

**BIOGRAPHICAL SKETCH**

NAME: Marsh, Anthony Paul

eRA COMMONS USER NAME (credential, e.g., agency login): marshap

POSITION TITLE: Professor, Health and Exercise Science; Associate Dean for Research, Scholarship, and Creativity

**EDUCATION/TRAINING**

INSTITUTION AND LOCATION	DEGREE	Completion Date	FIELD OF STUDY
University of Western Australia	B.P.E.(Hons)	04/1986	Exercise Science
University of Western Australia	M.Ed.	04/1989	Exercise Science
Arizona State University, Tempe AZ	Ph.D.	12/1995	Exercise Science

**A. Personal Statement**

My previous research experience and training in biomechanics and exercise physiology make me ideally suited to function as a co-investigator (Co-I), co-leader of the clinical research core, and a REC scholar mentor for the WFU OAIC. The focus of the WFU OAIC aligns closely to my ongoing research on physical activity and weight loss interventions in older adults and the effect of these interventions on gait, muscle strength and power, balance, and physical function. My expertise in biomechanics is integral to the assessment and interpretation of these outcomes, both in the context of observational and exercise intervention studies. I have over 25 years of experience conducting interdisciplinary translational research in older adults with chronic disease where physical and muscle function are the primary outcomes. I have been the Co-PI or Co-I on multiple clinical trials of physical activity in older adults with physical limitations and chronic disease. I serve as the Co-leader of the Clinical Research Core of the WFU Claude D. Pepper Older Americans Independence Center where I am responsible for the development of novel measures to assess function and providing expertise in the integration of measures of physical and muscle function into clinical research. As summarized below, I have established a strong record of collaborative research in this area. Particularly relevant to the current study is an R18 (CLIP-II) that will be completed in 2018 (R18 HL076441, Rejeski, Marsh) and a U01 (The LIFE Study) in 2016 (U01 AG022376). Both have involved aerobic and resistance training interventions and/or weight loss to improve functional outcomes.

1. Rejeski WJ, Ambrosius WT, Burdette JH, Walkup MP, **Marsh AP**. Community weight loss to combat obesity and disability in at-risk older adults. *Journals of Gerontology: Medical Sciences* 2017 Jan 6. pii: glw252. doi: 10.1093/gerona/glw252. [Epub ahead of print] PMID: 28064148
2. **Marsh AP**, Applegate WB, Guralnik JM, Rejeski WJ, Church TS, Fielding RA, Gill TM, King AC, Kritchevsky SB, Manini TM, McDermott MM, Newman AB, Stowe CL, Walkup MP, Pahor M, Miller ME, LIFE study investigators. Hospitalizations during a physical activity intervention in older adults at risk of mobility disability: Exploratory analyses from the LIFE Study randomized clinical trial. *Journal of the American Geriatrics Society*, 64(5), 933-43, 2016. PMID: 27225353
3. **Marsh AP**, Janssen JA, Ip EH, Barnard RT, Ambrosius WT, Brubaker PR, Burdette JH, Sheedy JL, Rejeski WJ. (2015). Assessing Walking Activity in Older Adults: Development and Validation of a Novel Computer-Animated Assessment Tool. *Journals of Gerontology: Medical Sciences*, 70(12), 1555-61. PMID: 26261044
4. **Marsh AP**, Shea, MK, Vance Locke RM, Miller ME, Isom S, Miller GD, Nicklas BJ, Lyles MF, Carr JJ, Kritchevsky SB. (2013). Resistance training and pioglitazone lead to improvements in muscle power during voluntary weight-loss in older adults. *Journals of Gerontology: Medical Sciences*, 68(7), 828-36. PMID: PMC3693600

**B. Positions and Honors****Positions and Employment**

1987 - 1989      Research Assistant, Dept. of Human Movement Studies, Univ. of Western Australia  
1990 - 1995      Research Assistant, Dept. of Exercise Science & P.E., Arizona State University  
1995 - 1995      Faculty Associate, Dept. of Exercise Science & P.E., Arizona State University

1995 - 1996	Lecturer, Dept. of Health & P.E., California State University, Sacramento
1996 - 2001	Assistant Professor, Dept. of Health and Exercise Science, Wake Forest University
2001 - 2012	Associate Professor, Dept. of Health and Exercise Science, Wake Forest University
2012 - Present	Professor, Dept. of Health and Exercise Science, Wake Forest University
2003 - Present	Professor, VT-WFU School of Biomedical Engineering and Sciences
2006 - Present	Professor, Gerontology & Geriatric Medicine, Dept. of Internal Medicine, Wake Forest School of Medicine
2016 - Present	Associate Dean of Research, Scholarship, and Creativity, Wake Forest University

### **Other Experience and Professional Memberships**

Since 1992	Member, American College of Sports Medicine
Since 2010	Member, Gerontological Society of America
Since 2012	Fellow of the American College of Sports Medicine
Since 2016	Fellow of the Gerontological Society of America

### **Honors**

2014	Team Science Award, Wake Forest School of Medicine
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### **C. Contributions to Science**

My research has focused on the preservation or rehabilitation of physical function to reduce physical disability in older adults using behavioral interventions that focus on physical activity and weight loss. The format for my research has been randomized controlled trials conducted in a university laboratory setting and in the community. To compliment these efforts, my colleagues and I have developed novel assessment tools and interventions targeting muscle strength, power, and mobility. In particular, I investigate (1) how the basic components of muscle strength, power, balance, and body composition influence physical function and the performance of daily tasks in older adults; and (2) how interventions designed to target these basic components can lead to improvements in the health and well-being of older adults. I believe that collaborative, interdisciplinary research is essential to address the important questions in aging research.

#### **1. Innovative Approaches to Assess Physical Activity and Mobility**

My colleagues and I have developed novel state-of-the-art methods to assess physical function in older adults. The assessment of physical function in older adults using valid and reliable instruments is a fundamental requirement for conducting randomized controlled trials that examine the influence of various interventions on physical function and mobility (e.g., physical activity, drugs, and supplements). Further, both self-report and performance-based assessment tools offer unique and complimentary information about the physical capacities (real and perceived) of an individual. We have incorporated computer animation and applications using tablet technology to assess physical function and physical activity and are leading efforts to better understand the use and interpretation of accelerometry data in older adults with physical limitations.

1. Rejeski WJ, **Marsh AP**, Brubaker PH, Buman M, Fielding RA, Hire D, Manini T, Rego A, Miller ME, for the LIFE Study Investigators. (2015). Analysis and Interpretation of Accelerometry Data in Older Adults: The LIFE Study, *Journals of Gerontology: Medical Sciences*, 2015.
2. **Marsh AP**, Janssen JA, Ip EH, Barnard RT, Ambrosius WT, Brubaker PR, Burdette JH, Sheedy JL, Rejeski WJ. (2015) Assessing Walking Activity in Older Adults: Development and Validation of a Novel Computer-Animated Assessment Tool. *Journals of Gerontology: Medical Sciences*, 70(12), 1555-61. PMID: PMC3843993
3. **Marsh AP**, Wrights AP, Haakonssen EH, Dobrosielski MA, Chmelo EA, Barnard RT, Pecorella A, Ip EH, Rejeski WJ. (2015) The Virtual Short Physical Performance Battery (vSPPB). *Journals of Gerontology: Medical Sciences*, 70(10), 1233-41. PMID: 25829520
4. **Marsh AP**, Ip EH, Barnard RT, Wong YL, Rejeski WJ. (2011). Using video animation to assess mobility in older adults. *Journals of Gerontology: Medical Sciences*, 66(2), 217-27. PMID: PMC3021373

#### **2. Enhancing Physical Function via Physical Activity**

A significant part of my research has focused on large and smaller scale randomized controlled trials of physical activity in older adults to improve physical function and prevent mobility disability. I have served in a lead role as a Field Center co-PI for the LIFE-Pilot and LIFE studies. The LIFE Study was the largest and longest-term trial of physical activity in older adults conducted to date and it showed that a physical activity

intervention prevented the development of the primary outcome of mobility disability compared to a health education control. Prior to the LIFE study there was no definitive evidence that physical activity prevented mobility disability in older adults.

1. Pahor M, Guralnik JM, Ambrosius WT, Blair S, Bonds DE, Church TS, Espeland MA, Fielding RA, Gill TM, Groessl EJ, King AC, Kritchevsky SB, Manini TM, McDermott MM, Miller ME, Newman AB, Rejeski WJ, Sink KM, Williamson JD; LIFE study investigators. (2014). Effect of structured physical activity on prevention of major mobility disability in older adults: the LIFE study randomized clinical trial. *Journal of the American Medical Association*, 311(23), 2387-96. PMID: PMC4266388
2. Rejeski WJ, **Marsh AP**, Chmelo EA, Prescott AJ, Dobrosielski M, Walkup MP, Espeland MA, Miller ME, Kritchevsky SB. (2009). The Lifestyle Interventions and Independence for Elders Pilot (LIFE-P): Two-year follow-up. *Journals of Gerontology: Medical Sciences*, 64(4), 462-67. PMID: PMC2657174
3. LIFE Study Investigators. (2006). Effects of a physical activity intervention on measures of physical performance: Results of the lifestyle interventions and independence for Elders Pilot (LIFE-P) study. *Journals of Gerontology: Medical Sciences*, 61(11):1157-65. PMID: 17167156
4. **Marsh AP**, Katula JA, Pacchia CF, Johnson LC, Koury KL, Rejeski WJ. (2006). Effect of treadmill and overground walking on function and attitudes in older adults. *Medicine and Science in Sports and Exercise*, 38(6), 1157-64. PMID: 16775558

### 3. Aerobic and Resistance Training and Weight Loss to Enhance Body Composition and Physical Function

The growing population of older adults in the United States, coupled with a 40% prevalence of obesity among adults aged 65-74 underscores the urgency to develop effective approaches to address both the management of weight as people age and to preserve their mobility. My colleagues and I have conducted both short- and longer-term randomized trials of weight loss combined with different modes of physical activity and we published a review paper on the topic of obesity, intentional weight loss and physical disability in *Obesity Reviews* in 2010. Traditionally, aerobic training has been the cornerstone for physical activity when combined with caloric restriction. However, a major concern with weight loss in older adults who are overweight or obese is a loss of muscle mass that may lead to or accelerate functional limitations. We have examined resistance training as an alternative to aerobic training as it may offer some unique advantages with respect to the preservation of muscle mass and strength and power, as well as bone mass. We have also sought to increase the translational significance of our interventions by having them delivered by community partners such as the YMCA.

1. Nicklas BJ, Chmelo EM, Delbono O, Carr JJ, Lyles MF, **Marsh AP**. (2015). Effects of resistance training with and without caloric restriction on physical function and mobility in overweight and obese, older adults: A randomized controlled trial, *American Journal of Clinical Nutrition*, 101(5), 991-9. PMID: PMC4409692
2. Beavers KM, Beavers DP, Nesbit BA, Ambrosius WT, **Marsh AP**, Nicklas BJ, Rejeski WJ. (2014). Effects of an 18-month physical activity and weight loss intervention on body composition in overweight/obese older adults. *Obesity*, 22(2), 325-31. PMID: PMC3880399
3. **Marsh AP**, Janssen JA, Ambrosius WT, Burdette JH, Gaukstern JE, Morgan AR, Nesbit BA, Paolini JB, Sheedy JL, Rejeski WJ. (2013). The Cooperative Lifestyle Intervention Program-II (CLIP-II): Design and Methods. *Contemporary Clinical Trials*, Nov;36(2):382-93. PMID: PMC3843993
4. **Marsh AP**, Shea, MK, Vance Locke RM, Miller ME, Isom S, Miller GD, Nicklas BJ, Lyles MF, Carr JJ, Kritchevsky SB. (2013). Resistance training and pioglitazone lead to improvements in muscle power during voluntary weight-loss in older adults. *Journals of Gerontology: Medical Sciences*, 68(7), 828-36. PMID: PMC3693600

### 4. Role of Muscle Strength and Power in Physical Function in Older Adults

Muscle strength and power are both important contributors to physical function in older persons. My colleagues and I have conducted studies to assess the relative importance of strength and power and compared muscle strength and muscle power training protocols designed to improve muscle and physical function outcomes in older adults.

1. **Marsh AP**, Rejeski WJ, Espeland MA, Miller ME, Church TS, Fielding RA, Gill TM, Guralnik JM, Newman AB, Pahor M; the LIFE Study Investigators. (2011). Muscle strength and BMI as predictors of major mobility disability in the Lifestyle Interventions and Independence for Elders Pilot (LIFE-P), *Journals of Gerontology: Medical Sciences*, 66(12), 1376-83. PMID: PMC3210962

2. **Marsh AP**, Miller ME, Rejeski WJ, Hutton S L, Kritchevsky SB. (2009). Lower extremity muscle function following strength or power training in older adults. *Journal of Aging and Physical Activity*, 17(4), 416-43. PMID: PMC4318571
3. Norris JA, Granata KP, Mitros MR, Byrne EM, **Marsh AP**. (2007). Effect of augmented plantarflexion power on preferred walking speed and economy in young and older adults. *Gait and Posture*, 25(4), 620-27.
4. **Marsh AP**, Miller ME, Saikin AM, Rejeski WJ, Hu H, Lauretani F, Bandinelli S, Guralnik JM, Ferrucci L. (2006). Lower extremity strength and power are associated with 400-meter walk time in older adults: The InCHIANTI study. *Journals of Gerontology: Medical Sciences*, 61(11):1186-93. PMID: PMC2668162

#### 5. Balance and fall risk in older adults

A key component of the ability to function independently and safely is the ability to maintain and control posture. We have conducted laboratory based studies of balance in older adults and used novel analytic methods and tasks to challenge the postural control system. This work combined with our previous investigations of muscle function in older adults has led to funding (R01 AG042411-01, PI-Houston) to examine the effect of vitamin D supplementation on neuromuscular functions related to fall risk in older adults.

1. Pamukoff DN, Haakonssen EC, Zaccaria JA, Madigan ML, Miller ME, **Marsh AP**. (2014). The effects of strength and power training on single-step balance recovery in older adults: a pilot study. *Clinical Interventions in Aging*, 9, 697-704. PMID: PMC4000185
2. **Marsh AP**, Rejeski WJ, Hutton SL, Brown CL, Ip E, Guralnik JM. (2005). Development of a lateral mobility task to identify individuals at risk for mobility disability and functional decline. *Journal of Aging and Physical Activity*, 13(4), 363-81.
3. Norris JA, **Marsh AP**, Smith IJ, Kohut RI, Miller ME. (2005). Ability of static and statistical mechanics posturographic measures to distinguish between age and fall risk. *Journal of Biomechanics*, 38(6), 1263-72.
4. **Marsh AP**, Rejeski WJ, Lang W, Miller ME, Messier SP. (2003). Baseline balance and functional decline in older adults with knee pain: The Observational Arthritis Study in Seniors. *Journal of the American Geriatrics Society*, 51(3), 331-39.

#### Complete List of Published Work in MyBibliography:

<http://www.ncbi.nlm.nih.gov/sites/myncbi/anthony.marsh.1/bibliography/47433681/public/?sort=date&direction=ascending>

#### **D. Research Support**

##### Ongoing Research Support

1U24AR071113-02 (Pahor, Rejeski, et al.)      12/06/16-11/30/22      0.75 months AY / 0.75 months summer  
NIH/Common Fund  
MoTrPAC Consortium Coordinating Center

MoTrPAC is a large-scale, multidisciplinary research project to investigate the molecular changes that occur in response to physical activity (PA), and to relate these changes to the health benefits of PA. The coordinated effort of clinical and animal studies supported by bioinformatics and chemical analyses will achieve the Molecular Transducers of Physical Activity Consortium (MoTrPAC) goals of assessing the molecular changes that occur in response to PA. The Consortium Coordinating Center (CCC) for MoTrPAC will provide support for the organization, administration, planning, standardization, documentation, monitoring and reporting activities relating to the project. The CCC will play a pivotal role in ensuring the cohesion of the MoTrPAC by enhancing communication and integration across all study components, including the Clinical Sites, the Preclinical Animal Study Sites, the Bioinformatics Center, the Chemical Analysis Sites, and the various study committees.

2P30AG021332 (Kritchevsky)      07/01/18-06/30/23      0.00 months AY / 0.60 months summer  
NIH/NIA  
Claude D. Pepper Older Americans Independence Center Clinical Research Core

The major goals of this project are the developing, testing and dissemination of effective therapies for the treatment and prevention of physical disability in later life, and training the next generation of leaders in clinical geriatrics research.

## **Completed Research Support**

R01 AG042411

Houston (PI)

4/1/13-3/31/18

NIH/NIA

Trial of vitamin D supplementation and neuromuscular function in older adults

The goal of this study is to examine the effect of vitamin D supplementation on neuromuscular functions related to fall risk in older adults.

Role: Co-I

R18HL076441-06A1

Rejeski/Marsh (MPI)

3/1/12-2/28/17

NIH/NHLBI

CLIP-II: Cooperative Lifestyle Intervention Programs-II.

The major goal of this project is to contrast the effects of exercise only and a combined diet and exercise intervention on physical function on underserved older adults with CVD or the metabolic syndrome.

Role: Principal Investigator

P30 AG021332

Kritchevsky (PI)

7/15/13-6/30/18

NIH/NIA

Claude D. Pepper Older Americans Independence Center and Coordinating Center

The major goals of this project are the developing, testing and dissemination of effective therapies for the treatment and prevention of physical disability in later life, and training the next generation leaders in clinical geriatrics research.

U01 AG022376

Pahor (PI)

9/30/09-8/31/15

NIH/NIA

LIFE Study: Lifestyle Interventions and Independence for Elders - Field Study

A Phase 3 randomized, controlled trial (RCT) that will provide definite evidence in the use of physical exercise to prevent physical and mobility disability in older persons.

Role: Co-PI, Responsible for study conduct and all aspects of the physical activity intervention.

R01 AG020583

Nicklas (PI)

9/1/09-6/30/14

NIH/NIA

*Loss of fat tissue and functional responses to exercise in older, obese adults*

This study was a randomized, clinical trial in 130 older (65-79 yrs), obese, sedentary women and men with low physical function designed to determine whether addition of caloric restriction to a standardized, progressive resistance training program enhances improvements in skeletal muscle and overall physical function. We also examined the effects of the interventions on *in vitro* characteristics of skeletal muscle (single-fiber contractility, mitochondrial function, and intramyocellular lipid content).

Role: Co-Investigator, Responsible for study conduct and all aspects of the resistance training protocol.

P30 AG21332

Kritchevsky (PI)

6/15/09-5/31/13

NIH/NIA

WFU School of Medicine Claude D. Pepper Older Americans Independence Center and Coordinating Center

The major goals of this project are the developing, testing and dissemination of effective therapies for the treatment and prevention of physical disability in later life, and training the next generation of leaders in clinical geriatrics research.

Role: Co-Investigator, Clinical Research Core Co-Leader, Provide guidance and support on assessments for all investigators for projects using CRC resources.

## **Mentoring Experience**

I have co-mentored three junior faculty within the WFU OAIC and have worked with multiple junior faculty to provide advice on physical activity interventions and assessments of muscle and physical function. All have successful research and/or clinical careers.