Social Circumstances and Education: Life Course Origins of Social Inequalities in Metabolic Risk in a Prospective National Birth Cohort

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Objectives. We investigated the relative importance of education and childhood and adult social class in the risk of metabolic syndrome.

Methods. We conducted a prospective birth cohort study of 1311 men and 1318 women aged 53 years in 1999, when metabolic syndrome components were measured. Logistic regression analyses were used to calculate relative index of inequality estimates.

Results. Relative to men and women at the highest education levels, men (odds ratio [OR] = 2.0; 95% confidence interval [CI] = 1.2, 3.2) and women (OR = 2.7; 95% CI = 1.5, 4.6) with the least education were at twice the risk or more of having the metabolic syndrome. Adjustment for childhood and adult social class strengthened this result among men and weakened it among women. Childhood social class was independently associated with the metabolic syndrome in women (OR = 2.0; 95% CI = 1.1, 3.6) but not in men (OR = 1.1; 95% CI = 0.7, 1.8). Associations between adult social class and the metabolic syndrome or its components were largely accounted for by childhood socioeconomic measures.

Conclusions. Educational differences should be considered in the design of interventions aimed at reducing the burden of the metabolic syndrome in socially disadvantaged groups. (*Am J Public Health.* 2006;96:2216–2221. doi:10.2105/AJPH.2004.049429)

The prevalence of cardiovascular risk factor clustering known as "the metabolic syndrome" has risen rapidly in association with the global obesity epidemic.[1,2] Clustering of adverse levels of cardiovascular risk factors has been demonstrated among children, and early levels of risk factors are known to persist over time.[3] This evidence suggests that risks acquired early track into adulthood, but the origins of such risks remain unclear.

Social inequalities affect children's lives and health, and there is now increasing evidence that the social gradient in cardiovascular risk may begin at the early stages of life. Previous studies have compared the contributions of childhood and adult social class to cardiovascular risk in men,[4,5] women,[6] or both.[7] These studies have shown that there is an independent influence of childhood social class on several cardiovascular risk factors that are components of the metabolic syndrome, as defined by the National Cholesterol Education Program's Adult Treatment Panel III (ATPIII).[8] Such findings support the hypothesis that early disadvantage may have long-term effects on adult health, specifically on metabolic disturbances influencing atherosclerosis and cardiovascular disease risk.[9]

Educational achievements play an important role in the continuity between child and adult socioeconomic position,[10] and educational inequalities in the metabolic syndrome and its components have been demonstrated.[11–13] However, no previous study has investigated the relative importance of education versus childhood and adult social class in the risk of the metabolic syndrome, even though such knowledge is essential in designing successful interventions aimed at reducing social inequalities in health. Using data from a national birth cohort investigation in which participants were followed until middle age, we conducted the first study, to our knowledge, including prospective information on education and childhood and adult social class in an attempt to examine their separate contributions to the metabolic syndrome in men and women.

METHODS

Participants

The Medical Research Council National Survey of Health and Development is a prospective birth cohort study of 2547 women and 2815 men. The class-stratified sample was initially composed of all infants born during the first week of March 1946 in England, Scotland, and Wales. Follow-ups included 22 contacts with the entire cohort between birth and 53 years of age, when 3035 participants (1563 women and 1472 men) provided information. The majority of the participants (n=2989) were interviewed and assessed at their homes by trained research nurses using a standardized protocol. Participation rates were 70.4% among survivors who were still residents of England, Wales, or Scotland and 89.6% among those for whom contact was attempted.[14]

Avoidable loss to follow-up through participant refusal or inability to locate participants was more common among those with adverse socioeconomic circumstances in childhood or young adulthood and those with low educational attainment.[15,16] After 53 years of follow-up in 1999, participants were still reasonably representative of residents of England, Wales, and Scotland of the same or similar ages, taking into account the fact that immigration trends and exclusion of multiple births and infants born outside wedlock prohibited the sample from being completely representative.[16]

Measurements

Clinical measurements. When participants were 53 years of age, their waist circumference was measured according to a standardized protocol at a point midway between the costal margin and the iliac crest and in line with the mid-axilla. Peripheral blood pressure was measured twice after 5 minutes of rest, with the participant sitting (as described previously[14]). The second reading was used in the analysis.

High-density lipoprotein (HDL) cholesterol and triglyceride levels were obtained from nonfasting venous blood samples taken by nurses during the home visits. Total cholesterol was measured via the enzymatic cholesterol oxidase phenol 4-aminoantipyrine peroxidase method. Phosphotungstic Mg^{2+} reagents were used for precipitation in measurement of HDL cholesterol; triglyceride levels were measured with a glycerol/kinase peroxidase-linked reaction of glycerol liberated enzymatically from triglycerides. These measurements were made with a Bayer DAX-72 (Bayer Diagnostics, Basingstoke, England). Samples were analyzed for glycated hemoglobin (HbA1c) with the Tosoh A1C 2.2 Plus Analyzer (Tosoh Corp, Tokyo, Japan) via high-performance liquid chromatography.

Medication. During the interview at age 53 years, the research nurses recorded any information on participants' current medications. This information was coded according to the British National Formulary (BNF), and participants who were taking BNF-classified antihypertensive medications (diuretics, beta blockers, drugs affecting the renin–angiotensin system, and calcium-channel blockers) or BNF-classified diabetes medications were distinguished from those not taking these drugs. Overall, 13.8% of men and 15.5% of women were being treated for hypertension, corresponding closely to values observed in the Health Survey for England in this age group.[17] In addition, 2.2% of men and 2.0% of women were taking antidiabetic medication.

Metabolic syndrome and its components. We defined the metabolic syndrome and its components using cut points recommended by ATPIII[8]; we modified this definition to include HbA1c instead of fasting plasma glucose, data for which were unavailable. Participants were classified as having the metabolic syndrome if they met any 3 of the following criteria: waist circumference above 102 cm (40 in; among men) or 88 cm (among women), triglyceride level of 1.7 mmol/L (150 mg/dL) or higher, HDL cholesterol level below 1.036 mmol/L (among men) or 1.295 mmol/L (among women), blood pressure level of 130/85 mm Hg or higher, or HbA1c level in the top gender-specific quarter of the distribution (greater than 5.8% among both men and women). Participants using antihypertensive and antidiabetic medications were considered as meeting high blood pressure and HbA1c criteria, respectively.[18]

Childhood and adult social class. Social class was based on occupation according to the United Kingdom Registrar General's Classification. Six categories were used: professional, intermediate, skilled nonmanual, skilled manual, semiskilled, and unskilled. Childhood social class was based on father's occupation when participants were 4 years old. If this information was unavailable, father's occupation when participants were 11 years (n=125) or 15 years (n=48) of age was used instead. Adult social class was based on cohort members' own occupation at the age of 53 years. If this information was unavailable, their occupation when they were 43 years (n=513) or 36 years (n=185) of age was used instead.

Education. Cohort members' highest educational or training qualifications achieved by the age of 26 years, classified according to the Burnham scale,[19] were grouped into the following categories: (1) higher education/postsecondary college or university degree (degree level or equivalent), (2) advanced secondary education/university entrance qualification (or their training equivalents), (3) ordinary secondary education/junior high school qualifications (or their training equivalents), and (4) below ordinary secondary qualifications.

Statistical Analysis

We assessed differences in the distribution of continuous and categorical variables between men and women using *t* tests and χ^2 tests, respectively. In addition, we calculated relative indexes of inequality (RIIs), separately for men and women, for childhood social class, educational group, and adult social class.[20] Including information on individuals in all socioeconomic groups and not only those at the extremes, RIIs take into account changing socioeconomic distributions over time and different distributions among men and women.[21]

To calculate the RII for each of the 3 socioeconomic variables, we assigned each category a value between 0 and 1 according to the percentage of participants in the sample above the midpoint of that category (e.g., if 7% of men were in the highest social class and 16% were in the second highest class, men in the first category would be assigned a value of 0.035 [0.07/2], and men in the second category would be assigned a value of 0.15 [0.07+0.16/2]). The values 0 and 1 hence represented the highest and lowest social positions, and fitting this variable as a continuous explanatory variable in a logistic regression model provided the RII, which represented a comparison of the predicted odds at the lowest position in the social hierarchy (socioeconomic variable=1) with the predicted odds at the highest position (socioeconomic variable=0), including exposure information on all participants.

Initially, we calculated unadjusted RIIs for the effects of childhood social class, education, and adult social class on the metabolic syndrome and its components among men and women. We then conducted fully adjusted analyses simultaneously including all 3 explanatory variables. Tests for interaction (Wald tests) were carried out, separately for each exposure variable, to investigate whether the effects of childhood social class, education, and adult social class on the metabolic syndrome and its components differed according to gender. We fit these models including both men and women and, in addition to the interaction term, the main effects of the socioeconomic variable and an indicator variable representing gender.

Analyses were restricted to participants with complete information on education, childhood and adult social class, and at least 1 component of the metabolic syndrome. We used χ^2 tests to investigate whether the prevalence of metabolic syndrome components differed between participants with and without complete information on the explanatory variables.

RESULTS

The study population (n=2629) included 1311 men and 1318 women with information on all 3 social measures and at least 1 component of the metabolic syndrome. Table 1 shows that men were more likely than women to have unfavorable risk factor levels.

TABLE 1—Characteristics of Participants in the Medical Research Council National Survey of Health and Development: 1946 Birth Cohort, England, Scotland, and Wales

	Men		Women		
	No.	Mean (SD) or %	No.	Mean (SD) or %	P
Mean systolic blood pressure, mm Hg	1293	140.0 (19.7)	1278	132.6 (19.4)	<.001
Mean diastolic blood pressure, mm Hg	1293	87.2 (12.2)	1278	81.9 (11.6)	<.001
Mean HbA1c, %	1160	5.7 (1.1)	1131	5.7 (1.1)	.6
Mean triglyceride level, mmol/L	1147	2.5 (1.8)	1127	1.8 (1.7)	<.001
Mean HDL cholesterol level, mmol/L	1034	1.5 (1.5)	1090	1.8 (1.3)	<.001
Mean waist circumference, cm	1304	97.7 (10.8)	1309	85.6 (12.8)	<.001
Father's social class	1311		1318		.9
Professional	76	5.8	84	6.4	
Intermediate	231	17.6	227	17.2	
Skilled nonmanual	245	18.7	258	19.6	
Skilled manual	389	29.7	398	30.2	
Semiskilled	282	21.5	270	20.5	
Unskilled	88	6.7	81	6.1	
Educational level	1311		1318		<.001
Higher education	197	15.0	71	5.4	
Advanced secondary	370	28.2	310	23.5	
Ordinary secondary	194	14.8	338	25.6	
No academic qualifications	550	42.0	599	45.4	
Adult social class	1311		1318		<.001
Professional	164	12.5	25	1.9	
Intermediate	510	38.9	465	35.3	
Skilled nonmanual	129	9.8	456	34.6	
Skilled manual	368	28.1	92	7.0	
Semiskilled	109	8.3	199	15.1	
Unskilled	31	2.4	81	6.1	
Hypertension	1298	76.3	1291	60.4	<.001
High waist circumference	1304	31.2	1310	35.6	.02
High triglyceride level	1147	64.6	1127	40.2	<.001
Low HDL cholesterol level	1031	10.2	1090	9.9	.9
High HbA1c	1165	27.6	1134	26.5	.6
Metabolic syndrome	1010	33.4	1056	23.6	<.001

Note. HbA1c = glycated hemoglobin; HDL = high-density lipoprotein.

Among participants with complete information on all components (79% of the sample), metabolic syndrome prevalences were 33.4% for men and 23.6% for women. Although the childhood social class distribution did not vary between male and female participants (P=.9), significant differences were observed for educational groups and adulthood social classes (P≤.001 for both). Men were more likely than women to have higher educational degrees and to be members of the highest social classes.

Table 2 shows that education was significantly associated with the metabolic syndrome in both men and women, with those at the lowest educational levels having at least twice the odds of those at the highest educational levels of having the metabolic syndrome (odds ratio [OR]=2.0; 95% confidence interval [CI]=1.2, 3.2, among men and OR=2.7; 95% CI=1.5, 4.6, among women). Adjustment for childhood and adult social class strengthened this association in men (OR=2.5; 95% CI=1.3, 4.5) but resulted in an attenuation in women (OR=1.7; 95% CI= 0.9, 3.3).

Despite the effect of education on risk factor "clustering," associations with individual metabolic syndrome components were attenuated and lost statistical significance after adjustments, with the exception of high waist circumference in men (OR=2.5; 95% CI= 1.4, 4.3). Differences in the effects of education on the metabolic syndrome or its components between men and women were not statistically significant (interaction P≥.1 in all cases). Additional analyses showed significant educational inequalities in the metabolic syndrome among men and women combined and after adjustment for gender, childhood social class, and adult social class (OR=2.0; 95% CI=1.3, 3.2; data not shown).

Childhood social class showed an independent and significant effect on the metabolic syndrome among women (OR=2.0; 95% CI=1.1, 3.6); however, no such association was observed among men (OR=1.1; 95% CI=0.7, 1.8). Differences in the association between childhood social class and the metabolic syndrome between men and women were of borderline significance (interaction P=.05) and reflected stronger associations with HDL cholesterol and waist circumference among women than among men (interaction P=.05 and .08, respectively). Relative to their more advantaged counterparts, women from the lowest childhood social classes were at more than twice the risk of having low HDL cholesterol (OR=2.5; 95% CI=1.1, 5.7) and almost twice the risk of having a high waist circumference (OR=1.8; 95% CI=1.1, 2.8) after education and adult social class had been taken into account. The corresponding odds ratios among men were 1.2 (95% CI=0.5, 2.6) and 1.1 (95% CI=0.7, 1.7).

Adult social class was not associated with the metabolic syndrome in men (OR=1.1; 95% CI=0.7, 1.8); associations with hypertension (OR=1.6; 95% CI=1.0, 2.5) and high HbA1c (OR=2.3; 95% CI=1.4, 3.7) were reduced and nonsignificant after adjustments. Among women, the effect of adult social class on the metabolic syndrome (OR=2.0; 95% CI=1.2, 3.3) disappeared after adjustments (OR=1.3; 95% CI=0.7, 2.3); however, independent of their education and childhood social class, women in the

TABLE 2—Odds Ratios Comparing the Bottom and Top of the Social Class and Educational Hierarchies (Relative Indexes of Inequality): Medical Research Council National Survey of Health and Development, 1946 Birth Cohort, England, Scotland, and Wales

	Hypertension	High Waist Circumference	High Triglyceride Level	Low HDL Cholesterol Level	High HbA1c Level	Metabolic Syndrome
Men						
No.	1298	1304	1147	1031	1165	1010
Childhood social class						
Unadjusted model	2.2 (1.4, 3.4)	1.4 (0.9, 2.1)	1.5 (1.0, 2.4)	1.2 (0.6, 2.3)	1.6 (1.0, 2.5)	1.3 (0.9, 2.1)
Fully adjusted model	1.8 (1.1, 2.9)	1.1 (0.7, 1.7)	1.4 (0.9, 2.2)	1.2 (0.5, 2.6)	1.1 (0.7.1.8)	1.1 (0.7, 1.8)
Education						
Unadjusted model	2.1 (1.3, 3.4)	2.2 (1.4, 3.4)	1.6 (1.0, 2.4)	1.1 (0.5, 2.3)	2.4 (1.5, 3.8)	2.0 (1.2, 3.2)
Fully adjusted model	1.7 (0.9, 3.2)	2.5 (1.4, 4.3)	1.5 (0.8, 2.5)	1.1 (0.4, 2.9)	1.7 (1.0, 3.2)	2.5 (1.3, 4.5)
Adult social class						
Unadjusted model	1.6 (1.0, 2.5)	1.3 (0.9, 2.0)	1.2 (0.8, 1.9)	0.9 (0.4, 2.0)	2.3 (1.4, 3.7)	1.1 (0.7, 1.8)
Fully adjusted model	0.9 (0.5, 1.7)	0.8 (0.5, 1.3)	0.9 (0.5, 1.6)	0.8 (0.3, 2.1)	1.7 (0.9, 3.0)	0.7 (0.4, 1.2)
Women						
No.	1291	1309	1127	1090	1134	1056
Childhood social class						
Unadjusted model	1.8 (1.2, 2.6)	2.4 (1.6, 3.5)	1.7 (1.1, 2.6)	3.1 (1.5, 6.4)	1.2 (0.8, 2.0)	2.7 (1.6, 4.5)
Fully adjusted model	1.6 (1.0, 2.5)	1.8 (1.1, 2.8)	1.4 (0.9, 2.3)	2.5 (1.1, 5.7)	0.8 (0.5, 1.4)	2.0 (1.1, 3.6)
Education						
Unadjusted model	1.4 (1.0, 2.2)	2.3 (1.5, 3.6)	1.8 (1.1, 2.8)	2.6 (1.2, 5.6)	2.0 (1.2, 3.3)	2.7 (1.5, 4.6)
Fully adjusted model	0.8 (0.5, 1.3)	1.4 (0.8, 2.4)	1.4 (0.8, 2.3)	1.8 (0.7, 4.6)	1.8 (1.0, 3.2)	1.7 (0.9, 3.3)
Adult social class						
Unadjusted model	2.2 (1.5, 3.3)	2.2 (1.5, 3.3)	1.6 (1.0, 2.4)	1.5 (0.7, 3.0)	1.9 (1.2, 3.0)	2.0 (1.2, 3.3)
Fully adjusted model	2.2 (1.4, 3.4)	1.6 (1.0, 2.6)	1.2 (0.8, 2.0)	0.9 (0.4, 1.9)	1.5 (0.9, 2.7)	1.3 (0.7, 2.3)

Note. HDL = high-density lipoprotein; HbA1c = glycated hemoglobin. Values in parentheses are confidence intervals.

lowest adult social class were significantly more likely than those in the highest class to have hypertension (OR=2.2; 95% CI=1.4, 3.4) and high waist circumferences (OR=1.6; 95% CI=1.0, 2.6). Although these results were suggestive of a stronger effect of adult social class among women, differences between men and women were of borderline significance for waist circumference only (interaction *P*=.08).

The prevalence of hypertension, high triglyceride levels, low HDL cholesterol levels, and high HbA1c values did not differ significantly between participants who had complete information on all 3 explanatory variables and those who did not have complete information (data not shown). However, the prevalence of high waist circumference was lower among men and women included in the study than among those not included (33% vs 41%).

DISCUSSION

In this prospective birth cohort study of middle-aged men and women, prevalences of the metabolic syndrome, according to a modified ATPIII definition, were 33% among men and 24% among women, comparable to estimates from the US population as a whole when standard diagnostic criteria are applied.[18] Educational inequalities in the metabolic syndrome were similar in men and women, with those who were least educated having twice the odds of those who were most educated of having the metabolic syndrome after childhood and adult social class had been taken into account.

A recent study also showed that educational differences in the metabolic syndrome were of similar magnitude among men and women according to either ATPIII or World Health Organization diagnostic criteria.[13] We have confirmed these findings and extended previous research by showing that educational inequalities in the metabolic syndrome are independent of childhood and adult social position. Results from a French study suggested that education may play slightly more of a role in the development of the metabolic syndrome among women; however, the same study confirmed strong significant associations in both men and women.[12]

Among men, education was the only variable significantly associated with the metabolic syndrome, either before or after adjustments had been made. Our results provide evidence of greater inequalities in terms of childhood social class among women than among men; significant associations with the metabolic syndrome, high waist circumference, and low HDL cholesterol levels were observed before and after adjustments, along with gender interactions of borderline significance for these associations. Similar to our results, previous studies have shown that childhood social class influences dyslipidemia and high waist circumference in women independent of their adult social class.[6,7] In our study, these associations persisted after further adjustment for educational differences.

Although the differences in the effects of childhood social class between men and women revealed in this study potentially represent chance findings of the subgroup analyses, they may also reflect a truly greater importance of early disadvantage in the women in this cohort. It remains unclear whether biological differences between men and women play a part; it seems more likely that gender differences in access to educational and employment opportunities among women born after the Second World War are important. In this study, the childhood social class distribution did not vary between men and women. However, differences in educational attainment and adult social class were evident, with women being less likely than men to have higher educational degrees or belong to the highest adult social classes.

Thus, in comparison with men, women's limited upward social mobility through education may have led to their childhood social class playing a greater role in their life course socioeconomic positions, including health-related behaviors and psychosocial and material conditions, consequently leading to inequalities in health outcomes. Limited supporting evidence comes from a previous study that investigated factors influencing a central metabolic syndrome score derived from a principal components analysis; results showed that a greater proportion of the variance of the score was explained by infancy and childhood conditions in women than in men, whereas the contributions of adult socioeconomic position and lifestyle were similar.[22]

The effects of adult social class on the metabolic syndrome or its components were largely accounted for by childhood social class, with the exception of hypertension and waist circumference in women. The significant unadjusted association found here between women's adult social class and the metabolic syndrome was observed in another recent study as well. However, unlike our findings, a similar association—although slightly weaker—was also seen in men.[12] Brunner et al. reported significant associations between adult employment grade and metabolic risk factor clustering among male and female civil service workers in London.[23] These earlier studies did not account for the influence of other indicators of socioeconomic position, and thus, the relative importance of adult social class was difficult to assess.

In the present study, adult social class showed the strongest influence on hypertension among women, and this result was not observed in an earlier investigation of postmenopausal women[6] or among women from an occupational cohort of civil servants.[7] Unlike the results obtained here, previous studies also revealed associations between adult social class and high blood pressure in men after adjustment for childhood social class.[4,5,7] However, none of the associations of education, childhood social class, and adult social class with hypertension observed here differed significantly between men and women, and thus, results from these subgroup analyses should be viewed with caution.

In an attempt to investigate the timing and potential mechanisms by which social inequalities may affect metabolic risk, we investigated the relative roles of education and childhood and adult social class in metabolic syndrome risk. The correlation and temporal ordering of these different measures of social position throughout the life course should be considered in interpreting our findings.

The attenuation of the effects of adult social class after adjustment for the more distal influences of childhood social class and education does not imply that adult social position is not important in terms of adult health. Rather, it indicates that the greater metabolic risk of those in lower adult social classes partly stems from the influence of early and continuing disadvantage throughout the life course on adult social position and health. This circumstance was particularly observed among the women in our cohort and is suggestive of early origins of inequalities in health. Further evidence of the long-term effects of early inequalities was also found in the form of an independent influence of women's childhood social class on the metabolic syndrome.

It is difficult to make inferences about independent or causal associations with data from observational studies, and educational attainment and occupational class may both reflect more general aspects of adult socioeconomic position rather than representing distinct and specific influences on metabolic risk. The degree to which each of the socioeconomic variables assessed here captured behaviors and circumstances associated with the metabolic syndrome may have differed between men and women and thus contributed to some of the gender differences observed in this study.

Several limitations of this prospective study should be noted. For example, blood samples were taken from participants in their own homes, and results were based on nonfasting values. Although interpretation of HDL cholesterol levels is appropriate for nonfasting testing opportunities,[8] with several studies confirming that nonfasting values are acceptable for screening purposes and guiding primary prevention treatment decisions,[24,25] this is not the case for triglyceride levels. Hence, associations between the social variables assessed here and triglyceride levels may be subject to bias and should be treated with caution.

Although it is not part of the original ATPIII metabolic syndrome definition and is not a standard measure of diabetes or insulin resistance according to World Health Organization criteria,[8,26] glycated hemoglobin was used as a measure of glucose metabolism. However, it is a reliable estimate of usual glycemia over the preceding 6 to 12 weeks and has been shown to predict mortality continuously across the entire population distribution in people without diabetes.[27,28] Sensitivity analyses revealed that results were essentially unchanged when the top quintile (HbA1c above 5.9%), rather than quartile, was used as the cutoff for defining the adverse group (results not shown).

Whereas we found that adult social class showed stronger associations than childhood social class with HbA1c, Lawlor et al.[6] obtained the opposite result when the homoeostasis assessment model was used as an indicator of insulin resistance. Other studies involving the use of an oral glucose tolerance test[7] or blood glucose[4] showed no significant influence of childhood social class. These discrepancies demonstrate that studies investigating different aspects of glucose metabolism are difficult to compare, and the lack of information on fasting plasma glucose in the present study contributes to the problem.

Survivor bias is unlikely to have had a large affect on our results, in that only 4.8% of the cohort members died in adulthood.[29] The risk of potentially avoidable loss of participants in this study (through refusal or inability to trace) was greater among those from less advantaged social positions before the age of 53 years.[16] However, we have no reason to believe that these participants differed in terms of metabolic syndrome components from those of similarly disadvantaged backgrounds who were examined at 53 years of age. With the exception of waist circumference, the prevalence of the metabolic syndrome and its components in participants examined at the age of 53 years did not differ significantly between those with complete information on all 3 explanatory variables and those without complete information.

Finally, it should be noted that the intragenerational and intergenerational social mobility of the post–World War II period, for our cohort's generation in particular, was high in comparison with other cohorts.[30] Our results may therefore not apply to populations with different social distributions and mobility patterns.

Educational inequalities in the metabolic syndrome were similar among men and women and independent of earlier and later social position. Differences in access to and quality of education seem essential for understanding inequalities in the metabolic syndrome, and these differences should be considered in the design of interventions and implementation of policies aimed at reducing the burden of this rapidly growing public health problem in socially disadvantaged groups. Consideration of childhood disadvantage among women and continuing disadvantage through limited educational opportunities among both men and women may advance our understanding of the timing and nature of exposures underlying social inequalities in the metabolic syndrome. ■

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Contributors

All of the authors contributed to interpreting the analyses and to writing and revising the article. C. Langenberg developed the study aim and wrote the article. C. Langenberg and R. Hardy conducted the statistical analyses.

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Human Participation Protection

This study was approved by the multicentre research ethics committee. Cohort members provided written informed consent for all aspects of the data collection procedure.

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