ARIC Manuscript Proposal #2270

PC Reviewed: 12/10/13 **Status: A** **Priority: A**
SC Reviewed: _____ **Status: _____** **Priority: ____**

1.a. Full Title: **Associations between husbands' and wives' levels of sport and leisure physical activity in the Atherosclerosis Risk in Communities (ARIC) cohort study**

b. Abbreviated Title (Length 26 characters): **Physical activity in ARIC couples**

2. Writing Group:
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- Others welcome

I, the first author, confirm that all the coauthors have given their approval for this manuscript proposal. S.K. **[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: Starting immediately, to be completed during my sabbatical (ending Feb. 28, 2014)

4. Rationale:
Physical activity (PA) is associated with reduced risk of various chronic diseases including coronary heart disease, obesity, type 2 diabetes mellitus, hypertension, osteoporosis, depression, and breast and colon cancer [1-3]. Moreover, the impact of physical inactivity (i.e., not engaging in the recommended amount of physical activity) on the burden of non- communicable disease worldwide has been reported to be similar to that of smoking[3]. A physically active lifestyle was

listed among the Healthy People 2010 Leading Health Indicators and physical inactivity has been recognized as a major public health concern in the U.S. However, there has been little to no progress toward meeting population level targets for PA. Between 1997 and 2008, the proportion of adults who report regularly engaging in moderate or vigorous PA remained stable at just 32%[4]. Estimates of the proportion of adults meeting the guidelines significantly differ according to the methods used for data collection: the most recently analyzed data from NHANES show that the proportion of adults meeting the guidelines for moderate plus two instances of vigorous physical activity ≥150 minutes/week is 62.0% according to self reports, and only 9.6% according to accelerometer-measured PA[5].

Marriage and co-habitation with a steady partner are known to benefit health. Health indicators have been found to be generally better and mortality has consistently been shown to be lower for married persons compared to unmarried persons[6-7]. PA has been referred to as considerably contributing to the lower risk of cardiovascular mortality in married adults[8]. Similarities in defined health behaviors and lifestyles have been shown in married couples[9-11]. Spousal concordance has been shown both for negative behaviors, such as smoking, alcohol, and illicit drug use, and positive behaviors, including dietary quality and attending medical screenings[9, 12]. Data on spousal concordance of PA and whether the associations differ for husbands and wives are more limited. Although correlations between husbands' and wives' PA have been shown[13-14], longitudinal associations are less well established. Concordant longitudinal changes in PA have been reported in couples[15], and a recent study supports concordance in PA trajectories of married couples during a 6-year period[16]. However, these reports are based on information collected using a single question about PA[15] or using a combined sport and leisure time measure on frequency of vigorous, moderate and mild PA with a ceiling response of "more than once a week"[16].

In the Atherosclerosis Risk in Communities (ARIC) Study, PA is evaluated using the ARIC/Baecke questionnaire, a reliable questionnaire allowing for an accurate assessment of leisure-time PA[17]. Data on all four dimensions of PA are collected (type, frequency, duration and intensity) and on different domains as recommended by the AHA Scientific Statement on Assessment of Physical Activity, 2013[18]. Details on PA were collected at baseline (1987-1989) and visit 3. Separate scales and indexes were available for the various domains, including sport and leisure PA. We aim to study the association between husbands' and wives' levels of sport and leisure PA, changes in levels of PA in couples, and potential differences in the pattern of spousal impact on husbands' and wives' levels of PA in the 4,507 spouse pairs participating in the ARIC cohort study.

5. Main Hypothesis/Study Questions:

1. Levels of sport and leisure PA of individual ARIC participants are associated with their spouses' PA levels.
2. Changes in the levels of PA in one spouse are associated with changes in the level of the other.
3. Is the impact of spousal PA different in husband-to-wife and wife-to-husband associations?

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).

Data on levels of sport and leisure PA collected at baseline and visit 3 for 4,507 spouse pairs in ARIC cohort will be used for the study of cross-sectional and prospective associations.

Main outcome variables:

- Levels of sport and leisure PA for husbands and wives
- Changes in sport and leisure PA over the follow-up period

Study population:
The study population includes white and African-American ARIC married couples with complete information on sport and leisure PA at baseline and visit 3. Participants with missing data on main covariates will be excluded.

Summary of data analysis:

1. Descriptive statistics:
    a. Differences in baseline characteristics between husbands and wives will be studied with McNemar's test for race, smoking status, education, diabetes, hypertension, CVD, COPD, cancer and self-ranked general health status, and with paired t-test for age, BMI, and level of sport and leisure PA.
    b. Spearman correlation between husbands' and wives' age, BMI and levels of sport and leisure PA will be assessed.
2. Statistical analyses:
    a. Cross-sectional analysis will be performed with linear regression for each visit.
    b. We will use linear regression with the change in PA level of the participant as the outcome and the change in the PA level of their spouse as the main predictor.

    Four models will be studied: 1) unadjusted, 2) adjusting for individual age, race, and education, 3) additionally adjusting for individual BMI, smoking, self-ranked general health status, diabetes, hypertension, CVD, cancer, and COPD, 4) adjusting also for spouse's age, race, education and risk factors. In longitudinal models, individual BMI, smoking, self-rated general health status, diabetes, hypertension, CVD, cancer, and COPD, as well as spouse's risk factors will be entered as time-varying covariates. The linearity assumption will be tested and alternative non-linear approaches to modeling will be studied.

Anticipated challenges/limitations:
PA was also measured in ARIC visit 5, but due to both a change in the questions asked between visit 3 and 5, and the long time lag between the visits, we did not feel it was appropriate to include those measures here. However, having only two time-points is a limitation of this analysis, as is the self-reported nature of the available PA measures in ARIC.

7.a. Will the data be used for non-CVD analysis in this manuscript? __Yes __X__No

8.a. Will the DNA data be used in this manuscript? ___Yes __X__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)?

- Richardson MT, Ainsworth BE, Wu HC, Jacobs DR Jr, Leon AS. Ability of the Atherosclerosis Risk in Communities (ARIC)/Baecke Questionnaire to assess leisure-time physical activity. *Int J Epidemiol*. 1995; 24:685-93.
- Meyer AM, Evenson KR, Couper DJ, Stevens J, Pereria MA, Heiss G. Television, physical activity, diet, and body weight status: the ARIC cohort. *Int J Behav Nutr Phys Act.* 2008; 17: 5:68.
- McAdams DeMarco M, Coresh J, Woodward M, Butler KR, Kao WH, Mosley TH, Jr., Hindin M, Anderson CA. Hypertension status, treatment, and control among spousal pairs in a middle-aged adult cohort. *Am J Epidemiol*. 2011;174:790-796.
- Cobb, L.K. Mara McAdams DeMarco, Cheryl Anderson, Ellen Demerath, Mark Woodward, Elizabeth Selvin, Josef Coresh. Body mass index and change in obesity status over 25 years: the relationship within spouse pairs in the Atherosclerosis Risk in Communities Study [Manuscript Proposal]

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

12a. 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.

12b. The NIH instituted a Public Access Policy in April, 2008 which ensures that the public has access to the published results of NIH funded research. It is **your responsibility to upload manuscripts to PUBMED Central** whenever the journal does not and be in compliance with this policy. Four files about the public access policy from http://publicaccess.nih.gov/ are posted in http://www.cscc.unc.edu/aric/index.php, under Publications, Policies & Forms. http://publicaccess.nih.gov/submit_process_journals.htm shows you which journals automatically upload articles to Pubmed central.

References

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2. U.S. Department of Health and Human Services. *Physical Activity Guidelines Advisory Committee Report, 2008.* Washington, DC: U.S. Department of Health and Human

Services; 2008. http//www.health.gov/paguidelines/Report/pdf/CommitteeReport.pdf/. Accessed November 7, 2013.
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9. Homish GG, Leonard KE. Spousal influence on general health behaviors in a community sample. *Am J Health Behav*. 2008763-32:754;
10. McAdams DeMarco M, Coresh J, Woodward M, Butler KR, Kao WH, Mosley TH, Jr., Hindin M, Anderson CA. Hypertension status, treatment, and control among spousal pairs in a middle-aged adult cohort. *Am J Epidemiol*. 2011;174:790-796
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16. Li K-K, Cardinal BJ, Acock AC. Concordance of physical activity trajectories among middle-aged and older married couples: Impact of diseases and functional difficulties. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*. 2013;68:794-806

17. Richardson MT, Ainsworth BE, Wu HC, Jacobs DR, Jr., Leon AS. Ability of the Atherosclerosis Risk in Communities (ARIC)/Baecke questionnaire to assess leisure-time physical activity. *Int J Epidemiol*. 1995;24:685-693
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