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Positive childhood experiences and ideal cardiovascular health in midlife: Associations and mediators

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ABSTRACT

In 2010, the American Heart Association introduced a new conceptual framework to encourage a focus on primary prevention and provided a definition for "ideal cardiovascular health". In this study we examined the relationship between positive childhood experience and ideal cardiovascular health in mid-life, and the extent to which education, depression, and social support mediate this association. Data are from participants in the Midlife and Aging in the United States study who completed a clinic-based assessment of health ($N = 1255$, aged 34–84 years, 2004–2005). We created a positive childhood experiences index based on retrospective report of eight childhood experiences, and calculated a continuous ideal cardiovascular health score for each participant following the American Heart Association's definition of ideal, intermediate and poor cardiovascular health across seven health metrics (analyses conducted in 2015–2016). Positive childhood experiences were associated with ideal cardiovascular health: compared to individuals in the lowest quartile, respondents in the second, third, and fourth quartile of positive childhood experiences scored 0.42 (standard error (SE) = 0.18), 0.92 (SE = 0.18) and 1.04 (SE = 0.18) units higher on ideal cardiovascular health, adjusting for age, sex, and race. Respondent's education, depression status, and social support fully mediated the direct effect of positive childhood experiences on ideal cardiovascular health, with the largest indirect effect for education. These results suggest that positive childhood experiences are associated with ideal cardiovascular health in midlife. Strategies to promote cardiovascular wellbeing may benefit from a focus on social interventions early in life; educational attainment, major depression, and social support may represent key points of intervention.

Cardiovascular diseases (CVD) are the leading cause of death for men and women in the United States and accounted for >801,000 deaths in 2013 (Mozaffarian et al., 2016). CVD processes begin in early life (Berenson et al., 1998; Berenson and Srnivasan, 2005; Lloyd-Jones et al., 2009; Mahoney et al., 1991), and social factors during childhood shape CVD risk across the life course (Gundersen et al., 2011; Pollitt et al., 2005; Slopen et al., 2013; Slopen et al., 2011). National policy statements from both the American Heart Association (AHA) (Lloyd-Jones et al., 2010) and the American Academy of Pediatrics (Garner et al., 2012) highlight childhood as a critical time point for the prevention of CVD. Traditionally, research on the influence of childhood experiences on chronic disease risk has focused on how disadvantage during childhood (Doom et al., 2016; Lehman et al., 2005; Pollitt et al., 2007, 2008; Pollitt et al., 2005) confers elevated risk for poor outcomes, including cardiovascular diseases (Galobardes et al., 2006; Johnson et al., 2013; Loucks et al., 2011; Miller et al., 2011; Shonkoff et al., 2009). To date, limited research has considered the influences of positive experiences during childhood for cardiovascular wellbeing in later life (Appleton et al., 2013; Laitinen et al., 2013; Pulkki-Råback et al., 2015; Sood and Gidding, 2016; Lehman et al., 2005; Russek and Schwartz, 1997; Slopen et al., 2016; Sood and Gidding, 2016; Westerlund et al., 2013), in contrast to disease as the outcome (Lehman et al., 2005; Russek and Schwartz, 1997; Slopen et al., 2016; Westerlund et al., 2013).In this study, we examined the relationship between positive childhood experience and an ideal cardiovascular health in a large sample of adults in mid-life, and evaluated the extent to which education, depression, and social support in midlife mediate this association.

In 2010, the AHA set a goal to improve the cardiovascular health of the population by introducing a new conceptual framework to encourage a focus on primary prevention (Lloyd-Jones et al., 2010). The AHA's approach—consistent with the World Health Organization's definition of health as "a state of complete physical, mental, and social wellbeing and not merely the absence of disease or infirmity"—defines "ideal,"

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"intermediate," and "poor" cardiovascular health for seven metrics that can be monitored over time (Lloyd-Jones et al., 2010). The definition includes four health behaviors (i.e., smoking, weight, physical activity, and diet) and three health factors (i.e., blood pressure, total cholesterol, and glycemia) (Lloyd-Jones et al., 2010). Individuals who achieve a greater number of ideal metrics have lower risk of incident myocardial infarction and stroke (Dong et al., 2012), cancer (Rasmussen-Torvik et al., 2013), and mortality (Dong et al., 2012; Yang et al., 2012). The prevalence of ideal cardiovascular health in the US (defined as "ideal" across all metrics) is very low (Bambs et al., 2011; Folsom et al., 2011; Ford et al., 2012; Shay et al., 2012; Yang et al., 2012). For example, in a population-based study of 12,744 participants ages 45–64 years, 0.1% met ideal levels across all seven indicators (Folsom et al., 2011). Although the concept encourages consideration of health-promoting factors (Ford, 2012), limited research has examined the social factors in childhood (Appleton et al., 2013; Pulkki-Råback et al., 2015) or adulthood (Caleyachetty et al., 2015; Unger et al., 2014) associated with ideal cardiovascular health in mid-life.

We are aware of three prior studies that examined childhood characteristics in relation to ideal cardiovascular health. Using prospective data from the New England Family Study ($n = 415$) (Appleton et al., 2013), Appleton and colleagues documented a positive association between attention regulation, cognitive ability, and positive home environment at 7 years and favorable cardiovascular health in adulthood (mean age = 42.2 years). Drawing on data from 477 men and 612 women in the Cardiovascular Risk in Young Finns Study, Pulkki-Raback and colleagues found that psychosocial factors between the ages of 3 and 18 years were associated with ideal cardiovascular health in adulthood (mean age = 37.2 years) (Pulkki-Råback et al., 2015). Similarly, a cross-national comparison study using population-based cohorts from Finland ($n = 1883$), Australia ($n = 1803$), and the United States ($n = 723$) (Laitinen et al., 2013) found that childhood socioeconomic position and parental smoking were inversely associated with ideal cardiovascular health 19–31 years later (30–48 years at follow-up).

The current study builds on prior research to examine positive childhood experiences and ideal cardiovascular health, and potential underlying pathways, using a large national sample of US adults in midlife. Informed by life course theory (Ben-Shlomo and Kuh, 2002; Ben-Shlomo et al., 2014), we hypothesized that positive childhood experiences would show a dose-response association with ideal cardiovascular health, and that education, major depression, and social support would mediate this association.

1. Methods

1.1. Sample

The data are from the Midlife in the United States (MIDUS) study, an interdisciplinary effort to investigate the relationships between social, psychological, behavioral factors and health. The first wave of MIDUS (MIDUSI, 1994–1995) enrolled 7108 non-institutionalized individuals ages 25 to 74 years through random digit dialing from across the US, including siblings for some respondents and some pairs of twins (Brim et al., 2004). The second wave (MIDUSII, 2004–2005) followed up 4963 (70%) of the original participants, and newly recruited 592 African Americans from Milwaukee, WI (Radler and Ryff, 2010). Participants who completed the psychosocial survey at MIDUSII and were healthy enough to travel ($N = 3191$) were invited to participate in a biomarker substudy that required an overnight stay at one of three General Clinical Research Centers. A total of 1255 individuals completed comprehensive biological assessments. Participants enrolled in the biomarker project were similar to non-participants with regard to sex, age, race, marital status, income and chronic conditions, but were more highly educated (Dienberg Love et al., 2010).

We present complete case analysis for our main results ($N = 1147$). Participants in the complete case sample had higher ideal cardiovascular health scores and more positive childhood experiences, were more likely to be white and highly educated, and were less likely to be depressed, compared to the excluded individuals. Results from multiple imputed data sets in supplemental tables ($N = 1255$). Participants provided informed consent, and the study was approved by Institutional Review Boards at participating institutions. Analyses were conducted in 2015–2016.

1.2. Measures

1.2.1. Positive childhood experiences index

We created a positive childhood experiences index based on the presence or absence of eight components: high parental education, high perceived SES, two-parent family, residential stability, no smokers residing in home, high parental warmth, high emotional support and high instrumental support (range: 0 to 8; details below). Factor analysis confirmed the presence of a single factor for the index. Quartiles for the index were created such that the top quartile indicated the most positive experiences.

1.2.1.1. High parental education. Each participant reported his/her mother's and father's highest education levels. We created an indicator for high parental education (using the highest value for either mother or father), whereby 4-year college degrees or more were considered as high.

1.2.1.2. High perceived SES. Participants reported on their family financial status during childhood compared to the average family. Responses ranged from 1 (a lot better off) to 7 (a lot worse off). Participants who reported a lot better off or somewhat better off were categorized as "high perceived SES."

1.2.1.3. Two-parent family. Family structure in early life was queried with a single yes/no question: "Did you live with both of your biological parents up until you were 16?" Participants who responded affirmatively were categorized as growing up in two-parent family.

1.2.1.4. Residential stability. Residential mobility in childhood was assessed with a single question: "how many times during your childhood did you move to a totally new neighborhood or town?" Following prior work (Bures, 2003), participants who reported <3 moves were categorized as stable.

1.2.1.5. No smokers residing in home. Respondents were asked: "During your first 16 years, did you live with anyone in your household who smoked cigarettes or other tobacco products?" (response options: no one, father, mother, someone else). Respondents who reported "no one" was considered as having no smokers in home.

1.2.1.6. High parental warmth. Parental warmth in early life was queried with a six-item Parental Support Scale (Rossi, 2001) (e.g., "how much did your mother/father understand your problems and worries?"), with responses ranging from 1 (a lot) to 4 (not at all). Responses were reverse-coded such that a higher score represents greater warmth, and averaged responses across all items ($\alpha = 0.91$) (Rothrauff et al., 2009). We created quartiles of the score, and participants in the top quartile were categorized as having high parental warmth.

1.2.1.7. High emotional support. Emotional support in childhood was assessed with five items from the Emotional Neglect subscale of the Childhood Trauma Questionnaire (Bernstein and Fink, 1998; Bernstein et al., 1994) (e.g., "there was someone in my family who helped me feel that I was important or special"), with responses ranging from 1 (never true) to 5 (very often true). A score was constructed by averaging responses across all items ($\alpha = 0.85$), and we created quartiles of