ARIC Manuscript Proposal # 1603

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

1.a. Full Title: Race, Lung Function, and Mobility: the ARIC Study

b. Abbreviated Title (Length 26 characters): Race, Lung Function, and Mobility

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

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3. Timeline: This is an analysis of existing data only. We anticipate the completion of the manuscript <1 year after approval.
4. **Rationale:**

Studies of racial disparities in functional status in older adults have consistently found African Americans to have higher rates of disability than their white counterparts.\(^1\)\(^-\)\(^3\) Given that the disablement process can extend over several years, even decades, it is likely that precursors to disability such as mobility limitations and other functional impairments are more prevalent in African Americans and that such disparities in function are present prior to old age. Support for this notion comes from a study conducted in the St. Louis area which found black adults aged 51-61 years to have a higher prevalence of sub-clinical disability than a national sample of similarly aged whites\(^4\) and rates of functional limitation similar to those in a national sample of persons aged 65 and over.\(^5\) Focused research on race-related differences in mobility and the impairments and health conditions that may underlie functional deficits in middle-aged adults is lacking.

Although several conditions have been found to impact mobility,\(^6\) more focused investigations of specific impairments that contribute to the disablement process and known to vary by race are needed. Lung function, one potentially important but understudied, physiologic impairment may be a key contributor to race-related differences in mobility.\(^7\)\(^-\)\(^9\) Blacks have disproportionately higher rates of poor lung capacity and upper respiratory conditions such as asthma and chronic obstructive pulmonary disease.\(^10\)\(^,\)\(^11\) Higher rates of smoking, obesity, and residence in neighborhoods with poor air quality among Black individuals also may contribute to and potentially compound the functional consequences of poor lung function.\(^10\)\(^,\)\(^12\)\(^,\)\(^13\) Although the relationship between lung function and mobility has been documented among adults with chronic obstructive pulmonary disease (COPD), little is known about this relationship in middle-age healthy individuals where there is better potential for preventative interventions. The overall goal of this project is to evaluate inter-relationship(s) among and between race, lung function, and mobility in black and white adults aged 45 to 64 years with no discernible mobility limitation at baseline. We will apply the weathering hypothesis which contends that the health status of blacks begins to decline prematurely in early adulthood and as a consequence of long-term and compound exposure to unfavorable social-environmental, psychosocial and economic conditions, disparities in health status/indicators increase with age.\(^14\)

5. **Main Hypothesis/Study Questions:**

We hypothesize that blacks will have a higher prevalence of impaired lung function than whites over 9 years of observation. The average age of blacks who have impaired lung function will be younger than the average age for whites. We also hypothesize that impaired lung function among blacks will be associated with higher incidence of mobility limitation and poorer lower extremity function relative to whites within and across age.

To test these hypotheses, we propose to conduct analyses to answer the following questions:

1. Do blacks have higher prevalence of impaired lung function than whites?
2. Are blacks who have impaired lung function on average younger than whites?
3. Do blacks with impaired lung function have higher incidence of mobility limitation or report poorer lower extremity function than whites with impaired lung function?
4. To what extent do differences in lung function contribute to race differences in mobility limitation and severity of lower extremity functioning independent of demographic and health-related characteristics?

Results from this study will enhance the understanding of race differences in mobility in a middle-aged biracial cohort. These findings will inform future research to clarify the mechanisms that contribute to racial disparities in mobility.

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).

Exposure
Participants self reported their race at baseline as: white, African American, American Indian or Alaskan Indian, or Asian or Pacific Islander. For this study only African Americans and whites will be included.

Outcome
Mobility limitation and severity of lower extremity functioning, which were assessed at visit 4, will be the two outcome measures. Mobility limitation will be defined as self-report of any difficulty or inability of walking a quarter mile or walking up ten steps without resting. We will construct a scale to quantify the severity of lower extremity functioning which will be based on reported levels of difficulty from walking a quarter mile, walking from one room to another on the same level, walking up ten steps, and stooping, crouching and kneeling. Participants with no difficulty walking from one room to another on the same level will be assigned scores ranging from zero to four based on their reported difficulty walking ¼ mile. Those reporting some difficulty walking from one room to another on the same level will be assigned a score of five, and participants reporting much difficulty or inability to walk from one room to another on the same level will be assigned a score of six. Scores for difficulty walking up ten steps without resting will be assigned as 0=no difficulty, 1=some, and 2=much difficulty or unable to do. Difficulty stooping, crouching or kneeling will be dichotomized as able to do (with or without difficulty) or unable with scores of zero and one, respectively. Scores will be summed to create a ten point summary scale with a lower score indicating better lower extremity functioning.15

Covariates
Key variables include those obtained at baseline: income, education, and occupation, age, gender, race, chronic conditions, smoking and drinking history, pulmonary function (FEV₁, FEV₁ to FVC ratio, FVC% predicted, FEV₁% predicted, FVC), medical history, respiratory symptoms, physical activity, BMI, self-reported health, marital status, and health insurance.

Exclusions
Because measures of mobility were not collected at baseline, we will exclude participants who reported using a wheelchair, crutches, walker, or cane; those with prevalent coronary artery disease, stroke, cancer, or chronic lung disease; and those who reported poor self-rated health at baseline to eliminate individuals who are likely to have mobility problems. Using these measures as proxies for mobility deficits to exclude
participants have been previously published using these data.\textsuperscript{16} We will exclude African Americans in Maryland and Minnesota because of the small sample size (n=55)\textsuperscript{16} and individuals who report their race other than African American or white. Similar to Yeh and colleagues\textsuperscript{17} we will exclude individuals with missing data on spirometry, self-reported asthma or chronic lung disease or use of medications for the conditions at baseline. We also exclude individuals with spirometry values in the upper or lower 1\% of FVC, FEV\textsubscript{1}, FEV\textsubscript{1} to FVC ratio at baseline because they represent outliers.

**Statistical Methods**

Chi-square and ANOVA tests will be used to evaluate the proportional and mean differences by race for the demographic and health-related characteristics, lung function, and mobility. Regression analyses will be performed to examine the association among race, lung function and mobility. Interactions between race and lung function will be tested. If interactions are significant all analyses will be stratified by race.

**Limitations**

Mobility measures were not obtained at baseline but we will use proxy measures to exclude participants who are likely to have mobility problems. As noted above, these measures have been used in a previously published manuscript using these data. Similar to Houston and colleagues\textsuperscript{16} we intend to mention this in our discussion section of the manuscript. We will also conduct a sensitivity analyses to determine whether excluding these individuals will influence our results.

**References**


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.cscce.unc.edu/ARIC/search.php](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# 1102, 1099, 830, 874, 825, 829

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.