Exercise for Aging Adults

A Guide for Practitioners

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Editors
Gail M. Sullivan, MD, MPH
UConn Center on Aging
University of Connecticut School of Medicine
Farmington, CT, USA

Alice K. Pomidor, MD, MPH
Department of Geriatrics
Florida State University College of Medicine
Tallahassee, FL, USA

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Preface

The first patient today is an 80-year-old retired ballet dancer, who now teaches French at the senior center, takes opera singing lessons, and enters Argentine tango competitions. I tell her she is my model of successful aging. She laughs and replies, "I have to exercise my mind and body or I feel too slow!" This exemplary patient inspires us as health care professionals to work harder to understand the motivations and needs of more typical older adults, those who believe that retirement signals a time to acquire a recliner and grab the remote. No matter the age or functional level, exercise in many ways resembles Ponce de Leon's fabled "fountain of youth" in enabling older adults to stay independent, at home, and with fewer conditions usually associated with aging.

Later that morning at the assisted living facility, I watch residents as they participate in the daily exercise class. One person is standing and swaying to the music. The other residents are sitting, in fact many of them dozing, while a single aide bounces a balloon towards the seated individuals. The effectiveness of this exercise class is questionable, yet currently this is the only activity available aside from walking to meals. In contrast, exercise does not mean playing a session of basketball as many older adults believe. For most older adults, movements to enhance flexibility, strength, balance, and aerobic capacity lie somewhere in between these extremes.

The goal of this book is to provide professionals working with older adults, at all levels of function and with various disease conditions, with activities that can be implemented immediately in a variety of settings. The intent of this book is to bridge the gap between what research has demonstrated is beneficial for older adults and implementation of these strategies in real-world settings. Each chapter provides key points about the topic, an illustrative case, and helpful resources, to jump start knowledge translation from the page directly to adults in common sites of care: clinic, home, assisted living, nursing home, hospital, or gym. We have also provided links to videos, developed specifically for this book, to demonstrate activities which can be used immediately for training staff, educating trainees, or demonstrating activities to older adults.

The first three chapters of this book provide justifications for implementing suggestions found in the latter chapters and can be used to prepare for discussions with administration, supervisors, trainees, or clinical staff. The up-to-date information in these chapters may be used as background information to motivate and/or reassure individuals regarding the need to start or add new activities and for leaders to start or enhance exercise programs.

The latter chapters of this book include specific, evidence-based techniques to increase physical activity for a variety of older adults. Experts describe strategies to employ with older adults with stable chronic conditions, with existing functional problems, in mixed group settings, and with specific conditions such as dementia or visual impairments that require adaptive approaches. One chapter describes in detail the motivational interviewing technique for talking to older adults about exercise, to move more older persons from ambivalence and towards commitment to making lifestyle changes. As cultural background determines in large part one's views about health and exercise, one chapter explores the state of research in this area and provides suggestions for successful programs targeted to diverse groups.

At the end of the book, chapters describe community-based and large-scale, system-wide strategies to initiate and sustain exercise programs for large groups of older adults. These programs require broad buy-in from diverse stakeholders, yet have been successfully implemented in diverse groups with a decade of experience for some interventions.

Each chapter can stand alone, such that you do not need to start at chapter one and read through to the end of the book. In today's overly busy world, we want to give you "just in time" tools that can be used with the older adults you will see and care for today. As aging "boomers" ourselves, we are passionate about adding value to years, as stated eloquently more than 50 years ago by John F. Kennedy:

> It is not enough for a great nation merely to have added new years to life—our objective must also be to add new life to those years [1].

We hope you enjoy reading this book and use it frequently. Please write and give us feedback.

Farmington, CT, USA — Gail M. Sullivan, MD, MPH
Tallahassee, FL, USA — Alice K. Pomidor, MD, MPH

Reference

1. Kennedy JF. Special message to the Congress on the needs of the nation's senior citizens (February 21, 1963). In: Public Papers of the Presidents of the United States; 1963. p. 189. http://www.bartleby.com/73/22.html. Accessed 9 Dec 2014.

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Video 4.1 Fitness Assessments for Older Adults. This video demonstrates 6 maneuvers used to assess fitness: the timed up and go, chair stand, arm curl, chair sit-and-reach, back scratch, one-legged stand.

Video 4.2 Water Exercises. This video demonstrates 8 water-based endurance activities, 5 strength exercises, and 2 balance exercises which can be performed in a pool to minimize weight-bearing strain on joints.

Video 4.3 Cardiovascular Exercises. This video demonstrates 5 maneuvers for endurance activity and cardiovascular conditioning: marching in place, heel digs, side steps, knee lifts, and modified jumping jacks.

Video 4.4 Pet Therapy Exercise class. This video demonstrates how dogs have been incorporated for fun and motivation in an exercise class which includes flexibility, endurance and balance training.

Video 5.1 Exploring Ambivalence. This video demonstrates how to explore ambivalence about physical activity with an older adult who has diabetes.

Video 5.2 Making a Plan and the Confidence Ruler. Demonstrates the skill of guiding while looking for DARN themes in "change talk" and use of the Confidence Ruler.

Video 5.3 The Importance Ruler. Illustrates the use of OARS techniques and the Importance Ruler.

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Video 5.5 Rolling with Resistance. Demonstrates how to use strategies such as asking permission to inform and help guide the older adult in decision-making.

Video 5.6 Relapse and Making a New Plan. Shows how to use OARS skills to support an older adult when relapse occurs and making a new plan is needed.

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Video 8.1 Seated Exercises for Coordination, Balance, Endurance and Strength. Demonstrates modified exercises for older adult residents of a facility with limited ability promoting coordination, balance, endurance and strength.

Video 8.2 Seated Exercises for Upper Extremity Range of Motion and Flexibility. Demonstrates modified exercises for older adult residents of a facility with limited ability promoting upper extremity range of motion and flexibility.

Contributors

Ashley L. Artese, MS Department of Nutrition, Food and Exercise Sciences, Florida State University, Tallahassee, FL, USA

Melissa J. Benton, MSN, PhD Beth-El College of Nursing and Health Sciences, University of Colorado at Colorado Springs, Colorado Springs, CO, USA

Ellen Binder, MD Division of Geriatrics and Nutritional Science, Washington University School of Medicine, St. Louis, MO, USA

Jennifer Sokol Brach, PhD, PT Department of Physical Therapy, University of Pittsburgh, Pittsburgh, PA, USA

Kenneth Brummel-Smith, MD Department of Geriatrics, Florida State University College of Medicine, Tallahassee, FL, USA

Wojtek Jan Chodzko-Zajko, PhD Department of Kinesiology, University of Illinois at Urbana-Champaign, Urbana, IL, USA

Rosaly Correa-de-Araujo, MD, MSc, PhD Division of Geriatrics and Clinical Gerontology, National Institute on Aging, Bethesda, MD, USA

Maren S. Fragala, PhD Institute of Exercise Physiology and Wellness, University of Central Florida, Orlando, FL, USA

Gareth Jones, PhD School of Health and Exercise Sciences, University of British Columbia – Okanagan, Kelowna, BC, Canada

Marcia G. Ory, PhD, MPH Department of Health Promotion and Community Health Sciences, Texas A&M Health Science Center School of Public Health, College Station, TX, USA

Lynn B. Panton, PhD Department of Nutrition, Food and Exercise Sciences, Florida State University, Tallahassee, FL, USA

Chae Hee Park, PhD Department of Sport and Healthy Aging, Korea National Sport University, Seoul, South Korea

Barbara Resnick, PhD, CRNP, FAAN, FAANP Organizational Systems and Adult Health, University of Maryland School of Nursing, Baltimore, MD, USA

Debra J. Rose, PhD Department of Kinesiology, California State University, Fullerton, Fullerton, CA, USA

Liza Stathokostas, PhD Faculty of Health Sciences, School of Kinesiology, Western University, London, ON, Canada

Alan B. Stevens, PhD, MA Center for Applied Health Research, Baylor Scott and White Health, Temple, TX, USA

Gail M. Sullivan, MD, MPH UConn Center on Aging, University of Connecticut School of Medicine, Farmington, CT, USA

Samuel D. Towne Jr., PhD, MPH, CPH Department of Health Promotion and Community Health Sciences, Texas A&M Health Science Center School of Public Health, College Station, TX, USA

Chapter 1
The Physiology of Aging and Exercise

Maren S. Fragala

Key Points

- Biological aging does not always align with chronological aging.
- Age-related alterations in the neuromuscular and cardiovascular systems may have the greatest impact on physical function.
- Disability and aerobic physical frailty are related and have profound effects upon outcomes important to older adults, such as nursing home residence and mortality.
- Physiologic aging mimics "disuse" syndromes.
- Exercise reverses many physiological changes commonly associated with aging.
- Disuse may actually be a key cause of primary aging.

Introduction

When an older adult complains about loss of balance or challenges during everyday activities, have you heard this response, "you have to learn to live with this as it is just a symptom of aging?" For many years, clinicians gave this discouraging response as there was no simple prescription or medication that could restore balance, improve functional capacity, or increase strength. Symptoms such as loss of balance confidence and difficulty walking long distances or rising from a toilet are frequently experienced with aging. Fortunately, there is good news: a plethora of research demonstrates that these common changes can be remedied with an important, often overlooked prescription: exercise. With habitual physical exertion

M.S. Fragala, Ph.D. (✉)
Institute of Exercise Physiology and Wellness, University of Central Florida,
12494 University Blvd, Orlando, FL 32816-1250, USA
e-mail: Maren.S.Fragala@QuestDisgnostics.com

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in the form of exercise, several studies have shown that balance can be restored, functional status can be increased, and strength can be improved.

The purpose of this chapter is to provide a general overview of the physiology of aging with a focus on the body systems most affected. In addition, this chapter will discuss the physiology supporting the potential reversibility of aging through physical exercise, to challenge the common notion that physical limitations accompanying aging are inevitable.

In exploring the physiological changes that accompany aging, this chapter will discuss how these changes mimic those we see with general physical inactivity or disuse. In fact, it is difficult to decipher which physiological changes are truly aging, per se, and which are a result of sedentary behavior. As the most functionally limiting age-related changes are largely attributed to lack of exercise, physical exercise may be close to a "fountain of youth" for older adults.

Biology of Aging

To fully understand the biology of aging, we must carefully distinguish between the concepts of chronological aging and biological aging. Chronological aging refers to the numerical age of a person in years, whereas biological age refers to the physiological status and functioning of the person, and varies among individuals of the same chronological age. For example, adults who have attained 85 years differ markedly in biological robustness. One 85-year-old person may live a full, independent, and vibrant life including safely driving, playing an 18-hole round of golf, and caring for his or her home. Another 85-year-old individual may have physical ailments and functional decline that result in his stopping favorite pastimes and moving to a nursing home. Thus, physiological changes affect individuals at different chronological ages with a high degree of variation.

Theories of Aging

Several theories have been proposed to describe the biological process of aging. Suggested theories generally fall within two prevailing themes: theories based on cellular structural damage and theories based on programmed cellular obsolescence. Theories based on structural damage attribute aging to molecular damage that accumulates in cells over time, which results in their breakdown and malfunctioning. The most widely held structural damage theory is the *free radical theory*, which is based on the oxidative cell hypothesis. According to this theory, the cumulative exposure to free radicals over a lifetime eventually damages cells so that their functioning becomes impaired. Free radical exposure can result in cellular damage in the form of wear and tear, faulty reconstruction, immunosuppression, and mitochondrial damage. In contrast, programmed obsolescence theories attribute aging to an