Influence of Life Course Socioeconomic Position on Older Women's Health Behaviors: Findings From the British Women's Heart and Health Study

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Objectives. We examined the association between health behaviors and socioeconomic status (SES) in childhood and adult life.

Methods. Self-reported diet, smoking, and physical activity were determined among 3523 women aged 60 to 79 years recruited from general practices in 23 British towns from 1999 through 2001.

Results. The most affluent women reported eating more fruit, vegetables, chicken, and fish and less red or processed meat than did less affluent women. Affluent women were less likely to smoke and more likely to exercise. Life course SES did not influence the types of fat, bread, and milk consumed. Adult SES predicted consumption of all foods considered and predicted smoking and physical activity habits independently of childhood SES. Childhood SES predicted fruit and vegetable consumption independently of adult SES and, to a lesser extent, predicted physical activity. Downward social mobility over the life course was associated with poorer diets and reduced physical activity.

Conclusions. Among older women, healthful eating and physical activity were associated with both current and childhood SES. Interventions designed to improve social inequalities in health behaviors should be applied during both childhood and adult life. (*Am J Public Health.* 2009;99:320–327. doi:10.2105/AJPH.2007.129288)

In 1977, the United Kingdom Department of Health commissioned an inquiry focusing on health inequalities in the country's population. The resulting report—the *Black Report,* published in 1980—highlighted the marked association between adult socioeconomic status (SES) and mortality rates.[1] Such socioeconomic gradients in mortality rates persist today, tracking into old age.[2]

Inequalities in health are a result of clearly identifiable social and economic factors that could potentially be modified to improve people's quality and length of life. Employment, education, housing, transportation, environment, health care, and "lifestyle" (in particular smoking, exercise, and diet) all affect health and tend to be favorably distributed in advantaged groups.

In the United Kingdom, the introduction of the National Service Framework for Coronary Heart Disease in 2000 was intended to reduce the prevalence of and social inequalities in coronary risk factors in the country's population.[3] Achieving these aims requires equitable access to and use of preventive care irrespective of SES, age, and gender. Health promotion initiatives such the "5-a-day" fruit and vegetable diet plan,[4] smoking cessation clinics, and structured exercise plans have all been part of the drive to reduce the prevalence of coronary risk factors.

Recent years have seen increased recognition of the potential implications of life course SES and a deeper understanding of the conceptual framework on which it is based.[5,6] There is growing evidence that coronary heart disease (CHD) risk is associated with life course SES,[7–10] with those in the most disadvantaged SES groups throughout life showing nearly 3 times greater risk than those in more advantaged groups.[8] This raises the question of the extent to which behavioral CHD risk factors are similarly dependent on life course SES. We examined the effects of childhood and adulthood SES on various health behaviors (diet, smoking, and physical activity) of older British women.

METHODS

Study Design and Data Collection

We conducted a cross-sectional analysis of baseline data from participants in the British Women's Heart and Health Study. The methodology of that study has been fully reported elsewhere.[11] Briefly, from 1999 through 2001, 4286 women aged 60 to 79 years were recruited from general practice lists in 23 representative British towns. Participants completed a questionnaire including items focusing on diet, smoking,[12] and physical activity. As a means of gathering dietary data, women were asked how often (more than once a day, daily, most days, once or twice a week, less than weekly, or never) they ate fresh fruit, green vegetables, meat, and other foods.

Behavioral Data

Principal-component analyses were used to identify various food groups. Fruits, salads, green vegetables, fish, and poultry formed the first component; however, given the public health focus on fruits and vegetables, these foods were examined separately. Red and processed meat formed the second component; healthful bread (e.g., whole-meal bread), milk (e.g., skim milk), and fat (e.g., vegetable oil rather than animal fats, and low-fat margarine rather than butter) formed the third.

Participants were asked to indicate the number of hours each week during the winter and summer they engaged in a specified range of physical activities; they were also asked to rate their walking speeds.[13] These measurements were used to calculate their weekly number of hours of moderate or vigorous physical activity. Activities considered moderate or vigorous included walking at a relatively brisk or fast pace, cycling, heavy gardening, and other physical exercise (e.g., aerobics, swimming).

Socioeconomic Status Data

Ten SES indicators[8] were used to construct a life course SES score and childhood and adult subscores: longest-held occupation of the participant's father during her childhood; whether the participant's childhood home had a bathroom and a hot water supply; whether the participant had shared a bedroom as a child; whether, during the participant's childhood, her family had access to a car; the age at which the participant completed full-time education; the longest-held occupation of the participant and her spouse; the participant's current housing status (whether she lived in rented social housing or owner-occupied and private rented properties); and the participant's current automobile access and pension arrangements (state only or state in combination with other arrangements).

Participants' childhood social class was based on their fathers' longest-held occupation, and their adult social class was based on their husbands' longest-held occupation (or, in the case of single women, their own longest-held occupation). Adult and childhood social class categories, defined according to the UK registrar general's classification, ranged from I (nonmanual, professional occupations) to V (manual, unskilled occupations). Given that the life-course SES score denoted the number of socioeconomic hardships experienced by women, a score of 10 indicated the greatest level of hardship.

We assessed the effects of changes in SES over the life course on health behaviors by classifying upward social mobility as change from manual social class in childhood (defined according to father's occupation) to nonmanual social class in adulthood (defined according to husband's occupation or, among unmarried women, their own occupation); downward social mobility was classified as the reverse circumstance. All analyses were restricted to women without any evidence of CHD or stroke at baseline (n=3523; 83% of the cohort); 595 women (13%) were excluded from the analyses (with the exception of those involving multiple imputations) because they also had missing data on 1 or more SES indicator.

Statistical Analyses

Women were grouped according to SES score, and the percentage of women reporting adverse health behaviors in each SES group was calculated. We assessed differences in the percentages of women reporting high-risk behaviors by individual SES indicator variables. In addition, stratifying by town of recruitment, we conducted logistic regression analyses examining the relative importance of childhood SES and adult SES scores as predictors of health behaviors and the effects of upward and downward social mobility on health behaviors.

We used conditional logistic regression in most of our analyses because the sampling strategy produced data clustered according to town of residence. We used ordinal logistic regression, clustered by town, in analyses of smoking and diet because the behavioral data were collected in 3 ordered categories. This technique allowed us to avoid using multiple significance tests, which would have been required to compare each pair of categories in turn.

Our analyses were based on the assumption that missing data were missing completely at random; that is, women included in the analyses could be regarded as a random sample of the women who took part in the study. If this assumption proved to be false, our results could be biased.

We assessed the sensitivity of the results by examining the effects of missing data. We assumed that data were missing at random (rather than missing completely at random, where the probability of data being missing does not depend on observed or unobserved values) and in this situation the missing values depend on the values of variables measured in the study. The missing values can then be imparted from knowledge of other measured values. Multiple imputation allowed our analysis to be conducted under the missing-at-random assumption; we used the multivariate chained equation method,[14,15] including all of the health habit variables and childhood and adulthood SES scores in the imputation model.

Ten regression switching cycles were used with 20 imputed data sets. Use of Rubin's formulas for combining results from the separate imputed data sets ensured that any incomplete data were properly accommodated in the inferences. The results of these alternative analyses were very similar to the results of the analyses conducted with women who had complete data (i.e., the analyses described here). Stata version 9 (StataCorp, College Station, TX) was used in conducting all analyses.

RESULTS

Table 1 presents health behavior data by SES score, and Table 2 shows differences in the percentages of women reporting unhealthful behaviors according to individual SES indicator variables. Table 3 shows odds of unhealthful behaviors for each 1-unit increase in childhood and adulthood SES score (i.e., increasing deprivation), with adjustment of childhood associations for adult SES (and vice versa).

Diet

Only 10% of women reported eating 4 or 5 portions of fruits and vegetables daily (the UK government recommendation); half reported consuming less than 2 portions (Table 1). A majority of the women (55%) selected mostly healthful fat, milk, and bread options; 30% ate red or processed meat on most days.

Women in the most deprived groups (those with an SES score of 9 or 10) had poorer diets than did women in the less deprived groups, consuming fewer fruits and vegetables (61% consumed less than 2 portions per day) and more red or processed meats (41% ate these meats on most days; Table 1). Both childhood and adult indicators of low SES were associated with unhealthful diets (Table 2). Eleven percent ($P<.001$) more women raised in manual social class families than in nonmanual social class families ate fruits and vegetables less than twice a day. Similar differences of between 5% and 11% in consumption of fruit and vegetables were seen for other childhood deprivation indicators (e.g., no hot water in the family home, no family access to a car).

Adult indicators of deprivation showed similar levels of strength; the strongest predictor was current residence in local authority (i.e., social) housing (13% more women living in local authority housing than women not living in such housing reported eating fruit and vegetables less than twice a day; $P<.001$). Both childhood (for each 1-unit increase in childhood SES score, odds ratio [OR]=1.13; 95% confidence interval [CI]=1.07, 1.19) and adult (for each 1-unit increase in adult SES score, OR=1.16; 95% CI=1.07, 1.25) SES scores were independent predictors of fruit and vegetable intake (Table 3).

TABLE 1—Women's Diet, Smoking, and Exercise Behaviors, by Socioeconomic Score: British Women's Heart and Health Study, United Kingdom, 1999–2001

		Socioeconomic Status Score										
	No. of Women Responding	0 or 1 (n = 399), % (SE)	2 (n = 377), % (SE)	3 (n = 469), % (SE)	4 (n = 437), % (SE)	5 (n = 409), % (SE)	6 (n = 378), % (SE)	7 (n = 240), % (SE)	8 (n = 148), % (SE)	9 or 10 (n = 71), % (SE)	Total (n = 2928), % (SE)	*P*
No. of times per day fruit and vegetables consumed	2624											<.001[a]
4 or 5		13 (1.8)	14 (1.8)	8 (1.3)	10 (1.5)	9 (1.5)	11 (1.7)	11 (2.2)	7 (2.4)	6 (3.5)	10 (0.6)	
2 or 3		52 (2.6)	43 (2.6)	43 (2.4)	38 (2.4)	38 (2.6)	33 (2.6)	28 (3.2)	30 (4.4)	33 (6.8)	40 (1.0)	
<2		35 (2.5)	43 (2.6)	49 (2.4)	53 (2.5)	53 (2.6)	57 (2.8)	61 (3.4)	63 (4.6)	61 (7.0)	50 (1.0)	
Eats red or processed meat most days	2698	25 (2.2)	27 (2.4)	26 (2.1)	27 (2.2)	34 (2.5)	33 (2.6)	36 (3.3)	33 (4.3)	41 (6.6)	30 (0.9)	<.001
Eats chicken or fish most days	2819	77 (2.1)	76 (2.2)	76 (2.0)	70 (2.2)	66 (2.4)	65 (2.5)	65 (3.2)	71 (3.9)	68 (5.9)	71 (0.9)	<.001
Selects mostly healthful fat, milk, and bread options	2709	55 (2.5)	57 (2.6)	51 (2.4)	59 (2.4)	56 (2.5)	59 (2.7)	51 (3.5)	51 (4.4)	44 (6.3)	55 (1.0)	.19
Smoking status	2922											<.001[a]
Current smoker		8 (1.4)	10 (1.5)	12 (1.5)	9 (1.4)	11 (1.5)	11 (1.6)	13 (2.2)	18 (3.2)	18 (4.6)	11 (0.6)	
Ex-smoker		33 (2.4)	27 (2.3)	30 (2.1)	32 (2.2)	36 (2.4)	33 (2.4)	30 (3.0)	29 (3.7)	44 (5.9)	32 (0.9)	
Never smoked		59 (2.5)	63 (2.5)	58 (2.3)	59 (2.4)	54 (2.5)	55 (2.6)	56 (3.2)	54 (4.1)	38 (5.8)	57 (0.9)	
No. of hours per week of moderate or vigorous exercise	2915											<.001[a]
<2		49 (2.5)	56 (2.6)	58 (2.3)	61 (2.3)	64 (2.4)	68 (2.4)	71 (2.9)	72 (3.7)	68 (5.6)	61 (0.9)	
2–3		13 (1.7)	12 (1.7)	12 (1.5)	11 (1.5)	11 (1.6)	10 (1.6)	9 (1.9)	10 (2.5)	6 (2.8)	11 (0.6)	
>3		38 (2.4)	32 (2.4)	30 (2.1)	28 (2.2)	25 (2.2)	22 (2.1)	19 (2.6)	18 (3.2)	27 (5.3)	28 (0.8)	

[a]From ordinal logistic regression of behavioral data on socioeconomic status, clustered by region (otherwise from conditional logistic regression stratified by region).

Associations with the other dietary variables were less strong. Consumption of red or processed meat on most days was independently associated with adult SES (adjusted OR=1.15; 95% CI=1.06, 1.25) but not childhood SES (adjusted OR=1.03; 95% CI=0.97, 1.09) after mutual adjustment. Poultry and fish consumption showed a similar pattern of stronger association with adult SES (adjusted OR=1.17; 95% CI=1.08, 1.26) than childhood SES (adjusted OR=1.06; 95% CI=1.00, 1.12). Selection of mostly healthful fat, milk, and bread options was not significantly related to SES or any SES subcomponents.

Smoking

Most women (57%) had never smoked tobacco regularly, and only 11% currently smoked (Table 1). However, 62% of women in the lowest SES group had smoked regularly at some point in their life (and 18% of them continued to smoke), as compared with less than 50% of the women in all other SES groups. The median age of smoking initiation was 18 years (5th percentile=15 years, 95th percentile=35 years), and there were minimal differences according to SES. Among quitters, women in higher SES groups quit at a younger median age (45 years [5th percentile=24 years, 95th percentile=65 years] among women with SES scores of 0–3 and 51 years [5th percentile=22 years, 95th percentile=70 years] among women with SES scores of 7–10).

Smoking was associated with having grown up in a manual social class family but was not related to other childhood SES indicators (Table 2). All adverse adult SES indicators were associated with smoking. The strongest predictor was local authority housing tenancy; women living in such housing were 18% more likely to smoke. As can be seen in Table 3, adult SES, but not childhood SES, was independently associated with smoking (for each 1-unit increase in adult SES, adjusted OR=1.18; 95% CI=1.09, 1.27).

Physical Activity

Most women were inactive. Sixty-one percent reported less than 2 hours per week of moderate or vigorous exercise; however, more than one quarter (28%) engaged in more than the recommended minimum of 3 hours per week. Generally, more women in the most disadvantaged SES groups than in the less disadvantaged groups reported a sedentary lifestyle ($P<.001$).

Adverse individual childhood and adult SES indicators were each associated with an increase in physical inactivity of at least 5% (Table 2). The strongest association was with local authority housing tenancy in adulthood; 16% more women living in this type of housing than in other types of housing engaged in less than 2 hours of moderate or vigorous activity each day. Adult SES and childhood SES were both independently associated with physical activity, but the association with adult SES was stronger (for each 1-unit increase in childhood SES, adjusted OR=1.06; 95% CI=1.01, 1.12; for each 1-unit increase in adult SES, adjusted OR=1.22; 95% CI=1.13, 1.32).

Social Mobility

Table 4 shows the effects of social mobility, classified according to father's and husband's

TABLE 2—Differences in Percentages of Women Reporting Unhealthy Behaviors, by Socioeconomic Status (SES) Indicators: British Women's Heart and Health Study, United Kingdom, 1999–2001

	Eats Fruit and Vegetables Less Than 2 Times/Day, % (95% CI)	Eats Red or Processed Meat Most Days, % (95% CI)	Eats Neither Chicken Nor Fish Most Days, % (95% CI)	Selects Mostly Unhealthy Options,[a] % (95% CI)	Has Ever Smoked, % (95% CI)	Exercise[b] Less Than 2 Hours/Week, % (95% CI)
Childhood SES indicator						
Manual social class	11.4*** (6.9, 15.9)	-3.5 (-7.6, 0.5)	5.7** (1.8, 9.7)	2.5 (-1.9, 6.9)	4.6* (0.3, 8.9)	6.7** (2.5, 10.9)
No bathroom in house	11.6*** (7.7, 15.6)	-4.6* (-8.2, -1.1)	5.0** (1.6, 8.5)	1.0 (-2.9, 4.8)	-0.7 (-4.4, 3.0)	6.8*** (3.1, 10.4)
No hot water in house	10.5*** (6.5, 14.6)	-4.5* (-8.1, -0.8)	5.4** (1.9, 8.9)	0.2 (-3.8, 4.1)	0.8 (-2.9, 4.6)	6.1** (2.4, 9.8)
Shared bedroom	5.3** (1.5, 9.2)	-2.5 (-6.0, 0.9)	3.6* (0.2, 6.9)	2.0 (-1.8, 5.7)	3.3 (-0.3, 6.9)	5.4** (1.9, 9.0)
No access to car	10.3*** (5.5, 15.2)	1.2 (-3.2, 5.5)	3.9 (-0.4, 8.1)	1.3 (-3.4, 6.1)	-2.4 (-7.0, 2.2)	7.9*** (3.3, 12.4)
Left full-time education early[c]	9.0** (3.0, 15.0)	-4.5 (-9.8, 0.9)	-1.6 (-6.8, 3.6)	-3.2 (-9.2, 2.7)	3.6 (-2.0, 9.1)	5.3 (-0.2, 10.8)
Adult SES indicator						
Manual social class	10.4*** (6.6, 14.2)	-7.4*** (-10.8, -3.9)	6.8*** (3.5, 10.1)	-2.2 (-5.9, 1.6)	3.5 (0.0, 7.1)	8.5*** (4.9, 12.0)
Local authority housing	13.3*** (6.9, 19.7)	-9.5*** (-15.1, -3.8)	6.6* (1.2, 12.0)	1.2 (-4.9, 7.2)	18.1*** (12.4, 23.8)	15.6*** (10.0, 21.2)
No access to car	7.1** (2.6, 11.6)	-6.3** (-10.3, -2.3)	5.3** (1.5, 9.2)	3.3 (-1.0, 7.7)	7.9*** (3.8, 12.0)	11.3*** (7.2, 15.3)
State pension only	7.3** (2.8, 11.8)	-2.8 (-6.8, 1.2)	3.5 (-0.3, 7.4)	1.6 (-2.7, 6.0)	6.2** (2.1, 10.3)	10.1*** (6.1, 14.2)

Note. CI = confidence interval. Values are the percentages of women with specified SES indicators minus the percentages of women without the specified indicators.
[a]Unhealthy fat, milk, and bread.
[b]Moderate or vigorous.
[c]Left education before the minimum school-leaving age (which changed from 14 to 15 years in 1945).
*$P<.05$; **$P<.01$; ***$P<.001$.

social class (or, in the case of unmarried women, their own social class), on women's health behaviors. Upwardly mobile women were less likely to report unhealthful behaviors than were women who remained in the manual group. For example, they were 37% less likely to consume small amounts of fruits and vegetables (OR= 0.73; 95% CI=0.61, 0.88) and 21% less likely to be inactive (OR=0.79; 95% CI=0.66, 0.94).

Downwardly mobile women adopted worse health behaviors than women remaining in the nonmanual social class. For example, they were 51% more likely to eat red or processed meat on most days (OR=1.51; 95% CI=1.04, 2.18) and 47% more likely to engage in less than 2 hours of exercise per week (OR=1.47; 95% CI=1.05, 2.06); surprisingly, however, they were 45% more likely to select mostly healthful fat, milk, and bread options (OR=1.45; 95% CI=1.03, 2.06). We found no effects of social mobility on smoking. Although downward social mobility adversely affected women's diet and physical activity behaviors, the effect was not as marked as that observed when women who had remained in the manual social class throughout their life were compared with those who had always been in the nonmanual class.

DISCUSSION

Women who had experienced socioeconomic adversity throughout their lives were less likely than women who had not to eat healthily and were more likely to have smoked regularly at some point in their lives, to currently smoke, and to be inactive. Our data suggest that both childhood and adult SES affect fruit and vegetable consumption in old age, with roughly an equal strength of association. However, it was primarily adult SES that influenced whether these women were more likely to eat meat or fish. Adult SES appeared to determine quantity and duration of smoking through the age of smoking cessation. Although exercise behaviors in old age were influenced by childhood SES, the effect of adult SES was greater. Upward social mobility and downward social mobility were, respectively, beneficial and detrimental with respect to health behaviors.

TABLE 3—Odds of Unhealthful Behaviors for Each 1-Unit Increase in Women's Childhood and Adulthood Socioeconomic Status (SES) Score: British Women's Heart and Health Study, United Kingdom, 1999–2001

Behavior	Childhood SES, OR (95% CI)	Adult SES, OR (95% CI)	Childhood SES, AOR (95% CI)	Adult SES, AOR (95% CI)
Eats fruit and vegetables less than twice per day	1.16*** (1.11, 1.22)	1.21*** (1.13, 1.3)	1.13*** (1.07, 1.19)	1.16*** (1.07, 1.25)
Eats red or processed meat most days	1.07** (1.02, 1.13)	1.23*** (1.15, 1.33)	1.03 (0.97, 1.09)	1.15*** (1.06, 1.25)
Eats neither chicken nor fish most days	1.09*** (1.04, 1.15)	1.16*** (1.08, 1.24)	1.06* (1.00, 1.12)	1.17*** (1.08, 1.26)
Selects mostly unhealthful fat, milk, and bread options	1.03 (0.98, 1.08)	1.04 (0.97, 1.12)	1.02 (0.97, 1.07)	1.01 (0.94, 1.09)
Has ever smoked	1.01 (0.96, 1.05)	1.16*** (1.08, 1.24)	0.96 (0.92, 1.01)	1.18*** (1.09, 1.27)
Engages in less than 2 hours of moderate or vigorous exercise per week	1.12*** (1.07, 1.17)	1.33*** (1.24, 1.43)	1.06* (1.01, 1.12)	1.22*** (1.13, 1.32)

Note. AOR = adjusted odds ratio; OR = odds ratio; CI = confidence interval. ORs were derived through conditional logistic regression analyses and stratified by town of recruitment. AORs adjusted for age and childhood or adult SES.
*$P < .05$; **$P < .01$; ***$P < .001$.

Diet

Elderly people come from a generation in which childhood diets were generally healthier in terms of lower saturated fat and calorie content than today. Indeed, it has been reported that older people continue to have better diets; however, deprivation, which may particularly affect elderly people, may partially counteract this trend.[16] Other studies have shown that elderly people often have a poor diet that is low in energy and in the amounts of vitamins and minerals consumed.[17–19]

Given that few people do so, it is not surprising that small numbers of women in this cohort reported eating the recommended 5 portions of fruits and vegetables per day. Our findings with respect to deprivation are consistent with those of other research.[20] People in lower SES groups are more likely to live in areas lacking access to high-quality produce, especially if they do not have access to a car or suffer from poor personal mobility.[21] Access to social support (e.g., "meals on wheels" programs) may provide a partial solution for the most vulnerable groups.

Childhood SES indicator variables were associated with diet quality in adulthood; however, after adjustment for adult SES, the associations were weaker than the associations of adult SES variables adjusted for childhood SES. This finding suggests that some of the childhood risk factors assessed were mediated through adult SES. The direct effect of childhood SES on diet in old age may result from the tastes developed and the cooking skills and practices learned in childhood.[22] This might explain some of the observed effect of childhood SES on adult CHD risk.

Childhood diet may also have a more direct effect on adult health, in that growth affects later disease risk. Leg length (indicative of prepubertal nutritional status) is positively associated with a reduced risk of cardiovascular disease in later life.[23,24] Similarly, reduced energy intake in childhood is associated with reduced adult cancer risk.[25,26] This direct effect on health may have unforeseen consequences for the

TABLE 4—Odds of Engaging in Unhealthful Behaviors, by Women's Social Class (Manual or Nonmanual) in Childhood and Adulthood: British Women's Heart and Health Study, United Kingdom, 1999–2001

Behavior	Upwardly Mobile,[a] OR (95% CI)	Downwardly Mobile,[b] OR (95% CI)	Manual vs Nonmanual,[c,d] OR (95% CI)
Eats fruit and vegetables less than twice per day	0.73*** (0.61, 0.88)	1.3 (0.92, 1.86)	1.99*** (1.58, 2.53)
Eats red or processed meat most days	0.72*** (0.59, 0.87)	1.51* (1.04, 2.18)	1.65*** (1.27, 2.13)
Eats neither chicken nor fish most days	0.71*** (0.58, 0.86)	1.07 (0.73, 1.58)	1.61*** (1.25, 2.08)
Selects mostly unhealthful fat, milk, and bread options	1.02 (0.85, 1.21)	0.69* (0.48, 0.97)	0.95 (0.76, 1.20)
Has ever smoked	0.88 (0.74, 1.04)	0.91 (0.65, 1.28)	1.15 (0.91, 1.43)
Engages in less than 2 hours of moderate or vigorous exercise per week	0.79** (0.66, 0.94)	1.47* (1.05, 2.06)	1.55*** (1.24, 1.94)

Note. OR = odds ratio; CI = confidence interval. ORs were derived through conditional logistic regression analyses and stratified by town of recruitment. Upwardly mobile women were compared with women who remained in the manual social class from childhood into adult life. Downwardly mobile women were compared with women who remained in the nonmanual social class. The data shown are for women with data on social class in childhood and adulthood.
[a]Upwardly mobile, n = 895; always manual, n = 1104.
[b]Downwardly mobile, n = 206; always nonmanual, n = 450.
[c]Among those who were not mobile.
[d]Always manual, n = 1104; always nonmanual, n = 450.
*$P < .05$; **$P < .01$; ***$P < .001$.

increasing number of overweight children in our population.

Smoking

Women who experienced lifelong deprivation were more likely to have smoked in the past and to currently smoke. Among those who had quit, more deprived women generally had smoked for longer periods. These findings are consistent with those of other research on SES and smoking habits.[27–29]

Our analysis of individual SES indicators suggested that, consistent with other research, adult SES had a strong influence on smoking habits.[30] If women perceive more immediate threats to their health (e.g., occupational hazards, street crime), they may downplay the health dangers of smoking and place less priority on stopping smoking.[31,32] There is little evidence in our data that childhood SES was related to smoking. This may reflect the attitude toward smoking in the 1940s and 1950s; when these women were young, smoking was more acceptable.

Physical Activity

Most participants were inactive, which is a concern given the strong evidence linking activity with healthy survival in old age.[33,34] However, the percentage of women who did exercise for more than 3 hours per week (28%) was higher than the percentages reported among other UK cohorts (e.g., 13% in the English Longitudinal Study of Ageing[35]). According to the Allied Dunbar National Fitness Survey, conducted in 1990, 40% of women aged 65 to 74 years (comparable to the age range in our cohort) reported no physical activity in the previous 4 weeks, and the average was less than 3.5 hours during a 4-week period.[36] However, that survey showed that neither education nor social class had an effect on women's exercise behavior.

Our data show that both adult SES and childhood SES were associated with exercise patterns. Few studies have examined the relationship between SES and physical activity across the life span.[37] Participation in sports in adolescence is reportedly a predictor of adult physical activity,[38] and teenagers in low-SES groups have been shown to be less likely to participate than teenagers in high-SES groups. Other studies have revealed little association between childhood SES and adult physical activity.[39] In a separate study involving the present cohort,[40] we also found an independent effect of area-level deprivation over and above individual SES, and this is a further and important dimension for consideration in developing health and social policy.

Adult SES affects exercise behavior both directly, as a result of factors such as financial costs (e.g., gym memberships), and indirectly, given that deprivation is associated with increased disability.[41] Women without access to a car reported less physical activity than those who had a vehicle, suggesting that walking does not fully compensate for structured exercise opportunities.

Social Mobility

Our data suggest that socially mobile individuals adopt the eating and exercising habits of their new social group. Women whose SES improved over the course of their lives (i.e., women who became more affluent) were more likely than were women whose SES did not improve to eat fruit and vegetables and to exercise; however, they were not as likely to do so as those who had always been members of the nonmanual social class. Conversely, those who moved down the social scale were likely to adopt detrimental health behaviors, but these behaviors were not as harmful, in general, as those engaged in by women who had always been members of the manual social class.

Motivation for some of these behavioral changes may be financial; for example, processed meats are cheaper, and gym admissions and structured exercise programs are expensive. Moreover, many downwardly mobile women married men from poorer backgrounds who then influenced the family's health behaviors.

Strengths and Limitations

Previous studies have highlighted how the use of separate indicators for education, occupation, and family income during childhood adds uniquely to our understanding of how SES is related to behavior.[5,6,8] Our work, which extends earlier findings in that we used a much wider range of SES indicators, demonstrates the various ways in which cumulative disadvantage influences health behaviors. Our use of several childhood and adult SES indicators is a strength of this study; it is common practice to use only 1 measure for each, often occupational social class. Adjusting for an individual's socioeconomic position either by conditional logistic regression adjusted for the 10-point socioeconomic score, or by using each of the 10 socioeconomic variables as a binary indicator variable did not make any difference to the findings.

We acknowledge that SES measurement error may have influenced the accuracy of our results regarding the independent predictive effects of adulthood and childhood SES on women's health behaviors. However, the modest correlation of 0.33 between SES scores in childhood and adulthood, the differences in the independent predictive power of childhood and adult SES with respect to different health behaviors, and the use of multiple SES indicators at each study time point all suggest that our results are likely to have captured meaningful differences in the predictive power of childhood and adult SES.

Our results were derived from women who were all aged 60 to 79 years at the time of data collection. Without evidence to the contrary, it seems likely that today's children will also retain some of their dietary and exercise habits into adulthood, implying that our findings may have some relevance to the current population of children.

Some women without cardiovascular disease at baseline were excluded from the study because they had missing SES data; however, it is unlikely that exclusion of these women resulted in substantial bias in our analyses, as indicated by the very similar findings obtained in multivariate multiple imputation analyses (data available on request). Dietary data were derived from a simple self-reported food frequency questionnaire that allowed participants to answer questions relatively quickly and easily. The resulting food groups used to indicate a healthful diet were simple but were based on a principal-components analysis that produced interpretable groupings. However, our categories did not capture detailed differences in types of food; for example, fish and chicken can include very healthful oily fish and unhealthful fried chicken and fish.

Physical activity as assessed here was not purely a measure of exercise or sporting

activities, but rather, included day-to-day activities such as walking and gardening, which are recommended as part of adult activity programs. These forms of physical activity were appropriate for women of the age of our study population and captured the activity level currently recommended by the UK government (30 minutes of moderate activity at least 5 days a week).[42]

Social desirability bias is a potential issue in all observational studies that collect self-reported behavioral data. However, such bias would tend to attenuate any associations and was unlikely to be sufficiently powerful to remove the widely reported differences in cardiovascular disease outcomes either between socioeconomic groups or by self-reported diet, exercise, or smoking behaviors. Whenever possible, we attempted to validate our risk factor data; for example, we found, in a repeated measures analysis of variance, a significant association between quantity of fruits and vegetables consumed and serum vitamin C levels ($P<.001$), suggesting that reported intake was a valid indicator (data available on request).

Implications

We have demonstrated that childhood SES, independently of adult SES, is associated with aspects of a healthful diet and physical activity. Our results emphasize the importance of establishing good habits during childhood. School meals in England, after strong criticism,[43] are currently being reformed through government programs. These reform efforts may improve the diets of today's generation of children as they mature.

Home economics classes in which children are taught about food preparation and healthful eating may also be helpful. Successfully educating adults to improve their diets will reduce not only their own CHD risk but that of their children. Targeted programs aimed at increasing physical activity in the poorest communities (where activity levels are lowest), through better provision of opportunities for activity in schools, may also help to increase adult activity levels in years to come.

A focus on the individuals who are currently at highest cardiovascular risk is also warranted. Seemingly the most direct way to improve older people's health behaviors would be to tackle their underlying deprivation. According to recent estimates, the minimum income for pensioners in the United Kingdom to maintain a healthful lifestyle is £122.70 ($236.00) per person per week, somewhat more than the minimum pension credit of £109.45 ($210.50) (including additional benefits such as winter fuel).[44] One of the consequences of poverty is that dietary decisions are often financial,[45] and members of low-SES groups typically choose unhealthful, cheaper foods. A healthful diet for a moderately active couple in which each partner is older than 65 years costs approximately £63.70 ($122.50) per week, yet average spending in the poorest 40% of couples in this age group is just £44.50 ($85.60) per week.[44]

The small increases in the UK basic pension instituted in the past 2 years have not been adequate to close these gaps. Older widowed women, previously dependent on their partner's income to raise their family, are particularly affected by today's inadequate pension provisions. Additional financial support for our growing elderly population is needed to ensure people's health in old age.

Conclusions

Our findings highlight the adverse effects of socioeconomic inequalities throughout life on behaviors that are known risk factors for cardiovascular disease and other life-threatening conditions. Improving socioeconomic inequalities in health behaviors and, ultimately, in disease outcomes will require development of better interventions, and these interventions will need to be applied across the life course and will need to focus on disadvantaged groups to provide the greatest benefit. ■

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Contributors

H.C. Watt contributed to developing the study aims and writing the article and undertook and interpreted the statistical analysis. C. Carson contributed to developing the study aims, undertook the literature review, and made major contributions to the drafting of the article. D.A. Lawlor contributed to developing the study aims and design and contributed to the writing of the article. R. Patel contributed to the drafting of the article. S. Ebrahim supervised the writing of the article and contributed to developing the study aims.

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Human Participant Protection

The British Women's Heart and Health Study received local research ethics committee approval from each of the 23 towns in the study and multicenter approval from the London Multi Region Ethics Committee. All participants provided informed consent.

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