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Childhood socioeconomic position and cognitive function in adulthood

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Background Risk of dementia and Alzheimer's disease is higher among adults with limited education, and the less educated perform poorer on cognitive function tests. This study determines whether the socioeconomic environment experienced during childhood has an impact on cognitive functioning in middle age.

Methods A population-based study of eastern Finnish men (n = 496) aged 58 and 64 for whom there were data on parent's socioeconomic position (SEP), their own education level, and performance on neuropsychological tests. Cognitive function was measured using the Trail Making Test, the Selective Reminding Test, the Verbal Fluency Test, the Visual Reproduction Test, and the Mini Mental State Exam.

Results We found a significant and graded association between parental SEP (combined as an index) and cognitive function both prior to and after adjustment for respondent's education. Those from more disadvantaged backgrounds exhibited the poorest performance. When the separate components of the parental SEP measure were used, father's occupation and mother's education were independently associated with the respondent's score for three and five of the tests, respectively (there was no association with father's education and mother's occupation). After adjustment for the respondent's education, father's occupation was no longer associated with respondent's test score, however, the results were essentially unchanged for mother's education.

Conclusions Higher SEP during childhood and greater educational attainment are both associated with cognitive function in adulthood, with mothers and fathers each contributing to their offspring's formative cognitive development and later life cognitive ability (albeit in different ways). Improvements in both parental socioeconomic circumstances and the educational attainment of their offspring could possibly enhance cognitive function and decrease risk of dementia later in life.

Keywords Socioeconomic factors, childhood, cognitive function, health inequalities

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Socioeconomic position (SEP) exerts a pervasive influence on many health outcomes across the life span,[1–3] including neurological conditions such as impaired cognitive function[4–7] dementia,[8,9] and Alzheimer's disease.[10,11] Typically, adults with limited educational attainment score poorest on neuropsychological tests and they are at increased risk of Alzheimer's disease and other dementias. While our knowledge and understanding of these relationships is limited, a number of possible causal biological mechanisms have been proposed.[12–14] Neurodegeneration associated with normal ageing may be reduced or slowed down as a consequence of physiological changes to the brain (e.g increased cortical thickness and dendritic branching) brought about by the stimulating effects of SEP measured by education; and/or education may improve communication networks among neurons, thus providing a reserve or buffer against the onset of cognitive decline. Animal studies provide some support for these processes.[15,16]

There is also evidence linking parental SEP and children's cognitive development.[17–22] Compared with children from higher SEP backgrounds, greater proportions of children from socioeconomically disadvantaged backgrounds manifest poor

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cognitive performance. The aetiology of this association is complex and multifaceted, with parental SEP believed to influence the child's cognitive development via economic and material factors, the quality and quantity of parent-child interactions, and through unspecified processes linked to maternal education. It is not known whether there are critical or sensitive periods in which the impact of SEP on neuroanatomical development is manifest. Considerable evidence has accumulated indicating heightened responsivity of neural development and function to stimulation that occurs early in life and some of these processes appear to be sensitive to particular periods of development.[23,24] Thus it is possible that the association between education and cognitive function and dementia in middle and old age partially reflects processes that occur early in life, prior to the completion of formal education. If this is the case then measures of parental SEP should be related to adult cognitive status. We undertake a partial test of this hypothesis by examining the relationship between childhood SEP and cognitive function in middle-aged adults with and without adjustment for the known association between obtained level of education and cognitive function. To our knowledge this is the first test of the hypothesis that childhood SEP is associated with adult cognitive function independent of achieved level of education.

Participants and Methods

We used data from the Kuopio Ischaemic Heart Disease Risk Factor Study, a continuing population-based investigation of heart disease risk factors, mortality, and other health-related outcomes among middle-aged men from the Kuopio region of Eastern Finland.[25] Between August 1986 and December 1989, 1516 men aged 42, 48, 54 and 60 years (82.6% of those eligible) were recruited for a baseline examination. Of this group, 1229 underwent an ultrasound examination, and 1038 of these (84.4%) were re-examined approximately 4 years later, between March 1991 and December 1993. Of the 191 not examined at follow-up, 107 refused, 52 died, had serious illness or had moved, and 32 could not be contacted.

At the re-examination the two oldest groups (n = 555), then aged 58 and 64 years, were invited to participate in a series of neuropsychological tests and 545 (98.1%) completed at least one test (the number who undertook each of the neuropsychological tests varied, see below). Participants were excluded from the current analyses if they reported having not lived with their father or mother (n = 31), or if they provided no information about their own or their parent's socioeconomic position (n = 18), leaving 496 men with complete data.

Measurement of socioeconomic position

Respondent's SEP was measured at baseline using self-reported educational attainment grouped into four categories: (1) did not complete elementary school (11.3%), (2) completed elementary school, or elementary plus some junior high school (42.7%), (3) completed elementary school plus vocational training (⩾1 year) (32.5%), and (4) junior high school or more (13.5%). Parental SEP was measured using self-reported education and occupation. Given that the parents of the study's participants were educated in the early 1900s few attained a high level, thus the education distribution for both fathers and mothers was skewed towards the lower levels. Parent's educational attainment was categorized as (1) did not complete primary school and (2) primary school or more. Parent's occupation pertained to their longest lasting principal vocation during the respondent's childhood and was coded as (1) upper white collar and professional, (2) lower white collar and skilled manual, and (3) unskilled manual.

In order to estimate the total impact of parental SEP on the respondent's cognitive function, we created a composite measure that combined father's and mother's education and occupation. First, father's education (2 levels) and occupation (3 levels) were cross-tabulated to produce a six-cell table, with each cell representing a different combination of father's socioeconomic characteristics. This cross-tabulation was subsequently re-coded as a single six-level variable, with each level representing a distinct SEP that ranged from 'low-low' to 'high-high'. This same process was repeated using the mother's education and occupation. The six-level socioeconomic variables for the father and mother were then cross-tabulated to produce a 36-cell table that was collapsed into four categories, with Father(low)Mother(low) as the bottom SEP category and Father(high)Mother(high) as the top. The former included fathers and mothers who were both poorly educated and worked in unskilled manual occupations whereas the latter contained fathers and mothers who were both better educated and employed in higher status occupations.

Measurement of cognitive function

Cognitive function was measured using five neuropsychological tests: the Trail Making Test,[26] the Selective Reminding Test,[27] the Verbal Fluency Test,[28] Russell's adaptation of the Visual Reproduction Test,[29] and the Mini Mental State Exam.[30] The tests were administered by interviewers trained in neuropsychological assessment. Each of the tests has been validated in the Finnish population.[31]

The Trail Making Test is a test of frontal lobe functioning as indicated by perceptual motor speed, visual searching and sequencing, and the ability to make alternating conceptual shifts.[32] The original version of the test consisted of two parts (A and B), however, a special version of Part B was developed for this population that required the participant to draw a line connecting numbers 1 to 13 with the names of each month in ascending sequence as quickly as possible.[33,34] Performance was judged in terms of the number of seconds required to complete the test.

The Selective Reminding Test examines storage, retention and retrieval of information from short- and long-term memory and learning ability. Participants were initially read ten unrelated words in approximately 20 seconds and asked to recall the entire list in any order. Participants were then read only those words that they failed to recall after the first reading and were again asked to recall the entire list of ten words. This procedure was repeated six times and the participant's score was the total number of words recalled correctly (potential maximum score of 60).

The Verbal Fluency Test is a test of language performance that assesses the participant's ability to spontaneously produce words under the restrictions of a limited letter category[32] and is also a test of frontal lobe functioning, particularly the left frontal lobe. Participants were asked to generate as many words as possible beginning with the letters P, A and S: 60 seconds was allocated for each letter. Different forms of the same word and proper names of people or places were not counted as correct. Performance was assessed by counting the number of words produced during the 3-minute period, with higher scores indicating better language facility.

The Visual Reproduction Test examines visual memory for non-representative figures (right temporal lobe functioning) and constructional ability. Participants were initially shown a single geometric figure for 10 seconds, after which it was removed from view: the participant was then required to draw the figure from memory. This procedure was repeated with a figure of greater complexity, and then for a third time, although on this occasion the participant was asked to draw two figures. Scoring was based on the degree to which the participant was able to correctly and accurately replicate the figures (potential maximum score of 21).

The Mini Mental State Exam has been widely used in both population-based and clinical research[35,36] to test for the presence of cognitive impairment and as a screening tool for dementia.[37] The test assesses orientation (10 items), registration (3 items), attention and calculation (5 items), recall (3 items) and language (9 items). A correct response to each item scores 1 (incorrect 0) which are summed to give a potential maximum score of 30. Higher scores indicate better cognitive function.

Of the 496 respondents included in this study's analyses, 30 (6.0%) refused to participate in one or more of these tests. The age ($\chi^2 = 0.13$, d.f. = 1, $P = 0.929$) and childhood SEP ($\chi^2 = 3.38$, d.f. = 3, $P = 0.337$) of this group were no different from the rest of the sample, however, they tended to be the least educated ($\chi^2 = 8.12$, d.f. = 3, $P = 0.043$).

Data analyses

We investigated the influence of childhood SEP on adult cognitive function using the General Linear Models procedure in SAS.[38] This procedure produces least-square estimated mean levels of cognitive function across categories of each socioeconomic indicator. Three sets of analyses were conducted. The first examined the association between respondent's education and cognitive function. The second used the four-level measure that combined parental education and occupation as a predictor. Respondent's age-adjusted mean score on the five tests for each level of parental SEP were examined with and without adjustment for respondent's education. The third stage of the analysis involved examining the independent association between each of the components of the parental SEP index and respondent's cognitive function, with and without adjustment for respondent's education.

Results

Table 1 shows the sample characteristics, and means and standard deviations for each of the neuropsychological tests.

Respondent's educational attainment and cognitive function

Table 2 shows the age-adjusted association between respondent's educational attainment and mean score on each test. There was a consistently graded relationship across all levels of cognitive function and education, with the least educated performing worst on all five tests and the most highly educated doing best.

Table 1 Characteristics of the study sample and descriptive statistics for each cognitive function measure

	No.	%
Respondent's age (years)		
58	253	51.0
64	243	49.0
Respondent's education		
Part of elementary school	56	11.3
Elementary school plus part junior high	212	42.7
Elementary school plus vocational	161	32.5
Junior high or more	67	13.5
Father's education		
Did not complete primary school	291	58.7
Primary school or more	205	41.3
Father's occupation		
Unskilled manual	181	36.5
Lower white collar and skilled manual	154	31.0
Upper white collar and professional	161	32.5
Mother's education		
Did not complete primary school	270	54.4
Primary school or more	226	45.6
Mother's occupation		
Unskilled manual	240	48.4
Lower white collar and skilled manual	204	41.1
Upper white collar and professional	52	10.5
Parent's socioeconomic position[a]		
Father(low)Mother(low)	238	48.0
Father(high)Mother(low)	32	6.5
Father(low)Mother(high)	53	10.7
Father(high)Mother(high)	173	34.9
Cognitive function		
Trail Making Test (seconds)	484	126.4 (66.7)[b]
Selective Reminding Test (no. words)	478	34.3 (8.3)
Verbal Fluency Test (no. words)	493	32.1 (12.9)
Visual Reproduction Test (no. correct)	496	11.2 (3.7)
Mini Mental State Exam (score)	495	27.0 (2.2)

[a] Father(low)Mother(low): where both parents attained a low education level and were employed in a low prestige occupation.

[b] Mean and standard deviation.

Parental socioeconomic position and respondent's cognitive functioning

Table 3 presents mean neuropsychological test scores for respondents from different childhood socioeconomic backgrounds. There was significant variation by parental SEP in age-adjusted cognitive function score for each of the five tests (model 1). Respondents whose father and mother were least educated, and employed in low skilled/low status occupations, performed worst, and those with more educated parents in skilled/high status occupations generally performed best. Importantly, adjustments for the respondent's own education (model 2) attenuated but did not eliminate the effect of parental SEP on cognitive function score. Scores on the Trail Making Test, the Selective Reminding Test, the Visual Reproduction Test and the Mini Mental State Exam varied significantly between the levels of the parental socioeconomic measure after accounting

Table 2 Respondent's education and cognitive function[a]

Respondent's education	Trail Making Test (seconds)	Selective Reminding Test (no. of words)	Verbal Fluency Test (no. of words)	Visual Reproduction Test (no. correct)	Mini Mental State Exam (score)
Part of elementary school	163.2 (146.9–179.6)	32.0 (29.9–34.1)	24.3 (21.3–27.3)	8.5 (7.6–9.4)	25.7 (25.1–26.2)
Elementary school plus part junior high	146.5 (138.4–154.6)	32.7 (31.6–33.7)	28.1 (26.6–29.6)	10.6 (10.1–11.0)	26.6 (26.3–26.9)
Elementary school plus vocational	107.0 (97.7–116.3)	34.7 (33.4–35.9)	34.2 (32.4–35.9)	11.9 (11.4–12.4)	27.3 (27.0–27.6)
Junior high or more	83.7 (69.4–98.0)	39.9 (38.0–41.9)	46.0 (43.3–48.7)	13.7 (12.9–14.5)	28.4 (27.9–28.9)
P-value[a]	0.0001	0.0001	0.0001	0.0001	0.0001
No. respondents	484	478	493	496	495

[a] Least square age-adjusted means and 95% confidence intervals.

[b] *P*-value (F-test) for the association between education and cognitive function adjusted for age.

Table 3 Parental socioeconomic position (SEP) and respondent's cognitive function score[a]

	Trail Making Test (seconds)		Selective Reminding Test (no. of words)		Verbal Fluency Test (no. of words)		Visual Reproduction Test (no. correct)		Mini Mental State Exam (score)	
Parental SEP	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Father(low) Mother(low)	145.8 (137.8–153.9)	136.8 (128.2–145.3)	32.4 (31.4–33.4)	33.7 (32.6–34.9)	28.9 (27.3–30.6)	32.3 (30.7–34.0)	10.3 (9.8–10.7)	10.7 (10.2–11.2)	26.5 (26.2–26.7)	26.7 (26.4–27.0)
Father(high) Mother(low)	127.9 (106.2–149.5)	137.0 (116.2–157.8)	34.6 (31.8–37.5)	34.5 (31.7–37.4)	34.8 (30.3–39.2)	33.8 (29.7–37.8)	11.5[b] (10.3–12.7)	11.0 (9.8–12.2)	27.1 (26.4–27.9)	26.9 (26.2–27.6)
Father(low) Mother(high)	109.2[b] (92.3–126.0)	106.4[b] (90.1–122.7)	35.8[b] (33.6–38.0)	36.5[b] (34.3–38.7)	34.7[b] (31.3–38.2)	36.1 (33.0–39.2)	11.9[b] (10.9–12.8)	11.8[b] (10.9–12.8)	27.5[b] (26.9–28.1)	27.5[b] (27.0–28.1)
Father(high) Mother(high)	105.9[b] (96.5–105.9)	113.1[b] (103.4–122.8)	36.3[b] (35.0–37.5)	35.9[b] (34.5–37.2)	35.1[b] (33.2–37.0)	33.3 (31.4–35.1)	12.2[b] (11.7–12.8)	11.6[b] (11.1–12.2)	27.5[b] (27.1–27.8)	27.2[c] (26.8–27.5)
P-value[d]	0.0001	0.0001	0.0001	0.03	0.0001	0.18	0.0001	0.03	0.0001	0.05
No. respondents	484		478		493		496		495	

[a] Least square means and 95% CI adjusted for respondent's age (model 1) and age and education (model 2).

[b] $P \leqslant 0.05$ for the comparison with 'Father(low)Mother(low).

[c] $P \leqslant 0.10$ for the comparison with 'Father(low)Mother(low).

[d] *P*-value (F-test) for the association between parental SEP and respondent's cognitive function score adjusted for the covariate(s).

for respondent's educational attainment, with those from the most disadvantaged backgrounds exhibiting the poorest performance.

Parent's occupation and education and respondent's cognitive functioning

Table 4 presents the respondent's mean scores for each neuropsychological test according to father's and mother's education level and occupational status. The results for model 1 show that father's occupation and mother's education were independently associated with respondent's cognitive function score for three and five of the tests, respectively. The direction of the association for each of these relationships was consistent: those respondents who performed best had fathers who were employed in upper white collar and professional occupations, or mothers who attained at least a primary school education. There was no independent association between father's education or mother's occupation and respondent's cognitive function score.

After adjusting for respondent's educational attainment (model 2), father's occupation was no longer associated with respondent's test score. The results, however, were essentially unchanged for mother's education. Thus mother's education level was significantly predictive of their sons' cognitive function score at 58 and 64 years of age after simultaneously adjusting for father's education and occupation, mother's occupation, and respondent's age and education.

Discussion

This is the first study to examine the separate impact of childhood and adult SEP on cognitive function in later life. Using a variety of neuropsychological tests, we found a consistent pattern of lower childhood SEP being associated with poorer adult cognitive function. While childhood SEP is strongly associated with achieved level of education in this cohort,[39] there is a residual effect of childhood SEP on adult cognition even after adjustment for the respondent's educational attainment, which itself is a strong predictor of cognitive function in these data. Thus there seems to be a long-lasting imprint of childhood socioeconomic conditions on adult cognitive performance. These results are consistent with a 'latency' model of development which sees certain environmental conditions and psychosocial events occurring early in life as having a lasting impact on later health and well-being irrespective of what is experienced during the intervening period.[40, 41] Interestingly, support for early life imprinting was not found in a previous study using the Kuopio data that examined childhood SEP and mortality.[42] The findings of this research suggested that socioeconomic conditions in childhood were not important determinants of health in adulthood, although, as was noted in the paper, this in itself was no basis for rejecting the notion that a person's formative years are important in terms of shaping and circumscribing health in later life. There were a number of socio-historical

Table 4 Components of parental socioeconomic position (SEP) and respondent's cognitive function score[a]

	Trail Making Test (seconds)		Selective Reminding Test (No. of words)		Verbal Fluency Test (No. of words)		Visual Reproduction Test (No. correct)		Mini Mental State Exam (score)	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Father's education										
Did not complete primary school	129.0 (119.2–138.7)	124.6 (114.7–134.4)	33.6 (32.3–34.9)	34.4 (33.1–35.8)	31.7 (29.8–33.7)	33.7 (31.8–35.6)	10.9 (10.3–11.4)	11.0 (10.4–11.5)	26.9 (26.6–27.3)	27.0 (26.7–27.4)
Primary school or more	125.0 (113.8–136.2)	130.5 (119.4–141.7)	34.4 (32.9–35.8)	34.3 (32.8–35.8)	32.9 (30.6–35.2)	32.2 (30.1–34.4)	11.3 (10.7–12.0)	10.9 (10.3–11.6)	27.0 (26.6–27.4)	26.8 (26.4–27.2)
P-value[b]	0.61	0.42	0.45	0.91	0.45	0.30	0.27	0.90	0.85	0.36
Father's occupation										
Unskilled manual	136.7 (124.1–149.2)	131.7 (119.3–144.1)	33.4 (31.7–35.0)	34.3 (32.6–35.9)	30.4 (27.9–32.9)	32.3 (30.0–34.7)	10.6 (9.9–11.3)	10.7 (10.0–11.4)	26.8 (26.3–27.2)	26.9 (26.4–27.3)
Lower white collar and skilled manual	129.8[c] (118.0–141.6)	129.7 (117.9–141.6)	33.6 (32.1–35.2)	34.3 (32.7–35.9)	31.6 (29.2–34.0)	32.8 (30.5–35.1)	10.9 (10.2–11.5)	10.8 (10.1–11.5)	26.8 (26.4–27.2)	26.8 (26.4–27.2)
Upper white collar and professional	114.5[d] (104.2–124.8)	121.2 (111.0–131.5)	34.9 (33.5–36.2)	34.6 (33.2–35.9)	35.0[c] (32.9–37.0)	33.7 (31.7–35.6)	11.8[d] (11.2–12.4)	11.3 (10.7–11.9)	27.3 (27.0–27.7)	27.1 (26.7–27.4)
P-value[b]	0.03	0.41	0.39	0.95	0.02	0.70	0.04	0.40	0.10	0.50
Mother's education										
Did not complete primary school	141.9 (131.2–152.6)	141.7 (131.0–152.3)	32.6 (31.2–34.0)	33.2 (31.8–34.7)	30.7 (28.5–32.8)	31.9 (29.8–33.9)	10.5 (9.9–11.1)	10.5 (9.9–11.1)	26.6 (26.2–27.0)	26.6 (26.2–27.0)
Primary school or more	112.1[c] (102.2–122.0)	113.5[c] (103.4–123.5)	35.3[c] (34.0–36.6)	35.5[c] (34.1–36.9)	34.0[c] (32.0–36.0)	34.0 (32.1–35.9)	11.7[c] (11.2–12.3)	11.4[c] (10.9–12.0)	27.3[c] (27.0–27.7)	27.2[c] (26.9–27.6)
P-value[b]	0.0001	0.0001	0.006	0.01	0.02	0.13	0.003	0.01	0.005	0.01
Mother's occupation										
Unskilled manual	124.9 (115.7–134.1)	124.1 (114.7–133.5)	34.3 (33.1–35.5)	34.9 (33.6–36.1)	31.7 (29.8–31.7)	32.7 (31.0–34.5)	11.4 (10.9–11.9)	11.4 (10.9–11.9)	26.9 (26.6–27.2)	26.9 (26.6–27.2)
Lower white collar and skilled manual	122.3 (113.4–131.3)	122.4 (113.5–131.4)	35.2 (34.0–36.4)	35.5 (34.3–36.7)	33.4 (31.6–35.2)	33.6 (31.9–35.3)	11.4 (10.9–11.9)	11.2 (10.7–11.7)	27.2 (26.9–27.5)	27.2 26.8–27.5)
Upper white collar and professional	133.8 (115.1–152.4)	136.1 (118.0–154.2)	32.4 (29.9–34.9)	32.8 (30.3–35.2)	32.0 (28.2–35.7)	32.5 (29.0–35.9)	10.5 (9.4–11.5)	10.3 (9.2–11.3)	26.8 (26.1–27.4)	26.7 (26.0–27.3)
P-value[b]	0.52	0.36	0.08	0.10	0.41	0.67	0.27	0.16	0.19	0.22
No. respondents	484		478		493		496		495	

[a] Least square means and 95% CI simultaneously adjusted for age, parental education and occupation (model 1) plus respondent's attained education (model 2).

[b] *P*-value (F-test) for the association between parental SEP indicator and respondent's cognitive function score adjusted for the covariate(s).

[c] $P \leqslant 0.10$ for the comparison with the low SEP group.

[d] $P \leqslant 0.05$ for the comparison with the low SEP group.

events unique to Finland when these men were children and growing up that may have contributed to the finding of no association between childhood SEP and mortality (e.g. large-scale relocation and economic devastation as a consequence of the 1939–1945 war, rapid post-war economic development). Moreover, there are now many other studies that clearly show that SEP in childhood is an important factor in adult health.[43–47]

When the separate aspects of childhood SEP were examined, we found that mother's education and father's occupation made a significant, independent contribution to their son's cognitive function. Test performance was better among those who had a more highly educated mother, or a father who was employed in an upper white collar or professional occupation. After adjustment for the respondent's own educational attainment, only mother's education level remained significantly related with cognitive function. This result seems to suggest two things. First, that the activities and roles engaged in by mothers during the childhood of these men played an important role in the cognitive development of their offspring that endured well into the fifth and sixth decade. Second, while father's occupation was also important in terms of their children's later life cognitive function, its impact was more indirect via its contribution to the child's educational attainment (Figure 1). Thus mother's education and father's occupation, and their socioeconomic context more generally, each contribute to children's cognitive development, albeit in seemingly independent and different ways. Similar findings have emerged from studies examining the determinants of child health, development, and academic achievement.[48,49]

Several issues should be considered when interpreting this pattern of results. First, it is possible that the modest differences in cognitive function scores across the levels of parental SEP after adjustment for respondent's education were due in part to residual confounding related to inadequate measurement of the quality of education. Second, while there are graded effects of childhood SEP, the differences are modest. It is possible that

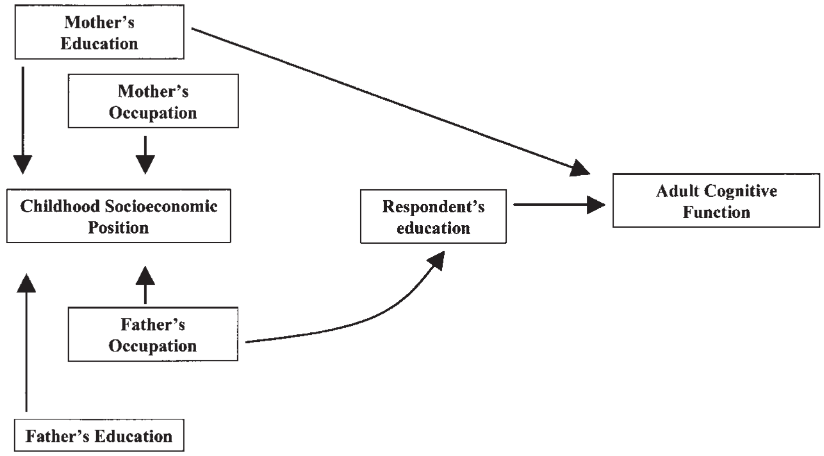

Figure 1 Pathways linking parental education and occupation and adult cognitive functioning in the Kuopio Ischaemic Heart Disease Risk Factor study

these modest differences may become more meaningful as the respondents enter older ages. Third, we need to note that the lack of association between mother's occupation and their child's cognitive function may reflect difficulties in the classification of women's occupations;[50] a problem compounded in this study by the need to classify respondent's mothers based on occupations they held during the 1920s and 1930s. However, it was clear from an analysis of mother's occupation and education (not shown) that there is an association between these indicators of maternal SEP.

The results of this study raise a number of questions for future research. While parental education and occupation seem important, we know little about the differences they make in the day-to-day childhood lives of these respondents—a problem that is not unique to this study.[51] The differential effects of maternal and paternal characteristics are also of interest. Without detailed information about the nature and allocation of parenting tasks and interactions between parents and their child when these respondents were growing up, we can do little but fall back on current patterns and stereotypes. Did more highly educated mothers of Finnish boys born in 1927–1935 read to their children more, speak more complex sentences, or engage more in other informal teaching than less well-educated mothers or than the boys' fathers?[52,53] What are the social and economic processes that led to children of parents with higher occupational status completing a greater number of years of education? The answers to these questions are critical if we are to understand why maternal and paternal characteristics are related to adult cognitive status. Understanding the behavioural and pathophysiological pathways that link childhood exposures and adult outcome is also important.[39,54,55] In this cohort of men in an area of historically high rates of coronary heart disease, there is a strong association between childhood SEP and risk factors for coronary heart disease, and between extent of carotid atherosclerosis and cognitive function.[39,56] Thus it is possible that the relationship between childhood SEP and adult cognitive function is mediated by higher levels of risk factors and consequently greater atherosclerotic vascular disease, all beginning early in life. Similarly, low childhood SEP and its association with increased vascular disease may potentiate the impact of genetic determinants of cognitive function such as the apo-E4 genotype.[57]

Whatever the social, behavioural, and pathophysiological mechanisms, the current findings, if replicated in other studies, further emphasize the importance of childhood socioeconomic conditions for adult health. As childhood SEP reflects the status of parents, these results suggest that investments in education and skilled and professional employment opportunities, in so far as they benefit the SEP of children, can potentially reduce future levels of impaired cognitive function, and perhaps dementia in elderly populations.

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KEY MESSAGES

- Socioeconomic conditions during childhood have an impact on adult cognitive functioning, independent of educational attainment.
- While many aspects of childhood socioeconomic conditions influence adult cognitive functioning, maternal education and paternal occupation are critical determinants.
- This study adds to a growing literature indicating that early life socioeconomic conditions may contribute to adult health and well-being.

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