which have demonstrated success. Although the most immediate need will be to offer better emergency support and preventive interventions for the most marginal in society (low-income, low-wealth households facing multiple barriers), some systems may need to be retooled to assist a wider range of households. With alternate entry points that might include drop-in options as well as immediate referrals by qualified professionals, children can get required attention when it is most needed.

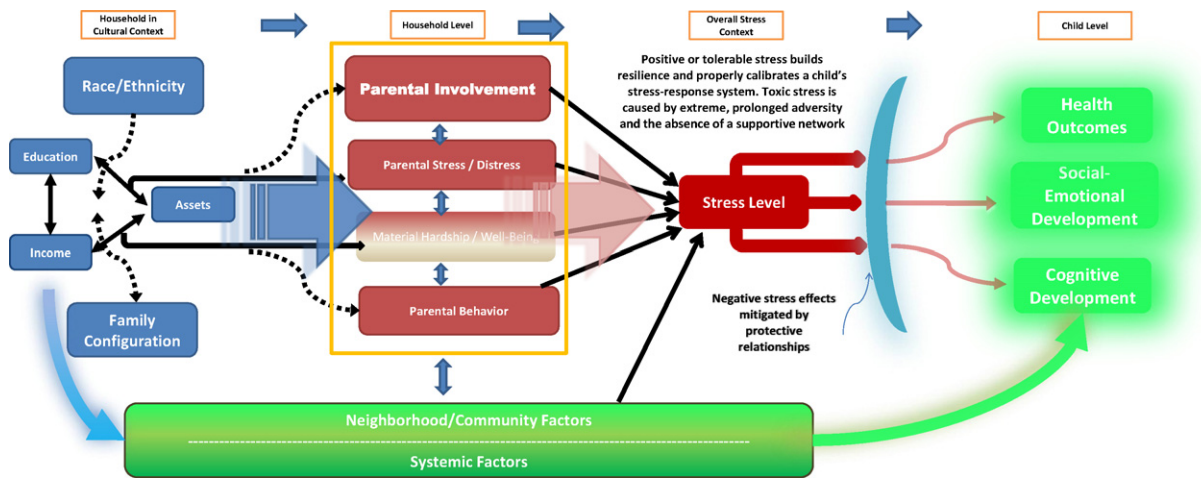


Fig. 2. Tolerable stress household.

With sustained unemployment and the erosion of work-based benefits, the number of families at-risk multiplies. Many workers are facing cuts in health care and pension or retirement benefits; even more have no dental benefits, vision care, mental health services, or disability coverage. As more households lose jobs and benefits, the number of children in need and potentially at risk for toxic stress increases. Creative ways to provide more extra-familial support would be helpful.

Ideally, options for educational enrichment can be aligned with interventions that improve family economic security by increasing income, assets, and education. In times of crisis, short-term interventions may be necessary, but in the long-term, the most valuable strategy for reducing toxic stress is to help households

become more economically secure. This way, households will have more resources to provide for themselves. For example, school enrichment activities can be more valuable when aligned with asset-building strategies or other ways to build economic security. To illustrate, a student may not be able to make the most of available activities if they require eyeglasses, individual tutoring, mental health counseling, or don't have a safe and quiet place to do homework. In a time of decreasing resources, it is unrealistic to expect overburdened school and other service systems to meet the needs of all children. When a household has regular income, more education, and modest levels of wealth, they are in a much better position to make the appropriate decisions to invest in their child's well-being.

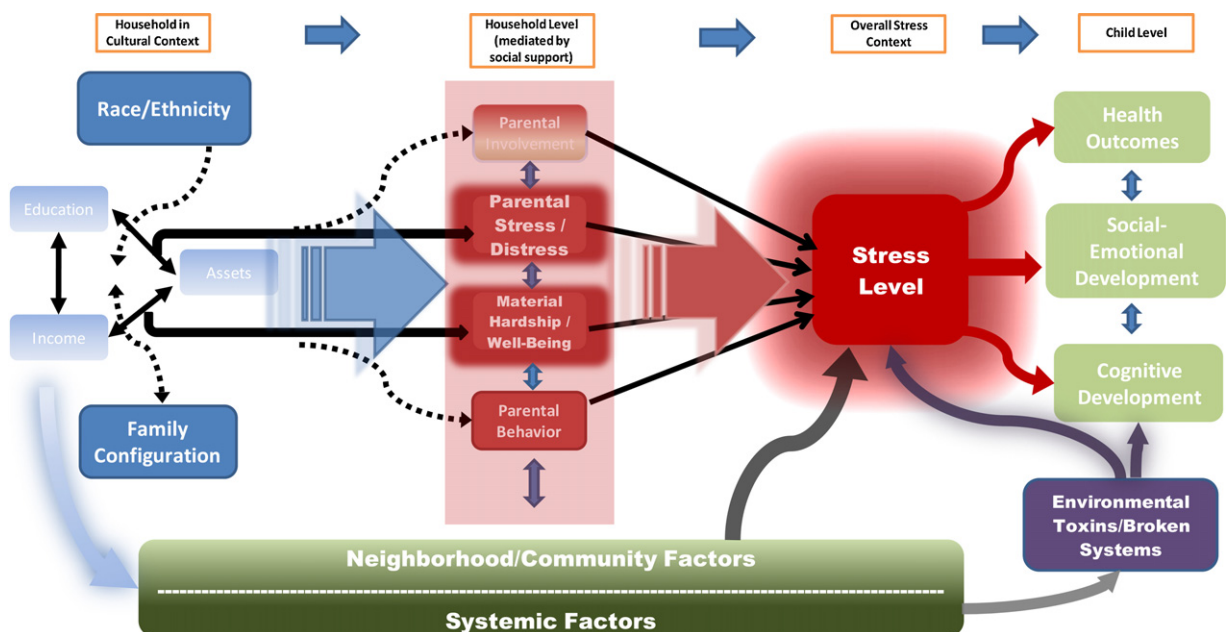


Fig. 3. Toxic stress household.

System	System Components	Common Issues
Child Welfare Early care and Education Education Health care Juvenile Justice Mental Health Youth Development Urban Planning Environmental Protection	Hierarchy Licensure and standards Protocols Theories of change	-Line workers have the most direct contact with children and families, but have the least amount of education -Senior staff make significant decisions but are in the least contact with children and families -Cultural and language barriers exist in serving the most vulnerable -Challenges of underserved communities have been historically ignored

Fig. 4. Public systems that influence children and their characteristics.

Given that multiple public systems are in direct contact with the target populations, activity must be realigned to better serve children. The systems listed in Fig. 4 below are a snapshot of those that could potentially be reformed and realigned based on developmental data. Each system includes a common range of components and issues that add to the complexity.

Even though the dynamic triangle of low-income, low-wealth, and low-education represents significant problems in and of themselves, these are typically associated with other intractable problems such as health disparities and environmental toxins. Even when parents are doing the best they can with limited resources, biological damage and chronic health problems can undermine academic achievement.

Addressing the environmental precursors of disparities is crucial. Despite significant improvements in environmental protection over the past several decades, millions of Americans continue to live, work, play, and attend school in unsafe and unhealthy physical environments. Unfortunately, many zoning, industry, and governmental practices and policies have had adverse impacts on poor people, people of color, and children. The lack of assets, income, and education has consigned many populations to substandard housing, unhealthy environments, and denied such groups their right to live in a safe environment. Eliminating environmental health disparities will make us a much stronger nation, and will result in exponential gains for America's children.

Child Savings Accounts can be a powerful add-on program that enhances other interventions. For low- to moderate-income children that live within a context of positive or even tolerable stress, an account in their own name or incentivized programs that increases the resources available for college or other asset-building purposes could greatly improve the odds for academic success, especially if offered at a very young age. They might help reduce some of the worry about the cost of a college education and clarify options for the child's future. Low- to moderate-income children that live within a context of toxic stress, however, will likely need to receive support and interventions to alleviate the physiological stress response before they might realize the predicted benefits of a child savings account. Thus, a child account and any associated incentives might lead to improved test scores, better grades, and a higher likelihood of college completion, but only once a child's brain, hormones, and reactivity are in a

state that they can learn and respond in a developmentally appropriate way. When in an unsafe and physically damaging environment, a child must have extraordinary psychological and inner strength to make the tough choices necessary to achieve academic success – and if this toxic environment begins from birth, it may be biologically improbable for them to excel.

When designing policies for children, it would be advisable to align forces in a way that is mindful of other constraints. As mentioned above, accounts alone might not address the more significant issues and compounded problems that come with exposure to toxic stress. If a universal child savings account policy were passed, local practitioners should consider designing a comprehensive strategy for the most disadvantaged children, schools, and neighborhoods. This might include things such as a mentor, tutoring, dental and medical attention, counseling, meals, and an emergency fund to pay for academically relevant expenses. In addition, these child accounts might be used as part of a dual-education strategy. This would mean offering an aligned IDA-style adult account for the parent or caregiver along with the child savings account. This could include allowing a structured alternative for poor households (less than 200% of federal poverty line) that includes a matched savings account, intense counseling around education, and academic support for the child, as well as affordable options to move if living in a toxic environment.

Together, the models mentioned above underscore the extent to which life outcomes are influenced by a dynamic interplay between the cumulative burden of risk factors and the buffering effects of protective factors that can be identified within the individual, family, community, and broader socioeconomic and cultural contexts.

6. Conclusion

The models presented here are more of a starting point for discussion rather than a final statement. Children, families, and the neighborhoods in which they live are dynamic and sometimes react to shifting circumstances in ways that are difficult to predict. Our models attempt to synthesize many of the recent and evolving literatures in a way that can lead in productive new directions. The correlation between household socio-economic status and developmental outcomes is well-known and has been discussed in multiple disciplines. What these models offer

is a lens for not just highlighting persistent and growing inequality on multiple dimensions amongst U.S. households and then documenting subsequent consequences for children, but also for providing a way to think about how such inequality is likely to influence what happens within households, neighborhoods, and the biological circuitry of children, as well as the educational outcomes that stem from these factors. These are effects that may persist throughout a child's lifetime. Exploring commonly discussed direct and mediating influences through the lens of the overall stress context faced by a child allows for several sets of conversations. First, how can the economic security of households be improved in ways demonstrated to strengthen household interactions and reduce biological indicators of toxic stress? Second, if the reality is such that the economic circumstances of a child's household are not likely to change and a situation of sustained toxic stress is apparent, what sorts of immediate interventions can provide a web of support and enrichment to mitigate the worst outcomes for children? Third, how can communities attend to environmental toxins and other immediate risks that endanger children? Ignoring this critical aspect can result in futile attempts to spur development. And finally, what are ways to influence mainstream governmental and extra-familial systems and policies in manners that either prevent situations of toxic stress in the first place or react quickly and appropriately when they do occur?

Collectively, new research findings underscore the need for intentional and persistent advancements in child and adolescent policy and practice. Generic policies and programs that focus on present priorities such as enhanced staff development, increased quality improvement, appropriate measures of accountability, and expanded funding to serve more children and families are not enough. The streams of evidence from biology and neuroscience need to be better integrated with conversations about policy and promising interventions. For example, passing a universal child savings account policy could make a substantial difference in the lives of most children, but may not be enough for children living in the context of toxic stress. Stated simply, current best practice must be viewed as a promising starting point, not a final destination. Grappling with these questions will not lead to easy answers, but might help provide partial solutions that can begin to break the link between household disadvantage and educational and developmental outcomes.

Acknowledgement

Support for this research came through a grant by the Annie E. Casey Foundation.

References

- Aber, J. L., Jones, S. M., & Cohen, J. (2000). The impact of poverty on the mental health and development of very young children. In C. H. Zeanah (Ed.), *Handbook of infant mental health* (3rd ed., pp. 113–128). New York: The Guilford Press.
- Aratani, Y., & Chau, M. (2010). *Asset poverty and debt among families with children*. New York, NY: National Center for Children in Poverty, Mailman School of Public Health, Columbia University.
- Annie E. Casey Foundation. (2011). *2011 Kids count data book*. Baltimore, MD: Annie E Casey Foundation.
- Arnett, J. J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist*, *55*, 469–480.
- Aud, S., Hussar, W., Kena, G., Bianco, K., Frohlich, L., Kemp, J., et al. (2011). *The condition of education 2011 (NCES 2011-033)*. Washington, DC: US Department of Education.
- Beverly, S. G. (2001). Measures of material hardship: Rationale and recommendations. *Journal of Poverty*, *5*(1), 23–41.
- Beyers, J. M., Bates, J. E., Pettit, G. S., & Dodge, K. A. (2009). Neighborhood structure parenting processes, and the development of youths' externalizing behaviors: A multilevel analysis. *American Journal of Community Psychology*, *31*(1), 35–53.
- Bowen, N. K., & Bowen, G. L. (1999). Effects of crime and violence in neighborhoods and schools on the school behavior and performance of adolescents. *Journal of Adolescent Research*, *14*, 319–342.
- Bowen, W. G., Kurzweil, M. A., Tobin, E. M., & Pichler, S. C. (2006). *Equity and excellence in American higher education* (1st ed.). Charlottesville, VA: University of Virginia Press.
- Braveman, P. A., Cubbin, C., Egerter, S., Chideya, S., Marchi, K. S., Metzler, M., et al. (2005). Socioeconomic status in health research: One size does not fit all. *Journal of American Medical Association*, *294*(22), 2879–2888.
- Braveman, P., & Egerter, S. (2008). *Overcoming obstacles to health: Report from the Robert Wood Johnson Foundation to the Commission to Build a Healthier America*. San Francisco: University of California, Robert Wood Johnson Foundation, Center on Social Disparities in Health.
- Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design*. Cambridge, MA: Harvard University Press.
- Bronfenbrenner, U. (1986). Ecology of the family as a context for human development: Research perspectives. *Developmental Psychology*, *22*(6), 723–742.
- Brooks-Gunn, J., & Duncan, G. J. (1997a). Income effects across the life span: Integration and interpretation. In G. J. Duncan & J. Brooks-Gunn (Eds.), *Consequences of growing up poor* (pp. 596–610). New York: Russell Sage Foundation.
- Brooks-Gunn, J., & Duncan, G. J. (1997b). The effects of poverty on children. *The Future of Children: Children and Poverty*, *7*, 55–71.
- Brooks-Gunn, J., Duncan, G. J., & Aber, J. L. (1997a). *Neighborhood poverty: Context and consequences for children*. New York City, NY: Russell Sage Foundation.
- Brooks-Gunn, J., Duncan, G. J., & Aber, J. L. (1997b). *Neighborhood poverty. Policy implications in studying neighborhoods* (Vol. 2). New York City, NY: Russell Sage Foundation.
- Brooks-Gunn, J., Duncan, G. J., & Britto, P. R. (1999). Are socioeconomic gradients for children similar to those for adults? Achievement and health of children in the United States. In D. P. Keating, Hertzman, & Clyde (Eds.), *Developmental health and the wealth of nations: Social, biological, and educational dynamics*. New York, NY: Guilford Press.
- Bruer, J. T. (1999). *The myth of the first three years: A new understanding of early brain development and lifelong learning*. New York: Free Press.
- Bullard, R. D., Johnson, G. S., & Torres, A. O. (2011). *Environmental health and racial equity in the United States: Building environmentally just, sustainable and livable communities*. Washington, DC: American Public Health Association Press.
- Burchinal, M. R., Follmer, A., & Bryant, D. M. (1996). The relations of maternal social support and family structure with maternal responsiveness and child outcomes among African American families. *Developmental Psychology*, *32*(6), 1073–1083.
- Bureau of Labor Statistics U.S. Department of Labor. (2011). *Usual weekly earnings of wage and salary workers second quarter 2011*. Washington, DC: Bureau of Labor Statistics U.S. Department of Labor. Retrieved from <http://www.bls.gov/news.release/pdf/wkyeng.pdf>.
- Casciano, R., & Massey, D. S. (2008). Neighborhoods, employment, and welfare use: Assessing the influence of neighborhood socioeconomic composition. *Social Science Research*, *37*(2), 544–558 <http://dx.doi.org/10.1016/j.ssresearch.2007.08.008>.
- Casey, B. J., Getz, S., & Galvan, A. (2008). The adolescent brain. *Developmental Review*, *28*(1), 62–77.
- Chang, M. (2010). *Lifting as we climb: Women of color, wealth and America's future*. Oakland, CA: Insight Center for Community and Economic Development.
- Chiteji, N. S., & Stafford, F. P. (1999). Portfolio choices of parents and their young children as adults: Asset accumulation by African-American families. *The American Economic Review*, *89*(2), 377–380.
- Cohen, S., Kessler, R. C., & Underwood-Gordon, L. (1995). *Measuring stress: A guide for health and social scientists*. New York: Oxford University Press.
- Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin*, *98*(2), 310–357.

- Conger, R., & Conger, K. (2002). Resilience in Midwestern families: Selected findings from the first decade of a prospective, longitudinal study. *Journal of Marriage and the Family*, 64(2), 361–373.
- Conger, R., & Donnellan, M. (2007). An interactionist perspective on the socioeconomic context of human development. *Annual Review of Psychology*, 58, 175–199.
- Conley, D. (1999). *Being black, living in the red*. Berkeley: University of California Press.
- Conley, D. (2001). Capital for college: Parental assets and postsecondary schooling. *Sociology of Education*, 74, 59–72.
- Cooper, C. E., McLanahan, S. S., Meadows, S. O., & Brooks-Gunn, J. (2009). Family structure transitions and maternal parenting stress. *Journal of Marriage and Family*, 71(3), 558–574 <http://dx.doi.org/10.1111/j.1741-3737.2009.00619.x>.
- Corcoran, M., & Chaudry, A. (1997). The dynamics of childhood poverty. *The Future of Children*, 7(2), 40–54.
- Dahl, R. E. (2004). Adolescent brain development: A period of vulnerabilities and opportunities – Keynote address. *Annals of the New York Academy of Sciences*, 1021, 1–22.
- Dahlem, N. W., Zimet, G. D., & Walker, R. R. (1991). The multidimensional scale of perceive social support: A confirmation study. *Journal of Clinical Psychology*, 47(6), 756–761.
- Danziger, S. K., Corcoran, M., Danziger, S. H., & Heflin, C. M. (2000). Work, income, and material hardship after welfare reform. *Journal of Consumer Affairs*, 34(1), 6–30 <http://dx.doi.org/10.1111/j.1745-6606.2000.tb00081.x>.
- Davis-Kean, P. (2005). The influence of parent education and family income on child achievement: The indirect role of parental expectations and the home environment. *Journal of Family Psychology*, 19(2), 294–304 <http://dx.doi.org/10.1037/0893-3200.19.2.294>.
- Davis-Kean, P., & Sexton, H. (2009). Race differences in parental influences on child achievement: Multiple pathways to success. *Merrill-Palmer Quarterly*, 55(3), 285–318.
- Dawson, G., & Ashman, S. B. (2000). On the origins of a vulnerability to depression: The influence of the early social environment on the development of psychobiological systems related to risk for affective disorder. In C. A. Nelson (Ed.), *The effects of adversity on neurobehavioral development: Minnesota symposia on child psychology* (pp. 245–280). Mahwah, NJ: Lawrence Erlbaum & Assoc.
- DeNavas-Walt, C., Proctor, B. D., & Smith, J. C. (2012). *U.S. Census Bureau: Income, poverty and health insurance coverage in the United States: 2011 (Current Population Reports, P60-243)*. Washington, DC: US Government Printing Office.
- Dincer, O. C. (2011). Trust and schooling in the United States. *Economics of Education Review*, 30(5), 1097–1102.
- Dohrenwend, B. S., Dohrenwend, B. P., Dodson, M., & Shrout, P. E. (1984). Symptoms, hassles, social supports, and life events: Problem of confounded measures. *Journal of Abnormal Psychology*, 93(2), 222–230 <http://dx.doi.org/10.1037/0021-843X.93.2.222>.
- Domhoff, G. W. (2011). *Wealth, income, and power* Retrieved from <http://sociology.ucsc.edu/whorulesamerica/power/wealth.html>.
- Eide, R. E., & Showalter, M. H. (2011). Estimating the relation between health and education: What do we know and what do we need to know? *Economics of Education Review*, 30(5), 778–791.
- Elliott, W., & Beverly, S. (2011). Staying on course: The effects of savings and assets on the college progress of young adults. *American Journal of Education*, 117(3), 343–374.
- Elliott, W., Destin, M., & Friedline, T. (2011). Taking stock of ten years of research on the relationship between assets and children's educational outcomes: Implications for theory, policy, and intervention. *Children and Youth Services Review*, 33, 2312–2328.
- Environmental Racism Law, & Legal Definition (2012). Retrieved from <http://definitions.uslegal.com/e/environmental-racism/>.
- Escarce, J. (2007). *Research synthesis report no. 12: Racial and ethnic disparities in access to and quality of health care*. Princeton, NJ: Robert Wood Johnson Foundation.
- Evans, G. W. (2003). A multimethodological analysis of cumulative risk and allostatic load among rural children. *Developmental Psychology*, 39(5), 924–933.
- Evans, G. W. (2004). The environment of childhood poverty. *American Psychologist*, 59(2), 77–92 <http://dx.doi.org/10.1037/0003-066X.59.2.77>.
- Evans, G. W. (2006). Child development and the physical environment. *Annual Review of Psychology*, 57, 423–451.
- Evans, G. W. (2009, April). As cited in "Research links poor kids' stress, brain impairment". The Washington Post.
- Evans, G. W., Eckenrode, J., & Marcynyszyn, L. A. (2010). Chaos and the macrosetting: The role of poverty and socioeconomic status. In G. W. Evans & T. D. Wachs (Eds.), *Chaos and its influence on children's development: An ecological perspective* (pp. 225–238). Washington: American Psychological Association. Retrieved from <http://psycnet.apa.org/books/12057/014>.
- Farah, M. J., Shera, D. M., Savage, J. H., Betancourt, L., Giannetta, J. M., Brodsky, N. L., et al. (2006). Childhood poverty: Specific associations with neurocognitive development. *Brain Research*, 1110(1), 166–174.
- Furstenberg, F. F., Jr., Kennedy, S., McCloyd, V. C., Rumbaut, R. G., & Settersten, R. A., Jr. (2003). *Between adolescence and adulthood: Expectations about the timing of adulthood* Available online: <http://www.transad.pop.upenn.edu/downloads/between.pdf> Accessed 01.08.08.
- Gabarin, J. (1995). *Raising children in a social toxic environment*. San Francisco, CA: Jossey-Bass Publishers.
- Galster, G., & Killen, S. (1995). The geography of metropolitan opportunity: A reconnaissance and conceptual framework. *Housing Policy Debate*, 6(1), 7–43.
- George, L. K., Blazer, D. G., Hughes, D. C., & Fowler, N. (1989). Social support and the outcome of major depression. *The British Journal of Psychiatry*, 154(4), 478–485 <http://dx.doi.org/10.1192/bjp.154.4.478>.
- Gershoff, E. T., Aber, J. L., & Raver, C. C. (2003). Child poverty in the United States: An evidence-based conceptual framework for programs and policies. In Jacobs, F., Wertlieb, D., & Lerner, R. M. (Eds.), *Handbook of applied developmental science: Promoting positive child, adolescent, and family development through research, policies, and programs* (Vol. 2, pp. 81–136). Thousand Oaks, CA: Sage.
- Guarino, C., Brown, A., & Wyse, A. (2011). Can districts keep good teachers in the schools that need them most? *Economics of Education Review*, 30(5), 962–979.
- Guo, G. (1998). The timing of influences of cumulative poverty on children's cognitive ability and achievement. *Social Forces*, 77(1), 257–287.
- Guo, G., & Harris, K. M. (2000). The mechanisms mediating the effects of poverty on intellectual development. *Demography*, 37(4), 431–447.
- Hamilton, J. T. (1995). Testing for environmental racism: Prejudice, profits, political power? *Journal of Policy Analysis and Management*, 14(1), 107–132.
- Hannon, L. (2005). Extremely poor neighborhoods and homicide. *Social Science Quarterly*, 86, 1418–1434.
- Haveman, R., & Wolfe, B. (1995). The determinants of children's attainments: A review of methods and findings. *Journal of Economic Literature*, 32, 1829–1878.
- Heckman, J. J. (2006). Skill formation and the economics of investing in disadvantaged children. *Science*, 312(5782), 1900–1902.
- Henrich, C. C., Schwab-Stone, M., Fanti, K., Jones, S. M., & Ruchkin, V. (2004). The association of violence exposure with academic achievement and feeling safe at school: Is it moderated by parent support? A prospective study. *Journal of Applied Developmental Psychology*, 25(3), 327–348.
- Holahan, C. J., & Moos, R. H. (1983). The quality of social support: Measures of family and work relationships. *British Journal of Clinical Psychology*, 22(3), 157–162.
- Holzer, H. J., Schanzenbach, D. W., Duncan, G. J., & Ludwig, J. (2008). The economic costs of childhood poverty in the United States. *Journal of Children and Poverty*, 14, 41–61 <http://dx.doi.org/10.1080/10796120701871280>.
- Hoover-Dempsey, K. V., & Sander, H. M. (1995). Parental involvement in children's education: Why does it make a difference? *Teachers College Record*, 97(2), 310–331.
- Jeynes, W. (2012). A meta-analysis of the efficacy of different types of parental involvement programs for urban students. *Urban Education*, 47(4), 706–742.
- Jones, D., Forehand, R., Brody, G., & Armistead, L. (2002). Psychosocial adjustment of African American children in single-mother families: A test of 3 risk models. *Journal of Marriage and Family*, 64(1), 105–115.
- Keister, L. A. (2004). Race, family structure, and wealth: The effect of childhood family on adult asset ownership. *Sociological Perspectives*, 47(2), 161–187.
- Kishiyama, M. M., Boyce, W. T., Jimenez, A. M., Perry, L. M., & Knight, R. T. (2009). Socioeconomic disparities affect prefrontal function in children. *Journal of Cognitive Neuroscience*, 21(6), 1106–1115.
- Kochhar, R., Fry, R., & Taylor, P. (2011). *Wealth gaps rise to record highs between Whites, Blacks, Hispanics*. Washington, DC: Pew Research Center. Retrieved from <http://pewsocialtrends.org/2011/07/26/wealth-gaps-rise-to-record-highs-between-whites-blacks-hispanics/1/>.
- Kuh, D., & Ben-Shlomo, Y. (2004). *A life course approach to chronic disease epidemiology*. Oxford: Oxford University Press.
- Landrigan, P. J., Carlson, J. E., Bearer, C. F., Cranmer, J. S., Bullard, R. D., Etzel, R. A., et al. (1998). Children's health and the environment: A new agenda for prevention research. *Environmental Health Perspectives*, 106(3), 787–794 <http://dx.doi.org/10.2307/3434190>.
- Langford, C. P., Bowsher, J., Maloney, J. P., & Lillis, P. P. (1997). Social support: A conceptual analysis. *Journal of Advanced Nursing*, 25(1), 95–100.
- Leventhal, T., & Brooks-Gunn, J. (2000). The neighborhoods they live in: The effects of neighborhood residence upon child and adolescent outcomes. *Psychological Bulletin*, 126(2), 309–337.
- Logan, J. R. (2011). *Separate and unequal: The neighborhood gap for blacks Hispanics and Asians in metropolitan America. US2010 Project*. Providence, RI: Brown University.

- Loman, M., & Gunnar, M. R. (2010). Early experience and the development of stress reactivity and regulation in children. *Neuroscience & Biobehavioral Reviews*, 34(6), 867–876 <http://dx.doi.org/10.1016/j.neubiorev.2009.05.007>.
- Lovenheim, M. F. (2011). The effect of liquid housing wealth on college enrollment. *Journal of Labor Economics*, 29(4), 741–771.
- Low, M. D., Low, B. J., Baumler, E. R., & Huynh, P. T. (2005). Can education policy be health policy? Implications for research on the social determinants of health. *Journal of Health and Political Policy Law*, 30(6), 1131–1162.
- Ludwig, J., Duncan, G. J., & Hirschfeld, P. (2001). Urban poverty and juvenile crime: Evidence from a randomized housing mobility experiment. *Quarterly Journal of Economics*, 116(2), 655–679.
- Lui, M., Robles, B., Leondar-Wright, B., Buser, R., & Adamson, R. (2006). *The color of wealth: The story behind the U.S. racial wealth divide*. New York, NY: New Press.
- Lupien, S. J., King, S., Meaney, M. J., & McEwen, B. S. (2000). Child's stress hormone levels correlate with mother's socioeconomic status and depressive state. *Biological Psychiatry*, 48(10), 976–980 [http://dx.doi.org/10.1016/S0006-3223\(00\)00965-973](http://dx.doi.org/10.1016/S0006-3223(00)00965-973).
- Lupien, S. J., de Leon, M. J., Sarti, S. D., Convit, A., Tarshish, C., Nair, N. P. V., et al. (1998). Cortisol levels during human aging predict hippocampal atrophy and memory deficits. *Nature Neuroscience*, 1(1), 69–73.
- Malecki, C. K., & Demaray, M. K. (2003). What type of support do they need? Investigating student adjustment as related to emotional, informational, appraisal, and instrumental support. *School of Psychology Quarterly*, 18(3), 231–252.
- Massey, D. S. (1996). The age of extremes: Concentrated affluence and poverty in the twenty-first century. *Demography*, 33, 395 <http://dx.doi.org/10.2307/2061773>.
- McEwen, B. S. (1998). Protective and damaging effects of stress mediators. *New England Journal of Medicine*, 338(3), 171–179.
- McEwen, B. S. (2008). Central effects of stress hormones in health and disease: Understanding the protective and damaging effects of stress and stress mediators. *European Journal of Pharmacology*, 583, 174–185.
- McEwen, B. S., & Sapolsky, R. M. (1995). Stress and cognitive function. *Current Opinion in Neurobiology*, 5(2), 205–216.
- McLeod, J. D., & Shanahan, M. J. (1993). Poverty, parenting, and children's mental health. *American Sociological Review*, 58, 351–366.
- McLoyd, V. C. (1998). Socioeconomic disadvantage and child development. *American Psychologist*, 53(2), 185–204.
- McLoyd, V. C. (2011). How money matters for children's socioemotional adjustment: Family processes and parental investment. In Carlo, G., Crockett, L. J., & Carranza, M. A. (Eds.), *Health disparities in youth and families* (Vol. 57, pp. 33–72). New York, NY: Springer New York. Retrieved from http://www.springerlink.com/index/10.1007/978-1-4419-7092-3_3.
- McLoyd, V. C., & Wilson, L. (1991). The strain of living poor: Parenting, social support and child mental health. In A. Huston (Ed.), *Children and poverty: Child development and public policy* (pp. 105–135). New York: Cambridge University Press.
- Morris, P., Jones, S. M., & Smith, J. (2003). *Children in public housing developments: An examination of the children at the beginning of the Jobs Plus Evaluation*. New York, NY: Manpower Demonstration Research Corporation.
- Nam, Y., Huang, J., & Sherraden, M. (2008). Asset definitions. In S. M. McKernan & M. Sherraden (Eds.), *Asset building and low-income families* (pp. 1–31). Washington, DC: Urban Institute Press.
- National Center for Children in Poverty. (1999). *Poverty and brain development*. Columbia University, Mailman School of Public Health. Retrieved from http://www.nccp.org/publications/pub_398.html.
- National Institute of Mental Health. (2001). *Teenage brain: A work in progress* (Publication No. 01-4929) Retrieved from <http://www.nimh.nih.gov/publicat/teenbrain.cfm>.
- National Research Council, & Institute of Medicine. (2000). From neurons to neighborhoods: The science of early childhood development. Committee on integrating the science of early childhood development. In J. P. Shonkoff & D. A. Phillips (Eds.), *Board on children, youth, and families, commission on behavioral and social sciences and education*. Washington, DC: National Academy Press.
- National Research Council, & Institute of Medicine. (2004). *Children's health, the nation's wealth: Assessing and improving child health*. Committee on evaluation of children's health, board on children, youth, and families, division of behavioral and social sciences and education. Washington, DC: The National Academies Press.
- National Research Council, & Institute of Medicine. (2009a). Preventing mental, emotional, and behavioral disorders among young people: Progress and possibilities. Committee on prevention of mental disorders and substance abuse among children, youth, and youth adults: research advances and promising interventions. In M. E. O'Connell, T. Boat, & K. E. Warner (Eds.), *Board on children, youth, and families, division of behavioral and social sciences education*. Washington, DC: National Academies Press.
- National Research Council, & Institute of Medicine. (2009b). *Depression in parents, parenting, and children: Opportunities to improve identification, treatment, and prevention*. Washington, DC: National Academies Press.
- Nelson, C. A. (2007). A neurobiological perspective on early human deprivation. *Child Development Perspectives*, 1, 13–18.
- Nelson, C. A., Furtado, E. A., Fox, N. A., & Zeanah, C. H., Jr. (2009). The deprived human brain: Developmental deficits among institutionalized Romanian children – And later improvements – Strengthen the case for individualized care. *American Scientist*, 97, 222–229.
- Nembhard, J. G., & Chiteji, N. (2006). *Wealth accumulation & communities of color in the United States: Current issues*. Ann Arbor, MI: University of Michigan Press.
- Olden, K. (1998). The complex interaction of poverty, pollution, health status. *The Scientist*, 12(4), 7.
- Oliver, M., & Shapiro, T. M. (1995). *Black wealth White wealth: A new perspective on racial inequality*. New York: Routledge.
- Ouellette, T., Burstein, N., Long, D., & Beecroft, E. (2004). *Measures of material hardship: Final report*. Washington, DC: US Department of Health and Human Services, Office of the Assistant Secretary for Planning and Evaluation.
- Pearce, M. J., Jones, S. M., Schwab-Stone, M., & Ruchkin, V. (2003). The protective effects of parent involvement and religiousness for the development of conduct problems among high-risk youth. *Child Development*, 74(6), 1682–1696.
- Powell, J. A. (2012). *Racing to justice: Transforming our conceptions of self and other to build an inclusive society*. Bloomington, IN: Indiana University Press.
- Ross, C. E., & Mirowsky, J. (1999). Refining the association between education and health: The effects of quantity, credential, and selectivity. *Demography*, 36(4), 445–460.
- Rubinowitz, L. S., & Rosenbaum, J. E. (2000). *Crossing the class and color lines: From public housing to white suburbia*. Chicago, IL: University of Chicago Press.
- Ryu, M. (2009). *Minorities in higher education*. Washington, DC: American Council on Education.
- Sameroff, A. J. (Ed.). (2009). *The transactional model of development: How children and contexts shape each other*. Washington, DC: American Psychological Association.
- Sameroff, A. J. (2010). A unified theory of development: A dialectic integration of nature and nurture. *Child Development*, 81(1), 6–22.
- Sameroff, A. J., & MacKenzie, M. J. (2003). Research strategies for capturing transactional models of development: The limits of the possible. *Development and Psychopathology*, 15(3), 613–640.
- Sampson, R., & Laub, J. (1994). Urban poverty and the family context of delinquency: A new look at structure and process in a classic study. *Child Development*, 65, 523–540.
- Sampson, R., Raudenbush, S., & Earls, F. (1997). Neighborhoods and violent crime: A multilevel study of collective efficacy. *Science*, 277, 918–924.
- Sansani, S. (2011). The effects of school quality on long-term health. *Economics of Education Review*, 30(6), 1320–1333.
- Sapolsky, R. M., Romero, L. M., & Munck, A. (2000). How do glucocorticoids influence stress responses? Integrating permissive, suppressive, stimulatory and preparative actions. *Endocrine Reviews*, 21(1), 55–89.
- Schneider, D. (2011). Wealth and the marital divide. *American Journal of Sociology*, 117(2), 627–667 <http://dx.doi.org/10.1086/661594>.
- Shanks, T. (2011). *Diverging pathways: How wealth shapes opportunity for children*. Oakland, CA: Insight Center for Community Economic Development.
- Shapiro, T. M. (2004). *The hidden cost of being African American: How wealth perpetuates inequality*. Oxford University Press.
- Shapiro, T. M., & Wolff, E. N. (2001). *Assets for the poor: The benefits of spreading asset ownership*. New York City, NY: Russell Sage Foundation.
- Sharkey, P. (2009). *Neighborhoods and the Black-White mobility gap. Report of the Economic Mobility Project*. Washington, DC: The Pew Charitable Trusts.
- Shonkoff, J. P., Boyce, W. T., Cameron, J., Duncan, G. J., Fox, N. A., Greenough, W. T., et al. (2004a). *Children's emotional development is built into the architecture of their brains*. National Scientific Council on the Developing Child. Retrieved from http://www.developingchild.net/pubs/wp/Childrens_Emotional_Development_Architecture_Brains.pdf.
- Shonkoff, J. P., Boyce, W. T., Cameron, J., Duncan, G. J., Fox, N. A., Greenough, W. T., et al. (2007a). *The science of early childhood development: Closing the gap between what we know and what we do*. National Scientific Council on the Developing Child. Retrieved from http://www.developingchild.net/pubs/persppdf/Science_Early_Childhood_Development.pdf.
- Shonkoff, J. P., Boyce, W. T., Cameron, J., Duncan, G. J., Fox, N. A., Greenough, W. T., et al. (2004b). *Young children develop in an environment of relationships*. National Scientific Council on the Developing Child. Retrieved from http://www.developingchild.net/pubs/wp/Young_Children_Environment_Relationships.pdf.

- Shonkoff, J. P., Boyce, W. T., Cameron, J., Duncan, G. J., Fox, N. A., Greenough, W. T., et al. (2005). *Excessive stress disrupts the architecture of the developing brain*. National Scientific Council on the Developing Child. Retrieved from http://www.developingchild.net/pubs/wp/Stress_Disrupts_Architecture_Developing_Brain.pdf.
- Shonkoff, J. P., Boyce, W. T., & McEwen, B. S. (2009). Neuroscience, molecular biology, and the childhood roots of health disparities: Building a new framework for health promotion and disease prevention. *The Journal of the American Medical Association*, 301(21), 2252–2259.
- Shonkoff, J. P., Duncan, G. J., Brooks-Gunn, J., Guyer, B., Magnuson, K., Phillips, D., et al. (2007). *Early childhood program evaluations: A decision-maker's guide*. National Forum on Early Childhood Program Evaluation. Retrieved from http://www.developingchild.harvard.edu/content/downloads/Decision_Guide.pdf.
- Short, K. S. (2005). Material and financial hardship and income-based poverty measures in the USA. *Journal of Social Policy*, 34, 21–38 <http://dx.doi.org/10.1017/S0047279404008244>.
- Stansfeld, S. A., Head, J., & Marmot, M. G. (1997). Explaining social class differences in depression and well-being. *Social Psychiatry and Psychiatric Epidemiology*, 33, 1–9 <http://dx.doi.org/10.1007/s001270050014>.
- Taylor, B. A., Dearing, E., & McCartney, K. (2004). Incomes and outcomes in early childhood. *Journal of Human Resources*, 39, 980–1007.
- Thompson, P. (2004). *Time-lapse imaging tracks brain maturation from ages 5 to 20*. Los Angeles: UCLA.
- Turner, R. J., & Wheaton, B. (1995). Checklist measurement of stressful life events. In C. Sheldon, R. C. Kessler, & L. Underwood-Gordon (Eds.), *Measuring stress: A guide for health and social scientists* (pp. 29–58). New York, NY: Oxford University Press.
- U.S. Census Bureau. (2008). *Annual social and economic supplement* Retrieved from <http://pubdb3.census.gov/macro/032008/pov/toc.htm>.
- U.S. Census Bureau. (2011). *State & county quickfacts*. Washington, DC: US 2010 census.
- U.S. Department of Housing and Urban Development. (2000). *Rental housing assistance – The worsening crisis*. Washington, DC: US Department of Housing and Urban Development.
- Weinger, S. (1998). Poor children “know their place”: Perceptions of poverty, class, and public messages. *Journal of Sociology and Social Welfare*, 25, 100–118.
- Wells, N. M., Evans, G. W., Beavis, A., & Ong, A. D. (2010). Early childhood poverty, cumulative risk exposure, and body mass index trajectories through young adulthood. *American Journal of Public Health*, 100(12), 2507–2512 <http://dx.doi.org/10.2105/AJPH.2009.184291>.
- Williams, D. R., & Mohammed, S. A. (2009). Discrimination and racial disparities in health: Evidence and needed research. *Journal of Behavioral Medicine*, 32(1), 20–47.
- Williams, D. R., Neighbors, H. W., & Jackson, J. S. (2003). Racial/Ethnic discrimination and health: Findings from community studies. *American Journal of Public Health* 93(2).
- Williams Shanks, T., Kim, Y., Loke, V., & Destin, M. (2010). Assets and child well-being in developed countries. *Children and Youth Services Review*, 32(11), 1488–1496.
- Wilson, W. J. (1987). *The truly disadvantaged: The inner city, the underclass and public policy*. Chicago, IL: University of Chicago Press.
- Yamokoski, A., & Keister, L. A. (2006). The wealth of single women: Marital status and parenthood in the asset accumulation of young baby boomers in the United States. *Feminist Economics*, 12(1/2), 167–194.
- Zhang, T., Parent, T., Weaver, I., & Meaney, M. J. (2004). Maternal programming of individual differences in defensive responses in the rat. *Annals of the New York Academy of Science*, 1032, 85–103.