ARIC Manuscript Proposal # 1715

PC Reviewed: 11/9/10 **Status: A** **Priority: 2**
SC Reviewed: _________ **Status: _____** **Priority: ____**

1.a. Full Title: Physical activity and incidence of cardiovascular disease in African Americans

b. Abbreviated Title (Length 26 characters): Phys act & CVD in Afr Am's

2. Writing Group:
Writing group members: Elizabeth J. Bell, Aaron R. Folsom, and Pamela L. Lutsey.

I, the first author, confirm that all the coauthors have given their approval for this manuscript proposal. EB **[please confirm with your initials electronically or in writing]**

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ARIC author to be contacted if there are questions about the manuscript and the first author does not respond or cannot be located (this must be an ARIC investigator).

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3. Timeline:
Literature review and obtain human subjects approval - 2 months
Data analysis - 2 months
Writing the manuscript - 2 months
Coauthor review and revisions - 2 months

4. Rationale:

There is substantial evidence that physical activity reduces a person's risk of coronary heart disease (CHD).[1-3,7] However, most of the studies on the relationship between physical activity and CHD examined Caucasian populations.[4] Data on the relationship between physical activity and CHD occurrence in African Americans and other minorities is scant. In a systematic evidence review of 30 prospective cohort studies that examined the association between physical activity and CHD risk, only two of them included >10% nonwhite participants in their investigations.[1,5,6,8]

The first of these two prospective studies with >10% nonwhite particpants looked at an African American population, but the sample size was too small to be useful.[8] The second of these two used data from the ARIC study[5]; it analyzed the relationship between physical activity at baseline and CHD incidence in African Americans over a follow-up period of 4-7 years. The results of the ARIC study showed no association between physical activity and CHD incidence among African Americans. The investigators were unsure why.

The follow-up period in the previous ARIC analysis was only 4-7 years. It yielded few CHD events among African Americans (n = 89). Using ARIC data with 20-years of follow-up, we propose to reexamine the association between physical activity and CHD incidence in African Americans. The possibility of false negative findings (type II error) will be lower with the additional follow-up time and a greater number of events.

There is also significant evidence[9] that physical activity in Caucasians reduces the overall risk of CVD, not just CHD. Because of this, we hypothesize that ischemic stroke, heart failure, and total CVD in African Americans will also have an inverse relationship with physical activity. We plan to examine available data to see if it agrees. For comparison, we will also examine the relation of physical activity to CVD in Caucasians.

5. Main Hypothesis/Study Questions:

This study will prospectively examine the relationship between physical activity and CVD incidence in African Americans.

It is hypothesized that, among African Americans, CVD incidence is negatively associated with physical activity.

We will also examine the components of CVD individually:
It is hypothesized that among African Americans, coronary heart disease (CHD), ischemic stroke, and heart failure (HF) incidence rates are negatively associated with physical activity.

6. Design and analysis (study design, inclusion/exclusion, outcome and other variables of interest with specific reference to the time of their collection, summary of data analysis, and any anticipated methodologic limitations or challenges if present).

<u>Study Design</u>
The study design will be prospective cohort.

<u>Inclusions/Exclusions</u>
We will include Caucasians and African Americans with baseline measurements and

exclude participants with any of the following at baseline: prevalent CHD, ischemic stroke, HF, or missing PA data. These same three exclusions apply to models using each of the four outcome variables (ex: looking at the relationship between ischemic stroke and physical activity, those with prevalent CHD, ischemic stroke, or HF at baseline will be excluded).

Variables

Exposure variable:

Physical activity. Physical activity will be assessed using a questionnaire developed by Baecke et al. [10] The Baecke questionnaire has 3 scores: sports, leisure, and work. We will use look at each score separately and also look at total activity (a combination of the 3 scores) to define physical activity.

The Baecke questionnaire was administered at visit 1 and visit 3 during the ARIC study. For each of the individual scores and the total activity score, we will take the average of the two visits and use this as the physical activity score for a participant. If a participant only has a physical activity score for visit 1, this will be his or her physical activity score.

Outcome variables:

CHD incidence. This will be defined as the first validated definite or probable myocardial infarction (MI) or definite CHD death.

Ischemic stroke incidence. This will be defined as the first hospitalization due to definite or probable ischemic stroke or death due to ischemic stroke.

HF incidence. This will be defined as the first hospitalization due to HF or HF coded as the underlying cause of death on death certificate.

CVD incidence. This will be defined as the first HF, CHD, or ischemic stroke (as defined above) event.

Proposed confounders include, but are not limited to: ARIC field center, sex, age, education level, smoking status, alcohol.

Possible mediators include, but are not limited to: diabetes, BMI, high blood pressure, fibrinogen, serum lipids.

Proposed effect modifiers include, but are not limited to: age, race, gender, and BMI.

Data Analysis

Findings will be stratified by sex and race (Caucasians and African Americans). The main analysis is for African Americans, but Caucasians will serve as a comparison group. Baseline characteristics will be described using means and proportions.

Physical activity will be categorized into quintiles for each Baecke score (sports, leisure, work, and total). Participants in the highest quintile will be the least active and participants in the lowest quintile will be the most active. The lowest quintile will serve as the reference group. Incidence rates will be calculated by physical activity category.

Cox proportional hazards regression will be used to assess the relationship between physical activity and incident CVD. Every model will be run four times, with four different outcome variables: CVD, CHD, ischemic stroke, and HF. Exact confounders and effect modifiers have yet to be determined for some of the models, but will likely stay constant for all four outcome variables. All models will be stratified by gender and race. We will look at the hazards ratios, but also look for a linear trend among the quintiles using the chi-square test.

Model one will adjust for ARIC field center (Jackson or Forsyth for African Americans), age and education. Model two will be a behavioral model; it will include model one + confounders (e.g., smoking, alcohol, and education). Model three will adjust for potential mediators.

We will, again using Cox proportional hazards regression, test for significant interactions with age, race, sex, and BMI using cross-product terms in the models.

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

b. If Yes, is the author aware that the file ICTDER03 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 ICTDER03 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 ___X_ No

8.b. If yes, is the author aware that either DNA data distributed by the Coordinating Center must be used, or the file ICTDER03 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://www.cscc.unc.edu/ARIC/search.php

___X___ 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#342: Physical activity and incidence of coronary heart disease in middle-aged women and men

As part of this analysis, Dr. Aaron Folsom looks at the association between physical activity and incidence of CHD in African Americans over 4-7 years of follow-up. Dr. Folsom is the senior author on this manuscript proposal.

11. a. Is this manuscript proposal associated with any ARIC ancillary studies or use any ancillary study data? **____ Yes _X___ No**

11.b. If yes, is the proposal

___ A. primarily the result of an ancillary study (list number* _________)

___ B. primarily based on ARIC data with ancillary data playing a minor role (usually control variables; list number(s)* __________ __________ __________)

*ancillary studies are listed by number at http://www.cscc.unc.edu/aric/forms/

12. Manuscript preparation is expected to be completed in one to three years. If a manuscript is not submitted for ARIC review at the end of the 3-years from the date of the approval, the manuscript proposal will expire.

References

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4. Berlin JA, Colditz GA. A meta-analysis of physical activity in the prevention of coronary heart disease. *Am J Epidemiol*. 1990;132:612– 628.
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7. Powell, K. E., P. D. Thompson, C. J. Caspersen, and J. S. Kendrick. Physical activity and the incidence of coronary heart disease.Annu. Rev. Public Health 8:253-287, 1987.
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10. Baecke, J. A. H., J. Burema, and J. E. R. Fritters. A short questionnaire for the

measurement of habitual physical activity in epidemiological studies. *Am. J. Clin. Nutr*. 36:932-942, 1982.