The Obesity Epidemic:

Health Consequences and Implications for Physical Therapy

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Objectives

After reading this article and the Update titled "Obesity: Overview of Prevalence, Etiology, and Treatment" (Racette SB, Deusinger SS, Deusinger RH. *Phys Ther.* 2003;83:276-288), you should be able to:

- Discuss the etiology, extent, and impact of obesity in the United States.
- Explain how the body mass index (BMI) can be used to classify adults as being normal weight, overweight, or obese.
- Understand the physiological, psychological, and public health consequences of obesity and how they may affect delivery of health care, including physical therapy.
- Describe the implications of obesity for approaches to examination, evaluation, diagnosis, prognosis, and intervention.
- Identify research needs.

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Introduction/Prevalence

Obesity has reached reached epidemic proportions. It is a worldwide problem,[1,2] affecting an estimated 300 million people,[3] with an increasing prevalence in both developed and developing countries. Obesity contributes to numerous chronic diseases and early mortality.[4,5] Furthermore, it has a profound, negative effect on quality of life in children and adolescents[6] as well as adults.[7]

Obesity may limit specific aspects of physical functioning and daily activity and therefore should be a condition of interest to physical therapists. Obesity is acknowledged in the American Physical Therapy Association's (APTA) ***Guide to Physical Therapist Practice***[8] (the Guide) as a risk factor for impairments in aerobic capacity, anthropometric characteristics, and integumentary integrity and other impairments that can affect a person's ability to function at work, in the community, or at leisure. Therapeutic exercise, the primary category of intervention provided by physical therapists, can improve the ability to perform physical actions, tasks, or activities related to self-care, home management, work, community, and leisure; improve fitness, health status, and physical function; and increase physical capacity[8(p105)]—all of which have relevance for the patient who is obese.

Intervention for patients who are obese must be broad-based and multidisciplinary in order to address comorbidities, nutritional needs, and eating habits as well as patterns of exercise and physical activity. An understanding of obesity can help physical therapists improve the health and functional independence of these patients and can facilitate a leadership role for physical therapists as they join other primary care practitioners in the effort to alleviate or prevent the health consequences of obesity. As the obesity epidemic progresses, APTA anticipates increased physical therapist involvement in the management of patients/clients with obesity-related impairments, functional limitations, and disabilities.[9]

Prevalence

The North American Association for the Study of Obesity[10] bases its definition of *obesity* on that of Aronne and Segal[11]: "the excessive accumulation of adipose tissue to an extent that health is impaired." Obesity is a complex condition that may have many contributing factors, including behavioral, environmental, physiological, social, and cultural factors. According to the International Obesity Task Force,[12] the current obesity "pandemic" is the result of "profound changes to society over the past 20-30 years that have created an environment that promotes a sedentary lifestyle and the consumption of a high fat, energy dense diet."

In the United States, it is estimated that approximately 65% of adults can be classified as overweight or obese.[13] As shown in Figure 1, the prevalence of obesity has increased dramatically, from 13.4% of adults during the 1960s[14] to 30.9% in 2000.[13,14] The prevalence of overweight (which includes obesity) has increased from

43.3% in the 1960s to 64.5% in 2000[13,14] (Fig. 2). Among children and adolescents, estimates indicate that 30% of children are affected, with 15% meeting the criteria for overweight and 15% being classified as "at risk for overweight."[15] Consistent with the data for adults, the prevalence of overweight and obesity among children and adolescents changed very little between the 1960s and early 1980s but increased dramatically during the 1980s and 1990s (Fig. 3).

Health Consequences

Physiological and Psychological

The adverse health consequences of obesity are vast.16 As noted in the Update by Racette et al,17(p276) there are many physiological and physical consequences of obesity, from cardiovascular disease to osteoarthritis to cancer to sleep apnea.18-27

In addition, obesity has psychological consequences. Bias and discrimination against people who are overweight or obese in the United States is well documented. More than 60 years ago, Bruch[28] demonstrated the existence of strong and persistent "anti-fat" prejudice in the United States. Subsequent research has attempted to discover the ideological etiology, attitudinal structure, and specific negative effects of obesity stigma. Overall, the phenomenon of "anti-fat bias" operates in the absence of norms that suppress overt expression of the bias, in contrast to the way that other prejudices (eg, racial hostility) are exhibited in our society.[29] The overt expression of prejudice against people who are obese may have harmful effects at any age.[30,31] Negative characterizations can affect self-esteem and self-image[32] and may include labeling an individual as lacking willpower, being lazy, or lacking intelligence. Overt behaviors that reflect anti-fat bias may be expressed in an employer's unwillingness to hire or promote individuals who are obese.[33]

Distress and potential challenge to quality of life may occur because of these psychosocial dynamics[34] and have led some people to assume that negative attitudes about obesity in the United States are associated with a true risk for psychological distress or mental disorders.[35] Lamertz et al,[36] however, recently concluded that body weight itself is not significantly related to depression or other psychopathology and that global assumptions about the mental health of adults who are obese may not be warranted.

Nevertheless, obesity stigma remains a pervasive part of the fabric of US society, fueled by traditional ideologies and group norms.[37,38] Such strong social phenomena strengthen the likelihood that discrimination against people who are obese may increase as the obesity epidemic expands. To help promote the health of patients who are obese, community education and individual patient/client instruction must be a priority for all health care professionals, including physical therapists.

Public Health

The public health threat posed by the obesity epidemic is reflected not only in the increased risk for chronic disease but also in the economic impact on society. In 1995, health care costs attributed to obesity were $99 billion.[39] With inflation, the costs increase, arising from lost productivity[40,41] and the need for medical care.[42,43] Concerns about these costs have led to the development of various action plans within schools, medical centers, community centers, and industry in an effort to ameliorate the detrimental effects of the obesity epidemic.[44] The success of these plans requires the combined efforts of health care practitioners, policymakers, and patients to respond to the rising risks of obesity.

Prevention: A Battle on Three Fronts

The reduction of overweight and obesity was one of the major goals of Healthy People 2000[45] and was restated as a goal for Healthy People 2010.[46] As noted, however, societal influences and individual behaviors have only helped *increase* the prevalence of obesity, and the relative lack of third-party payment for prevention of obesity may impede any national effort to stem further growth in the obesity epidemic.[47]

Efforts are required on all three fronts of prevention: primary prevention (of the condition or disease itself), secondary prevention (to decrease duration, severity, and sequelae through early diagnosis and prompt intervention), and tertiary prevention (to limit the degree of disability and promote rehabilitation and restoration of function in patients/clients with chronic and irreversible diseases).[8]

To assist the health care team in reducing the prevalence of obesity as a condition, physical therapists will need to incorporate measures of obesity risk (eg, body mass index [BMI] and waist circumference) into the examination of all patients, encourage routine physical activity, prescribe exercise, and educate patients about the health risks of sedentary lifestyles and poor nutritional habits. Attention to high-risk transition periods (puberty, transition to adulthood, menopause) in which weight gain is likely to occur may be required.[48,49] Similarly, the decline in required physical education in primary and secondary school systems[50] promotes the type of sedentary lifestyles that contribute to the development of obesity. Intervention at these early life stages could assist in primary prevention.

The goal of secondary prevention would be to avoid the comorbidities that are associated with obesity. It could be argued that interventions in this area are the ones most

familiar to physical therapists, such as educating patients about the role of physical activity in preventing type 2 diabetes and cardiovascular disease, providing intervention to address posture and movement impairments and functional limitations, and providing preoperative and postoperative interventions for patients having gastric bypass surgery.

Minimizing the disability associated with obesity (tertiary prevention) might be addressed through the use of such interventions as assistive devices to control gait deviations that occur with lower-extremity pain, energy conservation strategies to enable return to work or home management activities, and modification of the environment to help patients avoid injury, pain, and fatigue. A commitment to long-term involvement would seem to be essential if physical therapists are to be effective in mediating effects of obesity on the health and functional independence of patients.

The emphasis of this continuing education article is on components of physical therapist patient/client management for adults who are obese. Specific topics therefore include methods of assessing weight-related health risk; the myriad consequences associated with obesity; and strategies for examination, evaluation, diagnosis, and prognosis. Exercise strategies, educational reinforcements, and social support mechanisms are discussed to foster the design of interventions that are tailored to the unique needs of patients who are obese and that promote long-term adherence to more healthy lifestyles.

Examination

History

The history as described by the Guide includes general health status (general health perception, physical function, psychological function, role function, and social function–any of which could be affected by obesity) and social and health habits, including level of physical fitness.[8(p36)]

A thorough history can inform the physical therapist about the etiology or potential etiology of a patient's obesity. In addition to behavioral and environmental factors, genetic factors and medical conditions also may contribute to obesity in certain people. Physical therapists should be aware of the possible medical etiologies of obesity, including hormonal deficiencies (eg, hypothyroidism or adrenal dysfunction); hypothalamic dysfunction, such as Prader-Willi syndrome[51]; or hypothalamic damage resulting from head trauma.[52] In addition to these medical problems, impairments occurring as a result of conditions such as cerebral palsy,[53] amputations, spinal cord injury, and stroke may limit physical activity, alter energy balance, and contribute to weight gain and obesity.

As part of the history, the physical therapist also can collect data on weight chronology, current and past exercise and activity patterns, and comorbidities that compromise the patient's safety or potential for achieving functional goals. The history should include the patient's perspectives, both on obesity and on the way obesity affects quality of life. The patient's beliefs and attitudes about the ability of exercise to influence health—and about the degree of support for participation in an exercise program—are important perspectives.

The patient's readiness to adopt new behavioral patterns and the level of the patient's intention to follow through with exercise and activity recommendations can be assessed in the patient interview. In general, patient readiness seems to be a function of (1) what the patient expects in terms of outcomes, (2) level of available support, (3) whether the patient views himself or herself as a potential agent of change, and (4) the patient's perceptions and thoughts about quality of life.[54,55]

To help understand and assess readiness, Prochaska and Velicer[54] and Laforge et al[56] proposed a 6-stage construct—the transtheoretical model of health behavior change—which recognizes cognitive processes that enable adoption of new behavior. Table 1 summarizes the 6 stages of readiness (precontemplation, contemplation, preparation, action, maintenance, and termination) and their behavioral implications. Knowledge of the behavioral implications of each stage and the intervention strategies that may be most appropriate during each stage can help practitioners promote new health behaviors and lifestyle changes.

Identification of specific barriers that might compromise participation in exercise and physical activity also can occur during the patient interview. Ajzen and Fishbein[57] developed the theory of planned behavior (TPB), an approach that can be used to identify (1) attitudes and beliefs that either reinforce or compromise the initiation of positive health behaviors and (2) obstacles that a patient believes hinder efforts at behavioral change. The major emphasis of TPB is that intention, combined with an ability to control or overcome obstacles to success, will be a positive influence on the adoption of new health behavior.[57]

According to Sheeran et al,[58] the TPB is limited in its ability to predict whether new behavior will continue and in what patterns; however, Kimiecik[59] suggested that, regardless of its limitations, the TPB model may help clinicians identify and understand a patient's reasons for not adhering to new behavioral regimens (eg, being too busy, regarding the regimen as too difficult to follow, forgetting, not having sufficient resources or experiencing lack of support from family or friends).

Systems Review

Cardiovascular/pulmonary system. In assessing the cardiovascular/pulmonary system during the systems review, the physical therapist should measure the resting heart rate and blood pressure to assess the status of cardiovascular function and the potential risk of cardiovascular disease.[8,60-63] Particularly in view of evidence that exercise capacity may be reduced in adults who are obese even without preexisting cardiopulmonary comorbidities[64,65] and evidence that health and even longevity may be at risk in these patients,[66] continued monitoring of vital signs may influence the prognosis or decisions about physical therapy intervention. Monitoring of vital signs also can serve as an indicator for referral to another health care provider.

Resting heart rate and blood pressure measurements can be taken based on guidelines of the sixth Joint National Committee on Prevention, Evaluation, and Treatment of High Blood Pressure.[67] Heart rate monitoring by palpation of a pulse, however, may be obscured or even altered by medications that the patient may be taking and by excessive adiposity over the site where the pulse is to be taken.[67] A large blood pressure cuff may be required for people whose extremities are too large for standard equipment.

Respiration should be measured both at rest and during movement to determine whether the rate and pattern of breathing are compromised. Dyspnea may signal the need for caution during certain physical activity tests and dictate what types of exercises can be incorporated safely into an intervention. Central adiposity may be responsible for mechanical restriction of breathing particularly in sitting or supine positions, even in the absence of pulmonary disease.[68,69]

Integumentary system. The physical therapist should be aware that the patient who is obese may have skin disruption from lower-extremity venostasis if peripheral circulation is compromised or if there is friction of tissues in adjacent body segments (eg, inner thighs).

Musculoskeletal system. The physical therapist should be alert to patterns of pain or postural dysfunction that are consistent with long-term stress on weight-bearing joints in patients who are obese.[70]

Neuromuscular system. There may be impaired peripheral nerve integrity associated with peripheral nerve injury as a result of impingement by excessive adiposity, as has been reported in cases of carpal tunnel syndrome.[71,72] The physical therapist also should be alert to any similar impingement affecting the peripheral nerves in the trunk or lower extremities.

Communication, affect, cognition, and learning style. As with all patients, the physical therapist must assess communication, affect, cognition, and learning style in order to provide instruction and education about the patient's condition. Careful and specific patient instruction—delivered in a compassionate manner-is essential for patients who are obese and who need to make lifestyle changes.

Tests and Measures

Research is needed to establish a battery of tests and measures that, along with patient self-reports, can identify specific levels of impairment and characterize functional limitations of people who are obese. Research also is needed to identify the variables that are caused by or exacerbated by obesity and that have an effect on impairments. These variables may include status of vital signs, mass distribution and its effect on joint range of motion and the ability to move body segments against gravity, aerobic capacity and endurance, balance control, relative and absolute postural alignment and orientation, and motor control of the body and body segments during movement.

Recent work by Larsson and Mattsson[55,73] has been directed at determining protocols for examination to document the specific functional limitations of people who are obese. In a study of women with obesity, they investigated the test-retest reliability and content- and criterion-referenced validity of a disability questionnaire, comparing its results with those of a functional test regarding observations of similar functional limitations.[55] They found that women who are obese perceived disability to a much higher extent than did women of "normal weight," with a focus on "occupational work in strenuous positions, strain and pain, sports, walking outdoors or on stairs...moderate housework requiring squatting, stooping or lifting," rising from sitting positions, pedicure, and stress incontinence. Larsson and Mattsson concluded that the disability questionnaire indicated differences between the disability that women who are obese may *perceive* and the functional limitations that can be *observed and measured.*

In examining patients who are obese, the following Guide test-and-measure categories may be especially important.

Anthropometric characteristics. The use of body mass index (BMI) has gained international acceptance as a meaningful measure of obesity because of the associations between BMI and adiposity,[74] BMI and disease risk,[16] and BMI and mortality.[75] Although the BMI provides distinct ranges to differentiate between normal weight and overweight, the adverse health effects of overweight and obesity occur along a continuum of increasing adiposity.[45,46]

Table 2 and Table 3 are examples of BMI charts that can be used to estimate an adult's BMI quickly and easily.[76] BMI-for-age growth charts are readily available and can be downloaded from the Web site of the Centers for Disease Control and Prevention to help track overweight among children and adolescents.[77-79]

Although height and body weight may be self-reported during the history, body weight frequently is underreported, particularly among women and people who are obese.[80] In addition, older adults tend to report their height inaccurately, in part because height decreases as bone quality diminishes with age.[81] In order to increase the accuracy of the calculated BMI, therefore, both weight and height should be measured as part of the examination whenever feasible.

Use of BMI alone may cause clinicians to misinterpret health risk, however, particularly in people who are athletic, because of the relative density of lean body mass. BMI also can be misleading in older adults, who may have a BMI value in the healthy range despite muscle wasting and excess adipose tissue.[82] It also is important, therefore, to measure the distribution of fat mass.

Measurement of waist circumference can help estimate weight-related health risks, particularly for cardiovascular disease, either independently or in concert with BMI.[83-87] Measuring waist circumference requires use of a flexible measuring tape (eg, cloth or plastic) placed in a horizontal plane around the abdomen at the top of the iliac crests.[87-89] Measurement should be made in a standing position and over minimal clothing. The tape should be snug without compressing the skin and should be maintained parallel to the floor. The measurement should be taken at the completion of normal expiration. Potential errors in measurement, and therefore in estimation of health risk, may be made if attention is not paid to position, placement, and timing of measurement.

Aerobic capacity/endurance. Physical therapists may choose to use such tests as a timed stair-climbing test, an untimed 4-flight stair-climbing test, or a 6-minute walk test. As with all patients, individuals who are obese should be cautioned about performing these tests if they have lower-extremity joint pain, fear becoming exhausted, or fear falling because of balance difficulties or a history of falls. Stair-climbing tests may be inappropriate, for instance, if a person has discontinued or severely restricted the use of stairs in daily life. The pattern of stair climbing (eg, ascending sideways) also may be altered by people whose weight makes moving against gravity challenging or whose size impairs the ability to see the stairs clearly. Studies are needed to determine whether the pattern of stair climbing is as important an observation as speed in these types of patients.

The ability to quickly ascend and descend one full flight of stairs has been shown to be functionally important for older adults[90] and those who are obese.[91-93] Measuring the endurance required to negotiate multiple flights of stairs may be important for assessing function at home or work. An untimed stair-climbing test can be administered by asking patients to walk up and down the same flight of 10 stairs as many as 4 times. The number of flights completed and any difficulties observed (eg, pain, shortness of breath) should be recorded. These measurements, combined with a score on the rating of perceived exertion (RPE) scale,[94] may serve as another indication of level of endurance during physical activity and may help to explain development of sedentary habits,[73] such as restricted regular use of stairs, and the effects of these habits. The RPE has been used to assess perceived exercise intensity in obese women.[73] In exercise testing for people who are obese, the American College of Sports Medicine (ACSM) suggested using the original, or category, RPE rating scale, which rates exercise intensity on a scale of 6 to 20.[95(p151)]

The 6-minute walk test has been shown to be a comprehensive indication of aerobic capability in patients with respiratory disease[96] and in patients with chronic heart failure.[97] No studies on reliability and validity of these measurements have been conducted with obese populations, however.

With the 6-minute walk test, the distance (in feet) walked is the primary measurement. In a study of women with obesity, Mattsson et al[64] found that many functional activities require distances that exceeded their subjects' ability and suggested that women who are obese incur greater oxygen cost in walking than women who are lean. Patients who are obese, therefore, may demonstrate evidence of exertion or fatigue that is clinically important. Patients who have abnormal measurements in this type of testing[98] should be referred for physician consultation or cardiac assessment.

A 2-minute assessment of vital sign recovery may be an informative measurement in the absence of other quantitative measurements of energy expenditure (eg, Vo_2max). For instance, according to ACSM, many people with "a chronic disease or disability do not achieve a 'true' Vo_2max. Rather, they reach a point at which they cannot continue," that is, symptom-limited exhaustion, or peak Vo_2.[95(p8)]

Circulation. As noted in the systems review, measurement of heart rate, blood pressure, and respiration is essential in patients who are obese.

Gait, locomotion, and balance. The one-legged stance test[99-101] (also sometimes called "single-leg stance test") or modified Romberg tests[102,103] have been used for testing static posture balance in a variety of patient groups;

however, whether these tests could be useful for quantifying balance in people who are obese is unknown. Preliminary evidence indicates that patients who are obese may have problems with balance.[104]

The ability to move quickly from a standing position to sitting on the floor and then to return to standing was reported to be a useful functional measure in more than 5,000 people who were 71 years old or older.[105] This maneuver requires a degree of flexibility, lower-extremity muscle strength, motor planning (for coordination and speed control of body segments to achieve and change positions), and balance control. According to Larsson and Mattsson,[73] this test can be used with people who are obese, with a scale to document performance difficulty; however, as yet there is no evidence available regarding the reliability and validity of these measurements in patients who are obese.

Guralnik et al[105] reported that sit-to-stand task from various chair heights provides an indication of balance, trunk and lower-extremity motor control, and coordinated movement of multiple body segments in geriatric patients. Patients should be timed during performance of 5 repetitions of a sit-to-stand task from at least 2 different chair heights (36 cm [14 in] and 41 cm [16 in]). As with most tests that might be used by physical therapists to measure function, however, there are no published data on the reliability and validity of these measurements in people whose primary impairments are related to obesity. During testing, patients might need to be instructed to avoid using their arms during rising. A wide base of support might be necessary if abdominal girth is very large. For patients whose body size or weight makes it difficult to rise from a 36-cm or 41-cm chair, a 46-cm (18-in) chair might have to be used.

Muscle performance (including strength, power, and endurance). Manual testing of trunk and extremity musculature, such as that described by Kendall et al,[106] may be useful in determining deficiencies attributable to disease or other more serious associated comorbidities. When examining people who are obese, adjustment of hand placement or the patient's body position may be necessary if tissue bulk interferes with palpation. Lower abdominal muscles, for example, may be difficult to palpate when there is central adiposity.

Substitutions that compromise accurate muscle testing also may arise as a function of weight disparities of the extremities in relation to the trunk. Some patients, for instance, might internally rotate and adduct the thighs as a stabilizing strategy during testing of lower abdominal strength. This strategy may optimize positioning of the major adductor muscles to function as hip flexors, thus allowing them to substitute for weak trunk flexors. Such substitutions may give a false indication of greater abdominal strength. This phenomenon also may occur in patients with extremely heavy lower extremities.

Functional mobility tests might complement interpretations of strength or serve as "proxies" for manual muscle testing if there are no indicators that specific muscles should be examined. Larsson and Mattsson[73] suggested that tasks—such as rising from half-kneeling to standing, performing a modified prone or chair push-up, doing a squatting maneuver, lifting a box, or carrying a grocery sack—might be used to help measure strength in women who are obese.

Pain. In view of evidence that pain can affect both function and quality of life in people who are obese,[91,92] pain assessment—especially of the lower extremity[107]—may be particularly important. Analog scales for pain assessment[108] can be useful for assessing pain intensity.

Range of motion (including muscle length). As with all patients, examination should address both pain and joint excursion. In general, there is little research that has been published on clinical observations of muscle substitution. But in the examination process, physical therapists may observe that tissue accumulation surrounding some joints (eg, hips, shoulders) in the adult who is obese may prevent full joint excursion, even in the absence of documented joint disease. Over time, such limitations may interfere with normal alignment and joint kinematics, which, if the limitations persist, may result in tissue injury.[70]

Posture. As with most mechanical systems, the human body functions optimally when the mechanical components (skeletal joints and segments) are properly aligned. If alignment is faulty before motion begins, soft tissues and bony structures may have repeated and sustained stresses that are injurious during the faulty movement.[70] Sahrmann[109] contended that faulty movement patterns eventually are manifested as movement impairments.

Preliminary evidence has shown the presence of gait and postural abnormalities in children, adolescents, and adults with obesity,[110-112] but comprehensive research of postural disorders specifically related to obesity in adults has yet to be published.

When postural screening is conducted with the patient in the upright standing position, forward head, scapular winging, shoulder level asymmetry, increased or decreased lumbar curve, and abnormal positions of the hips (eg, excessive flexion), knees (eg, varus, valgus, recurvatum), and feet (eg, pronation or supination) can be observed.

Evaluation, Diagnosis, and Prognosis

Assessment of overall function is the result of triangulation of all data collected in the examination. Information obtained from the history, systems review, and tests and measures can assist in identifying existing cardiovascular disease and other conditions and the potential risk for developing other obesity-related comorbidities. The patient's self-report of current physical activity level and limitations-and the patient's level of commitment and perceived barriers to improving health status and physical function-contribute to an evaluation of readiness and commitment. Self-report assessments are usually quick, require minimal training on the part of health care providers, and have been indicated to be valid when used with geriatric populations.[113]

A trusting relationship between patient and physical therapist may help to increase the therapist's level of confidence in the patient's self-report. Some studies[113,114] have shown that patient self-report and practitioner measurements complement one another and that both types of information add to an understanding of the functional status of patients with obesity[114] and are essential for evaluation. Data on vital signs and anthropometric characteristics further clarify the level of obesity, potential risk for disease conditions, and physical limitations (high blood pressure, shortness of breath) that can compromise a patient's ability to initiate, maintain, and alter purposeful movement necessary to perform an action, task, or activity pertinent to daily function. The patient's experience with obesity and the physical therapist's professional perspectives on risk and the potential for improvement will drive all subsequent phases of patient/client management.[8]

Diagnosis

Determination of a diagnosis is the outcome of the evaluation of the examination data. The major focus is to sort the data into meaningful clusters that are consistent with unique, named diagnoses that describe movement impairments. "Obesity" is a medical diagnosis and is relevant to physical therapy intervention to the extent that it affects prognosis, how care is delivered, and outcomes.

The Preferred Physical Therapist Practice Patterns[SM] in the Guide represent the diagnoses made by physical therapists. For two of these patterns—"Primary Prevention/Risk Reduction for Cardiovascular/Pulmonary Disorders" and "Primary Prevention/Risk Reduction for Integumentary Disorders"—obesity is explicitly stated as one of the inclusion criteria. For patients classified in almost any pattern, however, obesity is a factor that could either require a new episode of care or modify the frequency of visits or the duration of the episode.

Prognosis

A diagnosis for physical therapy succinctly describes the patient's primary movement impairment and provides a sound basis for judging the potential for attenuating or alleviating the movement impairment. Determining the optimal level of improvement, given the influence of multiple inputs from elements of the patient examination, is the specific process of projecting a prognosis.[8] Interim steps toward final outcomes may need to be established, especially if a condition is chronic, but also in view of the need to maintain progress and prevent emergence of secondary effects.

The relationships among identified impairments—and the perspectives that each patient brings to the therapeutic encounter—contribute to the prognosis. In fact, an essential part of determining the prognosis is the patient's perspective in defining "optimal" in terms of potential levels and types of improvement. Although weight loss is clearly associated with reduction of health risk,[45,46] weight loss alone should not be the focus of physical therapist examination or intervention with adults who are obese. A balanced approach to encouraging adoption of healthy types and amounts of activity as well as changes in eating habits may be essential. Negotiating patients' interest in other outcome indicators may be a challenge if they have experienced a lifetime of pressure from others (or themselves) to lose weight or have been exposed to derogatory attitudes or outright discrimination related to obesity.

As members of the health care team, physical therapists should participate in helping patients who are obese to value improvements in movement and function as much as weight loss and to consider functional independence to be a component of optimal improvement. (See "Reducing the Risk of Comorbidities.")

Intervention

Remediation and prevention of movement-related disorders form the core of physical therapy interventions.[8,109] Obesity may result in pain, impaired muscle strength, impaired range of motion, limitations in function that compromise bed mobility or ambulation, and frank disability that may prevent vocational or avocational pursuits.[41,115] Deusinger et al[116] and Burlis et al[117] have argued that physical therapy intervention is indicated to address the enormous array of health compromises that accompany obesity. There is a dearth of literature, however, that describes the range of movement-related disorders that might be associated with obesity.

Because movement for people who are obese can be challenging (and even risky) for both the musculoskeletal

and cardiovascular systems,[55,64,65,73,107,110-112] obesity presents a number of safety issues related to physical therapy intervention. Of equal concern is the possibility of further movement-related risks that may occur if obesity persists over a lifetime.

For all types of patients, maintaining functional independence and optimizing health are the long-term goals for physical therapy.[8] Helping patients commit to improving health and functional status through daily physical activity may be a challenge when they have sedentary lifestyles and find physical activity unfamiliar, painful, or tiring. Various researchers[118-120] have concluded that, for people who are obese, goals must be personally satisfying, relevant to lifestyle preferences, and important for overall quality of life.

Interventions currently used by other health care professionals in treating obesity begin with attention to diet and physical activity, with success in these areas being highly dependent on behavioral change.[121] Pharmacologic agents and, finally, surgery contribute to the array of available interventions for people who are obese.[17] Because perceived behavioral control seems to have the strongest influence on outcomes, intervention should be targeted toward overcoming barriers by changing patient perceptions of the influence of these barriers, devising alternative plans in the presence of barriers, or reducing the effect or presence of stimuli that compromise intended behaviors. Behavioral intervention, therefore, would seem to be an essential component of physical therapy intervention.

This article's focus is on physical activity and exercise and the patient/client instruction needed to promote behavioral change. According to the Guide,[8] therapeutic exercise—one of the primary interventions provided by physical therapists—is intended to (1) remediate or prevent impairments, (2) enhance function, (3) reduce health risks, (4) optimize overall health, and (5) enhance fitness and well-being. Although weight loss in people with obesity is not discussed explicitly in the Guide, weight loss can be considered a part of optimizing their overall health and fitness.

Patient/Client-Related Instruction

The scope of physical therapist practice includes the obligation to educate consumers about risks to their health and functional independence. Thus, patient/client-related instruction is a central responsibility in all therapeutic encounters.[8] Effective instruction requires skillfully assessing the patient's readiness to learn, establishing a climate of trust, determining content that the patient must learn, and using effective care delivery strategies.

Instruction for people who are obese has many similarities to instruction for other patient groups—such as including mechanisms for continued contact and support, written reinforcements of concepts, methods to assess and track progress, and ways to overcome the barriers that emerge as other facets of patients' lives change. Unlike patient groups with some other types of chronic conditions, however, obesity is caused in part by behavioral patterns—the opposite of which can reverse obesity's effects. This opens a window of opportunity for physical therapists to positively influence the health of numerous adults. Physical therapists can influence physical activity patterns and exercise strategies for patients whose movement, function, and even longevity may be compromised by obesity.

As for all types of patients, instruction for patients with obesity can be said to rest largely on (1) a solid "curriculum" of concepts and information that can enhance the patient's understanding of the consequences of the condition and (2) the promotion of behavioral changes that support new lifestyle patterns. Physical therapists need to individually tailor patient/client instruction to meet the needs of the wide variety of people who are obese. As noted above, behavioral change is critical in the management of obesity, and such change directly relates to goals for primary, secondary, and tertiary prevention. In its Position Stand on "Appropriate Intervention Strategies for Weight Loss and Prevention of Weight Regain for Adults,"[122] the ACSM noted several requirements for behavioral change, including "activities that are at least moderate in intensity as part of a physically active lifestyle," "exercise options...which may improve the adoption and facilitate the maintenance of a physically active lifestyle," and "self-monitoring of eating and exercise behavior."

Because recidivism is high among patients who are obese, several approaches are needed to ensure "humanistic outcomes"—that is, outcomes that reflect the individual patient's needs.[123] These approaches include developing (1) positive thinking patterns that promote realistic expectations of outcome,[124,125] (2) the ability to overcome barriers (eg, time constraints) to a healthful lifestyle,[126] and (3) knowledge to distinguish fact from myth about obesity and to understand the implications of various commercial weight-loss remedies.[127]

First, health risks associated with elevated BMI should be made clear to the patient. For instance, obesity-related health problems[74]:

- Begin to increase when BMI is greater than or equal to 25 (overweight).
- Become more likely if BMI is greater than or equal to 30 (class I obesity).
- Further increase when BMI is greater than or equal to 35 (class II obesity).
- Become progressively severe with a BMI that is greater than or equal to 40 (class III obesity).

Although dietary intervention remains beyond the scope of physical therapist practice, primary care practitioners can provide useful nutrition counseling, and physical therapists often are asked questions about commercial diet strategies and weight-loss recommendations. By responding appropriately to these questions or referring the patient to the appropriate provider, physical therapists can help patients recognize inaccurate information and overstated advertising claims about the effectiveness of diets and supplements in reducing obesity.[127,128] Recent studies and guidelines have concluded that moderate-fat, low-calorie nutritional patterns are the most effective in enabling weight loss, preventing weight gain, and maintaining consistent weight status throughout adult life.[129,130]

For all types of patients, physical therapists must individually tailor instructions that are based on appropriate knowledge and concepts of engagement and motivation. The curriculum (both implicit and explicit) delivered during patient/client instruction should rely on sound principles from the biological sciences of movement and exercise and the social sciences of motivation and adherence. Physical therapists can incorporate several key concepts about movement, purposeful exercise, physical activity and fitness (and their respective differences[126]) into patient/client instruction for patients who are obese. Based on the available evidence, these concepts may include:

- The potential to reduce the risk of serious health conditions related to obesity and sedentary behavior.[17,131]
- The functional benefits that may accrue from exercise and being physically active.[132]
- The need to pursue both purposeful exercise and daily physical activity to minimize the deleterious effects of obesity.[128,133]
- The need to perform at least 30 minutes and preferably 60 minutes of physical activity and exercise on most or all days in one or several bouts to maximize health benefits.[134-136]
- The benefits that can be accrued in short bouts (at least 10 minutes) of exercise accumulated during the day.[135]
- The need to increase or maintain strength, flexibility,[137-139] and balance[104] as well as cardiovascular endurance.
- The role of posture and correct functioning of each body segment to enable an efficient, coordinated performance of elective or required functional activities.[104,110-112]
- The ways to measure the effects of physical activity and exercise, including use of perceived exertion scales, methods of measuring endurance, the meaning(s) of dyspnea and pain, and summative measurements of function[115,140] (eg, being able to shop in larger stores, requiring fewer rest periods at work and managing obstacles in the environment without falling[104]).
- The likelihood that nutritional change will be required to produce weight loss but that physical activity and exercise will be essential to maintain that loss.[141,142]

When providing information on adopting new lifestyles, clinicians should encourage initial engagement, follow-through, and long-term maintenance. These strategies may help patients overcome inertia and other obstacles (eg, previous embarrassment in a fitness setting, pain or other negative experiences after exercising, or boredom arising from repetitive activities, such as treadmills, that are not perceived as interesting or enjoyable) and become active.

Helping patients/clients develop "contingency plans" to overcome commonly occurring obstacles to active lifestyles may enhance follow-through. These contingency plans may include scheduling of family or work commitments, using joint protection strategies to avoid pain, finding alternative venues for exercise, and developing support systems (eg, exercise "buddies") that reinforce the importance of continuing new behaviors. Long-term maintenance requires the patient to believe that physical activity and exercise are health priorities.

In the United States today, numerous environmental cues promote excess food intake (eg, large portion sizes, easily available high-fat foods) and sedentary lifestyles (eg, television and computers).[17] In the face of these cues, possibly the most challenging aspect of instruction is helping patients who are obese to maintain new commitments and balance priorities. Physical therapists can empower people who are obese to see personally meaningful and healthful cues in the environment that may be overshadowed by the continuing predominance of the cues contributing to obesity.[143] Even so, physical therapists must be cognizant of how discouraging it can be to have a condition that American society stigmatizes, and they should avoid implicit or explicit actions or terminology that are consistent with that stigma.[144]

Physical Activity Prescription

Energy can be expended in numerous ways during daily life.[49,133] Energy expenditure has been determined for many physical activities that require a wide range of intensity of effort.[132] Actual prescription of physical activity may be required to convert a patient's habitual sedentary lifestyle to a more active pattern. Habitual physical activity is known to enable weight control as well as reduce the risk of comorbidities associated with obesity.[42,65,145] In fact, for all people—whether they are obese or normal weight—health and longevity of may be compromised without regular physical activity.[42,65,145]

For many people who are obese, beginning a physically active life is a major change. Counseling to increase

physical activity must account for the effects of a person's characteristics on movement safety, efficiency, and comfort.[143,144] Some ways that people who are obese could begin to switch to a more active lifestyle include choosing active outlets for family gatherings, using stairs instead of elevators, parking further away from the store or the office, doing housework or yardwork, or changing the TV channel without a remote.

Attempts to make necessary lifestyle changes may be impeded by the persistence of old habits, resistance of family and friends to participate in and support the attempt to change, and perceptions that physical activity will not be effective in remedying obesity. This will be particularly true if the person focuses exclusively on weight loss as the outcome.[146] Physical therapists can help people who are obese gain additional perspective by showing them the movement-related and function-related benefits of each strategy (eg, balance, strength, and flexibility to reach a higher shelf). Information about the caloric expenditure of various physical activities also may be important in order to show the patient how to balance energy expenditure with intake. Recording the time and effort expended during these activities can help the person see how best to tailor these physical activities to his or her lifestyle.

Exercise Prescription

Prescription of purposeful exercise strategies can be said to be the core expertise of physical therapists. The following therapeutic exercise interventions, described in the Guide,[8] may be

- Aerobic capacity/endurance conditioning or reconditioning (eg, walking, use of stationary cycling, swimming).
- Balance, coordination, and agility training (eg, using single-foot stance, exercising with gymnastic balls, tandem walking).
- Flexibility exercises (eg, using positioning, active range of motion, self-stretching).
- Strength, power, and endurance training for extremities and trunk (eg, using free weights, resistance bands, gravity-resisted movements).of particular use in patients who are obese:

Improvement in more than one of these four areas may be attained by single activities. As with other types of patients, a variety of motor tasks using novel combinations of direction, speed, and excursion may improve transfer of skills practiced during exercise sessions to meet the requirements of functional abilities; however, research is needed to validate this assumption regarding patients who are obese. Instruction in the basic movement attributes required for function (eg, endurance for walking, strength for stairclimbing, flexibility for tying shoes) remains important for correct performance as well as motivation.

Group exercise instruction may provide an environment of social support, an opportunity to introduce a variety of strategies to achieve desired outcomes, a venue for reinforcing educational concepts, and an efficient way to serve multiple individuals in need of health promotion intervention.

"Optimal Levels of Improvement": Can They Be Achieved?

Obesity is a chronic and dangerous condition that predisposes people to numerous serious health disorders, exposes them to discrimination, and increases the risk for premature death. Although the regulation of body weight is influenced by genetics, the obesity epidemic seems to be driven largely by behavioral and environmental factors. The costs of obesity both to the individual and to society are great and signal the need for comprehensive attention by all health care disciplines.

Physical therapists must understand the multiple complications of a condition that is so widespread and yet so poorly addressed by the current health care system, develop multiple strategies for patient/client instruction, and devise sound exercise and physical activity recommendations that are flexible, individually motivating, and useful for changing sedentary behavior.

Research is needed to grow the evidence base for the management of patients who are obese. Can "optimal levels of improvement" be achieved for these patients?

For more on the challenges for physical therapists, see "An Opportunity to be Agents of Change" on page 17.

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Reducing the Risk of Comorbidities

In what types of situations are physical therapists likely to encounter patients who are obese? Consider the following case example (the description of patient/client management has been abbreviated for the purposes of illustration).

BH is 35 years old, newly married, and pregnant with her first child. During the past 12 years, BH has reduced her body weight from 335 kg (745 lb) to her current weight of 149 kg (330 lb). To accomplish this, she has undergone several multidisciplinary interventions in an effort to address her obesity and reduce the risk of the myriad potential comorbidities of that condition. BH has received inpatient and outpatient care on both a group and individual basis, including use of antidepressants, appetite suppressants, and other pharmacological agents; use of meal replacements and other diet strategies; gastric bypass surgery; behavioral counseling; and liposuction and plastic surgery.

BH also has participated in a structured exercise program and implemented personal strategies to increase her levels of daily physical activity. Currently, some of these activities are restricted because of knee pain associated with osteoarthritis. One injection of cortisone has diminished the pain and reduced the need for assistive devices and activity limitation.

BH reports a lifelong and family-centered history of obesity and routine experience with derogation and criticism because she is obese. She acknowledges that she remains obese—her body mass index (BMI) is still greater than 50 kg/m^2—but she has accepted that label as a clinical term rather than as a personal criticism. She is not attempting to lose weight at this time, but she knows that she has to be vigilant to adhere to the dietary guidelines that are required following gastric bypass surgery and to maintain her reduced weight through balanced eating and activity patterns. Her current goals are to avoid another episode of pain in her knees as she anticipates the birth of her child.

The physical therapist's system review reveals no abnormalities in vital signs, gross strength, aerobic capacity, or posture. Range of motion in her trunk and lower extremities is limited in flexion ranges due to tissue bulk. She reports no pain, no medical comorbidities, and no pregnancy complications. Following a comprehensive examination and evaluation, the physical therapist gives BH a diagnosis of "Impaired Joint Mobility, Motor Function, Muscle Performance, and Range of Motion Associated With Connective Tissue Dysfunction" (Preferred Physical Therapist Practice Pattern^{SM} 4D[1]).

What might be the prognosis for BH? Prognosis is a projection of the likelihood that goals for intervention will be met optimally. In the case of people who are obese, this likelihood is influenced by a number of modifying factors, such as the patient's perspective about the costs and benefits of available interventions needed to attain and maintain a more desirable body weight and healthy lifestyle. Because each patient's perspectives are influenced by shifting views about obesity in America,[2-6] the definition of "optimal improvement" and the goals to be achieved through intervention must be highly individualized.

As BH ages, her musculoskeletal system may be affected by osteoarthritis. In addition, because she remains obese, she carries the prospective risk of other health problems. From BH's perspective, however, her success in markedly reducing her body weight, beginning her new married life, and successfully managing the pain in her knees may represent the achievement of "optimal outcomes." Physical therapy intervention from the standpoint of both primary and secondary prevention, especially through the establishment of an active lifestyle, could help BH both maintain her weight loss and protect her joints.

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Prevention and Obesity: Reimbursement Issues

Third-party reimbursement for physical therapy services for patients with a primary diagnosis of obesity currently is limited unless the health plan's coverage includes wellness programs or prevention. Physical therapists may be reimbursed for services provided to patients for whom obesity is an additional condition or comorbidity. When physical therapists evaluate the data gathered during the examination and determine a prognosis for anyone who is obese, they consider how obesity will affect the patient's goals, plan of care, and outcomes-for example, the patient's exercise progression may be slower because of the obesity-and more visits may be required to bring about the desired outcome. As we learn more about how obesity contributes to such conditions as heart disease, diabetes, joint disorders, and back pain, we may see more payers begin to reimburse for physical therapy services for the treatment of obesity. Because of their knowledge of the musculoskeletal system, body mechanics, and aerobic conditioning, physical therapists are uniquely qualified to determine appropriate exercise programs for people who are obese. They also can provide physiological monitoring of patients to ensure that they are performing exercises and activities safely.

Both employers and health care plans are looking for ways to decrease costs. Employers want to reduce the lost productivity and the rapidly escalating premium costs related to chronic diseases such as obesity, diabetes, and heart disease. Many employers are looking to develop in-house programs or other benefits for employees who are at high risk. They might provide gym memberships or programs for smoking cessation or weight loss, some of which would require the expertise of a health care professional. Physical therapists, therefore, have an opportunity to directly contract with employers to provide on-site exercise programs. Similarly, health care plans undoubtedly are targeting patients who are obese as potential high-cost enrollees and are looking for disease-specific management programs. This is another niche opportunity for physical therapists, one that could help them get into provider networks, with opportunities to market themselves as providers who offer obesity-management programs and set themselves apart from traditional physical therapy providers.

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APTA Reimbursement Department

Opportunity to be Agents of Change

Following is an interview with Susan Deusinger, PT, PhD, co-author of "The Obesity Epidemic: Health Consequences and Implications for Physical Therapy."

PTM: Where are some of the opportunities for physical therapists?

SD: Helping patients with obesity-related conditions requires the contributions of a variety of health care professionals with diverse skills who work as a team-and that includes physical therapists. According to the *Guide to Physical Therapist Practice*,[1] the scope of physical therapist practice includes the obligation to educate consumers about risks to their health and functional independence. Physical therapists might think this means "taking the pounds off" first. But, perhaps ironically, our primary role is in response to the need for physical activity and exercise, with emphasis on weight loss being secondary.

Opportunities for physical therapists to initiate or participate in community education exist at numerous points outside traditional patient care venues. Primary and secondary school systems, community clubs and social organizations, and religious groups all have an inherent investment in the health of their members. The increasing media attention on obesity and its related effects should be matched by the efforts of all health care practitioners to provide accurate and unbiased information and to suggest creative solutions. Our scope of practice does not include specific dietary consultation, but it should include providing information about the energy requirements of exercise and physical activity.

PTM: Give an example of roles that physical therapists might play.

SD: With the documented increase in the prevalence of overweight and obesity in children and adolescents, I would expect an increase in obesity on college campuses-and soon. University officials probably will struggle with the appropriateness of addressing health care issues in the context of academic higher education. They might raise concerns about openly addressing obesity because of its social sensitivity. They may believe that body weight is a private issue that primarily affects older or less well-educated individuals.

Intervention in college environments has the potential to positively influence the dietary, exercise, and physical activity habits of the next generation of Americans. A physical therapist who serves students through the college health center, for instance, would have an opportunity to influence beliefs about obesity. A plan in response to a

community education challenge might include educating both students and faculty members about the prevalence of overweight and obesity, the relevance of actual or potential health consequences for young adults, the health merits of physical activity and exercise, and plans for developing expectations, incentives, and rewards for remaining active. Encouraging an "ethos of health" within the collegiate culture—in much the same manner that educational institutions create an ethos of learning—may help to perpetuate health expectations after college and throughout life.

PTM: What's unique about treating patients who are obese?

SD: Positioning for tests, for example, may require adjustment because of the size of the patient's thighs or the genu valgum that may be present in individuals who are obese. These characteristics may prevent the patient from assuming the tandem, semi-tandem, or parallel foot positions that are required for certain tests. At the Washington University Physical Therapy Clinics, we've observed a number of responses to the 6-minute walk test, for instance—most being indications of decreased endurance rather than signs or symptoms that would connote frank cardiovascular disease. The same kinds of considerations may apply to intervention, particularly in terms of equipment use.

It can be argued that many patients—not just patients who are obese—have issues such as possible tissue restrictions and fear of initiating pain or exacerbating existing pain, unfamiliarity with physical activity when there is a history of sedentary behavior, or risk for injury if examination is too vigorous. What's different about patients who are obese, however, is the patient's additional embarrassment regarding overweight appearance.

PTM: In your article, you note a number of areas that need research.

SD: There are so many questions! At this time, there is no evidence in the peer-reviewed literature on "best practice" in the physical therapist patient/client management of this population. That includes the selection of tests and measures. My colleagues and I believe that there are five test-and-measure categories that may be of greatest concern: range of motion, including muscle length; muscle performance, including strength, power, and endurance; gait, locomotion, and balance, with an emphasis on balance; aerobic capacity/endurance; and functional mobility.

Is there a relationship between balance and obesity? At our clinics, patients who are obese have reported concerns about balance-particularly on stairs-and about falls. Our pilot data for a study involving more than 250 patients suggested the presence of balance deficiencies in patients under 55 years of age who are obese that are similar to documented deficiencies in patients older than 55 years who are not obese.[2]

Do patients who are obese have a greater tendency to use faulty postures? We don't yet know whether there are characteristics that can be directly attributable to extremity width or trunk girth and whether they compromise the quality and efficiency of gait.

Feedback from our patients indicates that they find the sit-to-floor-to-standing tests to be the most challenging because those tests involve a motor task that many patients have not performed in a long time and because they fear not being able to control their body weight on the way down to the floor or on the return to standing. We have observed that patients also fear embarrassment as a result of not being able to complete a functional test that they feel they "should" be able to do.

Do geriatric patients have impairments such as pain and functional limitations similar to those of people who are obese, and, if so, would tests that have been developed for use with geriatric patients be useful with patients who are obese? Given the absence of published standards specifically for people who are obese, it might be useful to use testing in elderly populations as a benchmark. We've found the baseline test results for elderly subjects for many tests are not met even by younger adults who are obese.

Diagnostic classification may be very important. Several schemes for diagnostic classification have been proposed for various populations.[2-4] Specific diagnoses for patients with obesity-related conditions could place patients with different types of movement-related impairments in distinct categories. Unique characteristics for each patient may lie in many domains, including health history, current attitudes toward exercise and physical activity, tolerance for exertion, and psychological state. Development of a standardized classification scheme could highlight the multiple movement-related problems manifested by adults who are obese.

People who are obese may have generalized deconditioning and reduced exercise capacity as a result of longstanding sedentary habits; flexibility limitations imposed in the trunk and extremities in response to tissue bulk; abnormalities in base of support, foot placement, and associated arm swing during gait that may result from tissue accumulation and compensatory mechanical alterations in lower-extremity position; pain patterns resulting from longstanding tissue stress and improper postural and movement patterns; habitual postural characteristics including genu recurvatum, increased lumbar curve, protracted shoulder girdle, and forward head that may result from adjustments to excess body weight

over time; sensory deficits (principally in distal extremities) that may arise from diabetic neuropathy or carpal tunnel syndrome or simply from pressure of excess fat mass near peripheral nerves; and compromised patency of skin, particularly on the abdomen, from friction of tissue.

PTM: Don't physical therapists typically encounter obesity-related impairments in patients who are referred to them for other reasons?

SD: At this time, yes, but there are some situations-and of course it depends on how the state practice act defines prevention-when physical therapists may work with clients who are obese and who come to them for primary prevention.

Direct intervention for prevention of obesity usually requires a long-term commitment by both the client and the practitioner and an emphasis on health promotion as well as rehabilitation. In this paradigm, the physical therapist functions as a caregiver, an educator, and a consultant to the individual client, roles that may predicate the specific targets for intervention. I believe there are four main targets of intervention: foster readiness to be active, treat existing impairments, promote physical activity as a lifestyle, and formulate or reformulate a fitness regimen. The key is in how physical therapists might "prioritize" these targets for intervention. Let's consider some scenarios.

"Sharon" was referred to a physical therapist by her gynecologist, who was concerned about her 50-lb weight gain over the past year. She is 42 years old, has a BMI of 48, and has been assessed by both the gynecologist and her internist to be in good health, although at risk for comorbidities associated with obesity. All of her family members are obese. She cancelled her physical therapy appointment three times and made it known that she sees no reason to exercise or change her activity patterns. She says she will keep the next appointment only to "get her physician off her back." For her, there are no existing impairments; however, she does need help, first in developing readiness to be active; second, in engaging in physical activity; and third, in formulating a fitness regimen.

"Emily," meanwhile, is seeking physical therapy care under her own referral for exercises to help her lose weight. She is 28 years old, 5'3" tall and weighs 285 lb. Her secretarial job and her 2-year-old daughter keep her very busy. She has a 10-year history of osteoarthritis in her right knee, a shoulder injury incurred 5 years ago and diagnosed as a rotator cuff problem, and newly diagnosed carpal tunnel syndrome—all of which she reports are daily "annoyances." She has a treadmill at home and access to a weight room at work and is a member of a mothers' activity group in her neighborhood. She's ready to be active, so that doesn't need to be the therapist's focus. The priority targets are to manage those existing impairments and formulate a fitness regimen. Promoting physical activity as a lifestyle is a lower priority for the physical therapist because this patient already has an active life!

Now consider "George," a 60-year-old executive, who recently joined a gym. He has encountered "pressure" from peers and gym personnel to rapidly progress in resistance and aerobic activities. Though he's pain free when he comes into the clinic, his wife pressured him to look into physical therapy because of his multiple complaints of muscle soreness that usually last 2 or 3 days. He has a history of high cholesterol; his doctor says he is "pre-diabetic" and that his waist circumference of 52" puts him at risk for cardiovascular disease, of which there is a family history. The physical therapist will prioritize the target of formulating a fitness regimen that will not be too intense for his current level of ability and that will thereby avoid musculoskeletal injury.

PTM: How can educators help physical therapists take on the challenges of the obesity epidemic?

SD: Our professional education programs can uphold changes in professional behavior-for instance, in approaches to patient instruction-by providing a thorough introduction to obesity as a major moderating variable for health and function.

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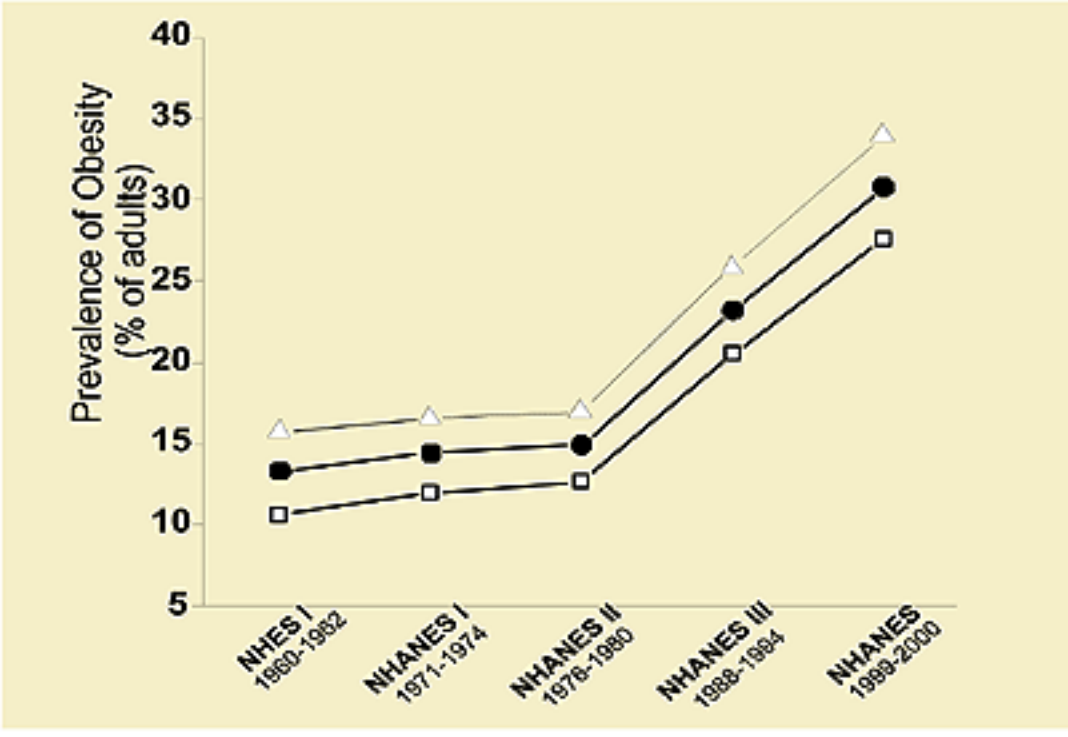

Figure 1. Prevalence of obesity among adults. Percentage of adults aged 20 to 74 years who were classified as obese (body mass index ≥30.0 kg/m^2) in the National Health Examination Survey I (NHES I) and in four National Health and Nutrition Examination Surveys (NHANES).[13] Key: All adults=•, women=△, and men=❑.

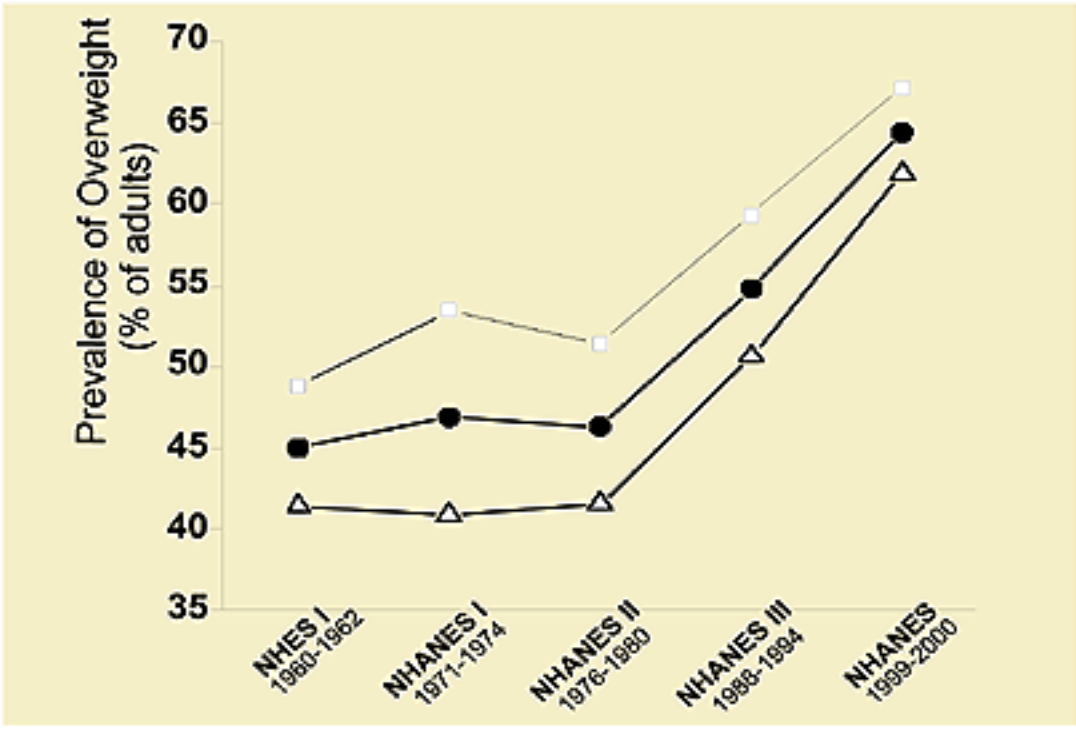

Figure 2. Prevalence of overweight among adults. Percentage of adults aged 20 to 74 years who were classified as overweight (body mass index ≥25.0 kg/m²) in the National Health Examination Survey I (NHES I) and in four National Health and Nutrition Examination Surveys (NHANES).[13,14,78] Key: All adults=•, women=△, and men=□. Adapted with permission of APTA from Figure 1, Racette SB, Deusinger SS, Deusinger RH. Obesity: overview of prevalence, etiology, and treatment. *Phys Ther.* 2003;83:276-288.

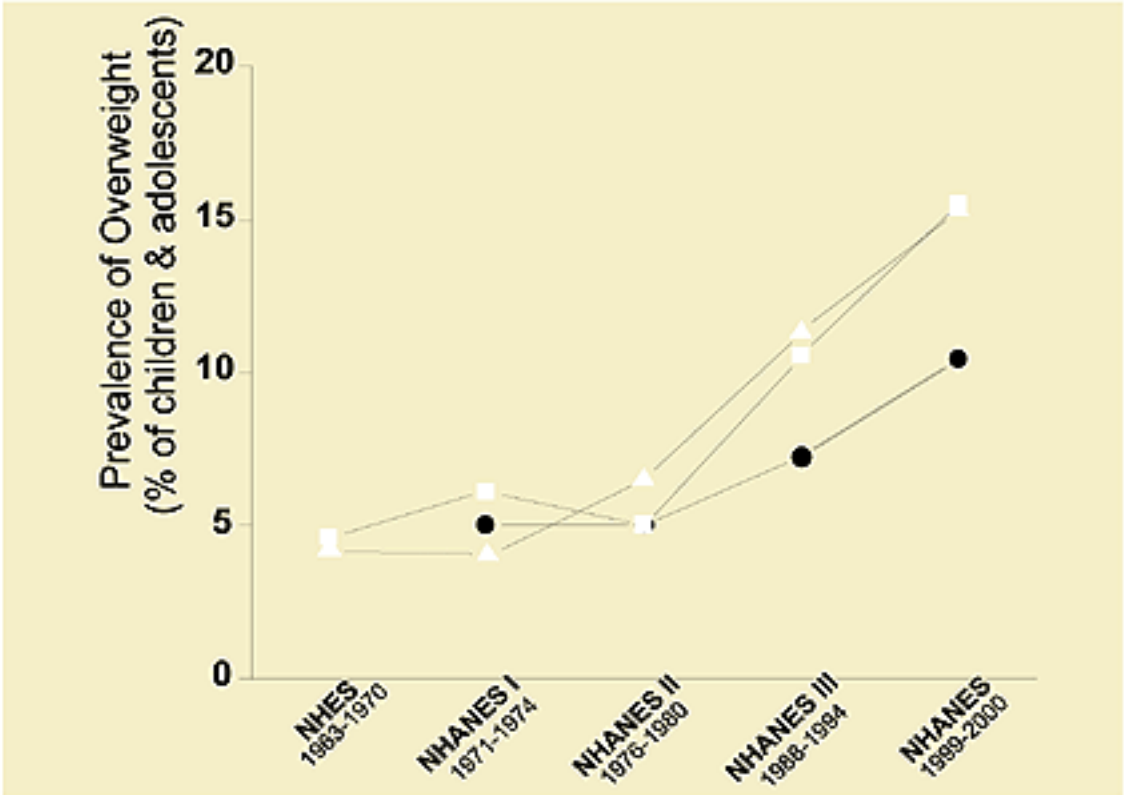

Figure 3. Prevalence of overweight among children and adolescents. Percentage of children aged 2 to 5 years (•), 6 to 11 years ( ), and adolescents 12 to 19 years (❑) who were classified as overweight (95th percentile of body mass index for age according to the 2000 Centers for Disease Control growth charts[3]) in the National Health Examination Surveys (NHES) and in four National Health and Nutrition Examination Surveys (NHANES).[15]

Stage	Behavioral Response	Time Frame	Intervention Options
Pre-contemplation	Avoidance "I won't"	Never	Risk-education; cognitive restructuring; stress management
Contemplation	Avoidance "I may"	Within the next 6 months	Realistic goal setting; social support, cost/benefit assessment; stimulus control
Preparation	Tentative trial(s) "I will"	Within the next month	Health education class or self-help book; counseling; meeting with practitioner
Action	Active trial "I am"	For less than 6 months	Trial changes that meet criteria for success; self-assessment and monitoring
Maintenance	Relapse prevention "I have"	For the past 6 months to 5 years	Follow-up and continued monitoring; reinforcement of benefits; design of alternative plans
Termination	Habitual performance "I still am"	Always	Periodic monitoring

Table 1. Stages of readiness for behavioral change.54,56

	Normal Weight						Overweight					Obese - Class I					Obese - Class II					Obese - Class III										
BMI	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Height (cm)	**Body Weight (kg)**																															
147	41	43	46	48	50	52	54	56	59	61	63	65	67	69	72	74	76	78	80	82	85	87	89	91	93	95	98	100	102	104	106	109
150	43	45	47	49	52	54	56	58	61	63	65	67	70	72	74	76	79	81	83	85	88	90	92	94	97	99	101	103	106	108	110	112
152	44	46	49	51	53	56	58	60	63	65	67	70	72	74	77	79	81	84	86	88	91	93	95	98	100	102	105	107	109	111	114	116
155	46	48	50	53	55	58	60	62	65	67	70	72	74	77	79	82	84	86	89	91	94	96	98	101	103	106	108	110	113	115	118	120
157	47	50	52	55	57	60	62	64	67	69	72	74	77	79	82	84	87	89	92	94	97	99	102	104	107	109	112	114	117	119	122	124
160	49	51	54	56	59	61	64	67	69	72	74	77	79	82	85	87	90	92	95	97	100	102	105	108	110	113	115	118	120	123	125	128
163	50	53	55	58	61	63	66	69	71	74	77	79	82	85	87	90	92	95	98	100	103	106	108	111	114	116	119	122	124	127	129	132
165	52	55	57	60	63	65	68	71	74	76	79	82	84	87	90	93	95	98	101	104	106	109	112	114	117	120	123	125	128	131	134	136
168	53	56	59	62	65	67	70	73	76	79	81	84	87	90	93	96	98	101	104	107	110	112	115	118	121	124	126	129	132	135	138	141
170	55	58	61	64	67	70	72	75	78	81	84	87	90	93	96	98	101	104	107	110	113	116	119	122	125	127	130	133	136	139	142	145
173	57	60	63	66	69	72	75	78	81	84	87	89	92	95	98	101	104	107	110	113	116	119	122	125	128	131	134	137	140	143	146	149
175	58	61	65	68	71	74	77	80	83	86	89	92	95	98	101	104	108	111	114	117	120	123	126	129	132	135	138	141	144	147	151	154
178	60	63	66	70	73	76	79	82	85	89	92	95	98	101	104	107	111	114	117	120	123	126	130	133	136	139	142	145	149	152	155	158
180	62	65	68	72	75	78	81	85	88	91	94	98	101	104	107	111	114	117	120	124	127	130	133	137	140	143	146	150	153	156	159	163
183	64	67	70	74	77	80	84	87	90	94	97	100	104	107	110	114	117	120	124	127	130	134	137	140	144	147	151	154	157	161	164	167
185	65	69	72	76	79	83	86	89	93	96	100	103	107	110	113	117	120	124	127	131	134	138	141	144	148	151	155	158	162	165	168	172
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191	69	73	76	80	83	87	91	94	98	102	105	109	112	116	120	123	127	131	134	138	142	145	149	152	156	160	163	167	171	174	178	181
193	71	75	78	82	86	89	93	97	101	104	108	112	116	119	123	127	130	134	138	142	145	149	153	157	160	164	168	171	175	179	183	186

Table 2. Body mass index (BMI) in metric units. BMI can be estimated by locating a patient's height and body weight in the table, and then reading the corresponding BMI value. (To convert inches to centimeters, multiply by 2.54; to convert pounds to kilograms, multiply by 0.45).76

	Normal Weight						Overweight					Obese - Class I					Obese - Class II					Obese - Class III										
BMI	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Height (in)	**Body Weight (lbs)**																															
58	91	96	100	105	110	115	120	124	129	134	139	144	148	153	158	163	167	172	177	182	187	191	196	201	206	211	215	220	225	230	234	239
59	94	99	104	109	114	119	124	129	134	139	144	149	153	158	163	168	173	178	183	188	193	198	203	208	213	218	223	228	233	238	243	248
60	97	102	108	113	118	123	128	133	138	143	148	154	159	164	169	174	179	184	189	195	200	205	210	215	220	225	230	236	241	246	251	256
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64	111	117	122	128	134	140	146	151	157	163	169	175	181	186	192	198	204	210	216	221	227	233	239	245	251	256	262	268	274	280	285	291
65	114	120	126	132	138	144	150	156	162	168	174	180	186	192	198	204	210	216	222	228	234	240	246	252	258	264	270	276	282	288	294	300
66	118	124	130	136	142	149	155	161	167	173	180	186	192	198	204	211	217	223	229	235	242	248	254	260	266	273	279	285	291	297	304	310
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69	129	135	142	149	156	163	169	176	183	190	196	203	210	217	223	230	237	244	251	257	264	271	278	284	291	298	305	311	318	325	332	339
70	132	139	146	153	160	167	174	181	188	195	202	209	216	223	230	237	244	251	258	265	272	279	286	293	300	307	314	321	328	335	341	348
71	136	143	151	158	165	172	179	186	194	201	208	215	222	229	237	244	251	258	265	272	280	287	294	301	308	315	323	330	337	344	351	358
72	140	147	155	162	170	177	184	192	199	206	214	221	229	236	243	251	258	265	273	280	288	295	302	310	317	324	332	339	347	354	361	369
73	144	152	159	167	174	182	189	197	205	212	220	227	235	243	250	258	265	273	280	288	296	303	311	318	326	333	341	349	356	364	371	379
74	148	156	164	171	179	187	195	203	210	218	226	234	241	249	257	265	273	280	288	296	304	312	319	327	335	343	350	358	366	374	382	389
75	152	160	168	176	184	192	200	208	216	224	232	240	248	256	264	272	280	288	296	304	312	320	328	336	344	352	360	368	376	384	392	400
76	156	164	173	181	189	197	205	214	222	230	238	246	255	263	271	279	288	296	304	312	320	329	337	345	353	361	370	378	386	394	403	411

Table 3. BMI in English units 76