

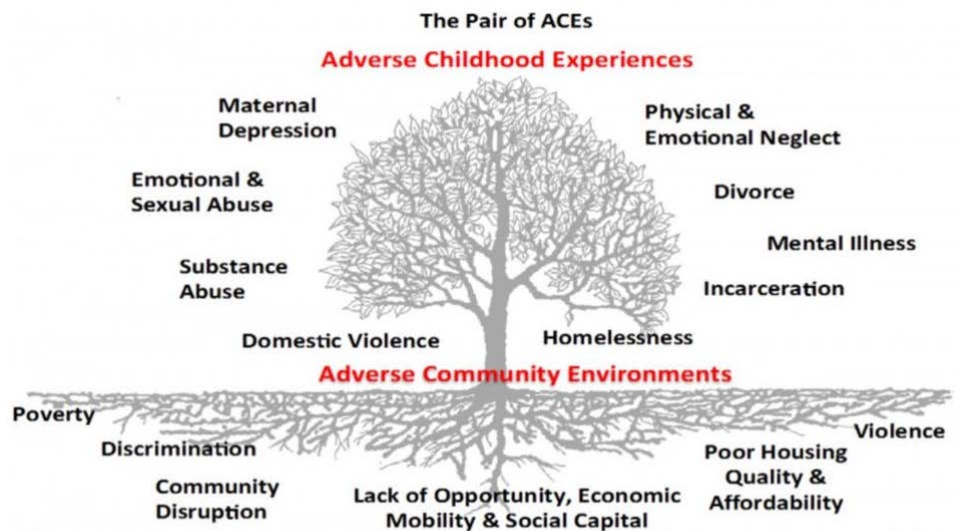
## The Relationship between Adverse Childhood Experiences (ACEs) and Health: Factors that Influence Individuals with or At Risk of CVD

### Background

Adverse childhood experiences (ACEs) are a variety of childhood traumatic experiences that include exposure to emotional, physical, or sexual abuse, maltreatment, exposure to violence and other environmental stressors, or household dysfunction during childhood.<sup>1</sup> Recent studies have expanded this definition to include substance use, mental illness or incarceration of a household member, domestic violence, and parental separation (see Graphic 1 below).<sup>2,3</sup> In addition, poverty—which is often described as an ACE itself—is shown as a strong reinforcing factor in the accumulation of ACEs.<sup>4,5</sup> While a majority of children living in poverty are not affected by multiple ACEs, there is a significant proportion of families with multiple ACEs who experience poverty.<sup>6</sup>

ACEs have been shown to negatively impact health and well-being and contribute to many of the leading causes of morbidity and mortality in the United States, especially among low-income and minority populations.<sup>7</sup> Research has found that the risk for negative health outcomes increases with the number of ACEs.<sup>8,9,10</sup> Multiple ACEs generally lead to higher prevalence of health issues, including cardiovascular disease (CVD), neurocognitive and mental health conditions, and dental health problems.<sup>11,12,13</sup> In particular, ACEs have been shown to be associated with weight status and poor outcomes following weight loss interventions associated with food addiction behaviors.<sup>14,15</sup> Additionally, adverse experiences such as childhood sexual abuse have been associated with increases in body weight and development of eating disorders.<sup>16</sup>

**Graphic 1.** The “Pair of ACEs” was developed by Ellis and Dietz (2017) to illustrate that ACEs occur within the context of adverse community environments such as poverty, poor housing, and violence outside of the home.



Ellis, W., Dietz, W. (2017) A New Framework for Addressing Adverse Childhood and Community Experiences: The Building Community Resilience (BCR) Model. *Academic Pediatrics*. 17 (2017) pp. S86-S93. DOI information: 10.1016/j.acap.2016.12.011

## **Role of ACEs in CVD Risk**

A growing body of evidence has found links between ACEs and cardiovascular risk factors in adulthood.<sup>17,18,19,20,21,22,23,24,25,26</sup> According to a recent study, even one adverse childhood experience is strongly and independently associated with cardiovascular risk factors, with implications for primordial prevention.<sup>27</sup>

As one study demonstrated, psychosocial (at both the individual and neighborhood level) and environmental stress exposures across the life course have been shown to be relevant in the development of CVD.<sup>28</sup> These stressors act on biologic pathways, including immune function and inflammatory response, which are also impacted by ubiquitous environmental exposures such as air pollution.<sup>29</sup>

Further, in examining the relationship between exposure to family member incarceration during childhood (FMIC) and myocardial infarction, researchers concluded that the odds of heart attack among men with FMIC was significantly higher than among women.<sup>30</sup> Similarly, researchers have found that experiencing family and neighborhood poverty during childhood increases risk for hypertension for adults when assessed 30 years later.<sup>31</sup> Women raised in lower socioeconomic status (SES) families were found to have elevated markers of inflammation and hemostasis, increasing risk for CVD in adulthood.<sup>32</sup> Receipt of anti-poverty public assistance during childhood was found to decrease risk for hypertension by mid-life among women in another study.<sup>33</sup>

Additionally, in measuring the association between food insecurity and select CVD risk factors among Mississippi adults, compared to the referent group, Mississippi adults with high blood pressure, those with diabetes, those who were not physically active, and those who consumed fewer than five fruits and vegetables daily were found to have higher odds of food insecurity.<sup>34</sup> Similarly, another study found participants who were food insecure were significantly less likely to have good cardiovascular health compared to participants who were food secure.<sup>35</sup>

## **Environmental Hazards**

Research has demonstrated the link between a child's social, built, and natural environment and subsequent health and well-being implications in adulthood. For example, recent studies have stressed the significance of racism as an environmental hazard, to include poor living conditions perpetuated by racism.<sup>36</sup> Racism is shown to segregate children into neighborhoods and areas that are more likely to expose them to toxic environments. Certain neighborhoods may be more vulnerable to climate change and air pollution—phenomena with known negative health effects—and these tend to be predominantly ethnic-minority neighborhoods.<sup>37,38,39</sup> Often these same neighborhoods include homes in poor condition, which may expose residents to pests, toxins, and generally unhealthy living conditions.<sup>40</sup> Collectively, the cumulative negative environmental factors to which a child is exposed may increase their risk of developing unhealthy behaviors and, to a lesser extent, obesity and heart disease.<sup>41,42,43, 44,45</sup> There is some evidence that a socially strong community can protect against some of the negative effects of unhealthier neighborhoods.<sup>46</sup>

While the role of health care in mitigating environmental hazard risk factors is unclear,<sup>47</sup> Bruner, et al. note that these children require more support in order to thrive yet tend to receive far less.<sup>48</sup> A 2017 article suggests that addressing processes that disproportionately threaten vulnerable populations, to include environmental health hazards, requires both targeted and cross-cutting approaches such as genomics and health IT research.<sup>49</sup>

## **Substance Use/Abuse**

Substance use in the household is the third most commonly reported ACE among the U.S. adult population, behind emotional abuse and parental separation or divorce.<sup>50</sup> Studies have shown household substance use can negatively impact the health and well-being of children throughout the life course.<sup>51,52,53,54,55,56,57</sup> For example, research

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suggests parental drinking is predictive of adolescent alcohol use<sup>58</sup> and exposure to maternal substance use disorder is found to increase a child's risk for an alcohol use disorder at ages nineteen and twenty-six.<sup>59</sup> Similarly, another study found that young individuals exposed to drugs, either through prenatal drug exposure or witnessing parental addiction, during their developmental age were characterized by elevated rates of neuropsychological impairments.<sup>60</sup>

To address the negative health impact of household substance use on children throughout their life course, health care providers should be encouraged to screen for ACEs.<sup>61</sup> Additionally, prioritizing primary prevention is critical to addressing issues of childhood adversity.<sup>62</sup>

### Parental Mental Illness

Living with a family member, especially a parent, with a mental illness has been identified as a potential adverse experience that can affect the short- and long-term health outcomes of a child.<sup>63,64</sup> Though the research to support this knowledge is relatively established, more recent literature has attempted to frame the scope and precise impact of early intimate exposure to poor mental health on a child's development.<sup>65,66,67</sup> Living with a parent who has poor mental health puts a child at greater risk of mental illness and may also affect physical well-being.<sup>68</sup>

A recent study determined that parental stress is among the most common risk factors for maltreatment of children, indicating that parents suffering from stress may create less nurturing environments for their children.<sup>69</sup> Abuse and neglect can produce a traumatic stress response in children, aging their cells prematurely and contributing to long-term physical and mental health challenges.<sup>70,71</sup> Children of parents with mental health challenges may also struggle in school and show lower resilience to adversity than their peers, setting them up for a lower chance of succeeding socioeconomically later in life.<sup>72</sup> Parents may be aware of these effects but lack the support and/or resources to overcome their trauma.<sup>73</sup>

Parents, who experienced ACEs in their own childhood, may unintentionally project their mental distress onto their children.<sup>74,75</sup> For example, two studies found that mothers who had experienced at least one ACE were found to be more likely to engage in unhealthy behaviors and/or have poor mental health, which could negatively impact their children.<sup>76,77</sup> In some cases, parents with poor health habits may pass these to their children.<sup>78</sup> It may also be possible for women to pass on "biologically-embedded" adversity and stress to their offspring regardless of the nature of their parenting later on.<sup>79,80</sup> By affecting their reactions to adversity, such transmission may affect how strongly a child's health is affected by stress throughout life.<sup>81</sup> There is some evidence that a supportive community can mitigate the negative effects of a parent's mental health on children's abilities to thrive, and by the same token, negative environments may exacerbate existing turbulence in the family.<sup>82,83</sup>

### Parental/Family Member Incarceration

Exposure to parental or familial incarceration can lead to adverse outcomes for children throughout the life course.<sup>84</sup> Research has shown children of incarcerated parents exhibit higher levels of substance use, delinquency, home instability, externalizing and internalizing behaviors as well as problems in school.<sup>85,86,87,88,89</sup> Further, parental incarceration frequently leads to maladjustment and increases propensity towards risky behaviors which may lead to negative health outcomes.<sup>90</sup> For example, studies determined an association between maternal imprisonment during childhood and risky sexual behavior, such as early sexual onset, inconsistent condom use,<sup>91</sup> and prevalence of sexually transmitted diseases later in life.<sup>92</sup> Parental incarceration has also been linked to increased suicide risk. According to a recent study, all ACEs, including parental incarceration, increased the risk of suicidal ideation and suicide attempts in adulthood by 1.4 to 2.7 times.<sup>93</sup>

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Intervening during or prior to the adolescent developmental period may ameliorate risky sexual behaviors and related health outcomes among children of incarcerated parents.<sup>94</sup> Support for policies that lower incarceration rates, criminal justice reform, and early intervention for children at risk of ACEs, particularly children of the incarcerated, should be considered relevant to the topic of improving health outcomes among at-risk populations.

### Poverty

Research on ACEs shows correlations between early adversity linked to poverty, including income inequality, and poor health outcomes later in life.<sup>95,96,97,98,99</sup> The timing, duration, and community context of poverty appear to influence life course outcomes, with earlier experiences, longer duration, and higher concentrations of poverty in the community leading to poorer outcomes.<sup>100,101,102</sup> According to one study, exposure to economic hardship in early life has negative consequences for health both among individuals who begin life in poverty or are chronically poor, as well as among those who moved into poverty during their childhood years.<sup>103</sup> Because poverty may have cumulative impacts on health, early interventions may be optimal for long-term protection.<sup>104</sup>

Studies have reported the association between growing up in poverty and health conditions in childhood and across the life course related to: asthma,<sup>105,106,107,108</sup> obesity,<sup>109,110,111</sup> chronic kidney disease (CKD),<sup>112</sup> mental health,<sup>113,114,115,116</sup> brain development,<sup>117,118,119,120,121,122</sup> and CVD.<sup>123,124,125</sup>

To mitigate the negative health impacts of poverty on children throughout their life course, health care practices should adopt effective methods to identify poverty-related socioeconomic determinants of health.<sup>126,127</sup> Research has identified opportunities for continuing education to teach pediatricians and other pediatric health practitioners in a family-centered medical home to assess the financial stability of families, link families to resources, and coordinate care with community partners.<sup>128</sup> Additionally, increased partnership between the health sector and community development can further highlight issues of childhood poverty and health outcomes for community development investments, helping to optimize intervention strategies for health.<sup>129</sup>

### Food Insecurity

Food insecurity is defined as having limited or uncertain capacity for acquiring sufficient, safe, and nutritious food to meet one's dietary needs; while "food deserts" refer to economically and socially-deprived areas with inadequate food supply that are often inhabited by low-income groups.<sup>130</sup> Food insecurity is a social determinant of chronic disease, including diabetes, CVD, stroke, and asthma.<sup>131</sup> It is associated with risk factors such as high blood pressure, obesity, fruit and vegetable consumption, physical inactivity, and smoking.<sup>132,133,134</sup> Additionally, food insecurity and hunger during childhood are associated with an array of developmental problems, including impulse control problems and violence.<sup>135</sup> As with all ACEs, the likelihood and prevalence of food insecurity has distinct racial and ethnic disparities.<sup>136</sup>

Among all other ACEs, food insecurity, in particular, has economic and political origins and solutions. Laws and policies that empower local merchants and stakeholders to help eliminate food deserts, and exert public pressure through lobbying and advocacy, should be supported.<sup>137</sup> For example, the Safe Environment for Every Kid (SEEK) model, a comprehensive program developed to help child care professionals across multiple primary care settings to identify and address psychosocial risk factors for child maltreatment including food insecurity, is a promising model for improving outcomes among families with young children.<sup>138</sup>

## The American Heart Association Position on Adverse Childhood Experiences (ACEs):

ACEs have been found to have a direct and synergistic impact on health and well-being throughout the life course, with a dose-response effect between the occurrences of ACEs and adult health. Further, over the past decade, a number of retrospective and prospective studies have assessed associations between ACEs and CVD risk in adulthood. Policymakers should seek to identify evidence-based interventions to help mitigate parental and familial factors, such as household incarceration, poverty, substance use and mental illness, environmental hazards, and food scarcity that may contribute to ACEs among children.

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