

Socioeconomic Circumstances in Childhood and Blood Pressure in Adulthood: The Cardiovascular Risk in Young Finns Study

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PURPOSE: Prospective evidence suggests an inverse association between socioeconomic circumstances in childhood and adolescence and blood pressure (BP) in adulthood, but uncertainty remains about whether this association is confounded by risk factors acting in utero, early infancy, and adulthood. The authors investigated this question in a population-based cohort of 2270 Finnish children and adolescents aged 3 to 18 years at study entry.

METHODS: Information about early socioeconomic circumstances, birth weight, and breast-feeding were requested from participants or their mothers in 1980 and 1983. Adulthood socioeconomic position, lifestyle factors, and systolic BP were measured at ages 24 to 39 years in 2001.

RESULTS: There was a graded association between lower parental socioeconomic position in childhood and adolescence and higher systolic BP in adulthood for men and women in different birth cohorts and across different socioeconomic indicators. This association was independent of adulthood socioeconomic position. Adjustment for risk factors, including birth weight, breast-feeding, adult body mass index, smoking, and alcohol consumption, had little effect on the association between parental socioeconomic position and systolic BP.

CONCLUSION: Early socioeconomic disadvantage seems to carry a long-lasting harmful effect on BP that is not counteracted by risk profiles in later life.

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KEY WORDS: Blood Pressure, Socioeconomic Factors, Social Class, Health Behaviour, Birth Weight, Body Mass Index, Breast-Feeding, Life Course.

INTRODUCTION

An association between socioeconomic disadvantage in childhood and adolescence and high blood pressure (BP) in adulthood was shown by several studies (1–5). Whether such disadvantage is associated with a long-lasting detrimental effect on BP is uncertain. Alternatively, early socioeconomic disadvantage may represent effects of adulthood socioeconomic disadvantage, a correlate of childhood circumstances (6). Other potential confounding effects originate from prenatal and early infancy factors (e.g., birth weight and breast-feeding) and adulthood lifestyle-related factors (such as body mass, smoking, and alcohol consumption). These factors are associated with both socioeconomic circumstances in childhood and adult BP (4, 7–10). The Cardiovascular Risk in Young Finns Study provided an

opportunity to examine whether socioeconomic disadvantage in childhood and adolescence is predictive of adult BP after accounting for several risk factors acting in utero, early infancy, and adulthood.

METHODS

Participants

The Cardiovascular Risk in Young Finns Study is an ongoing five-center follow-up study of atherosclerosis risk factors of Finnish children and adolescents (11, 12). The first cross-sectional survey was conducted in 1980. The original sample size was 4320 children and adolescents at 3, 6, 9, 12, 15, and 18 years of age. Individuals were chosen randomly from the national register. There were 3596 participants (83% of those invited) in 1980 (11). The first follow-up study was conducted in 1983. In 2001, the participants, who had then reached 24 to 39 years of age, were reexamined. The study was approved by local ethics committees.

Measures

Socioeconomic circumstances in childhood and adolescence were assessed in 1980 and indexed by two measures:

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Selected Abbreviation and Acronym

BP = blood pressure

parental occupational status (higher grade nonmanual, lower grade nonmanual, and manual) and household income (top quartile, two middle quartiles, and bottom quartile). Data for the parent with a higher occupational status were used. BP was measured by using a random zero sphygmomanometer (Hawksley & Sons Ltd, West Sussex, UK) in 2001 (12). BP was measured in a sitting position after at least 5 minutes of rest. As in previous prospective studies of early socioeconomic position (3–5), we focused on systolic BP. Korotkoffs first sound was recorded as systolic BP, and readings to the nearest even millimeters of mercury were performed at least three times on each participant. The average of three measurements of systolic BP was used in statistical analysis. Baseline screening in 1980 identified participants with heart disease or diabetes in childhood or adolescence.

Several covariates were assessed. The participant's socioeconomic position in 2001 was measured through occupational status (similarly categorized as parental occupational status) and education (three categories: academic studying at or graduated from a university; secondary education, but not academic; and comprehensive school, as the highest level of education). Birth weight (grams) and breast-feeding (yes/no) were reported by the mothers of participants in 1983. Participants also were asked to bring with them the booklet from the well-baby center in which birth weights are recorded. Data for adulthood body mass index (weight [kg]/height [m²] derived from physical measurements), smoking status (current smoker versus other), and alcohol consumption (units of alcohol per week) were collected in 2001. Other study variables were sex and age, as indicated from birth year.

Statistical Analysis

Mean systolic BP ($\pm$ SE) for categories of socioeconomic indicators in men and women and by birth cohort (1962 and 1965; 1968 and 1971; and 1974 and 1977) were calculated. Analysis of variance in which socioeconomic indicators were treated as continuous variables (eg. 1 = manual, 2 = lower grade nonmanual, and 3 = higher grade nonmanual) was used to estimate the trend between socioeconomic indicators and systolic BP. When there was no interaction with sex and birth cohort, trends were calculated for men and women combined and across birth cohorts. Adjustments were made for age and when men and women were combined, sex. To evaluate whether adulthood socioeconomic position explained the association between

parental socioeconomic position and BP, models including adulthood socioeconomic indicators were compared with models without these covariates. The contribution of birth weight, breast-feeding, adult body mass index, smoking, and alcohol consumption to the association between parental socioeconomic position and BP was studied in a corresponding way. All tests were performed with Statistical Analysis System (SAS Institute; Cary; NC).

RESULTS

Of 3596 participants at baseline, 2270 (63%) had measurement of systolic BP and at least one indicator parental socioeconomic position available. They did not differ from the population at baseline in terms of socioeconomic position and age group (discrepancy in any category of the variables did not exceed 2%), but women were slightly over represented (55% in the study cohort versus 51% in the baseline population). Based on earlier observations, lack of time, absence from the place of residences at the time, of examination, and unwillingness to participate have been main reasons for nonparticipation (12).

Table 1 lists study variables by sex and birth cohort. The proportion of parents with low socioeconomic position was greater in older birth cohorts than younger birth cohorts (all $p < 0.05$, except for parental household income in women, for which $p = 0.313$). No differences between birth cohorts were seen in indicators of participants' own socioeconomic position. Breast-feeding was more common in younger than older birth cohorts in girls ($p = 0.019$), but no such difference was seen for boys. Mean values for adult body mass index and systolic BP decreased over time in men (both $p < 0.001$) and women ($p = 0.001$ and $p = 0.079$). Birth weight, smoking status, and alcohol consumption did not differ between birth cohorts.

As listed in Table 2, there was a gradient-like association between indicators of parental socioeconomic position and systolic BP after adjustment for age, less favorable position was related to greater systolic BP. Adulthood socioeconomic position was not associated with BP. There was no strong evidence that these findings differ between men and women. Results remained unchanged after exclusion of 29 participants with heart disease or diabetes at baseline.

Table 3 lists mean values for systolic BP by level of parental socioeconomic position before and after adjustment for adulthood socioeconomic position. The adjustment had small or no effect on the gradient between parental socioeconomic position and systolic BP, which remained across birth cohorts and for both indicators of parental socioeconomic position.

Adjustment for factors acting before and after childhood minimally affected association between parental

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