

Exercise and Psychological Well-Being

After reading this chapter, you should be able to

1. explain the effects of exercise on anxiety and depression;
2. describe the relationship between exercise and mood states;
3. discuss the effects of exercise on psychological well-being;
4. describe the relationships among exercise, personality changes, and cognitive functioning;
5. discuss the runner's high; and
6. discuss the use of exercise as an adjunct to therapy.

Much of technology was meant to make our lives easier. However, the advent of cell phones, instant messaging, the Internet, and other communication devices has made our world increasingly complex and pressured. Ever more demands seem to be built into our daily existence, and noise, smog, inflation, unemployment, racism, sexism, drug abuse, gambling, and random violence add still more stress to our lives. These demands have affected the mental health and psychological well-being of society.

The most common disorders in the United States are anxiety disorders and depression. These affect 17% and 11%, respectively, of people aged 15 to 54 years, and each costs the public about \$45 billion a year. Lifetime prevalence rates are approximately 25% for anxiety disorders and 20% for depression (Dishman, Washburn, & Heath, 2004). In addition, the World Health Organization projected that depression will be second only to cardiovascular disease as the world's leading cause of death and disability by the year 2020

(Murray & Lopez, 1997). Although people typically deal with these mood disturbances through psychological counseling, drug therapy, or both, more and more individuals are looking to exercise to promote their psychological well-being. Many researchers, clinicians, and laypeople have observed that physical activity enhances feelings of well-being, in particular by reducing anxiety and depression and increasing vigor. In addition, in the past 10 to 15 years, reviews of the literature have concluded that exercise is related to decreases in anxiety and depression as well as to increases in feelings of general well-being (Berger & Tobar, 2011; Biddle, 2011b; Landers & Arent, 2001).

Recent epidemiological data add credibility to these observations of the beneficial influences of exercise. These epidemiological data refer to statistics and information about the distribution and determinants of health problems or health-related events in populations as they apply to the control of health problems. For example, Stephens (1988) analyzed data from 56,000

participants and concluded that “the level of physical activity is positively associated with good mental health in the household population of the United States and Canada, when mental health is defined as positive mood, general well-being, and relatively infrequent symptoms of anxiety and depression” (p. 41). The positive effects of exercise on physical well-being are well documented and include changing the course of such illnesses as osteoporosis, hypertension, coronary heart disease, and cancer as well as improving feelings of psychological well-being (Blair, 1995).

In this chapter we look at the psychological benefits of exercise in four broad areas: reduction of anxiety and depression, enhancement of mood, improvement in self-concept, and improvement in quality of life. It is important to note that terms such as *subjective well-being*, *psychological well-being*, *emotional well-being*, and simply *well-being* have all been used in the literature and often have been defined somewhat differently (Lundquist, 2011). Because defining these terms is beyond the scope of this chapter, we use these terms interchangeably to refer to the six dimensions that make up well-being:

- Self-acceptance (positive views of one’s self)
- Positive relations with others (trusting, caring, and empathetic relationships)
- Autonomy (self-determined with intrinsic motivation and self-referenced standards)
- Environmental mastery (effective mastery of the environment to fulfill personal values)
- Personal growth (sense of development and self-fulfillment over time)
- Purpose in life (directed toward purposeful goals for living)

Reducing Anxiety and Depression With Exercise

Mental health problems account for some 30% of the total days of hospitalization in the United States and about 10% of total medical costs. The mental health problems that have received the most attention are anxiety and depression. Although millions of Americans have anxiety disorders and depression, not all of them have psychopathological states; many simply have subjective distress, a broader category of unpleasant emotions. For these people, regular exercise appears to have some therapeutic value in

reducing feelings of anxiety and depression. Participating in regular exercise for psychological well-being is more than an American phenomenon. For example, in a survey conducted in England, Londoners also found exercise to be one of the most effective things to do when feeling depressed.

So far, most studies of the relationship between exercise and reductions in anxiety and depression have been correlational, so we cannot conclusively state that it was exercise that caused or produced the change in mood state. Rather, exercise appears to be *associated with* positive changes in mood states and reductions in anxiety and depression.

The effects of exercise on anxiety and depression can be classified as acute or chronic. **Acute effects** refer to immediate and possibly, but not necessarily, temporary effects arising from a single bout of exercise. Sport psychologists have also studied the long-term or **chronic effects** of exercise, investigating the validity of the old motto “A sound mind in a sound body.” Research on the chronic effects of exercise has focused on changes over time in both anxiety and depression. The vast majority of research on the relationship between exercise and psychological well-being has used aerobic exercise. Although it was once believed that exercise needed to be of a certain or sufficient duration and intensity to produce positive psychological effects, research has indicated that high-intensity aerobic activity is not absolutely necessary to produce these positive benefits (e.g., Berger & Motl, 2001; Landers & Arent, 2001). In fact, activities such as weight or strength training, yoga, and other nonaerobic exercises have produced positive effects on psychological well-being. “Chronic Exercise and Mental Health” presents the conditions most associated with reductions in anxiety and depression and positive changes in mood.

KEY POINT Although a cause–effect relationship has not been established, regular exercise is associated with reductions in anxiety and depression.

Exercise in the Reduction of Anxiety

Studies of how exercise influences the reduction of anxiety have typically investigated either acute (short-term) or chronic (long-term) effects; studies have tended to focus more on the short-term effects. Investigations on the chronic effects of exercise have involved programs that typically last about 2 to 4 months, with two to four exercise sessions per



Exercise has been shown to reduce anxiety, depression, and chronic diseases and increase feelings of well-being, relaxation, and overall good health.

week. For example, two studies (Long, 1984; Long & Haney, 1988) compared different anxiety reduction techniques, such as stress inoculation and progressive relaxation, with jogging as stress management interventions. In both studies the jogging groups and stress management groups exhibited significant decreases in state anxiety over the course of the intervention period compared with the waiting-list control participants. But, more important, these reductions in state anxiety were maintained in follow-ups of up to 15 weeks (figure 17.1). Other studies (see O'Connor & Puetz, 2005, for a review) have also found chronic effects of exercise in reducing anxiety.

Most research on the acute effects of exercise has focused on the reduction of state anxiety. Similar to earlier studies (see Landers & Arent [2001] and Taylor [2001] for reviews), more recent studies showed that aerobic exercise resulted in lowered state anxiety and higher tranquility scores. In addition, research has revealed that moderate-intensity exercise produced the greatest positive effects in affective responses (Arent, Landers, Matt, & Etnier, 2005). Markowitz

and Arent (2010) showed that exercise at or 5% below lactate threshold (the point at which lactate begins to accumulate in the bloodstream faster than it is removed) produces the maximal affective benefit during the task and for 30 minutes after the task. Conversely, exercise above the lactate threshold produces comparable affective improvements only 30 minutes after completing the task and worsens affect while performing the task. Knowledge of what psychological changes to expect for given exercise intensity levels can help individuals choose the most appropriate level of exercise for their continued adherence.

How long does the tranquilizing effect of exercise last? Raglin and Morgan (1987) found that state anxiety was reduced for up to 24 hours (although more typically 2–4 hours) after the exercise bout, whereas participants in a control rest condition returned to baseline levels within 30 minutes. Although acute exercise is no more effective in decreasing state anxiety than quiet rest or distraction, the effects last longer. Specifically, Breus and O'Connor (1998) found that the decreases in state anxiety after exercise lasted

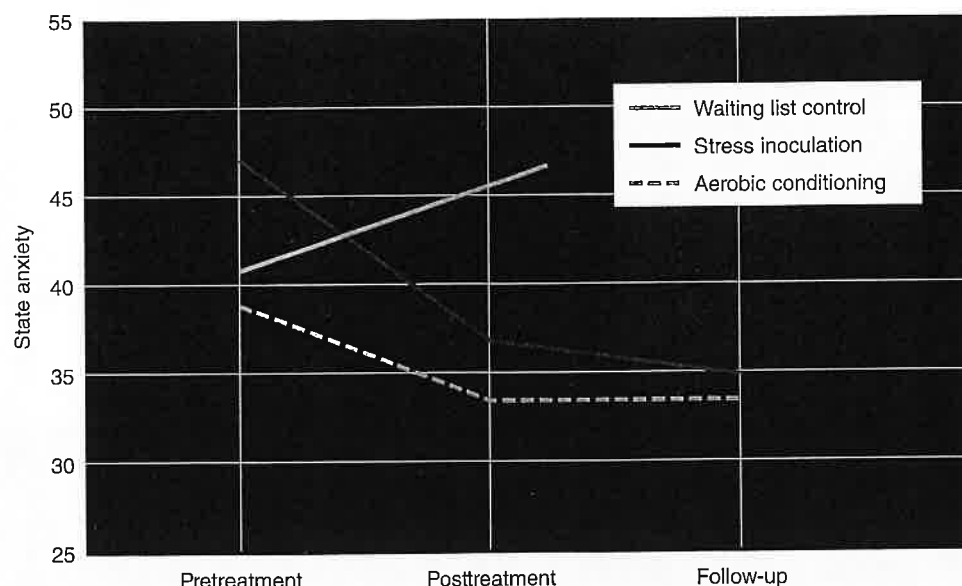


FIGURE 17.1 Mean ratings of change in measures of stress before and after treatment and at a 3-month follow-up.

Adapted, by permission, from B.C. Long, 1984, "Aerobic conditioning and stress inoculation: A comparison of stress-management interventions," *Cognitive Therapy and Research* 8(5): 529.

several hours, which was more than in the distraction and quiet rest groups.

Some literature reviews using the statistical technique called meta-analysis (e.g., Landers & Petruzzello, 1994; Long & Stavel, 1995), as well as narrative reviews (Martinsen & Stephens, 1994; Mutrie & Biddle, 1995), were conducted to determine the relationship between exercise and anxiety reduction. For example,

according to a comprehensive examination of 27 narrative reviews (Landers & Petruzzello, 1994), 81% of studies conducted between 1960 and 1992 concluded that physical activity was related to anxiety reduction after exercise (and the other 19% showed partial support for this conclusion). Reed and Ones (2006), examining 158 studies between 1979 and 2005, found strong results for the ability of even low-intensity exercise to

Chronic Exercise and Mental Health

The National Institute of Mental Health convened a panel to discuss the possibilities and limitations of physical activity for coping with stress and depression (Morgan & Goldston, 1987). Although the recommendations regarding the relationship between chronic exercise and mental health have been updated over the years, the basic conclusions remain the same:

- Physical fitness is positively associated with mental health and well-being.
- Exercise is associated with the reduction of stress emotions such as state anxiety.
- Anxiety and depression are common symptoms of failure to cope with mental stress, and exercise has been associated with a decreased level of mild to moderate depression and anxiety.
- Long-term exercise is usually associated with reductions in traits such as neuroticism and anxiety.
- Severe depression usually requires professional treatment, which may include medication, electroconvulsive therapy, psychotherapy, or a combination of these, with exercise as an adjunct.
- Appropriate exercise results in reductions in various stress indicators, such as neuromuscular tension, resting heart rate, and some stress hormones. Current clinical opinion holds that exercise has beneficial emotional effects across ages and sexes.
- Physically healthy people who require psychotropic (mood-altering) medication may safely exercise under close medical supervision.

improve affect. In addition, Wipfli, Rethorst, and Landers (2008) reviewed 49 studies that used randomized control trials (the highest level of scientific evidence). Results revealed greater reductions in anxiety for exercise groups than for groups that received other forms of anxiety-reducing treatment. These reviews (based on hundreds of studies involving thousands of participants) show general consensus about the positive effects (generally moderate) of exercise in reducing both acute and chronic anxiety (not simply attributable to a time-out or rest), including the following additional findings:

- Longer training programs (sessions conducted over weeks rather than hours or days) are more effective than shorter ones in producing positive changes in well-being.
- Reductions in state anxiety and depression after aerobic exercise may be achieved with exercise intensities between 30% and 70% of maximal heart rate (as opposed to earlier research suggesting that one needs to exercise at 70% of the maximal heart rate to achieve psychological benefits). For anaerobic exercise (e.g., weightlifting), mood-enhancing effects appear evident at a lower range (30%–50%) of maximal heart rate.
- Exercise training is particularly effective for individuals who have elevated levels of anxiety, but it reduces anxiety even for people with low levels of anxiety.
- All durations of exercise significantly reduced anxiety, although larger effects were found for periods up to 30 minutes (especially under moderate intensity conditions).
- State anxiety returns to pre-exercise anxiety levels within 24 hours (maybe as quickly as 4–6 hours).
- Exercise is associated with reductions in muscle tension.
- Reductions in anxiety are not necessarily tied to the physiological gains resulting from the exercise bout.
- The anxiety reduction after exercise occurs regardless of the intensity, duration, or type of exercise (although greater effects occurred for aerobic vs. anaerobic activities).
- Aerobic exercise can produce anxiety reductions similar in magnitude to those produced by other commonly used anxiety treatments.

- Anxiety reduction after exercise occurs for all types of participants (e.g., male or female, fit or unfit, active or inactive, anxious or nonanxious, healthy or nonhealthy, younger or older, with or without anxiety disorders).

Exercise in the Reduction of Depression

Depression is a well-documented source of human suffering, and about one in four Americans suffers from clinical depression at any given time. The prevalence of major depression has increased steadily during the past 50 years (Kessler et al., 2003). Depression is especially prevalent in girls and women, who have two (under 25 years old) to six (25–54 years old) times the rate of depression of boys and men (Regier et al., 1988). Finally, depressive disorders are estimated to affect approximately 6% of adolescents. Although most of the time depression is treated through prescription drugs or therapy, a recent Gallup poll identified exercise as a close second behind religion as an effective alternative means of relieving depression. In addition, physical inactivity has been shown to be related to higher levels of depression.

In a study by Blumenthal and colleagues (1999), participants (who were diagnosed as clinically depressed) were randomly assigned to a supervised aerobic exercise program three times per week, a medication treatment (Zoloft), or a combined treatment of medication and exercise. Results revealed that after 16 weeks of intervention, all three groups significantly reduced depressive symptoms; the exercise was as effective as the other two treatments. In another study, exercise was shown to reduce clinical depression; this reduction was attributable predominantly to successful coping self-efficacy (Craft, 2005). A study by Desha, Ziviani, Nixholson, Martin, and Darnell (2007) showed that adolescent males who were not involved in extracurricular organized sporting activities exhibited greater severity of depressive symptoms than males involved in sporting activities, underscoring the importance of sport participation for young males.

In addition, Legrand and Heuze (2007) found that the frequency of exercise might be important in relieving depressive symptoms. Specifically, they found that exercising three to five times per week produced significant reductions in depression compared with exercising once per week. Furthermore, adding a group-based intervention for the group that exercised three to five times per week did not significantly

reduce depressive symptoms, underscoring the importance of exercise per se in reducing depression. Finally, a series of studies revealed that physical activity interventions were successful in reducing depression among adolescent boys and girls. These results demonstrate, from a sequencing perspective, that exercise precedes changes in depression.

Consistent agreement about the moderate relationship between exercise and depression is also seen in other studies; these include several narrative (e.g., Martinsen & Stephens, 1994; Mutrie, 2001; Mutrie & Biddle, 1995) and statistical (Craft & Landers, 1998; North, McCullagh, & Tran, 1990) reviews as well as empirical studies (e.g., Dunn, Trivedi, Kampert, Clark, & Chambliss, 2005). Note that the relationships between exercise and depression are correlational: Exercise is associated with, but may not cause, changes in depression. Some of the consistent findings from these reviews of the literature regarding the relationship between exercise and depression are as follows:

- The positive effects are seen across age groups, health status, race, socioeconomic status, and sex.
- Exercise is as effective as psychotherapy in reducing depression.
- Exercise produces larger antidepressant effects when the training program is at least 9 weeks long.
- Both aerobic and anaerobic exercise are associated with reductions in depression.
- Reductions in depression after exercise do not depend on fitness levels.

Although people report feeling better after exercise, approximately 50% of individuals drop out of exercise programs and many more do not exercise at all. So, does exercise actually make us feel better? An article by Backhouse, Ekkekakis, Biddle, Fosskett, and Williams (2007) offers some thoughtful alternatives to the well-known “feel better” phenomenon based on empirical data:

- Occasional findings of negative affective changes tend to be discounted.
- Potentially relevant affective states (e.g., unpleasant high activation) are not always measured.
- Examining changes pre- to postexercise could

miss negative changes that occur during exercise (i.e., require more measurement points).

- Analyzing changes only at the group level might conceal divergent patterns at the level of individuals or subgroups (i.e., individual differences).

The authors conclude that they were not trying to undermine the “feel better” phenomenon regarding exercise and psychological well-being. Rather, they suggest that the focus should be on the exercise–affect relationship as it bears on the public health problem of exercise adherence rather than on exercise related to mental health.

KEY POINT Mood is generally defined as a state of emotional or affective arousal of varying, impermanent duration.

Mood changes have been studied in a variety of settings, and considerable experiential and anecdotal evidence supports the existence of changes in positive mood states related to exercise (Berger & Tobar, 2011; Biddle, 2000). For example, psychologists and psychiatrists rate exercise as the most effective technique for changing a bad mood; they are more likely to use exercise than other techniques to energize themselves (Thayer, Newman, & McClain, 1994). In addition, various studies have concluded that physical activity is positively related to positive mood, general well-being, and relatively infrequent symptoms of anxiety and depression. Other findings have revealed that exercise is related to decreases in fatigue and anger as well as increases in vigor, clear thinking, energy, and alertness and an increased sense of well-being. Hansen, Stevens, and Coast (2001) showed increases in positive mood states with as little as 10 minutes of moderate exercise, highlighting the notion that short bouts of exercise can produce positive psychological benefits. Frith, Kerr, and Wilson (2011) found that a variety of types of exercise, including weight training aerobics and tai chi, helped improve anger, sullenness, resentment, tension, and anxiety. Furthermore, exercise improved positive mood regardless of the number of negative and positive events in a given day (Giacobbi, Hausenblas, & Frye, 2005). Finally, Daley and Maynard (2003) found that increasing the choice of exercise mode was related to exercisers scoring lower on negative affect. A quote from Sarah Ban Breathnach (1998) makes the point that exercise is related to changes in mood:

“A half hour of walking every other day increases your vitality and energy level and you find yourself less depressed. Suddenly, you become more relaxed and fun to be around. You smile, maybe even laugh. You catch a reflection of yourself in a mirror and you’re pleasantly surprised.” (p. 86)

Researchers (Thayer et al., 1994) identified various techniques for altering mood and categorized and evaluated the effectiveness of these methods used by men and women (ranging in age from 16 to 89 years). Mood regulating, they say, has three interrelated components: changing a bad mood, raising one’s energy level, and reducing tension. The researchers conclude, “Of all the separate behavioral categories described to self-regulate mood, a case can be made that exercise is the most effective. This behavior was self-rated as the most successful in changing a bad mood, fourth most successful in raising energy, and third most

successful at tension reduction” (p. 921). Although we know that exercise is related to positive changes in mood states (Gauvin, Rejeski, & Reboussin, 2000), little evidence suggests that exercise itself causes the benefits. Perhaps, for example, those who have more desirable (“better”) moods simply exercise more often. Along these lines, Carels, Colt, Young, and Berger (2007) found that a positive morning mood was associated with an increased likelihood of exercising and that as positive mood increased throughout the day, exercise initiation and intensity both were increased. So, how you feel also is related to your propensity to exercise, apart from the effect of exercise itself on improving mood. Finally, positive mood changes do not come automatically with exercise. Rather, as noted in “Guidelines for Using Exercise to Enhance Mood,” certain types of exercises with certain levels of intensity, duration, and frequency are most likely to produce these positive mood changes.

Guidelines for Using Exercise to Enhance Mood

For an exerciser who wants to achieve positive mood changes (including reduced anxiety and depression), researchers recommend the following procedures and guidelines (Berger & Tobar, 2011; Berger & Motl, 2001).

- *Rhythmic abdominal breathing.* Many investigators have studied the role of aerobic versus anaerobic exercise in producing mood alteration. Although the original research suggested that exercise needs to be aerobic to produce positive psychological benefits, more recent research has shown that either aerobic or anaerobic exercise can be effective. What seems more important is that rhythmic abdominal breathing be generated, as in activities such as hatha yoga, tai chi, walking, running, riding a bicycle ergometer at light workloads, and swimming.
- *Relative absence of interpersonal competition.* Although some people find competition enjoyable, the vast majority of research has found that the absence of competition enhances psychological well-being. Competition can produce overtraining, pressure to win, and social evaluation, whereas in a noncompetitive environment the participants can focus on enjoying the activity itself.
- *Closed and predictable activities.* Closed environments (e.g., golf, swimming) allow participants to plan their movements, and unexpected events are unlikely. These self-paced activities enable participants to tune out the environment and engage in free association while they are exercising.
- *Rhythmic and repetitive movements.* The rhythmicity of repetitive movements such as walking or running encourages introspective or creative thinking, or both, during participation. This focus of attention can free the mind to attend to more important issues.
- *Duration, intensity, frequency.* Research has indicated that exercise should be at least 20 to 30 minutes in duration and of moderate intensity, and that it should be done regularly (two to three times per week).
- *Enjoyment.* Although the characteristics of the exercise are important (as just outlined), probably the most critical component is that the exercise is enjoyable (Berger & Tobar, 2011). Recent research in naturalistic settings (Raedeke, 2007) found that enjoyment was related to increases in positive affect. Thus, unless an activity is enjoyable, it is not likely that individuals will keep exercising over a long period of time (see chapter 18).

Jones and Sheffield (2007) investigated the effects of the outcome of a competition on psychological well-being. University and club sport athletes were assessed 4 to 6 days after a regular-season contest. Results revealed that winners, compared with losers, exhibited lower levels of depression and anger as well as higher levels of vigor. In addition, winners reported fewer somatic symptoms, fewer social dysfunction symptoms, and less anxiety than losers. Evidently, winning or losing (even for regular-season games) stays with athletes for at least several days, and losing could have an adverse effect on motivation levels for subsequent training and competition. Accordingly, coaches and athletes should be aware of affective control strategies for help in controlling negative affect after a loss.

Understanding the Effect of Exercise on Psychological Well-Being

The evidence we've reviewed so far suggests a positive relationship between exercise and psychological well-being (figure 17.2 summarizes the psychological benefits of exercise for adults). The psychological benefits of exercise for children and adolescents are often forgotten, although Biddle (2011b) summarizes these findings. In general, increased exercise is correlated with higher levels of self-efficacy and perceived competence, increased achievement motivation and intention to exercise, higher levels of task goal orientation (self-referenced goals), and lower levels of depression. In addition, the amount of exercise is related to perceived body attractiveness, importance of appearance, and physical self-worth in adolescent girls.

Several hypotheses, both psychological and physiological, have been proposed to explain how exercise enhances well-being. However, no one hypothesis has support as the sole or primary mechanism producing these positive changes. In fact, it is likely that the positive changes in psychological well-being are attributable to an interaction of physiological and psychological mechanisms. Therefore, we simply list the potential physiological and psychological mechanisms that researchers propose may account for the positive effect of exercise on psychological well-being.

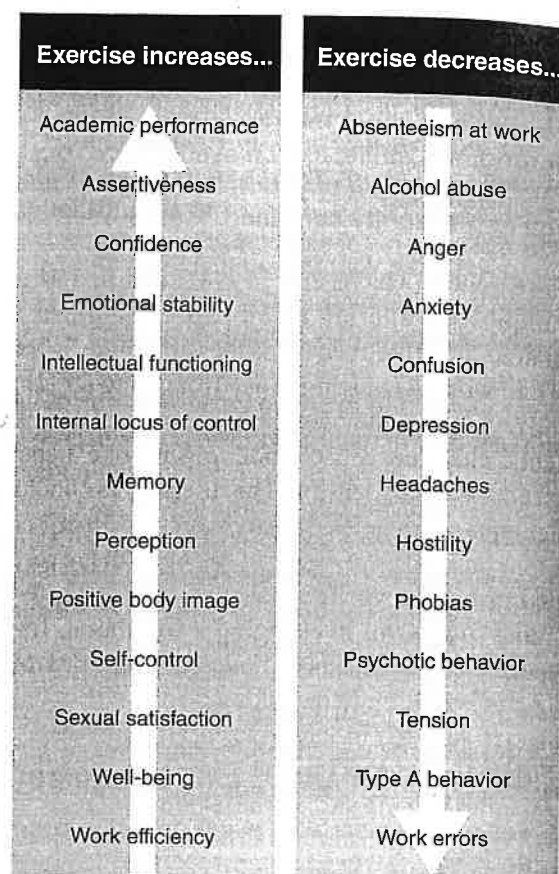


FIGURE 17.2 Psychological benefits of exercise in clinical and nonclinical adult populations.

Adapted from C. Taylor, J. Sallis, and R. Needle, 1985, "The relation of physical activity and exercise to mental health," *Public Health Reports* 100: 195-202.

Physiological Explanations

- Increases in cerebral blood flow
- Changes in brain neurotransmitters (e.g., nor-epinephrine, endorphins, serotonin)
- Increases in maximal oxygen consumption and delivery of oxygen to cerebral tissues
- Reductions in muscle tension
- Structural changes in the brain
- Increase in serum concentrations of endocannabinoid receptors

Psychological Explanations

- Enhanced feeling of control
- Feeling of competency and self-efficacy
- Positive social interactions
- Improved self-concept and self-esteem
- Opportunities for fun and enjoyment

Changing Personality and Cognitive Functioning With Exercise

In addition to examining the relationships among exercise and anxiety, depression, and mood, researchers have asked whether exercise can change personality and mental (cognitive) functioning. We briefly review the research in these areas and offer some suggestions to practitioners.

Personality

A classic study to determine the effects of a fitness program on middle-aged men led to some information on how exercise might change personality (Ismail & Young, 1973). Over the course of the program, the men improved their fitness levels and reported feeling dramatic psychological effects. They reported higher levels of self-confidence, greater feelings of control, improved imagination, and a greater sense of self-sufficiency. Other studies have since been conducted to investigate the relationship of exercise to various personality factors. In a review of these studies, McDonald and Hodgdon (1991) found that aerobic fitness training increased scores on self-sufficiency and intelligence and decreased scores on insecurity. In addition, studies using clinical populations showed positive changes in various aspects of personality adjustment.

Exercise and Development of the Self

Exercise and physical activity can be related to a participant's self-concept, self-esteem, and self-efficacy (Fox, 1997). These concepts of the self are interrelated yet distinct, although they all refer to how we feel about ourselves and our capabilities. Self-concept incorporates all aspects of what we think we are: It is central to our conscious lives. Thus, many people consider self-concept the most important measure of psychological well-being.

KEY POINT Regular exercise has been shown to be related to increased self-esteem.

It is commonly believed that bodily changes that result from physical fitness training can alter one's body image and thus enhance self-concept and self-esteem. In reviewing the research literature, Sonstroem and Morgan (1989) found that exercise programs are

associated with significant increases in self-esteem and that increases are especially pronounced among individuals who were initially lower in self-esteem. Sonstroem (1997a,b) qualified his earlier observations, saying that the increases in self-esteem seen after exercise may result from perceptions of improvement or other program factors (either biological or psychological) rather than from fitness improvement itself. In addition, positive changes in self-esteem have been found more recently in normal populations such as adult females, college students, obese teenage males, seventh-grade males, elementary school children, sedentary adolescent females, and adult male rehabilitation clients as well as in individuals who initially had low self-esteem—although individuals lower in fitness or ability also demonstrated significant positive changes in self-esteem.

According to the latest studies, changes in self-esteem have been maintained over a period of at least 1 year. For example, a study of middle-aged and older women (Hardcastle & Taylor, 2005) found that exercise over time was related to changes in self-identity as participants noted changes in feelings of achievement, sense of belonging, and social interactions as well as changes in actual self-cognitions. In addition, a longitudinal study of older adults (at least 60 years old) found that both a traditional exercise program and a lifestyle physical activity program (incorporating physical activity into daily living and working out at home) improved self-esteem as well as feelings of competence and physical self-worth (Opdenacker, Delecluse, & Boen, 2009).

Another study testing Sonstroem's self-esteem model found that for women, physical acceptance (how the women regarded their own bodies) was an important predictor of self-esteem (Levy & Ebbeck, 2005). In another study, Elavsky (2010) longitudinally followed middle-aged women (aged 42–58 years) for a 2-year period. (Few studies have followed the same group of exercisers this long.) This age group of women is especially significant because the North American Menopause Society advocates lifestyle changes such as physical activity as the first line of defense against the adverse symptoms of menopause. Healthy self-esteem is an essential component of mental health, and women who report low self-esteem also report more menopausal distress and poorer quality of life (Elavsky, 2009). Along these lines, results indicated that the effects of physical activity on changes in physical self-worth and global

Exercise for Enhancing Well-Being in Special Cases

Research has begun to study the relationship between exercise and different chronic diseases. The goal has been to determine whether some form of exercise will help reduce symptoms of different diseases and thus enhance quality of life for these individuals. The following is a sample of some of the diseases that have been investigated in relation to the effects of exercise.

Human Immunodeficiency Virus

One of the deadliest diseases that has recently appeared on the scene is acquired immunodeficiency syndrome (AIDS), which is usually preceded by human immunodeficiency virus (HIV-1). Since the first reported cases of HIV-1 infection in 1981, the number of individuals contracting the disease has grown exponentially, as has the number of deaths. Enhancing perceptions of well-being is particularly relevant for persons with HIV-1 and AIDS because perceived control over physical health is a primary concern for these groups. If individuals with HIV-1 and AIDS feel some sense of control over their psychological health and well-being, this may profoundly affect how they cope with the disease.

In one study (Lox, McAuley, & Tucker, 1995), individuals with HIV-1 were randomly assigned to an aerobic training group, a resistance weight-training group, or a stretching flexibility control group. Results revealed that both the aerobic and weight-training exercise groups (compared with the control group) had enhanced physical self-efficacy, improved moods, and higher satisfaction in life. In a more recent 16-week intervention study, Rojas, Schlicht, and Hautinger (2003) found that the exercise group had significant improvements in cardiopulmonary fitness and health-related quality of life compared with the control group. The authors suggest that moderate exercise may enhance health-related quality of life in individuals with HIV-1 and should therefore be considered a complementary therapy for these individuals.

Multiple Sclerosis

Multiple sclerosis (MS) is another disease for which no known cure exists. It is characterized pathologically by inflammatory lesions that disseminate in separate parts of the white matter of the brain and spinal cord. Although new drug therapies have become available recently, no pharmacological therapies clearly arrest the progression of the primary neurological deficits in the long term (Johnson, 1996). Thus, individuals' quality of life is often compromised by the symptoms of MS.

Because one of the main symptoms of MS is chronic fatigue, many people with MS avoid regular exercise. But given the many positive benefits of exercise, some believe that leading a relatively sedentary life may in fact exacerbate the debilitating effects of MS. Thus, Sutherland, Andersen, and Stooze (2001) investigated whether regular physical activity (in this case, water aerobics) could enhance the quality of life of people with MS. After a 10-week program, results revealed that the exercise group (compared with the control group) exhibited higher levels of energy and vigor and had better social and sexual functioning and less pain and fatigue. More recently, Motl and McAuley (2009) found that changes in physical activity levels were related to positive changes in quality of life over 6 months. These changes included less pain and fatigue along with higher levels of social supports and self-efficacy. Motl, Gappmaier, Nelson, and Benedict (2011) found that physical activity was positively related to cognitive processing speed in people with MS. Finally, in a review of the literature, Stork, Stapelton, and Martin-Ginis (2013) found that social support increases the likelihood that people with MS actually exercise. This is important because physical activity is related to positive changes in people with MS.

Cancer

A review of 47 studies investigated the effects of exercise on quality of life of survivors of breast cancer and other cancers (Courneya, 2003, 2005). Results revealed that exercise was beneficial

self-esteem were mediated by changes in self-perceptions related to physical condition and body attractiveness. Thus, women can enhance their self-esteem and how they perceive their physical condition and

body attractiveness through continued participation in physical activity.

A thorough review of literature involving 113 studies found that regular exercise brought a consis-

in both breast cancer and nonbreast cancer groups as well as during and after cancer treatment. It is also becoming more common for people to survive cancer. In fact, the 5-year survival rate for all cancers is 62%; this increases to 90% for some of the more common cancers (e.g., prostate, breast, and colon) if they are detected early. Thus, exercise appears to offer a viable mechanism for enhancing quality of life in this population (Culos-Reed, Robinson, Lau, O'Connor, & Keats, 2007; Rabin, Pinto, & Frierson, 2006). In addition, a recent study suggests that physical activity in breast cancer survivors can be predicted by increased autonomy and competence within self-determination theory (Milne, Wallman, Guilfoyle, Gordon, & Courneya, 2008). Mutrie, Kirk, and Hughes (2011) and Ferrer, Huedo-Medina, Johnson, Ryan, and Pescatello (2011) provide meta-analysis and review of studies linking exercise to the quality of life in cancer survivors.

Parkinson's Disease

Although no empirical studies have been conducted to date, there have been increasing anecdotal reports regarding the effect of Pilates (a popular exercise program that focuses on increasing core strength and improving flexibility and balance) on improving Parkinson's disease (a degenerative disease that inhibits a person's ability to control movement, as seen in tremors, slowness of movement, rigidity, and balance problems). Special Pilates classes for people with Parkinson's disease have started to spring up around the country. Although empirical testing is needed, many positive quotes have been heard, such as this one by a person diagnosed with Parkinson's disease 17 years earlier: "Now I realized how stiff and boxed up I was."

Diabetes

The psychological effects of facing a lifetime of dealing with diabetes and its effect on emotional and social adjustments, including lower quality of life and well-being, are well documented by health psychologists (Mutrie, Kirk, & Hughes, 2011). Regular physical activity has been recommended for individuals suffering from diabetes, and specific guidelines have been provided (Diabetes Prevention Program Research Group, 2002; Kirk, Barnett, & Mutrie, 2007). Several studies have shown that regular supervised physical activity (both individual and group) is associated with higher quality of life and overall better psychological functioning for individuals with either type 1 (insulin-resistant) or type 2 (non-insulin-resistant) diabetes (Kirk et al., 2007). Unfortunately, about 55% of adults with diabetes do not exercise at all. This underscores the importance of educating those with diabetes about the importance of exercise and strategies for starting and adhering to exercise programs (Durstine, Gordon, Wang, & Luo, 2013).

Coronary Heart Disease

Cardiac rehabilitation is an essential component in the treatment of individuals with coronary heart disease. Although meta-analyses of cardiac rehabilitation studies conducted on people with coronary heart disease have shown significant reductions (22%–31%) in total and cardiac mortality (Durstine et al., 2013; Taylor et al., 2004), psychological benefits have also been found. For example, several systematic reviews have shown that cardiac rehabilitation results in reductions in symptoms of anxiety and depression and increases in quality of life (McGhee, Hevey, & Horgan, 1999; Milani & Lavie, 2007). Individuals who are depressed (15%–45% of people are depressed after a cardiac event occurs) report poorer quality of life and more cardiac symptoms and are less likely to adhere to medical treatment and lifestyle changes than are people who are not depressed (Turner, Bethell, Evane, Goddard, & Mullee, 2002). Therefore, cardiac rehabilitation through exercise has very positive benefits on the psychological states of patients with coronary heart disease.

tent (although small) positive change in individuals' self-esteem. This relationship was enhanced for individuals displaying large increases in physical fitness (Schneider, Dunton, & Cooper, 2008) and

those involved in exercise programs as compared with skills training (Spence, McGannon, & Poon, 2005). Another review of the literature involving 57 interventions found that the exercise interventions improved



Regular exercise can help increase children's self-esteem, which may lead to better grades in school.

participants' body image (Campbell & Hausenblas, 2009). In summary, exercise has clearly and consistently been linked to positive psychological changes in self-esteem, self-concept, and body image, which are critical for effective psychological functioning.

In a review of children's programs, Gruber (1986) discovered that positive changes in self-concept and self-esteem were associated with participation in directed play and physical education programs. Physical fitness activities were also found to be superior to other components of elementary school physical education programs in developing self-concept. In an interesting study with elementary and middle school children in Sweden, Ericsson and Karlsson (2011) found that increasing physical activity and motor skill training (especially for children with deficits in motor skills) increased motor skills as well as several aspects of self-esteem.

Despite these positive findings, other research studies have *not* found positive relationships between exercise and self-concept. Perhaps this relationship varies according to exercise mode or a host of environmental conditions. In essence, self-concept is multidimensional, and certain aspects of self-concept (e.g., physical) might be more affected by exercise than others (e.g., social; Fox, 1997; Marsh, 1997). For example, physical self-concept has been shown to include a variety of factors such as sport competence, physical condition, body attractiveness, and physical strength, and the factor of physical condition is particularly influenced by physical activity (Fox, 1997).

A strong self-concept is critical to the healthy psychological development and adjustment of children, and exercise can be an important ingredient in helping children and adults feel good about themselves. In fact, Taylor and Fox (2005) found positive effects of exercise on physical self-perceptions and self-worth up to 40 weeks after the exercise program (10 weeks) had finished. Another study found that even though participants had no change in body shape or weight, they displayed an increase in body image after six 40-minute exercise bouts (Appleton, 2013). Berger (1996) proposed that exercise programs designed to enhance self-esteem and self-concept should emphasize experiences of success, feelings of increased physical competence, and attainment of goals. Whaley and Shrider (2005) found that enhancing positive self-perceptions in older adults focusing on hoped-for selves (e.g., remaining healthy and independent) as opposed to feared selves (e.g., avoiding dependence and negative health outcomes) produced higher levels of exercise and adherence.

Exercise and Hardiness

Hardiness is a personality style that enables a person to withstand or cope with stressful situations. Stress produces minimal debilitating effects in a hardy personality. You are hardy if you have these three traits (Gentry & Kosaba, 1979):

- A sense of personal control over external events
- A sense of involvement, commitment, and purpose in daily life
- The flexibility to adapt to unexpected changes by perceiving them as challenges or opportunities for further growth

KEY POINT Exercise can help protect against stress-related illness, especially for hardy people.

Some research has focused on how exercise in combination with hardiness can reduce some of the negative effects of stress. One study showed that business executives who scored high in both hardiness and exercise remained healthier than those who scored high in only one or the other component. Another study indicated that exercise combined with social support resulted in the least amount of illness in individuals with hardy personalities (Kosaba, Maddi, Puccetti, & Zola, 1985). In essence, a hardy personality and exercise in combination are more effective in preserving health than either one alone.

Cognitive Functioning

For a long time we have assumed that motor development is important to the development of intelligence in children (Piaget, 1936) and that learning potential (cognitive capacity) varies with a person's physical fitness level. Since the 1970s, researchers have looked for evidence that would validate these two assumptions. Neuroscientists, psychologists, and physicians rarely agree unequivocally on anything, but they do seem to agree that exercising is the best thing you can do for your brain. The latest research shows that cognitive decline is not inevitable. Yes, brain volume shrinks slightly, but the brain continues to make new neurons and fine-tune neural connections throughout the life span. Aerobic exercise appears to jump-start this process and thus reduces the level of brain loss and keeps cognitive abilities sharp. This is seen in the fact that regular aerobic exercise slashes one's lifetime risk of Alzheimer's in half and one's risk of general dementia by 60%.

The research findings have become more and more consistent, demonstrating that a strong relationship exists between exercise and cognitive functioning. Narrative reviews, for example, have generally demonstrated the beneficial effect of exercise on cognitive functioning (Chodzko-Zajko & Moore, 1994). Statistical reviews of more than 100 studies (Etnier et al., 1997; Thomas, Landers, Salazar, & Etnier, 1994) showed that exercise had a modest positive relationship with improved cognitive functioning. Chang and colleagues (2011) found that acute aerobic exercise was related to increased executive cognitive functioning in the areas of planning and problem solving, and

Alves and colleagues (2012) found positive effects for both aerobic and strength activities. Similarly, a multidisciplinary review of the literature found that aerobic physical activity has a positive effect on cognition and brain function (Hillman, Erickson, & Kramer, 2008). Specifically, it appears that executive central command, which includes working memory, planning, scheduling, multitasking, and dealing with ambiguity (e.g., doubt and uncertainty), are most affected by aerobic exercise. Furthermore, chronic exercise, in comparison with acute exercise, showed greater effects on cognitive performance; that is, exercise programs conducted over longer periods of time are associated with gains in cognitive functioning.

Sibley and Beilock (2007) found that acute exercise increased cognitive functioning in the form of working memory (short-term memory involved in the attentional control, regulation, and active maintenance of a limited amount of information with immediate relevance to the task at hand) only for individuals low in working memory. This underscores the individual-difference nature of the effects of exercise on cognitive functioning. The same can be said about executive control (higher-level functions that manage other more basic cognitive processes where individual differences again appear important) (Etnier & Chang, 2009). For example, the planning aspect of executive functioning seemed to be positively influenced by physical activity (Davis et al., 2007).

Moderate to vigorous physical activity has been shown to enhance executive functioning even in children with attention deficit/hyperactivity disorder (Gapin & Etnier, 2010). In addition, in a study by Vazou and colleagues (2012), 10 minutes of physical activity was integrated into six consecutive traditional lessons over a 2-week period. This integration produced increases in children's intrinsic motivation, perceived competence, and effort without enhancing perceptions of pressure or negatively affecting the value of the academic lesson being taught. Furthermore, the effects of exercise on cognitive functioning appear to be mediated by task type. Specifically, moderate-intensity exercise is related to increased performance of executive functioning (e.g., working memory, attentional flexibility), whereas high-intensity exercise improves speed of information processing (Chang & Etnier, 2009). The notion that exercise can improve cognitive functioning has been extended to children (especially those who are overweight). In a study by Davis and colleagues (2011), 3 months of aerobic

exercise improved cognitive functioning as well as math achievement. A dose-response relationship was also observed, meaning that more physical activity led to greater improvements in cognitive functioning. To support this increased cognitive functioning, increased prefrontal cortex activity and reduced posterior parietal cortex activity in the brain were also found.

Finally, reviews of the literature on the relationship between cardiovascular fitness and cognitive functioning in older adults (Colcombe & Kramer, 2002; McAuley, Kramer, & Colcombe, 2004) have revealed some interesting findings, including the following:

- Fitness training had beneficial effects on the cognitive functioning of older adults. These effects were largest for tasks involving executive control (e.g., planning, scheduling, working memory, task coordination).

- Fitness training combined with strength and flexibility programs had a greater positive effect on cognition than did fitness training with only an aerobic component. These effects appear to occur more in females than in males.
- Exercise effects on cognition were largest when exercise training exceeded 30 minutes per session.
- Cardiovascular exercise appears to protect the brain against the normal effects of aging and help repair or restore the aged brain.

Enhancing Quality of Life With Exercise

Researchers have also been investigating the more global question of how regular exercise affects our

Transitions Out of Sport: Relationship to Psychological Well-Being

Although this chapter focuses on the influence of exercise on psychological well-being, many highly competitive athletes confront psychological issues when they transition out of sport. Much has been written and many models have been developed regarding the psychological issues that occur when transitioning out of competitive sport (Alferman & Stambulova, 2007; Lavalley, Park, & Tod, 2013; Stambulova, Alfermann, Statler, & Cote, 2009). When athletes freely choose to retire and plan for it, leaving sport can add to their psychological well-being because they spend more time with their families, don't have the stresses of winning or losing, and have more time to pursue their hobbies.

However, leaving competitive sport is often not under an athlete's control. The two most prevalent reasons for forced retirement are being deselected (cut) from a team due to a decrease in performance or being injured and unable to perform at the normal level. Other reasons for involuntary retirement include drug use, gambling or other infractions of league policy, lockouts, financial issues, family problems, or boycotts. Retirement under these conditions often produces strong emotional reactions (e.g., anxiety, depression) and high levels of life dissatisfaction, which are seen in about 20% of athletes who retire. Petitpas, Tinsley, and Walker (2012) note a number reasons for these negative reactions, including the following:

- Bitterness of being forced to retire
- Loss of camaraderie with teammates and relationships with coaches
- Loss of self-identity because their identities have been closely tied to their sport
- Lack of confidence in their abilities to cope effectively with everyday life situations
- Loss of adulation from fans
- Inability to replace the excitement of the sport experience with anything else

Traditional stress management and cognitive-behavioral interventions have been used to help athletes with these negative reactions to retirement. Additionally, a program called the Life Development Intervention has been shown to help athletes cope with career transitions (Danish, Petitpas, & Hale, 1995; Lavalley, 2005). The Life Development Intervention provides useful strategies to use before an event (e.g., retirement), supportive strategies to use during an event, and counseling strategies to use after an event. Athletes are taught life skills to help them make decisions about retirement, coping skills, and goal-setting skills that can transfer to other areas of life.

quality of life (Berger & Tobar, 2011; Berger & Motl, 2001; Shepard, 1996). The nebulous phrase **quality of life** has been defined as “individuals’ perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns” (World Health Organization Group, 1995, p. 1405). Quality of life emphasizes the spirit, rather than objective conditions of life and affluence (Mroczek & Kolarz, 1998), and has been seen as the perceived degree to which individuals are able to satisfy psychophysiological needs. Quality of life has been investigated in the workplace, and it has been found that a regular exercise program can enhance employees’ feelings of life satisfaction, job satisfaction, and self-worth (Thogersen-Ntoumani, Fox, & Ntoumanis, 2005). Quality of sleep has also been shown to be important in quality of life (Brassington & Goode, 2013; Sadeh, Keinan, & Daon, 2004). In general, the positive effects of physical activity on quality of life can be grouped into four categories (Berger, 2009): enhanced physical functioning; subjective well-being, as indicated by personal enjoyment and mood alteration; experiencing peak moments such as peak experiences; and personal meaning.

This is what research can already tell us about the relationship between exercise and quality of life (see Berger & Tobar [2011] and Diener & Suh [1999] for a complete discussion):

- Physically active individuals tend to be in better health, report more stamina, have more positive attitudes toward work, and report a greater ability to cope with stress and tension than people who are not physically active.
- Exercise produces small increases in total sleep time, although it has no effect on how long it takes to fall asleep.
- College students participating in an endurance conditioning program reported significantly higher quality of life than did nonexercisers.
- Older adults who are physically active report greater life satisfaction—attributable to less dependence on others—and better overall physical health than those who are not physically active.
- Sociodemographic variables such as income, education, marital status, and age are not significantly related to perceptions of quality of life.

- Exercise programs contribute to a person’s quality of life by influencing affect, perceived stress, physical health, and life satisfaction.

Although exercise can have negative effects (e.g., fatigue, overuse injuries, decreased energy) on the quality of life if the individual habitually overtrains, exercise for the most part is linked to a variety of indexes that all relate to quality of life. These include the following:

- Increased levels of self-esteem and self-concept
- Increased feelings of enjoyment
- Decreased feelings of physiological and psychological stress
- Increased feelings of self-confidence
- Elevated mood states
- Decreased levels of anxiety and depression

Examining the Runner’s High

Many regular exercisers report feeling better psychologically, emotionally, and spiritually after exercising. This phenomenon is so pervasive among runners (in fact, among runners who have previously experienced the phenomenon, up to 30% experience it on their daily runs) that it has been termed the runner’s high. The **runner’s high** includes a sense of mental alertness and awareness; a feeling of liberation; a lift in the legs; suppressed pain or discomfort; and the sense of ease, perfect rhythm, and exhilaration.

Definition of the Runner’s High

Sachs (1984) and Berger (1996) found 27 words or phrases used in the literature to characterize the runner’s high, including *euphoria*, *spirituality*, *power*, *gracefulness*, *effortless movement*, *a glimpse of perfection*, and *spinning out*. Sachs and Berger consolidated these to define the runner’s high as a euphoric sensation felt during running, usually unexpected, in which the runner feels a heightened sense of well-being, an enhanced appreciation of nature, and a transcendence of time and space. This definition recalls aspects of peak performance and especially of flow (Jackson & Csikszentmihalyi, 1999; see chapter 6) in that the runner’s high requires rhythmic, long-lasting, and uninterrupted activity, which is similar to tasks where flow is achieved.

To See or Not to See: Questioning the Effect of Mirrors

With increasingly fast-paced lifestyles, concomitant stress, and a rise in obesity, there has been an increased emphasis on creating more positive feelings and mood during exercise. Along these lines, the American College of Sports Medicine has suggested that all exercise classrooms should have mirrors on at least two of their four walls (American College of Sports Medicine, 1997). Although these guidelines may aid exercisers in improving their form and maximizing the physical benefits of workouts, it appears that the presence of mirrors may have some negative consequences, including less positive and more negative affect.

To test this proposition, Martin Ginis, Jung, and Gauvin (2003) had college-aged sedentary women exercise moderately on a stationary bicycle in front of either a mirror or a nonmirrored wall for a 20-minute period. Results after just one bout of exercise revealed that regardless of body image, women in the mirrored condition felt worse after exercising than women in the unmirrored condition. However, another recent study (Lamarche, Gammage, & Strong, 2009) found that mirrors did not have a negative effect on social physique anxiety, although these women were generally more active and confident in their ability to exercise than were women in the previous study.

What does this all mean from a practical point of view? Specifically, a review of the literature (Fejfar & Hoyle, 2000) found that women, in particular, have an increased sensitivity and self-awareness when looking into a mirror because this heightens focus on the self and the potential discrepancy between the actual and the ideal self. Thus, in an exercise class with mirrors, women tend to focus more often on their own physique and this appears to increase negative affect because it heightens the perceived discrepancy between the actual and the ideal physique. But this seems to occur only if women are generally sedentary and have poor perceptions of self. Therefore, the recommended practice of placing mirrors in exercise centers might be dependent on the particular women who are exercising, which emphasizes an individual-difference approach.

KEY POINT The runner's high is a euphoric sensation, usually unexpected, of heightened well-being, an enhanced appreciation of nature, and the transcendence of time and space.

Characteristics of the Runner's High

In a qualitative study, Sachs (1980) interviewed 60 runners to discover what conditions (internal to the runner and external in the environment) facilitate the runner's high. Although there were individual differences in how often runners achieved this high, the participants told him that the runner's high cannot be reliably predicted but is facilitated by the presence of few distractions and cool, calm weather with low humidity. It requires long distances (6 or more miles) and at least 30 minutes of running at a comfortable pace—although there must be no concern with pace or time. The runners described the mood as a very positive psychological state with feelings of well-being, euphoria, relaxation, and effortlessness.

Here's a personal example of the runner's high:

“[With] my first step I felt lighter and looser than ever before. My shirt clung to me, and I felt like

a skeleton flying down a wind tunnel. My times at the mile were so fast that I almost felt like I was cheating. It was like getting a new body that no one else had heard about. My mind was so crystal clear that I could have held a conversation. The only sensation was the rhythm and the beat, all perfectly natural, all and everything part of everything else . . . Distance, time, motion were all one. There were myself, the cement, a vague feeling of legs, and the coming dusk. I tore on. I could have run and run. Perhaps I had experienced a physiological change, but whatever, it was magic. I came to the side of the road and cried tears of joy and sorrow. Joy for being alive; sorrow for a vague feeling of temporalness, and a knowledge of the impossibility of giving this experience to anyone.”

—Mike Spino, 1971 (p. 222)



VIEW Activity 17.1 assesses how exercise affects you psychologically.

Some preliminary results out of Germany provide initial evidence that a chemical change in the brain is related to the runner's high. Specifically, long-

distance runners took a positron emission tomography scan before and after a 2-hour run. Data revealed that endorphins (the brain's naturally occurring opiates) were produced during running and that they attached themselves to areas of the brain associated with endorphins—in particular, the limbic and prefrontal areas. These areas are activated when people are involved in romantic love or are listening to music that gives them a sense of euphoria. The greater the euphoria reported by runners, the higher the levels of endorphins found in the brain. Thus, after many years of speculation, there now appears to be initial evidence of a biochemical explanation for the feeling of euphoria reported by many long-distance runners.

Using Exercise as an Adjunct to Therapy

As noted earlier, millions of Americans have some sort of depression or anxiety disorder every year. Research has demonstrated that exercise can help reduce such negative psychological states and that aerobic exercise is related to enhanced self-esteem, improved mood, and higher levels of work productivity. Not surprisingly, the use of physical interventions, including some form of exercise, has received increased attention since the late 1970s (Folkins & Sime, 1981; Griest, Klein, Eischens, & Faris, 1978), and some physicians and mental health professionals now routinely recommend exercise for their patients (Hays, 2002, 2009). It's interesting that more psychologists don't use exercise as part of their interventions given the wealth of data on the immediate "feel good" effects of exercise. It usually takes time to show physical benefits of exercise (e.g., weight loss, lower cholesterol), but the positive effects of exercise on mood can be felt immediately. It would take more time for exercise to alleviate mood disorders such as anxiety and depression, of course, but people can at least begin to feel better right away, which may encourage them to exercise in the long run (Weir, 2011).

Exercise therapy has long been known to produce physiological benefits in a broad variety of rehabilitation settings, but its benefits for mental health and psychological well-being are only more recently being discovered. For example, because depression has been shown to be a predictor of future heart attacks in cardiac patients, exercise that reduces depression would be extremely beneficial in this population. Researchers (Tennant et al., 1994) have shown that exercise

in cardiac rehabilitation in fact decreased anger and hostility, depression, anxiety, and emotional disturbances. Large-scale epidemiological studies have also indicated that regular exercise programs are related to positive mental health, especially for more at-risk populations (e.g., Weyerer, 1992), and experimental studies using exercise with institutionalized patients have shown improvements in mood and affect and decreases in depression (Martinsen, 1993). Therefore, there appears to be ample evidence supporting the use of exercise to improve psychological well-being in clinical and other special populations.

Of all the aerobic activities shown to enhance psychological well-being, running has received the most attention in both the professional and popular literature. Running provides a natural, practical, inexpensive, and time-efficient adjunct to traditional psychotherapies (Long & Stavel, 1995). For example, one classic study demonstrated that running was four times more cost effective than more traditional verbal-oriented psychotherapies for treating depression (Griest et al., 1978). Running as an adjunct to therapy takes on added importance because of the high cost of health care and the trend toward cost-effective counseling. Running therapies add health benefits such as increased respiratory efficiency and cardiovascular endurance, and they improve muscle tone, weight control, and blood volume. Running as part of therapy can encourage a positive approach to health promotion as clients learn a healthier style of living through exercise.

KEY POINT Running can be an inexpensive, time-efficient adjunct to traditional psychotherapies, and it offers added health benefits such as increased cardiovascular efficiency and weight control.

Despite its psychological benefits, exercise should not be used in all cases of depression, stress, or other emotional disorders. For example, aerobic exercise therapy should not be prescribed for people who are obese (40% or more over ideal body weight), those with severe heart disease, or those with high blood pressure that cannot be controlled by medication. Exercise may also be contraindicated for people who are severely depressed and for those who have tenuous contact with reality or suicidal tendencies. Another caution is that for exercise to be effective, people must adhere to the program; dropout rates from regular exercise programs are approximately 50% (see chapter 18). Therefore, special care must be taken to support individuals who incorporate exercise as part of therapy.

