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Socioeconomic Status and Subclinical Atherosclerosis in Older Adults

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Abstract

Objective—This study investigated the long-term effects of socioeconomic status (SES) on atherosclerosis.

Methods—Data from the Epidemiology of Hearing Loss Study and the Beaver Dam Eye Study (Beaver Dam, WI, 1998–2000), were used to examine adult SES (education, household income, longest-held job) and childhood SES (household density and parental home ownership at age 13) associations with carotid intima-media thickness (IMT) and carotid plaque in a cohort of 2,042 men and women aged 53 to 94 years.

Results—For education, income, and occupation (women), those in the lowest SES group had statistically larger age-sex-adjusted IMT than those in the highest SES group (<12 vs. >12 years education: 0.92 vs. 0.86 mm respectively, $P<0.0001$), (<\$10,000 vs. >\$45,000: 0.97 vs. 0.87 mm, $P<0.0001$), (operator/fabricator/labor vs. manager/professional: 0.89 vs. 0.82 mm, $P<0.001$). Associations were similar using carotid plaque as the outcome. Participants with low levels of both adult and childhood SES measures had age-sex-adjusted IMT greater than those with persistently high levels of SES (0.93 vs. 0.84 mm, $P<0.0001$).

Conclusions—Measures of SES at two points in the life-span were associated with subclinical atherosclerosis.

Keywords

Socioeconomic Status; Intima-media Thickness; Atherosclerosis; Carotid Artery plaque; Cardiovascular disease; Life-course epidemiology

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Introduction

The association between socioeconomic status (SES) and cardiovascular disease (CVD) has been well documented (Kaplan and Kiel, 1993) but more recent studies have focused on associations between SES and subclinical atherosclerosis measured by carotid artery intima-media thickness (IMT) and plaque measurements (Carson et al., 2007; Diez-Roux et al., 1995; Kivimaki et al., 2006; Lamont et al., 2000; Lemelin et al., 2008; Lutsey et al., 2008; Lynch et al., 1995; Nordstrom et al., 2004; Rosvall et al., 2000; Rosvall et al., 2002). Although there appears to be an inverse relationship between SES and measures of subclinical atherosclerosis, inconsistencies exist based on gender (Lamont et al., 2000; Rosvall et al., 2000; Rosvall et al., 2002), race and ethnicity (Diez-Roux et al., 1995; Lemelin et al., 2008; Lutsey et al., 2008), and SES indicator (Diez-Roux et al., 1995; Kivimaki et al., 2006; Lemelin et al., 2008; Lamont et al., 2000; Rosvall et al., 2000).

Atherosclerosis has been detected in the young (Strong, 1992), so it may be warranted to study the impact of SES throughout the life-course. Because of the limited number of published life-course studies (Carson et al., 2007; Lemelin et al., 2008; Rosvall et al., 2002), especially in older adults, the purpose of this study was to determine the associations between markers of adult, childhood (at age 13 years), and cumulative life-course SES and carotid IMT and plaque in a population-based cohort of older adults in Beaver Dam, Wisconsin.

Methods

The Epidemiology of Hearing Loss Study (EHLS) began in 1993 in a population-based cohort developed for the Beaver Dam Eye Study (BDES). A private census conducted in 1987-88 identified residents of the city or township of Beaver Dam 43 to 84 years of age ($n=5,924$) who were then invited to participate in the BDES ($n=4,926$) (Klein, 1994). Participants alive as of March 1, 1993 were eligible for the EHLS. Of these, 3,753 people (82.6%) participated in the baseline examination (1993-1995), 2,800 people participated in the 5-year follow-up (EHLS2 1998-2000), and 2,395 people participated in the 10-year follow-up examination (EHLS3 2003-2005). Data from the EHLS and concurrent BDES examinations were included in these analyses of the 2,042 EHLS2 participants with IMT measurements. These studies were approved by the University of Wisconsin-Madison Internal Review Board.

Educational status obtained at the baseline BDES was categorized as < 12 years, 12 years, and > 12 years of school completed. At the baseline EHLS, the type of work done the longest was coded by 1980 census classifications; homemakers were coded with service occupations. Household annual incomes from 1998-2000 (EHLS2), were used. At EHLS3, participants were asked: "When you were age 13, how many people lived in your home?" and "When you were age 13, how many bedrooms were in your home?" Childhood household density was defined as the number of people living in the home divided by the number of bedrooms in the home, then split at the median. Participants were also asked if at age 13, their parents rented or owned their home.

High resolution B-mode carotid artery ultrasound images (Biosound AU4, Biosound Esaote, Indianapolis, IN USA) were obtained at EHLS2 by a certified sonographer using a modification of the Atherosclerosis Risk In Communities (ARIC) study protocol (Bond, 1991). The areas of focus were the 1 cm of the distal common carotid artery (CCA) closest to the bifurcation, the bifurcation, and 1 cm of the proximal internal carotid artery (ICA) closest to the flow divider. IMT and plaque measurements were made by certified graders using a custom program interfaced with ImagePro software (Image Pro Plus version 4.1).

Media Cybernetics, Silver Spring, MD USA), and a modified ARIC protocol (Riley, 1991). Mean IMT was defined as the mean of the near and far walls of the CCA, the bifurcation and the ICA on both the left and right sides. Mean inter-grader difference in IMT was 0.03 mm. Plaque was determined by evaluating change in wall shape, change in wall texture, and wall thickness (greater than or equal to 1.5 mm). Plaque was considered present if one of these was present with acoustic shadowing, or two were observed in an area without acoustic shadowing. The number of sites (left and right CCA, ICA, and bifurcation) with plaque was categorized: 0, 1-3 and 4-6 sites. Inter-grader reliability for plaque was excellent; kappas averaged 0.76 and percent agreement averaged 90%. IMT measures were available for 2,042 (73%) participants. Ultrasounds were not obtained for participants unable to come to the central site, unable to lay flat, or when the sonographer was unavailable.

Cardiovascular risk factors were measured at the same study phase as IMT measurements. History of CVD was a self-reported physician-diagnosed stroke, myocardial infarction (MI), or angina. Family history of CVD was positive if either parent had had a stroke or MI. Blood pressure was measured using the Hypertension Detection and Follow-up Protocol (HDFP, 1976). Hypertension was defined as systolic blood pressure ≥ 140 mmHg, diastolic blood pressure ≥ 90 mmHg, or physician-diagnosed hypertension and current use of hypertension medication. Diabetes status was defined as self-report of physician-diagnosed and treated diabetes or elevated glycated hemoglobin levels using age- and sex- adjusted norms (Klein, 1992). Body mass index (BMI) was calculated as weight in kilograms divided by height in meters squared, with obesity defined as BMI ≥ 30 kg/m². Total and HDL cholesterol were measured using reflectance spectrophotometry. Pack-years were calculated for smokers. History of heavy drinking meant having consumed four or more alcoholic beverages daily at any point in life.

All analyses were performed with SAS version 9.1 (SAS Institute, Cary NC). Participants with and without IMT measurements were compared using chi-square, Cochran-Mantel-Haenszel, t-test and linear regression procedures. Multivariable least squares regression was used to test for associations between SES indicators and IMT. Ordinal logistic regression (the cumulative odds model) was used to estimate odds ratios and examine the associations between SES indicators and plaque score. Model 1 adjusted for age and sex, and model 2 adjusted for age, sex and traditional CVD risk factors (family history of CVD, prevalent CVD, diabetes status, hypertension, HDL and non-HDL cholesterol, pack-years of smoking (non-smokers coded as 0), and history of heavy drinking) in order to determine if SES associations were independent of these known risk factors. Analyses were repeated in a subgroup of participants without CVD, to examine associations in the healthiest participants. Based on the results of the separate childhood and adult SES analysis, an accumulation of risk model (Ben-Schlomo, 2002; Roswall, 2002) was built using the combined “exposures” of childhood household density and education as they were the most consistent childhood and adult SES indicators respectively in their associations with carotid IMT and plaque. An ordinal variable with six categories was created according to the possible groupings of 2 levels of density split at the median value (≤ 1.5 people/bedroom, >1.5 people/bedroom), and 3 levels of education (<12 years, 12 years, >12 years) with the group having low density and >12 years of education as the referent group.

Results

Comparisons between EHLS2 and previous phases have been published (Cruickshanks et al., 1998; Cruickshanks et al., 2003). Retention rates among survivors remained high throughout the study (82-83%) and participants tended to be younger, more often female, have higher SES, and less likely to smoke than non-participants (Cruickshanks et al., 1998; Cruickshanks et al., 2003). Adjusting for age and sex, EHLS2 participants with IMT

measurements were more educated ($P < 0.001$), had higher HDL-cholesterol levels ($P < 0.05$) and were less likely to have had a history of CVD ($P < 0.01$) than EHLS2 participants without an IMT measurement (Table 1). Amongst participants with IMT measurements, those who provided childhood SES information five years later were younger, more educated, less likely to have diabetes, and had lower IMT at EHLS2 (data not shown) than nonparticipants at EHLS3.

Participants in the lowest education group had larger age-sex-adjusted IMT (0.918 mm vs. 0.858 mm; $P < 0.001$) (Table 2), and were more likely to have higher plaque scores (OR=1.9, 95%CI: 1.5,2.5) than those in the highest education group. In stratified analyses based on the number of sites with plaque (≤ 1 and > 1), lower education remained significantly associated with the larger IMT (data not shown). IMT ranged from 0.969 mm in the lowest income category ($< \$10,000$) to 0.866 mm in the highest category ($> \$45,000$) (P for trend < 0.001) in age- and sex-adjusted analyses. Results were similar when excluding retired participants (data not shown). A significant interaction was found between sex and occupation ($P < 0.05$). In stratified analyses, associations with IMT were significant in women only (P for trend < 0.0001). Because homemakers may be different than service employees, occupation models were rerun excluding homemakers and results were similar (data not shown). In analyses excluding participants with prevalent CVD, effect sizes were somewhat attenuated, but remained statistically significant (data not shown).

Those above the median household density had larger IMT than those below after adjusting for age and sex ($P < 0.05$) and CVD risk factors ($P < 0.05$), but only a borderline association with plaque (Table 3). There were no statistically significant associations between parental home ownership and IMT or plaque.

Those with higher household density during childhood, and < 12 years of education (low SES at each time) had statistically significant larger IMT than those with low childhood and high adult SES (0.926 mm vs. 0.844 mm; $P = 0.0001$) and those with high SES at each time (0.926 mm vs. 0.840 mm; $P < 0.0001$) (Table 4). The odds of higher plaque score were 2.1 times higher (95%CI 1.3,3.1) for those with low childhood and high adult SES, and 2.6 times (95%CI: 1.7,3.9) higher than those with the highest SES at both times. Estimates were similar when CVD risk factors were included in the model.

Discussion

Higher SES as measured by education, income, and longest held job (in women) was significantly associated with larger IMT and higher plaque score. Associations between childhood SES and atherosclerosis were less consistent. However, IMT was 0.09 mm greater in participants with low SES at each time point compared to those with high SES at each time point. This difference in IMT is likely to be clinically meaningful since a 0.1 mm increase in IMT may increase the risk of MI by 15% and of stroke by 18% (Lorenz et al., 2007). These population-based findings are consistent with other studies showing increased subclinical atherosclerosis in those with persistently low life-course SES (Carson et al., 2007; Lemelin et al., 2008; Rosvall et al., 2002).

Education showed a graded statistically significant inverse association that remained after adjustment for age and sex, and CVD risk factors similar to previous reports (Diez-Roux et al., 1995; Nordstrom et al., 2004; Lutsey et al., 2008; Lynch et al., 1995). For income and occupation in women, the lowest SES group had larger IMT than the highest group but relationships were inconsistent across SES categories. Income may not be a good measure of SES among older, retired persons as atherosclerosis could force people into a “downward drift” in income. Results of analyses in the subgroup of people without prevalent CVD were

similar, suggesting this was unlikely. Sex differences for occupation may be due to sex differences in psychosocial working conditions, and occupational stress interactions with other gender-specific factors (Diez-Roux et al., 1995).

Household density, a marker of childhood SES (higher density, lower SES) was inversely associated with IMT and plaque score. Household density has been used as a proxy for childhood SES in previous epidemiological studies (Dedman et al., 2001; Frenkel et al., 1999; Galobardes et al., 2004; Galobardes et al., 2006). It is also a measure of childhood conditions (crowding), and has been linked to an increase in infections, and adult height; a predictor of future chronic illnesses (Dedman et al., 2001). Parental home ownership was not associated with atherosclerosis. Home ownership may not be a strong indicator of SES as neither housing value nor neighborhood factors are considered in this measure. Parental education and occupation were unavailable.

Participants with low SES in childhood and as an adult had the largest IMT measurements and highest plaque scores, suggesting that SES factors in childhood may be associated with atherosclerosis. Participants with low childhood SES who attained high educational levels had statistically lower IMT measurements and plaque scores than those who did not complete high school. These results are consistent with the hypothesis that education may facilitate positive social, psychological and economic skills (Krieger, 1997), which in turn may help compensate for lower SES levels in childhood.

Childhood SES measures may be useful in studies of the etiology of atherosclerosis which develops slowly over the life-time. SES probably operates through traditional CVD risk factors (smoking, cholesterol, etc.) (Diez-Roux et al., 1995). However, in EHLS participants, significant associations remained after adjusting for these factors. These may be due to imprecise measurement or the cross-sectional nature of the risk factor measurements which miss the accumulation of such factors over the lifetime (Lynch et al., 1996) but differences in medical care, genetic, environmental, and psychosocial factors including social support, depression, job strain, and chronic stress (Kaplan and Kiel, 1993) may also contribute. These factors may help explain how low SES has negative biological consequences such as elevated levels of inflammatory markers (Taylor et al., 2006), increased oxidative stress and decreased levels of anti-oxidants (Janicki-Deverts et al., 2009) that may lead to increased CVD risk.

Strengths and Limitations

This population-based cohort study had high participation and retention rates, used standardized measures of carotid artery atherosclerosis and had multiple measures of SES about two separate points in life. Our results may have been affected by survivor bias. Participants without IMT measures were less educated, older, and had a higher prevalence of CVD which may have led to underestimation of associations. IMT and plaque were not independent measures so results may be reflecting the effects of plaque rather than generalized low levels of thickening but models stratified by amount of plaque (≤ 1 site and > 1 site) demonstrated similar IMT trends across SES levels. Other limitations include the possibility of recall bias for childhood SES, the inability to characterize neighborhood SES due to the size of the community, and the fact that this study was limited to one IMT measurement. Despite these limitations this study adds to the evidence that childhood SES coupled with adult SES may have long-term implications for adult health.

Conclusion

Both childhood and adult SES were associated with subclinical atherosclerosis and the effect was greatest among those with consistently low SES. Further research is needed to

determine the mediating factors that link life-long low levels of SES and poorer cardiovascular health.

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Abbreviations

SES	Socioeconomic status
CVD	Cardiovascular Disease
IMT	intima media thickness
CCA	common carotid artery
ICA	internal carotid artery
MI	myocardial infarction
BMI	body mass index

HDL	high density lipoprotein
OR	odds ratio
CI	confidence interval
SEM	standard error of the mean

Table 1
Means and Prevalence of Select Characteristics between Participants with IMT
Measurements and Participants without IMT Measurements in the Epidemiology of
Hearing Loss Study, Beaver Dam, WI 1998-2000

Characteristic	IMT (n=2,042)*	No IMT (n=758)*	P Value ^a	P Value ^b
Age, yr, mean	68.1	72.6	<0.0001	
Sex n(%)			<0.01	0.074
Male	879 (43.1)	279 (36.8)		
Female	1163 (57.0)	479 (63.2)		
Education Years n(%)			<0.0001	<0.001
<12	342 (16.8)	210 (27.7)		
12	996 (48.8)	333 (44.0)		
>12	703 (34.5)	214 (28.3)		
Longest Held Job n(%)			0.033	0.171
Operator/fabricator/labor	362 (18.5)	155 (21.6)		
Production/Craft/Repair/Farming	282 (14.4)	98 (13.7)		
Service	384 (19.6)	166 (23.2)		
Technical/Sales/Administration	500 (25.6)	172 (24.0)		
Management/Professional	427 (21.8)	126 (17.6)		
Income n(%)			<0.0001	0.003
\$ <10,000	89 (4.9)	62 (10.9)		
\$10-19,000	349 (19.1)	141 (24.8)		
\$20-29,000	378 (20.7)	103 (18.1)		
\$30-44,000	391 (21.5)	124 (21.8)		
\$ >45,000	616 (33.8)	139 (24.4)		
Marital Status n(%)			<0.0001	0.028
Never	66 (3.3)	29 (4.3)		
Married	1383 (69.1)	365 (54.6)		
Separated/Divorced	146 (7.3)	62 (9.3)		
Widowed	406 (20.3)	213 (31.8)		
Hypertension present n(%)	1201 (58.8)	409 (64.3)	0.014	0.505
Diabetes present n(%)	229 (11.6)	87 (14.3)	0.071	0.091
BMI kg/m ² , mean	30.0	29.6	0.192	0.795
History of CVD n(%)	302 (15.1)	150 (22.8)	<0.0001	0.008
Current or Past Smoker n(%)	1065 (53.2)	326 (49.0)	0.060	0.976
Non-HDL cholesterol mg/dl, mean	163.00	160.60	0.223	0.286
HDL Cholesterol mg/dl, mean	50.82	49.14	0.03	0.012

Abbreviations: IMT, Intima-media thickness; BMI, Body Mass Index; CVD, cardiovascular disease; HDL, high density lipoprotein.

^aUnadjusted

^bAge-adjusted for sex, and Age- and Sex-Adjusted for all others;

* sample size may differ for each participant characteristic due to missing data

Table 2
Mean IMT (mm) (SEM), and OR, 95% CI for Carotid Plaque Score by Level of Education, Level of Annual Income, and Longest Held Job in the Epidemiology of Hearing Loss Study, Beaver Dam, WI 1998-2000

Education Level	Mean IMT (SEM)		OR for Carotid Plaque (95%CI)			
	Model 1 ^a	Model 2 ^b	Model 1 ^a	Model 2 ^b	Model 1 ^a	Model 2 ^b
	n=2,041	n=1,906	n=1,994	n=1,865		
<12 years	0.918 (0.011)***	0.903 (0.011)**	OR 1.9 1.5, 2.5	OR 1.7 1.3, 2.2	OR 95%CI	OR 95%CI
12 years	0.891 (0.006)**	0.887 (0.006)*	1.5 1.3, 1.9	1.4 1.2, 1.7		
>12 years	0.858 (0.008)	0.866 (0.007)	1	1		
P for trend	<0.0001	0.004	<0.0001	0.0001		
Income	n=1,823	n=1,739	n=1,784	n=1,703		
			OR 95%CI	OR 95%CI	OR 95%CI	OR 95%CI
\$<10,000	0.969 (0.022)***	0.958 (0.021)***	1.4 0.9, 2.2	1.2 0.7, 1.9		
\$10-19,000	0.902 (0.011)*	0.883 (0.011)	1.4 1.0, 1.8	1.0 0.8, 1.4		
\$20-29,000	0.882 (0.010)	0.879 (0.010)	1.3 1.0, 1.7	1.2 0.9, 1.6		
\$30-44,000	0.878 (0.010)	0.875 (0.010)	1.2 0.9, 1.5	1.0 0.8, 1.3		
\$>45,000	0.866 (0.009)	0.878 (0.008)	1	1		
P for trend	0.0002	0.064	0.022	0.490		
Longest Held Job	n=862	n=795	n=839	n=776		
Men			OR 95%CI	OR 95%CI	OR 95%CI	OR 95%CI
Operator/fabricator/labor	0.925 (0.017)	0.926 (0.016)	1.3 0.9, 2.0	1.2 0.8, 1.8		
Production/craft/repair/farmer	0.940 (0.015)	0.933 (0.014)	1.3 0.9, 1.9	1.2 0.8, 1.7		
Service	0.954 (0.022)	0.937 (0.022)	2.2 1.4, 3.6	1.7 1.0, 2.8		
Technical/sales/administration	0.956 (0.191)	0.955 (0.019)	1.3 0.8, 2.0	1.1 0.7, 1.8		
Management/professional	0.921 (0.015)	0.940 (0.015)	1	1		
P for trend	0.912	0.376	0.161	0.427		
Longest Held Job	n=1,093	n=1,029	n=1,070	n=1,008		
Women			OR 95%CI	OR 95%CI	OR 95%CI	OR 95%CI
Operator/fabricator/labor	0.891 (0.014)***	0.879 (0.014)**	1.7 1.1, 2.6	1.4 0.9, 2.2		
Production/craft/repair/farmer	0.822 (0.039)	0.816 (0.037)	1.0 0.4, 2.2	0.9 0.4, 2.1		

	Mean IMT (SEM)		OR for Carotid Plaque (95%CI)		
	Model 1 ^a	Model 2 ^b	Model 1 ^a	Model 2 ^b	Model 2 ^b
Service	0.859 (0.011) *	0.846 (0.011)	1.3	0.9, 1.9	1.1
Technical/sales/administration	0.830 (0.010)	0.833 (0.009)	1.1	0.8, 1.6	1.1
Management/professional	0.819 (0.013)	0.827 (0.012)	1		1
P for trend	<0.0001	0.0042	0.011		0.129

Abbreviations: SEM, standard error of the mean; OR, odds ratio; CI, confidence interval; IMT, Intima-media thickness; CVD, cardiovascular disease; HDL, high density lipoprotein.

* $P < 0.05$;
** $P < 0.01$;
*** $P < 0.001$ compared to the highest SES category.

^a Adjusted for age and sex for education and income, and age for longest held job,

^b Adjusted for age, sex (for education and income only), family history of CVD, self-history of CVD, hypertensive status, diabetes status, HDL and Non-HDL cholesterol levels, pack years and heavy drinking.

Table 3
Mean IMT (mm) (SEM), and OR, 95% CI for Carotid Plaque Score by Childhood Household Density and Parental Home Ownership in the Epidemiology of Hearing Loss Study, Beaver Dam, WI 1998-2000

	Mean IMT (SEM)		OR for Carotid Plaque (95%CI)			
	Model 1 ^a	Model 2 ^b	Model 1 ^a	Model 2 ^b	Model 1 ^a	Model 2 ^b
Household Density ^c	n=1,687	n=1,595	n=1,653	n=1,565		
			OR	95%CI	OR	95%CI
High (>1.5)	0.878 (0.007)	0.878 (0.006)	1.2	0.9, 1.4	1.2	1.0, 1.5
Low (≤1.5)	0.852 (0.006)	0.851 (0.006)	1		1.0	0.8, 1.3
P value	0.005	0.016	0.08		0.04	
Parental Home Ownership	n=1,675	n=1,579	n=1,641	n=1,549		
			OR	95%CI	OR	95%CI
Rented	0.870 (0.009)	0.853 (0.008)	1.1	0.9, 1.4	0.9	0.8, 1.2
Owned	0.863 (0.006)	0.868 (0.005)	1		1	
P value	0.547	0.119	0.279		0.605	

Abbreviations: SEM, standard error of the mean; OR, odds ratio; CI, confidence interval; IMT, Intima-media thickness; CVD, cardiovascular disease; HDL, high density lipoprotein.

* $P < 0.05$;

** $P < 0.01$;

*** $P < 0.001$ compared to the highest SES category.

^a Adjusted for age, sex,

^b Adjusted for age, sex, family history of CVD, self-history of CVD, hypertensive status, diabetes status, HDL and Non-HDL cholesterol levels, pack years and heavy drinking.

^c Number of people living in home/number of bedrooms in home

Table 4
Mean IMT (mm) (SEM), and OR (95% CI) for Carotid Plaque Score by Combinations of Childhood and Adult SES in the Epidemiology of Hearing Loss Study, Beaver Dam, WI 1998-2000

Childhood SES ^a	Adult SES ^b	Mean IMT (SEM)		OR for Carotid Plaque (95%CI)			
		Model 1 ^c	Model 2 ^d	Model 1 ^c	Model 2 ^d	Model 1 ^c	Model 2 ^d
		n=1,686	n=1,594	n=1,652	n=1,564		
High Density (>1.5) (Low SES)	< 12 years	0.926 (0.017) ***	0.905 (0.016) **	OR 2.6 95%CI 1.7, 3.9	OR 2.1 95%CI 1.4, 3.3		
	12 years	0.886 (0.009) ***	0.881 (0.009) **	1.7 1.3, 2.2	1.5 1.1, 2.1		
	> 12 years	0.844 (0.012)	0.861 (0.011)	1.3 0.9, 1.7	1.1 1.0, 2.0		
Low Density (≤1.5) (High SES)	< 12 years	0.860 (0.018)	0.849 (0.018)	1.9 1.3, 3.0	1.8 1.1, 2.8		
	12 years	0.860 (0.009)	0.857 (0.009)	1.6 1.2, 2.1	1.4 1.1, 1.9		
	> 12 years	0.840 (0.010)	0.844 (0.010)	1.0	1.0		
	p for trend ^e	<0.0001	<0.001	<0.001	0.002		

Abbreviations: SEM, standard error of the mean; OR, odds ratio; CI, confidence interval; SES, socioeconomic status; IMT, Intima-media thickness

* $P < 0.05$;

** $P < 0.01$;

$P < 0.001$ compared to the highest SES category.

^aHousehold Density: Number of people living in home/number of bedrooms in home,

^bEducation,

^cAge- and sex-adjusted,

^dAdjusted for age, sex, family history of CVD, self-history of CVD, hypertensive status, diabetes status, HDL and Non-HDL cholesterol levels, pack years and heavy drinking.

^eTrend across categories of combined SES