**ARIC Manuscript Proposal #2450**

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|---|---|---|
| **PC Reviewed: 10/14/14** | **Status: A** | **Priority: 2** |
| **SC Reviewed: _____** | **Status: _____** | **Priority: ____** |

**1a. Full Title**: Physical Activity Patterns and Predictors of Change from Midlife to Older Adulthood: the Atherosclerosis Risk in Communities (ARIC) Study

**b. Abbreviated Title (Length 26 characters)**: patterns of physical activity

**2. Writing Group**:

Writing group members (alphabetical order): Kelly Evenson, Kelley Gabriel, Dmitry Kats, Gerardo Heiss, Priya Palta, others welcome

I, the first author, confirm that all the coauthors have given their approval for this manuscript proposal. X **(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**: Analyses to start upon approval of proposal. Submit for publication within 6 months from proposal approval.

**4. Rationale:**

Patterns of physical activity have been explored in older adult populations and suggest declining activity over time.[1-3] A few non-US studies have examined patterns of physical activity from midlife to older adulthood,[4-6] a time period where lifestyle changes due to retirement, functional limitations and increased prevalence of comorbid conditions may significantly impact physical activity patterns. Longitudinal data on physical activity from midlife to older adulthood, with characterizing information on lifestyle changes (i.e. retirement, physical function, comorbid conditions) is not widely available. ARIC provides the unique opportunity to describe the biracial change in physical activity over 20 years in a population-based cohort. It is also well-characterized to sufficiently quantify factors that predict changes in physical activity patterns.

Based on data from the World Health Organization, the UK has quantified the impact of physical inactivity on population health metrics and found that being physically inactive was directly associated with 3% of the country's morbidity and mortality.[7] The question of how a physically active lifestyle impacts population health metrics, such as healthy life years (HLY) or years lived free of disability, using data from population-based studies in the US has been underexplored. A few longitudinal studies of older adults have estimated the impact of physical activity on population health metrics (i.e. number of years of extra life, years free of disability, life expectancy).[8-10] The Cardiovascular Health Study (CHS) quantified the extra years of life and years of life free of impairment associated with varying levels of physical activity.[8] In this sample of older adults 74 years and older, they found that compared to being sedentary, more active individuals had 1.49 greater years of healthy life. These outcomes have not been widely explored in a well-characterized population followed from midlife into older adulthood where the quantification of changes in physical activity can also be estimated.

Studies like this one, with prospective self-reported habitual physical activity data, provide new knowledge, can speak to the applicability of current physical activity guidelines, and inform on the need to test specific preventative interventions in populations.

## 5. Main Hypothesis/Study Questions:

Aim 1: Characterize the trends in physical activity from midlife to older adulthood.

Aim 2: Quantify predictors of change in physical activity from midlife to older adulthood.

Aim 2b: Estimate the effect of physical activity, and change in physical activity levels, on population health metrics (e.g. Years of Life (YOL), Healthy Life Years (HLY), and disability-adjusted life years (DALYS)).

## 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).

**Study design:** Prospective analysis of physical activity from visits 1 to 5, predictors of change in physical activity, and the effect on estimated population health metrics.

**Exclusion:** Not Caucasian or African-American

**Exposure:** Habitual physical activity during (1) leisure and (2) sport were assessed using the Baecke Questionnaire at ARIC visits 1, 3 and 5. [11]

**(1) MET-min/week, averaged over a year, based on the report of four sport activities**

**(2) Baecke Leisure Index**

The Baecke Leisure Index ranges from 1 (low) to 5 (high). Existing ARIC derived variables will be used (listed below).

| | V1 | V2 | V3 | V4 | V5 |
|---|---|---|---|---|---|
| **ARIC Derived Variable** | **lisr_i01** | | **lisr_i31** | | **lisr_i52** |

**(3) Baecke Sport Index**
The Baecke Sport Index ranges from 1 (low) to 5 (high). Existing ARIC derived variables will be used (listed below).

| | V1 | V2 | V3 | V4 | V5 |
|---|---|---|---|---|---|
| **ARIC Derived Variable** | **sprt_i02** | | **sprt_i31** | | **sprt_i51** |

**Outcomes- Population Health Metrics:**

**(1) Years of Life (YOL)**: Number of years the participant lived in the 23 years post baseline

**(2) Healthy Life Years (HYL)**: Number of years the participant reported being in excellent or good health, compared to fair or poor, based on annual follow-up reports of self-rated health

**(3) Disability-Adjusted Life Years (DALYS):** Estimated as the sum of the years of life lost (YLL) and years of life with disability (YLD)

YLL: average number of years a person would have lived if they did not die prematurely (average life expectancy age minus age at death)
YLD: number of years lived with a disability or disease

**Analysis:**

The primary analysis will estimate the average MET-min/week exerted, over a year, based on the report of four sport activities and by incorporating reported information on hours/week and months/year spent on the four activities. The following estimates of MET-min/week will be derived: (1) total MET-min/week, (2) MET-min/week of light activity, (3) MET-min/week of moderate activity, (4) MET-min/week of vigorous activity and (5) MET-min/week of moderate/vigorous activity.

We will examine the patterns of physical activity (in MET-min/week) among participants who attended visits 1, 3 and 5. We will explore the differences in physical activity patterns among individuals who (1) only attended visit 1 and (2) only attended visits 1 and 3. Based on recommendations from the NCS Analysis Working Group, appropriate methods will be used to account for attrition. We will examine the following as predictors of change in physical activity: race, gender, education, socioeconomic status, functional status, retirement, and relevant comorbid conditions (i.e., hypertension and diabetes). As a secondary analysis, we will explore patterns of physical activity as measured by the Baecke Sport and Leisure index scores.

As a subsidiary analysis, we plan to estimate the effect of physical activity, and change in physical activity levels, on population health metrics, (e.g. YOL, HLY, DALYS) using multivariable linear regression models.

**Methodological limitations:** Age-related declines in physical activity are inevitable and will be reflected in this particular cohort who is transitioning from midlife to older adulthood from visits 1 to 5. Appropriate methods to account for attrition in the ARIC cohort will be needed to accurately estimate the changes in physical activity.

**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**

**8.c. If yes, is the author aware that the participants with RES_DNA = 'not for profit' restriction must be excluded if the data are used by a for profit group?**
**____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#333, 333a, 333b, 333c (lead: K. Evenson) - Physical Activity Patterns and Predictors of Change in ARIC-published
MS#2314 (lead: P. Palta) - Physical activity and cognitive decline
MS#1088 (lead: P. Dubbert)- Physical Activity and Cerebral Abnormalities on MRI- published
MS#1374 (lead: Gabriella Tikellis)- Association between Physical Activity and Retinal Microvascular Signs and Age-related Macular Degeneration- published
MS#1677 (lead: Christine Autenreith)- Association between Physical Activity and Stroke Risk: the ARIC Study- published

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

**11.b. If yes, is the proposal**
**__X__ A. primarily the result of an ancillary study (list number* 1998.02-Life course SES, social context, and CVD (SESCVD)**

**___ 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/

**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. Agreed**

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.

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