Mission Statement

Our mission is to provide cutting edge training workshops and certification programs for fitness professionals throughout the United States, based on practical application of up-to-date theories of health and fitness. We are committed to promoting high quality fitness and wellness education in the communities we serve, and to the development of excellence in fitness leadership.

Welcome

NETA welcomes you. We are here to help you achieve your personal and professional career goals in the diverse and rapidly-growing fitness industry.

The fourth edition of NETA's *The Fitness Professional's Manual* is an in-depth, user-friendly guide to the foundational theories, concepts, and essential knowledge necessary to support your education and professional development.

In this Manual you will find topics including:

- The role and responsibilities of the fitness professional;
- Effective communication and interpersonal relationship-building skills;
- Techniques to facilitate behavioral change and motivation;
- Introduction to wellness coaching;
- Overview of exercise sciences including anatomy, kinesiology, biomechanics, and exercise physiology;
- Principles of nutrition and weight management;
- Administration and interpretation of health and fitness assessments;
- Guidelines to develop safe and effective exercise programs;
- Fundamentals of leading group exercise classes;
- Exercise-related medical considerations and guidelines for special populations; and
- Administrative and legal considerations for fitness professionals.

It is our sincere hope that this Manual will serve as an invaluable study tool and an ongoing informational resource throughout your fitness career.

For additional resources, such as information regarding our workshops, certification programs, and continued education offerings, please visit the NETA website at www.netafit.org.

Table of Contents

Section Two: Exercise Science

Section Three: Principles of Nutrition and Weight Management

Section Four: Health and Fitness Assessments

Section Five: Personal Fitness Programming

Section Six: Fundamentals of Group Exercise

Section Seven: Injury Management, Emergency Response, Medical Considerations, and Special Populations

Appendices:

3
Behavioral Change & Motivation

Introduction

When performed regularly, physical activity and exercise result in countless physical and physiological adaptions. These adaptations facilitate improved health, increased fitness, and enhanced performance. Although the act of exercising is a physical process, the adoption and maintenance of healthy lifestyle behaviors, such as regular physical activity, is largely mediated by psychological factors. A well-constructed and scientifically-based exercise program is of little benefit if the client is not willing or motivated to perform the activities.

Fitness and wellness professionals work with a wide variety of individuals, each having unique goals, sources of motivation, personal beliefs, values, and barriers to change. In order to facilitate and guide behavioral change, the fitness professional must discover, understand, and appreciate the uniqueness of each individual. Chapter 3 reviews the widely-accepted theories associated with behavior change as well as effective approaches to goal-setting and strategies to increase motivation and adherence. As the fitness industry slowly undergoes a paradigm shift from an approach focused largely on telling and directing, toward a philosophy of facilitating and guiding, knowledge of these behavioral sciences will help today's fitness professional to be a catalyst for change in the lives of their clients and participants.

Behavioral Change

Repeating a pattern, over time, forms specific behaviors. Behaviors are complex and have many determinants. They are influenced by social, environmental, psychological and/or biological factors. Each of these factors plays a significant role in the acquisition, maintenance, and cessation of behavioral patterns. Awareness of the need for changing a behavior, its origins, and consequences, is important in beginning the path to change.

Behavior change starts in the mind with a change in thoughts and thought processes. Studies show that the brain can make actual physical and neurological changes through a process called *neuroplasticity*. This process involves changing neurons within the brain through new experiences. The new experiences may be as subtle as repeating a positive statement to oneself regularly, such as an affirmation. The brain 're-wires' itself based on pathways that are developed by this new consistent pattern of thinking.

If your clients or class participants think positively or have positive thoughts about change, their brain may begin to 're-wire' itself to accept the changes. Maintaining a positive outlook toward behavior change will help clients and class participants make the beneficial changes they need to achieve their goals. The following sections summarize several of the models and theories regarding behavioral change including the transtheoretical model, the social cognitive theory, the self-determination theory, and the health belief model.

Transtheoretical Model

The **transtheoretical model (TTM)** originally emerged in the late 1970s as the result of studies and observations regarding individuals involved in smoking cessation (Lox et al., 2010; Prochaska & DiClemente, 1983). Since that time, the TTM has been applied to other types of behavioral change including the adoption of regular physical activity (Barkley, 2012; Hutchinson et al., 2009; Marshall & Biddle, 2001). In fact, among all models and theories of behavioral change, the TTM is perhaps the most commonly adopted with regard to increasing physical activity behavior (Hutchison et al., 2009). According to the transtheoretical model, also known as the "stages of change model," individuals move through five stages of change including precontemplation, contemplation, preparation, action, and maintenance (Barkley, 2012; Lox et al., 2010; Moore & Tschannan-Moran, 2010). A brief description of each of these stages, as they pertain to physical activity, is provided in table 3-1.

Individuals in pursuit of behavior change may take an undesirable, yet foreseeable detour into a lapse or relapse from the desired behavior. A *lapse* may describe a very brief and temporary departure from the desired behavior or a return to an undesirable behavior. For example, a client may miss two or three exercise sessions due to a particularly busy work schedule, yet then successfully return to their normal exercise routine the following week. A lapse may occur among those in either the action or main-

Table 3-1 Transtheoretical Model

TTM Stages of Change	
Precontemplation	The individual is not thinking about adopting physical activity or an exercise program and has no intention of beginning in the foreseeable future (e.g., the next 6 months). At this stage, the individual does not perceive any problems with their present lifestyle. They consider the disadvantages of exercise to outweigh the advantages and may even fail to recognize the benefits of regular physical activity entirely. Individuals in precontemplation may be defensive when others suggest or attempt to convince them to be more active. However, without intervention, individuals will stay in this stage for a long period of time. Individuals in precontemplation often have the attitude that "I won't" or "I can't" with regard to exercise.
Contemplation	The individual has intentions of becoming more physically active and/or beginning an exercise program within the next 6 months. There is a growing awareness of the advantages and benefits of exercise; however, this is off-set by perceived disadvantages and barriers. As such, the individual is weighing the pros and cons (i.e., decisional balance). There is a feeling of ambivalence in that the individual may simultaneously feel or express desires to become active and remain inactive at the same time. In the contemplation stage, the general attitude toward physical activity is "I may."
Preparation	The preparation phase is characterized by intentions to become physically active or start exercising within the next month. Individuals are preparing for exercise by joining a health club, purchasing new fitness apparel or exercise equipment, or scheduling a consultation with a fitness professional. At this stage, the individual may be performing some sporadic leisure-time physical activity or exercise, but not to the minimum threshold to be considered physically active. Individuals in the preparation stage are thinking, "I will."
Action	The individual is performing regular physical activity and/or exercise up to the minimum level, defined as the equivalent of at least 150 minutes of moderate-intensity leisure-time physical activity per week. Among all the stages of change, action is the most unstable as people attempt to maintain this new behavior while navigating the inevitable obstacles to their success. Individuals in the action stage can report, "I am" physically active.
Maintenance	Individuals move into the maintenance stage once they have sustained regular physical activity at or above the minimum levels for 6 consecutive months. The physical and psychological benefits they have attained, along with the belief in their own ability to live a physically-active lifestyle, continues to fuel their motivation and adherence to exercise. Although effort is still required to avoid set-backs, the individual's self-confidence regarding exercise is strong. Individuals in the maintenance stage say, "I still am."

Lox et al. (2010); Moore & Tschannan-Moran (2010)

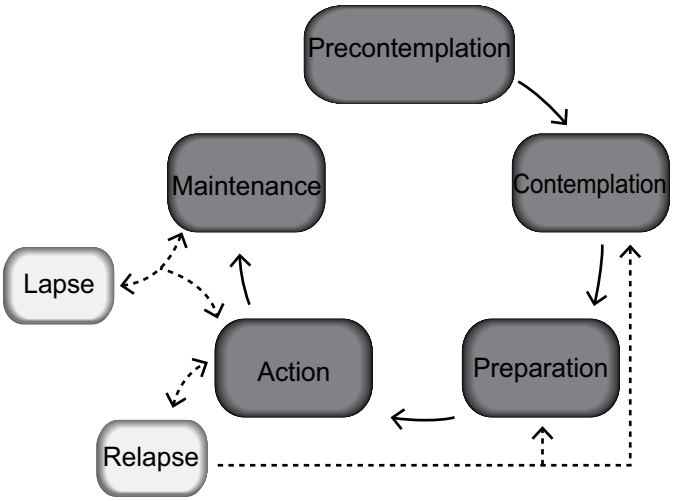
Table 3-2 Identifying the Stage of Change

Identifying The Stage of Change		
	No	Yes
1. I am currently Physically active.		
2. I intend to become more physically active in the next 6 months.		
For activity to be regular, it must add up to a total of 30 minutes or more per day and be done at least 5 days per week. For example, you could take one 30-minute walk or take three 10-minute walks for a daily total of 30 minutes.		
	No	Yes
3. I currently engage in regular physical activity.		
4. I have been regularly physically active for the past 6 months.		
Scoring Algorithm If question 1 and 2 = 'No', then client is at in precontemplation stage If question 1 = 'No' and 2 = 'Yes', then client is in contemplation stage If question 1 = 'Yes' and 3 = 'No', then client is in preparation stage If question 1 and 3 = 'Yes', and 4 = 'No', then client is in action stage If question 1, 3, and 4 = 'Yes', then client is in maintenance stage		

Marcus & Forsyth (2009)

tenance stage of change with a quick recovery back to either of those stages. A *relapse* represents a longer-term departure from behavioral change often accompanied by decreased desire and motivation to resume the targeted behavior. For example, this same individual may be overwhelmed by a busy work schedule, travel, and family obligations, which lead to several months away from their exercise routine. A relapse may occur for those in the maintenance stage, but more often strikes those still in the inherently unstable action stage. In this situation, the individual may be able to move themselves directly back into the action stage, but is more likely to revert back to an earlier stage such as preparation or even contemplation. Figure 3-1 provides a schematic representation of the transtheoretical model's stages of change.

Figure 3-1 TTM Stages of Change



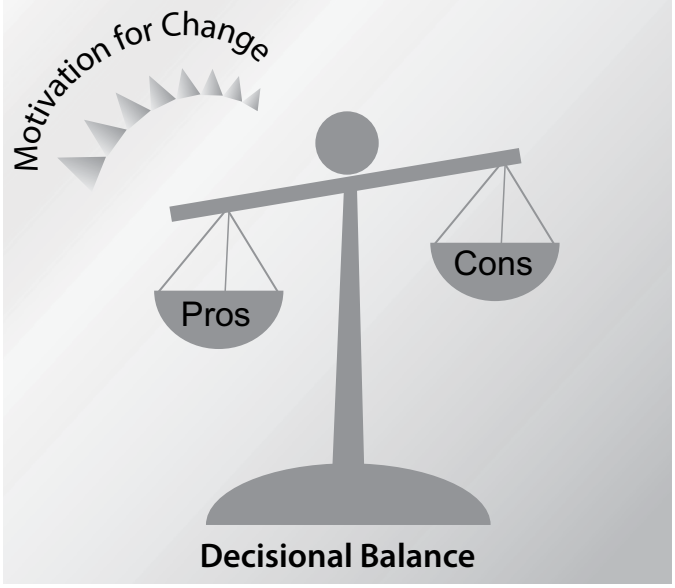
Based on the definition for each stage of the transtheoretical model, Marcus & Forsyth (2009) have presented a series of brief statements that may be used by fitness professionals to identify an individual's stage of change. The statements and interpretation algorithm are provided in table 3-2.

Decisional Balance and Self-Efficacy

Among the many factors that influence an individual's position and movement through the stages of change, two variables are of particular importance, especially during the earlier stages. These variables include decisional balance and self-efficacy.

Decisional balance refers to an individual's perceptions, beliefs, and interpretation of the pros and cons related to changing their behavior (ACSM, 2014; Janis & Mann, 1977; Lox et al., 2010; Moore & Tschannan-Moran, 2010). In the precontemplation stage, individuals perceive there to be more cons or barriers to adopting a physically active lifestyle (Lox et al., 2010; Marcus & Forsyth, 2009). Individuals in the contemplation stage are seeing a fairly equal balance between the pros and cons to physical activity (Lox et al., 2010; Marcus & Forsyth, 2009). The relative balance between their perception of the pros and cons at this stage contributes to their feelings of ambivalence toward engaging in physical activity. As individuals move into the preparation stage, the decisional balance scale begins to tip in favor of the advantages and benefits of physical activity, which fuels their motivation for change. See figure 3-2. As the individual moves forward into action and maintenance, their belief in the advantages and the value they place in the pros of being physically active continues to strengthen (Lox et al., 2010; Marcus & Forsyth, 2009). Table 3-3 provides a sample 2 x 2 decision-making matrix as it may look for an individual contemplating the adoption of physical activity.

Figure 3-2 Decisional Balance



As a fitness professional, it is important to recognize the pros and cons perceived by potential clients and class participants. In the early stages of behavioral change, it is important to emphasize the benefits of regular physical activity and to help individuals to identify effective strategies to overcome perceived barriers.

Another important factor that influences an individual's adoption or avoidance of physical activity is self-efficacy. **Self-efficacy** refers to situational or task-specific self-confidence. In this situation, self-efficacy is an individual's belief that they are capable of performing physical activity or exercise and adhering to a physically-active lifestyle or an exercise program. Lack of self-efficacy can have a very powerful influence on an individual's inaction toward change. Unfortunately, many people do not have the self-awareness to recognize the influential role low self-efficacy plays in their personal situation. The belief that one is incapable of successfully performing a task (e.g., physical activity, exercise) can be so strong that the individual will not even make an attempt to adopt the new behavior due to fear of failure or thinking it would be a waste of time.

5
Human Anatomy

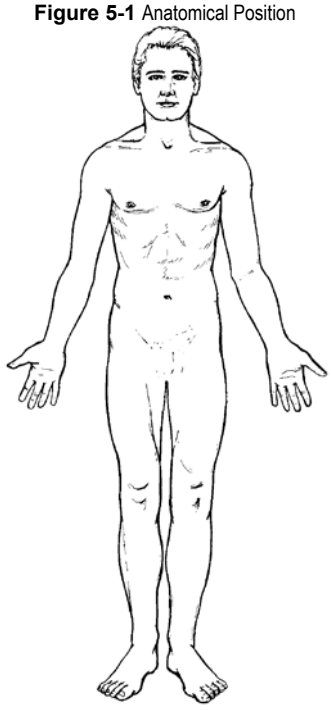
Introduction

Anatomy is a biological science which studies the structure of the body. There are many interrelated systems that comprise the human body. This chapter will focus primarily on the skeletal and muscular systems. The anatomical structures of other systems such as the circulatory and respiratory systems will be included within chapter 7 – Exercise Physiology. Understanding the 'language' of anatomy will allow the fitness professional to understand, locate, and identify structures throughout the human body. Important terms and definitions will be introduced that will soon become a natural part of the fitness professional's vernacular.

Location Terminology

The study of human anatomy begins with the **anatomical position**. In the anatomical position, the body is standing erect, the feet are positioned hip-width apart with the toes pointing forward, the arms are hanging to the sides of the body with palms of the hands facing forward, and the head and eyes are looking directly forward. Figure 5-1 illustrates the anatomical position. This position serves as the reference point from which structures of the body are named and located in relation to each other. With some exceptions, movements of the human body are also referenced using the anatomical position as the starting point.

Figure 5-1 Anatomical Position



The **median**, also known as the *midline*, divides the body into the right and left halves. Horizontally, a body part located closer to the midline of the body is said to be **medial**, whereas body parts located further away from the midline are referred to as **lateral**. Vertically, a body part located closer to the head is **superior** and a body part located away from the head (closer to the feet) is called **inferior**. When identifying the relative location of points on the extremities (arms and legs), the term **proximal** ('in close proximity to') refers to a point located closer to the attached end of a limb or the center of the body. **Distal** ('a greater distance from') refers to a point located further away from the attached end of a limb or the center of the body. For example, the wrist is located distal to the elbow; whereas, the elbow is located proximal to the wrist. The term **anterior** is used in reference to a body part on or toward the front of the body. **Posterior** refers to a body part on or toward the back of the body. For example, the quadriceps muscle group is on the anterior side of the leg and the hamstring muscle group is located on the posterior aspect. Finally, **superficial** refers to a point or a body part located closer to (external) or on the surface of the body and **deep** refers to a point or a body part located further beneath (internal) another point or away from the surface of the body. For example, the rectus abdominis muscle is superficial in relation to the transverse abdominis muscle, which is deep. Table 5-1 provides a summary of anatomical location terminology.

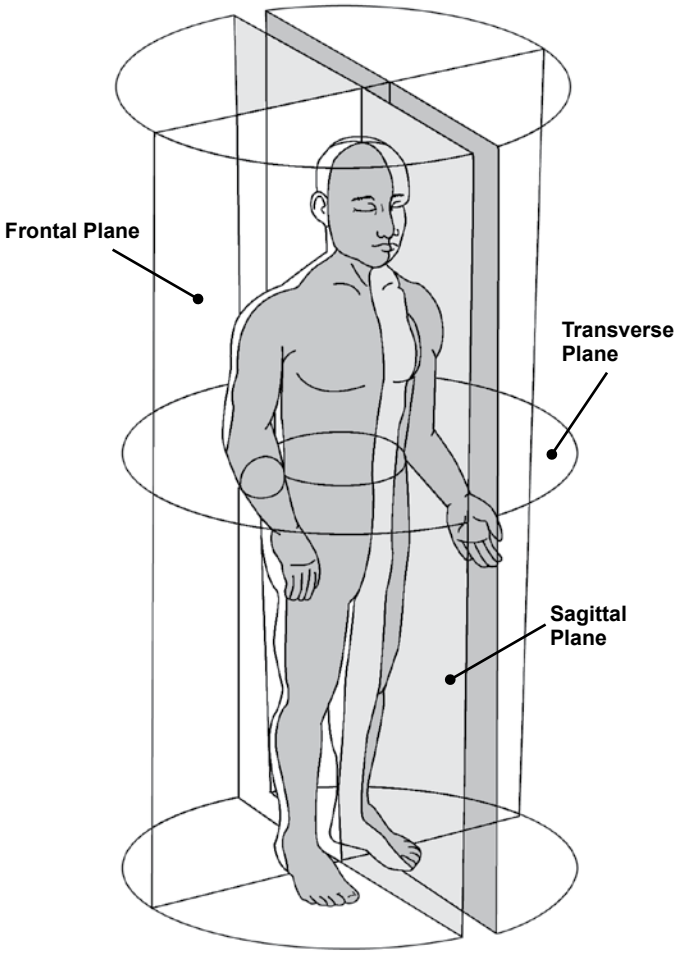
Table 5-1 Anatomical Location Terminology

Term	Definition
Medial	Closer to the midline or the middle of the body
Lateral	Away from the midline or the middle of the body
Superior	Closer to the head (away from the feet)
Inferior	Away from the head (closer to the feet)
Proximal	Closer to the attached end of a limb or the center of the body
Distal	Away from the attached end of a limb or the center of the body
Anterior	On or toward the front of the body
Posterior	On or toward the back of the body
Superficial	Closer to or on the surface of the body
Deep	Further beneath or away from the surface of the body

Planes of Motion

Human movement is often performed in three dimensions, each of which is identified in relation to a specific plane. A **plane** is a flat, level surface extending into space. Movement of the body is classified as occurring in three planes including sagittal, frontal, and transverse. The **sagittal plane** extends from the median dividing the body into the right and left sides. The **frontal plane** divides the body into the anterior (front) and posterior (back). The **transverse plane** (sometimes referred to as the horizontal plane) separates the body into the upper and lower segments. Figure 5-2 illustrates the three anatomical planes of motion. When a movement occurs in a specific plane of motion, it will "draw the plane" or run parallel to the plane of motion. For example, from the anatomical position, the movement of elbow flexion and extension occurs in the sagittal plane in that it moves parallel to the designated plane, but does not cross it. Movements of the body and the corresponding planes of motion will be covered in greater detail in chapter 6.

Figure 5-2 Planes of Motion



The Skeletal System

The skeleton system consists of 206 bones. Figures 5-3 (anterior) and 5-4 (posterior) illustrates the major bones of the human body. The skeletal system provides the supportive framework for the maintenance of posture. The bones and the corresponding joints also provide the lever system which works in collaboration with the muscles to produce movement. In addition, the skeletal system also protects the vital organs (e.g., brain, heart, lungs), serves as a storage site for essential minerals (e.g., calcium, phosphorous), and within the bone marrow, produces blood cells (e.g., red blood cells, white blood cells, platelets).

The 206 bones of the human body are categorized into the axial skeleton and the appendicular skeleton. The **axial skeleton**, consisting of 80 bones, includes the skull, spinal column, sternum, and ribs. The axial skeleton provides the supportive axis for the body and protects the central nervous system (brain and spinal cord) and the organs within the ribcage. The **appendicular skeleton**, which consists of the remaining 126 bones, includes the upper and lower extremities (i.e., arms, legs) as well as the shoulder and pelvic girdles. The appendicular skeleton is largely responsible for movement and locomotion of the body.

Good to Know

Many terms are utilized to name and identify bone structures, many of which serve as muscle attachment points. Some of these include:

Fossa: a broad shallow area of a bone.
Tubercle: a relatively small projection or bump on a bone.
Process: a relatively large or prominent bump on a bone.
Foramen: an opening or a hole in a bone through which nerves, blood vessels, and other structures may pass.

The Vertebral Column

The **vertebral column** (also called the spinal column) consists of as many as 33 of the bones within the axial skeleton. Figure 5-5 illustrates the vertebral column. The individual bones of the vertebral column are called **vertebrae**. The vertebral column is separated into three primary regions including the cervical, thoracic, and lumbar vertebrae. The **cervical** region of the spine consists of 7 vertebrae, which support the skull and neck. The first two cervical vertebrae, called the *atlas* (C1) and *axis* (C2), create a *pivotal joint* which allows the head to rotate from side to side. The **thoracic** region, consisting of 12 vertebrae, articulates (connects) to the ribs providing support to the thorax. The 5 vertebrae of the **lumbar**

Chapter 5 Review Questions

1. The anatomical plane which divides the body into the anterior and posterior sides is called the:
    A. Sagittal Plane
    B. Transverse Plane
    C. Frontal Plane
    D. Horizontal Plane

2. Which of the following anatomical structures is located distal to the elbow joint?
    A. The metacarpals
    B. The glenohumeral joint
    C. The acromion process
    D. The humerus

3. Which of the following bones is included within the axial skeleton?
    A. Scapula
    B. Tibia
    C. Sternum
    D. Ulna

4. The major muscle located on the posterior aspect of the tibia is called the _____.
    A. hamstrings
    B. triceps
    C. tibialis Anterior
    D. gastrocnemius

5. According to the Sliding Filament Theory, which of the following events occurs first during a muscular contraction?
    A. The actin filaments are pulled across the myosin filaments.
    B. An action potential is delivered by the central nervous system to the muscle.
    C. The actin and myosin filaments bind to create cross-bridges.
    D. The Z-lines move closer together causing the sarcomere to shorten.

6. Which of the following is considered to be a diarthrodial joint?
    A. The suture joints between the bones of the skull.
    B. The joint between the bodies of two adjacent vertebrae.
    C. The joint between the glenoid fossa of the scapula and the humerus.
    D. The joint between the sternum and a rib.

Answers to Review Questions on Page 368