

Melvin H. Williams
LIFETIME Physical Fitness
A Personal Choice



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Preface

The United States is in the midst of a health and fitness boom, with millions of Americans initiating aerobic exercise programs, shifting to a more natural healthful diet, breaking the smoking habit, decreasing alcohol consumption, and using various stress reduction techniques, all in order to look and feel better. This trend is a positive one, for these life-style changes may help to prevent many of the degenerative diseases that plague our modern society. These healthful changes characterize a Positive Health Life-style in which proper exercise and sound nutrition are two of the key elements.

The health and fitness boom originated among individuals in their thirties and forties, but increasing numbers of college-aged students appear to be adopting a Positive Health Life-style. This textbook is designed to provide contemporary information about the beneficial effects of a Positive Health Life-style and how to implement and live such a life-style. It is designed primarily to be used in conjunction with a physical activity course in colleges and universities such as "Health through Exercise," but the presentation of the material is also suitable for students to use on an individual basis. The basic premise of this book is that, with proper knowledge and guidance, the student can design and implement his or her own Positive Health Life-style.

The book is organized into eleven chapters. Most chapters contain Laboratory Inventories that help to assess the individual's current health life-style and provide guidelines for modification if necessary. Key concepts and key terms are highlighted at the beginning of each chapter, and numerous figures and tables are also included to help explain the major concepts. Contemporary research studies that support the chapter content are documented at the end of each chapter.

Chapter 1 is designed to establish the basis for adopting a Positive Health Life-style, while chapter 2 emphasizes the major degenerative diseases in our society today and how a Positive Health Life-style may affect them. Chapter 3 presents an overview of human energy systems and the basic principles of designing and implementing an individualized exercise program.

The heart of the textbook is found in chapters 4 through 9, where specific guidelines for adopting a Positive Health Life-style are offered. Chapter 4 covers aerobic exercise; chapter 5 provides the basis for sound nutrition; chapter 6 deals with methods to lose body weight, while chapter 7 documents how to gain muscle weight; chapter 8 provides guidelines for improved flexibility and prevention of low back pain, while chapter 9 is concerned with stress reduction techniques. Chapter 10 briefly discusses some issues relevant to females, while chapter 11 stresses a Positive Health Life-style as a lifelong program.

Other features include a glossary of terms used and six appendices including the Recommended Dietary Allowances, the six Food Exchange Lists, salt, fat, and cholesterol content of common foods, and the Calories expended through a variety of exercises.

This text is designed to get the individual to think about the possible consequences of his or her current life-style. But more importantly, it provides a mechanism for change by actively involving the student in a number of Laboratory Inventories designed to help implement a Positive Health Life-style.

I would like to acknowledge Mr. Ed Jaffe, editor for Wm. C. Brown Publishers, who encouraged me to write this textbook in the first place and who has been extremely supportive in its development over the past year. Special thanks also goes to Sue Hedrick for her excellent work in the preparation of the final manuscript.

The contributions of the following reviewers to the development of this text are gratefully acknowledged: Norman William Johanson, City College of the City University of New York; Ralph Honderd, Calvin College; Scott K. Powers, Louisiana State University; Bruce Drummond, California State University at Sacramento; Normand Gionet, University of Moncton; and Candace J. Norton, Georgia Department of Education.

Melvin H. Williams

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LIFETIME Physical Fitness

A Personal Choice

Key Terms

chronic diseases
disease phenomena
life expectancy
life span
personal choice

physical fitness
Positive Health Life-style
prudent health behavior
rectangular society
risk factor

Key Concepts

Aging is inevitable, and the catabolic effects of the aging process also appear to be inevitable, although many may be lessened by following a Positive Health Life-style.

The most prominent theory of aging suggests that the genes begin to make errors in protein synthesis in the cells, which may eventually lead to cellular dysfunction.

Although the average life span in the United States should be about eighty-five years, it is actually only seventy-four years which indicates the average death is eleven years premature.

Most premature deaths in the United States today are due to chronic diseases (such as coronary heart disease), many of which are preventable to some degree.

A Positive Health Life-style is not solely concerned with the prevention of chronic disease, but also incorporates a striving to achieve the healthiest body possible, within our natural limitations.

Health life-style assessment inventories are educational tools designed to analyze your current health life-style and to offer you a general idea of those areas in your life that may pose a health risk.

Several key risk factors are associated with the onset of chronic disease: physical inactivity; excess body weight; a diet high in fat, cholesterol, and salt; high blood pressure; excessive stress; smoking habits; and excessive alcohol intake.

The major thrust of personal preventive medicine is to encourage personal choices of positive health behaviors that will help counteract the key risk factors mentioned above.

The development of a Positive Health Life-style should be encouraged as early in life as possible, but the benefits attributed to adopting such a life-style may be achieved at almost any age.

Two major components of a Positive Health Life-style are a properly planned exercise program and a sound nutrition program.

Introduction

Have you ever thought about getting old? Have you ever contemplated how many years you would live? Have you ever wondered if you will be able to take care of yourself during your old age? Have you ever wondered if there is anything you could do to increase both the quantity and quality of your life? As a young college student, you probably do not spend a great deal of time worrying about such questions as these, but they may have crossed your mind at one time or another. For those of you who are older than the typical college age (eighteen to twenty-four), these questions may have become increasingly important.

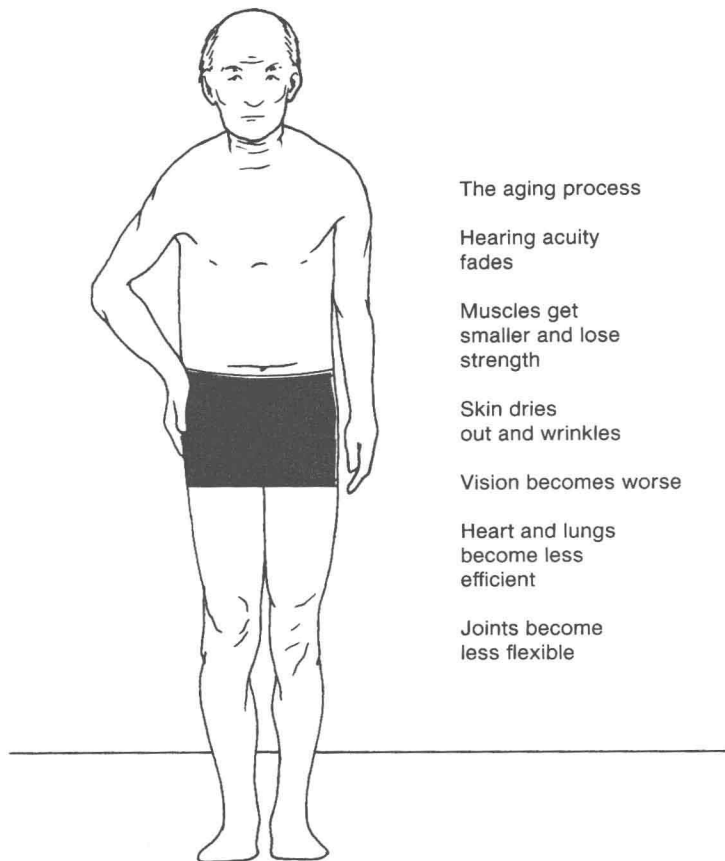
The major thrust of this book is to develop a particular set of health behaviors that may help to increase the quantity of your life and, at the same time, improve the quality. Many young adults exercise or diet, not to prevent the onset of coronary heart disease in their later years, but to improve their appearance and to feel good about themselves now. With the selection of proper health-related behaviors, both short-term and long-term benefits may be achieved concomitantly. Most of this book deals with the implementation of such health behaviors so that they constitute a life-style that we label a *Positive Health Life-style*.

The Aging Process

We all begin to age from the first day of conception, and our first twenty years or so are characterized by a dominance of anabolic processes in which the skeleton, muscles, nerves, and other bodily systems grow and develop. In general, this anabolic phase is completed in the late teens or early twenties. Following this anabolic phase are the maintenance and catabolic phases, wherein the body systems are maintained at an optimal functioning level, then begin to deteriorate as the body gets older. Some of these catabolic changes in the aging process are readily observable, while others are not as easily detected (fig. 1.1). We can note rather easily such symptoms as gray hair, impaired hearing and vision, increased body weight, stiff joints, and wrinkled skin; however, clogged arteries, less efficient lungs and heart, and diminished function of certain glands may not be readily noticed.

At the present time, aging is inevitable, and the catabolic effects that accompany the aging process also appear to be inevitable. In an affluent society that places a high value on a youthful appearance, certain technological and medical advances have been made to counteract some of these adverse catabolic effects. We can obtain an almost invisible device to improve hearing and soft contact lenses to correct vision or undergo plastic surgery to replace lost hair, smooth facial wrinkles, and remove excess body fat. Some of these applications may not be necessary, for although not all of the effects of aging are preventable, some of them can be diminished. There appears to be little we can do to deter the gradual erosion of proper vision, so glasses or contact lenses become a necessity. Hearing losses may or may not be preventable, depending on whether hearing loss is a natural occurrence of the aging process or is brought about by exposure to continuous periods of loud noise during younger years (such as from using stereo headsets). On the other hand, in most individuals, body weight may be controlled by a proper nutrition and exercise program so no excess body fat accumulates.

Figure 1.1 Physiological Changes Associated with the Aging Process. A number of physiological changes occur during the natural aging process. Some of the changes, such as decreased visual ability, are not too preventable. However, others, such as decreased cardiovascular functions, may be prevented to some degree by a Positive Health Life-style.

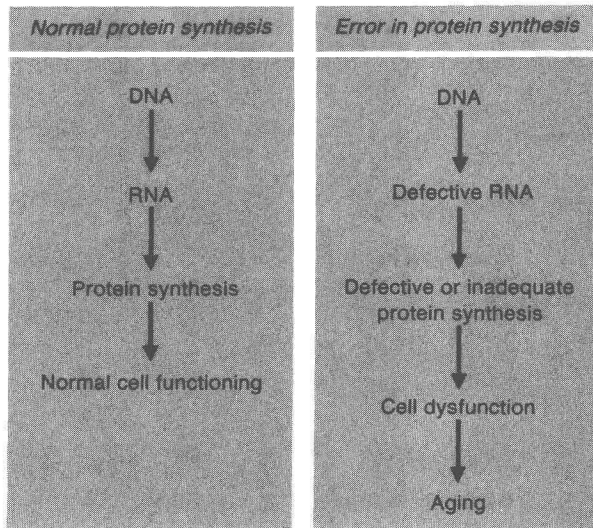


Many of the effects of aging are not primarily life-threatening. You are not likely to die from poor vision or hearing, but a decreased capacity to see or hear may lead to a greater probability of an accident—an indirect relationship to an actual cause of death. Conversely, clogged arteries, cancer, decreased heart efficiency, and altered organ (kidney or pancreas) functions, may be immediately life-threatening. How preventable are these conditions? We shall return to this question after a brief look at the aging process.

Theories of Aging

Why do we age? Aging is a very complex process that results from the interaction of a wide variety of factors. Thus a number of different theories have been advanced in attempts to explain why we grow older, and why aging produces its catabolic effects on the body. The most prominent theories center around genetic control. **One genetic**

Figure 1.2 Genetic Error Theory of Aging. The genetic error theory of aging proposes that defective DNA and RNA produce a defective or inadequate amount of protein within a particular cell and thus contribute to the aging of that cell and the related body tissues.



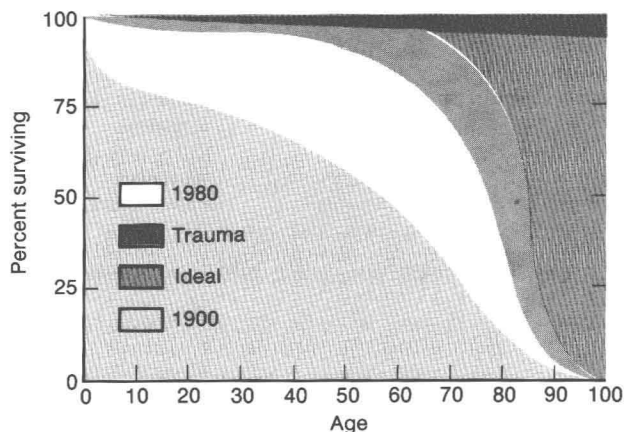
theory suggests that aging is an inherited factor—that a genetic clock or tape is present at conception, and cell function ceases when that clock or tape runs out. The second genetic theory (fig. 1.2) is that aging results when the genes that control the synthesis of every protein in the body begin to make random errors that eventually disrupt normal cellular functioning. Every cell in the body has a genetic control mechanism, designed to make that cell perform its major function—be it to form muscle proteins, produce an enzyme that may be used in energy-producing processes, or manufacture a hormone such as insulin. In simple terms, the genetic material, DNA, activates several types of RNA that control these cellular functions. Thus, the cumulative effect of random errors eventually disrupts this process and may result in cellular dysfunction. Fries and Crapo, in their excellent book on the aging process, *Vitality and Aging*, suggest that the second theory has the most supporting evidence.

Longevity

How long can you expect to live? According to Fries and Crapo, the **life span** (the biological limit to the length of life) of humans has been constant for at least 100,000 years and no change is anticipated in the near future. In their proposed rectangular society (discussed in figure 1.3), Fries and Crapo note that the median length of life is eighty-five years—one-half of all Americans can live to be eighty-five. They see a maximal age of one hundred, with the possibility of some individuals passing that barrier. However, life span must be differentiated from life expectancy. **Life expectancy** represents the number of years of life expected for a given individual or population. Life expectancy and life span do not necessarily coincide. For example, although the

Figure 1.3 Ideal Survival Curve Resulting from the Elimination of Premature Disease in the United States. By 1980, over 80 percent of the area between the curve for 1900 and the ideal curve was reduced. To interpret this figure, simply select an age, and move vertically until you intersect one of the three curves; then move horizontally to the Percent Surviving scale. For example, in 1900 less than 50 percent of the American population survived to age sixty, whereas over 80 percent survived in 1980. The ideal curve indicates a survival rate of nearly 95 percent. (Data from the National Bureau of Health Statistics).

Source: From *Vitality and Aging*, by J. Fries and L. Crapo. Copyright © 1981 by W. H. Freeman and Company. All rights reserved.



average life span may be eighty-five, the average life expectancy in the United States for men is about seventy-one years and for women is about seventy-six years. Thus, Americans are not attaining their full potential life span. Why?

The United States is becoming a **rectangular society**. Figure 1.3 helps explain this concept. Note that as the time frame progresses from 1900 to 1980, the curve becomes more rectangular in shape. The general interpretation of this curve is that more and more people are living longer, but the maximal life span is the same. Life span is fixed, but life expectancy is increasing. In 1900, only about 50 percent of the population survived to age sixty, whereas in 1980, about 83 percent were still living. This increase in life expectancy has resulted from the elimination of premature death rather than from extension of the natural life span, primarily due to the complete elimination or reduced mortality from such infectious diseases as tuberculosis, diphtheria, influenza, pneumonia, kidney disease, and diseases of early infancy. The 1980 curve can be improved so that it may begin to approach the ideal (nearly rectangular) curve. In order to do this, the **chronic diseases** (diseases that develop over a long period of time), such as atherosclerosis and other arterial diseases, cancer, diabetes, arthritis, emphysema, and cirrhosis—which account for nearly 80 percent of all premature deaths and over 90 percent of all disabilities—must be reduced. In 1900, the average individual died thirty-eight years prematurely, in 1950 seventeen years prematurely, and in 1980 twelve years prematurely. Thus, reducing the mortality rate from some of these chronic diseases could possibly add eleven to twelve years to the average American's life span. Note, also, that trauma, or accidents, are contributing factors to premature deaths. Although it is not reflected in the curves for 1900 and 1980, accidental deaths have increased to the point where they, too, are a major cause of premature death.