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Research article

Associations of adversity in childhood and risk factors for cardiovascular disease in mid-adulthood



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ABSTRACT

Studies assessing associations of childhood psychosocial adversity (e.g. sexual abuse, physical neglect, parental death), as opposed to socioeconomic adversity, with cardiovascular disease (CVD) risk factors in adulthood are scarce. The aim of this study is to assess associations of various types of psychosocial adversity and cumulative adversity in childhood, with multiple CVD risk factors in mid-life. At study enrolment, women from the Avon Longitudinal Study of Parents and Children (N = 3612) retrospectively reported: lack of maternal care, maternal overprotection, parental mental illness, household dysfunction, sexual abuse, physical and emotional abuse, and neglect in childhood. Approximately 23 years later, body mass index (BMI), waist circumference, systolic and diastolic blood pressure, plasma glucose, insulin, triglycerides, low and high density lipoprotein cholesterol, C-reactive protein, carotid intima-media thickness (cIMT) and arterial distensibility were assessed (mean age 51 years). We examined associations of each specific type of psychosocial adversity and cumulative adversity with CVD risk factors. No specific type of psychosocial adversity was consistently associated with the CVD risk factors. There was evidence that a one standard deviation greater cumulative psychosocial adversity was associated with 0.51 cm greater waist circumference (95% confidence interval [CI]: 0.02 cm, 1.00 cm, $p = 0.04$) and a lower arterial distensibility, even after adjustment for age, ethnicity and childhood and adult socioeconomic position. We found no consistent evidence that any specific type of psychosocial adversity, or cumulative psychosocial adversity in childhood, is associated with CVD risk factors in adult women.

1. Introduction

Studying the long-term health consequences of adversity in childhood is important for providing evidence to support the potential benefits of public interventions that seek to prevent adversity in childhood. The American Heart Association recently published a statement to increase awareness of the influence of social factors on the incidence, treatment, and outcomes of CVD. They recommended further observational studies examine the complex interactions between social factors and cardiovascular health (Bayer, Fairchild, Hopper, & Nathanson, 2013). There is now consistent evidence showing that socioeconomic adversity in childhood (e.g. low head of household social class, household overcrowding and low parental education) is associated with cardiovascular disease

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(CVD) risk factors in adulthood (Galobardes, Smith, & Lynch, 2006; Havranek et al., 2015). However, there is much less evidence for associations of psychosocial adversity in childhood (for example, sexual abuse and physical neglect) with later CVD risk, and existing studies have reported both positive and null findings (Crowell et al., 2015; Gooding et al., 2016; Halonen et al., 2015; Hosang et al., 2013; Rich-Edwards et al., 2012; Su et al., 2015; Thurston et al., 2014). The Adverse Childhood Experiences (ACE) study has been pivotal in characterising medium and long-term health outcomes of psychosocial adversity in childhood and Felitti et al. have previously reported a strong graded relationship between the number of categories of retrospectively reported adverse childhood exposures and the presence of CVD (including ischemic heart disease) in a study of 9508 adults (Felitti et al., 1998).

Existing studies have reported associations between specific types of psychosocial adversity, particularly sexual or physical abuse, (Gooding et al., 2016; Hosang et al., 2013; Rich-Edwards et al., 2012; Thurston et al., 2014) with increased CVD risk. However, few studies have considered a possible cumulative effect of exposure to multiple types of adversity in childhood (Crowell et al., 2015; Halonen et al., 2015; Su et al., 2015). Assessing the effects of cumulative psychosocial adversity acknowledges that adverse experiences tend to co-occur and that experiencing multiple types of psychosocial adversity in childhood may have a greater adverse effect on cardiovascular health than experiencing only one. Furthermore, there is some evidence to suggest that associations between childhood adversity and CVD risk in adulthood may differ between people who have high compared to low socioeconomic position (SEP) in adulthood (Halonen et al., 2015).

We aimed to assess associations of maternal lack of care, maternal overprotection, parental mental illness, household dysfunction, sexual abuse and physical or emotional abuse or neglect in childhood (each individually), and cumulative psychosocial adversity, with several established risk factors for cardiovascular disease including body mass index (BMI), waist circumference, systolic and diastolic blood pressure (SBP and DBP), plasma glucose, insulin, triglycerides, low and high density lipoprotein cholesterol (LDL and HDL), C-reactive protein (CRP), carotid intima media thickness (cIMT) and arterial distensibility, in adult women (Pearson et al., 2002; Pearson et al., 2003; Tehrani & Wong, 2015). Greater levels of each of these risk factors have been previously associated with higher risk of diabetes (Janiszewski, Janssen, & Ross, 2007; Mohammadifard et al., 2013), hypertension (Shihab et al., 2012), ischemic stroke (Rost et al., 2001), ischemic heart disease (Jeppesen, Hein, Suadicani, & Gyntelberg, 1998; Jeppesen, Hein, Suadicani, & Gyntelberg, 2000) and coronary heart disease (Flint et al., 2010), except for HDL whereby greater levels have been associated with lower risk of CVD (Rader & Hovingh, 2014). We also examined whether (i) observed associations were independent of SEP in childhood, (ii) whether they were mediated by SEP, BMI and smoking in adulthood, and (iii) whether they differed in women with high compared with low SEP in adulthood.

2. Methods

2.1. Study populations

The Avon Longitudinal Study of Parents and Children (ALSPAC) is a prospective birth cohort study from southwest England (full details in online supplement)(Boyd et al., 2012; Fraser et al., 2012). The study website contains details of all available data through a fully searchable data dictionary (www.bris.ac.uk/alspac/researchers/data-access/data-dictionary/). Ethical approval for the study was obtained from the ALSPAC Ethics and Law Committee and the Local Research Ethics Committees. Briefly, ALSPAC recruited 14 541 pregnant women with expected delivery dates between April 1, 1991 and December 31, 1992. Approximately 18 years after recruitment into the cohort (mean age 51 years), 4957 women attended a follow-up research clinic at which CVD risk factors were assessed (Fig. 1).

2.2. Assessing CVD risk factors

The following CVD risk factors were assessed at a research clinic at mean age 51 years: BMI; waist circumference; SBP, DBP; fasting plasma glucose, insulin, triglycerides, LDL, HDL and CRP; cIMT and arterial distensibility. Full assessment details of each CVD risk factor are provided in the online supplement.

2.3. Assessing adverse experiences in childhood

Exposure to psychosocial adversity in childhood (before age 17 years) was retrospectively reported in questionnaires administered at the time of enrolment into the study, throughout pregnancy and postnatally (from 12 weeks gestation to 33 months postnatally). *A priori*, we aimed to examine the same adversity measures as the Adverse Childhood Experiences (ACE) study (Felitti et al., 1998). However, ALSPAC measured many additional forms of adversity to this study. Thus, we decided to include as many types of psychosocial adversity as possible.

The following types of psychosocial adversity were considered: maternal lack of care, maternal overprotection, parental mental illness, household dysfunction, sexual abuse, and non-sexual abuse (physical and emotional abuse or neglect). Questions about maternal care and overprotection were based on a validated instrument for assessing maternal bonding (Parker, 1990). Maladaptive family functioning includes questions that assess the nature of the relationship between the participant's mother and father (i.e. whether the relationship was, for example, stable and predictable, affectionate, violent, respectful). Parental mental illness includes questions about depression, anxiety, schizophrenia or alcoholism in the participant's mother or father. Sexual abuse questions assessed experiences of various types of sexual abuse by different people (e.g. family members, friends or strangers). Non-sexual abuse includes questions that capture physical or emotional cruelty and neglect by either parent/guardian. It is important to note that

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