

ARIC Manuscript Proposal # 926

Revised 10/07/03

1.a. Full Title:

Individual and Area-Level Lifecourse Socioeconomic Status and Subclinical Atherosclerosis: The Atherosclerosis Risk in Communities (ARIC) Study

b. Abbreviated Title (Length 26 characters):

SES and Subclinical CVD

2. Writing Group (list individual with lead responsibility first):

Lead: April Perry Carson

Address: 137 East Franklin Street, Suite 306

Bank of America Plaza

Chapel Hill, NC 27514

Phone: (919) 966-1967 Fax: (919) 966-9800

E-mail: alperry@email.unc.edu

Writing group members: Kathryn Rose, Gerardo Heiss, Jay Kaufman, Sharon Wyatt, Ana Diez-Roux

3. Timeline:

Winter, Spring 2003: Data Analysis

Summer, Fall 2003: Manuscript Completion

4. Rationale:

The inverse relationship between socioeconomic status (SES) and cardiovascular disease (CVD) morbidity and mortality is well established (1). Low SES, as assessed by education, income, and/or occupational category, has been consistently associated with prevalent and incident clinical coronary events (2-6). Low SES has also been associated with subclinical atherosclerosis, although these associations have been weaker (6-10). Diez-Roux et al. reported an association between low SES and carotid artery IMT in the ARIC Study, which was attenuated after adjustment for traditional CVD risk factors (6). Van Rossum et al. reported an inverse association between SES and aortic calcification only among female participants in the Rotterdam Study (11). Lynch et al. reported an inverse relationship between SES and IMT in the Kuopio Ischemic Heart Disease Risk Factor (KIHD) Study (8). This association, identified among middle-aged Finnish men, was attenuated after adjustment for CVD risk factors. Low education and low income were also associated with the four-year progression of IMT in the KIHD Study and these associations were not explained by CVD risk factors (12).

Recently, several studies have attempted to further explore the association between SES and cardiovascular morbidity and mortality by evaluating SES across the lifecourse. Lifecourse SES has been inversely associated with all-cause mortality and cardiovascular morbidity and mortality; however, a variety of methods have been used to assess lifecourse SES and the literature is not consistent in the direction or the magnitude of these associations. The relationship between lifecourse SES and subclinical atherosclerosis is of particular interest since lifecourse SES seeks to represent cumulative exposures of SES while subclinical atherosclerosis represents the cumulative effect of various physiologic

processes throughout the lifecourse. Currently, only two studies have evaluated the association between lifecourse SES and subclinical atherosclerosis. Lamont et al. reported SES at birth was negatively associated with carotid artery IMT, although only SES at birth in women was a statistically significant covariate independent of adult SES in the Newcastle cohort (13). Rosvall et al. reported increased odds of carotid stenosis for those with low SES during childhood and low SES during adulthood, but only among women in the Malmö Diet and Cancer Study (14). Neither of these studies performed a multi-level analysis to address the effects of neighborhood SES and individual SES across the lifecourse on the extent of subclinical atherosclerosis.

Thus, the aim of this proposal is to evaluate the multi-level relationship between lifecourse SES and subclinical atherosclerosis among African-American and white men and women in the ARIC Study.

5. Main Hypothesis/Study Questions:

Part A

The first part of this proposal will focus on the development of individual-level and multi-level lifecourse SES measures and the descriptive analysis of these findings. The use of cumulative measures of SES will be explored. For an example of a cumulative measure of SES, a participant who reported low education, low income, and low occupation category will have a lower cumulative score than a participant who reported high education, high income, and high occupation category. The development of cumulative measures of SES will include all available SES measures.

Part B

The second part of this proposal will utilize the cumulative measures of SES developed in part A to evaluate the multi-level association between lifecourse SES and subclinical markers of atherosclerosis.

1. Is low SES, as assessed by cumulative individual lifecourse SES score, associated with increased intima media thickness (IMT) of the carotid artery?
 - a. If so, is this association stronger for females than males?
 - b. If so, is this association stronger for African Americans than whites?
 - c. If so, does this association remain after taking into account neighborhood lifecourse SES?

2. Is low SES, as assessed by cumulative individual lifecourse SES score, associated with decreased ankle brachial index (ABI)?
 - a. If so, is this association stronger for females than males?
 - b. If so, is this association stronger for African Americans than whites?
 - c. If so, does this association remain after taking into account neighborhood lifecourse SES?

6. Data (variables, time window, source, inclusions/exclusions):

Since this proposal seeks to evaluate subclinical atherosclerosis, persons with prevalent coronary heart disease at the baseline examination will be excluded from part b of the analysis. Additional exclusions include participants with missing data for IMT, ABI, and/or other covariates.

1.) Sociodemographic variables: age, race, gender, ARIC field center, family income, occupation, and education (all measured at visit 1), in addition to lifecourse SES measures obtained from the socioeconomic status form administered at visit 4 as part of the Lifecourse SES ancillary study (neighborhood poverty, occupational responsibility, etc.).

2.) Health-related variables: hypertension status, systolic blood pressure, use of anti-hypertensive medication(s), diabetes status, cigarette smoking status, alcohol consumption, body mass index (BMI), waist-to-hip ratio (WHR), physical activity index, total cholesterol, HDL cholesterol, LDL cholesterol, use of cholesterol-lowering medication(s), history of coronary heart disease, and history of stroke measured at visit 1.

3.) Dependent variables: IMT of the carotid artery and ABI measured at visit 1

7.a. Will the data be used for non-CVD analysis in this manuscript? Yes No

b. If Yes, is the author aware that the file ICTDER01 must be used to exclude persons with a value RES_OTH = "CVD Research" for non-DNA analysis, and for DNA analysis RES_DNA = "CVD Research" would be used? Yes No

(This file ICTDER01 has been distributed to ARIC PIs, and contains the responses to consent updates related to stored sample use for research.)

8.a. Will the DNA data be used in this manuscript? Yes No

8.b. If yes, is the author aware that either DNA data distributed by the Coordinating Center must be used, or the file ICTDER01 must be used to exclude those with value RES_DNA = "No use/storage DNA"? Yes No

9. The lead author of this manuscript proposal has reviewed the list of existing ARIC Study manuscript proposals and has found no overlap between this proposal and previously approved manuscript proposals either published or still in active status. ARIC Investigators have access to the publications lists under the Study Members Area of the web site at: <http://bios.unc.edu/units/csc/ARIC/stdy/studymem.html>

Yes No

10. What are the most related manuscript proposals in ARIC (authors are encouraged to contact lead authors of these proposals for comments on the new proposal or collaboration)?

MS #038: Social factors and atherosclerosis

MS #180: Neighborhood socioeconomic characteristics and cardiovascular disease

References:

1. Kaplan GA, Keil JE. Socioeconomic factors and cardiovascular disease: a review of the literature. *Circulation*. 1993;88:1973-98.

2. Burke GL, Evans GW, Riley WA, et al. Arterial wall thickness is associated with prevalent cardiovascular disease in middle-aged adults. The Atherosclerosis Risk in Communities (ARIC) Study. *Stroke*. 1995;26:386-91.

3. Chambless LE, Heiss G, Folsom AR, et al. Association of coronary heart disease incidence with carotid arterial wall thickness and major risk factors: the Atherosclerosis Risk in Communities (ARIC) Study, 1987-1993. *American Journal of Epidemiology*. 1997;146:483-94.
4. Hemingway H, Shipley M, Macfarlane P, Marmot M. Impact of socioeconomic status on coronary mortality in people with symptoms, electrocardiographic abnormalities, both or neither: the original Whitehall study 25 year follow up. *Journal of Epidemiology & Community Health*. 2000;54:510-6.
5. Rooks RN, Simonsick EM, Miles T, et al. The association of race and socioeconomic status with cardiovascular disease indicators among older adults in the health, aging, and body composition study. *Journals of Gerontology Series B-Psychological Sciences & Social Sciences*. 2002;57:S247-56.
6. Diez-Roux AV, Nieto FJ, Tyroler HA, Crum LD, Szklo M. Social inequalities and atherosclerosis. The atherosclerosis risk in communities study. *American Journal of Epidemiology*. 1995;141:960-72.
7. Din-Dzietham R, Liao D, Diez-Roux A, et al. Association of educational achievement with pulsatile arterial diameter change of the common carotid artery: the Atherosclerosis Risk in Communities (ARIC) Study, 1987-1992. *American Journal of Epidemiology*. 2000;152:617-27.
8. Lynch J, Kaplan GA, Salonen R, Cohen RD, Salonen JT. Socioeconomic status and carotid atherosclerosis. *Circulation*. 1995;92:1786-92.
9. Lynch J, Krause N, Kaplan GA, Salonen R, Salonen JT. Workplace demands, economic reward, and progression of carotid atherosclerosis. *Circulation*. 1997;96:302-7.
10. Lynch J, Kaplan GA, Salonen R, Salonen JT. Socioeconomic status and progression of carotid atherosclerosis. Prospective evidence from the Kuopio Ischemic Heart Disease Risk Factor Study. *Arteriosclerosis Thrombosis & Vascular Biology*. 1997;17:513-9.
11. van Rossum CT, van de Mheen H, Witteman JC, Mackenbach JP, Grobbee DE. Socioeconomic status and aortic atherosclerosis in Dutch elderly people: the Rotterdam Study. *American Journal of Epidemiology*. 1999;150:142-8.
12. Lynch J, Kaplan GA, Salonen R, Salonen JT. Socioeconomic status and progression of carotid atherosclerosis. Prospective evidence from the Kuopio Ischemic Heart Disease Risk Factor Study. *Arterioscler Thromb Vasc Biol* 1997;17:513-9.
13. Lamont D, Parker L, White M, et al. Risk of cardiovascular disease measured by carotid intima-media thickness at age 49-51: lifecourse study. *Bmj*. 2000;320:273-8.
14. Rosvall M, Ostergren PO, Hedblad B, Isacson SO, Janzon L, Berglund G. Life-course perspective on socioeconomic differences in carotid atherosclerosis. *Arterioscler Thromb Vasc Biol* 2002;22:1704-11.