



LIVING LONGER IN LATER LIFE

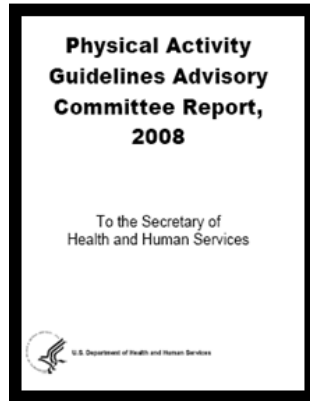
PHYSICAL ACTIVITY, MUSCLE STRENGTH, AND MORTALITY IN WOMEN AGES 63-99

Results from the OPACH Study

Michael J. LaMonte, PhD, MPH

University at Buffalo - SUNY

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Background

- Guideline recommended PA, **≈30% lower** multivariable RR for all-cause mortality.
- Observed at **older ages?** Dependent on PA **intensity?**
- **Assessing** PA is challenging in older adults; especially lower intensities.
- Use of **accelerometers** to objectively measure PA could improve understanding of associations with mortality risks in older adults.

Study Objective

Among older women in the OPACH study:

1. Examine associations between **accelerometer measured PA and mortality.**
2. Determine if associations **differ by age and race-ethnic** subgroups.



Methods



- **LLS** home examination and **accelerometer** measurements as described by Andrea.
- Present analysis **6,382 women**, mean age 78 y; 48% White, 34% Black, 18% Hispanic
- Follow-up through September 30, 2016 (**median 3.3 years**)
 - **450 (6.0%) deaths, 154 (2.4%) CVD, 87 (1.4%) Cancer**
- Cox regression analysis
- Covariables included:
 - Awake accelerometer wear time, age, race-ethnicity, education, smoking, alcohol intake, age at menopause, self-rated health status, BMI, number of comorbidities.

Results

Baseline characteristics (mean) by vital status (N = 6,382)

	Decedents	Survivors	P-value
N	405	5,932	
Age (years)	83.5	78.3	<.001
BMI (kg/m ²)	27.3	28.2	<.001
Comorbidities*	2.3	1.6	<.001
Total PA (min/d)	274.0	338.6	<.001
SB (hours/d)	9.8	8.1	<.001
Current smoker, %	3.1	2.5	.45

***Comorbidities** include CHD, stroke, cancer, diabetes, hip fracture, osteoporosis, depression, COPD, cognitive impairment, frequent falls.

Hazard Ratios (95% CI) for All-cause and CVD Mortality

	Physical Activity Tertile			P-Trend
	1 (low)	2	3 (high)	
All-cause deaths	259	124	67	
Total PA	1.00 (ref)	0.63 (0.50, 0.79)	0.43 (0.33, 0.58)	<.001
Low light PA	1.00 (ref)	0.83 (0.67, 1.04)	0.77 (0.59, 0.99)	.034
High light PA	1.00 (ref)	0.53 (0.43, 0.67)	0.41 (0.31, 0.54)	<.001
MVPA	1.00 (ref)	0.58 (0.46, 0.73)	0.36 (0.26, 0.49)	<.001
CVD deaths	97	43	14	
Total PA	1.00 (ref)	0.61 (0.42, 0.88)	0.27 (0.15, 0.48)	<.001
Low light PA	1.00 (ref)	0.67 (0.46, 0.97)	0.61 (0.39, 0.96)	.018
High light PA	1.00 (ref)	0.48 (0.33, 0.70)	0.27 (0.16, 0.46)	<.001
MVPA	1.00 (ref)	0.63 (0.43, 0.93)	0.37 (0.21, 0.64)	<.001

Adjusted for awake wear time, age, race-ethnicity, education, smoking, alcohol intake, age at menopause, self-rated health status, BMI, and number of comorbidities.

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Age- and wear-time adjusted association between [MVPA and cancer mortality](#) was statistically significant (HR: 1.00, 0.83, 0.45, trend p = .017).

Attenuated, and no longer significant after further adjustments.

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Multivariable HR (95% CI) of all-cause mortality for a 30-min/day increment in PA

	Total PA	Light PA**	MVPA**
All-cause death			
All (N=6,382; 450 deaths)	0.87 (0.84, 0.91)	0.93 (0.89, 0.97)	0.64 (0.55, 0.74)
Age			
< 80 (N=3,211; 90 deaths)	0.90 (0.84, 0.97)	0.98 (0.89, 1.08)	0.64 (0.48, 0.85)
≥ 80 (N=3,171; 360 deaths)	0.87 (0.83, 0.90)	0.92 (0.87, 0.96)	0.64 (0.54, 0.76)
Race-ethnicity			
White (N=3,150; 320 deaths)	0.88 (0.84, 0.92)	0.94 (0.89, 0.99)	0.62 (0.52, 0.74)
Black (N=2,151; 96 deaths)	0.84 (0.78, 0.91)	0.91 (0.82, 1.00)	0.58 (0.40, 0.84)
Hispanic (N=1,081; 34 deaths)	0.89 (0.79, 1.01)	0.89 (0.76, 1.04)	0.93 (0.64, 1.35)

Adjusted for awake wear-time, age, race-ethnicity, education, smoking, alcohol, age at menopause, self-rated health, BMI, and number of comorbid conditions. **Light PA** is combined minutes/day in low light PA and high light PA.

**[Light PA and MVPA are mutually adjusted for one another.](#) Statistical tests for interaction were nonsignificant at alpha .05.

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**[Light PA and MVPA are mutually adjusted for one another.](#) Statistical tests for interaction were nonsignificant at alpha .05.

Multivariable HR (95% CI) of all-cause mortality for a 5 MET-hr/wk[†] increment in PA at Light or Moderate-to-Vigorous Intensity

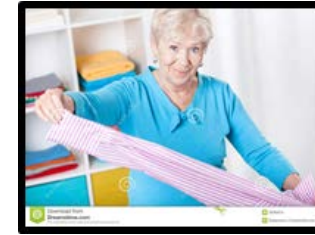
Physical Activity Intensity	HR* (95% CI)	β^* (SE)	P-value Difference between β
Light PA**	0.69 (0.56, 0.87)	-0.359 (0.11)	
MVPA**	0.35 (0.24, 0.52)	-1.042 (0.20)	P = .008 ($X^2_{df1} = 7.0$)

*Adjusted for awake wear-time, age, race-ethnicity, education, smoking, alcohol, age at menopause, self-rated health, BMI, and number of comorbid conditions. [**Light PA and MVPA are mutually adjusted for one another.](#)

[†] MET-hr/wk in LPA and MVPA was calculated by multiplying the observed hours/wk in LPA and MVPA by the median measured MET value (3.0 RMR) in our calibration study for Light PA (2.0 METs) and MVPA (3.8 METs during self-paced 400m walk).



Summary of Results



Among older community-living women in OPACH:

- ✓ **Total- and intensity-specific** PA is associated with lower risks of all-cause and CVD mortality, independent of several mortality predictors
- ✓ **Both lighter intensity and MVPA** are associated with significantly lower all-cause mortality, even when simultaneously adjusted for one another
- ✓ Associations with **cancer** mortality are less clear and require additional follow-up



Muscular Strength & Longevity



- **Aerobic physical activity** and healthy aging in older adults.
- Studies have shown **muscular strength** associated with lower mortality in later life.
 - Controlled for self-reported physical activity (PA) ... residual confounding?
 - Influence of sedentary behavior (SB) and aerobic physical fitness?

Study Objective

Among older women in the OPACH study:

1. Examined the association between **muscle strength and all-cause mortality**.
2. Determined if the association is **independent** of:
 - a) **accelerometer-measured** PA and SB, and
 - b) **timed walk** performance (*proxy of aerobic fitness*)



Methods



- **Present analysis includes 5,061 women** *with required information*
- Follow-up: mean 3.3 years; **306 (6.0%) all-cause deaths**
- Muscle strength exposures:
 - **Dominant hand grip strength (kg); 5 unassisted chair stands (time to complete)**
- Cox regression analysis
- **Covariables** included:
 - Age, race-ethnicity, education, smoking, alcohol intake, BMI, number of comorbidities
 - Accelerometer measured MVPA and SB
 - 8-meter walk speed (meters/sec) ... *proxy for aerobic fitness*

Association between Chair Stands and Mortality

	Chair Stand Quartiles				Trend
	1 (low)	2	3	4 (high)	P-value
Crude rate* (deaths)	25.5 (132)	19.7 (82)	16.3 (56)	11.1 (36)	
Model 1	1.00 ref	0.82 (0.62, 1.09)	0.76 (0.55, 1.04)	0.53 (0.36, 0.77)	<.001
Model 1 adjusting for MVPA	1.00 ref	0.91 (0.69, 1.20)	0.88 (0.65, 1.22)	0.65 (0.44, 0.94)	.033
Model 1 adjusting for walk time	1.00 ref	0.93 (0.68, 1.24)	0.89 (0.63, 1.24)	0.57 (0.38, 0.86)	.014
Model 1 adjusting for SB	1.00 ref	0.85 (0.64, 1.12)	0.79 (0.57, 1.07)	0.56 (0.38, 0.81)	.009

Data are HR (95% CI). *Deaths per 1,000 person-years.

Model 1: adjusted for age, race-ethnicity, education, smoking, alcohol, BMI, number of comorbidities.



Conclusions



Among community-living women, 63-99 years, in OAPCH:

1. Muscular strength significantly **inversely associated** with mortality, even **after controlling** for accelerometer measured MVPA and SB, and timed walk speed.
2. **Promoting muscle strength** is an important component to aging well, **in addition to** guideline recommendations for aerobic PA in later life.
3. A community-based **RCT testing the hypothesis** that increasing PA and resistance exercise will reduce CVD incidence and mortality is ongoing: **WHISH** (PI: Stefanick)

Living Longer In Later Life



- **Move more**

Every movement counts!

- **Sit less**

Get up out of the chair!

- **Strengthen your muscles**

Pump iron, stretch bands, get up out of the chair!