

Physical activity and feeling good

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SUMMARY

Physical activity can make participants feel better, an effect that has wide-ranging applications for promoting mental health and increasing motivation for continued physical activity participation. Numerous studies have shown that physical activity can lower anxiety and depression, two mental health problems that impact the quality of life of millions of people. Furthermore, if certain conditions are met, physical activity can increase feelings of energy and calmness, thus offering a healthful alternative to widely consumed but unhealthy chemical agents that are often used as affective-state regulators (e.g., sugar, caffeine, alcohol, nicotine). This chapter summarizes the key findings in this line of research and outlines what exercise professionals can do to increase the likelihood that physical activity will result in positive affective experiences.

INTRODUCTION

Since the dawn of exercise psychology in the late 1960s and early 1970s, understanding the effects of physical activity on how people feel has been a major research focus. What justifies this level of interest? There are at least two important reasons. First, if physical activity, either a single session (what is referred to in the literature as “acute” activity) or a long-term program lasting several weeks or months (what is referred to in the literature as “chronic” activity), can make people feel better, this may have implications for improving people’s mental health. Anxiety and mood disorders, such as depression, are among the leading causes of disability worldwide. The standard

approaches to treatment, namely drugs and psychotherapy, can be effective for many people but also have considerable cost and, especially in the case of drugs, some very undesirable side-effects. On the other hand, physical activity is not only inexpensive and safe but also offers a multitude of additional benefits for the cardiovascular, metabolic, immune, muscular, and skeletal systems.

The second reason why exercise psychologists are interested in how physical activity makes people feel is because, as was explained in Chapter 6, the positive or negative feelings people associate with physical activity may influence their motivation for future partici-

pation and adherence. People generally choose to do what makes them feel better and tend to avoid what makes them feel worse. So, it is reasonable to expect that, if participants feel better during and after physical activity, they may be more inclined to incorporate regular physical activity into their lives. Conversely, if

physical activity consistently makes them feel worse, their motivation may be diminished.

For these reasons, how people feel in response to physical activity is of extraordinary importance. In this chapter, we review the main conclusions from this line of research (see Figure 44.1).



OBJECTIVES

After reading this chapter you should be able to:

- 1 Explain the main challenges in designing studies to establish a cause-and-effect relationship.
- 2 Define anxiety and depression.
- 3 Describe the main types of anxiety and mood disorders.
- 4 Summarize the effects of physical activity on anxiety and depression.
- 5 Identify conditions that promote the “feel-better” effects of physical activity.

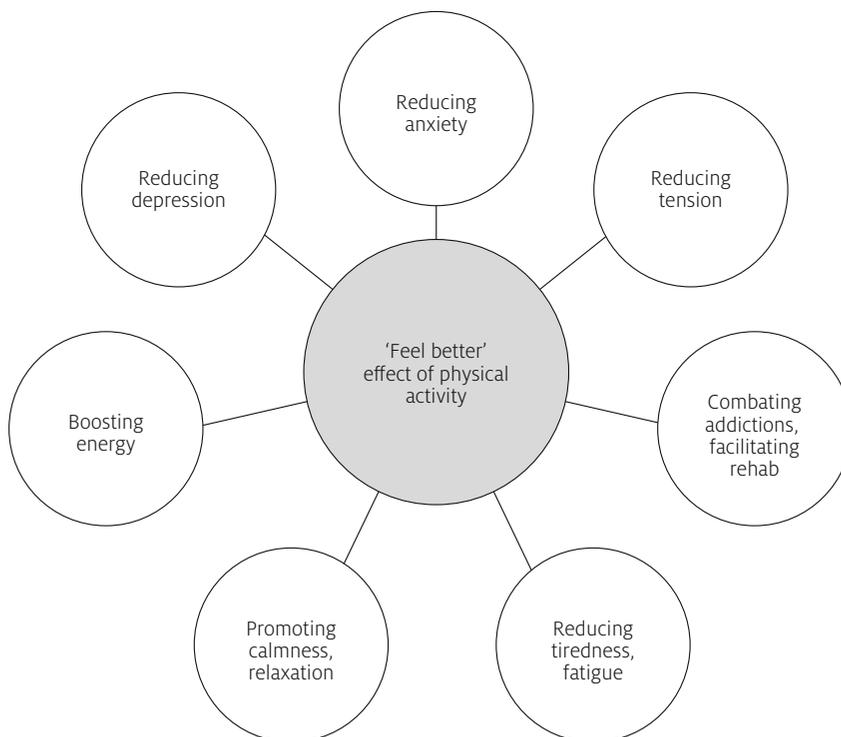


Figure 44.1 Physical activity can make people feel better. This effect has several important applications, from helping individuals control anxiety and depression, to acting as a healthy substitute for many unhealthy substances that people use to lower tension and tiredness and increase energy and calmness (e.g., sugar, caffeine, nicotine, alcohol), to facilitating rehabilitation from addictions.

THE CHALLENGE OF ESTABLISHING CAUSATION

Despite mounting evidence for its effectiveness in ameliorating a range of mental health problems, physical activity is not yet widely recognized as a form of treatment by clinicians. On the other hand, exercise psychologists have been extolling the benefits of physical activity for mental health with great conviction for decades. This striking difference of opinion stems primarily from differing evaluations of the quality of the research evidence (which may, in turn, reflect some degree of bias on both sides). This issue is complex but understanding it is crucial for evaluating this literature in a balanced and scientifically responsible manner.

You have probably heard the expression “correlation does not equal causation.” For example, let’s say that a researcher administers questionnaires to the 3,000 members of a local community, assessing their amount of regular physical activity and their levels of depression. Let’s also imagine that, by analysing these data, the researcher finds a substantial negative correlation (for example, $r = -0.40$) between physical activity and depression, indicating that higher levels of self-reported physical activity are associated with lower levels of depression (and vice versa). Would this finding enable the researcher to conclude that physical activity is an effective method for reducing depression?

As tempting as this might be for anyone who believes in the benefits of physical activity, the answer is no, one would not be justified in drawing this conclusion. The reason is that this finding is merely a correlation. That physical activity reduces depression is just one possibility. However, based only on this correlation, an equally likely interpretation is that high levels of depression reduce one’s willingness to be physically active. In other words, the direction of causality might be reversed. Finally, it is also possible that high physical activity and low depression might be due to some third factor, such as socioeconomic status or genetics.

So, how can one prove causation? The most direct way is by conducting well-designed experimental studies. In an experimental study, researchers recruit individuals who are chronically sedentary and have been diagnosed with the condition they are interested in treating (e.g., anxiety, depression). These individuals must be a representative sample of the population to which one wishes to generalize the findings (e.g., British men and women between 40 and 65 years of age, or male patients with cardiovascular disease). Researchers then randomly assign these participants to either an “experimental” group that will follow a program of physical activity or a “control” group.

This seems straightforward but conducting such a study well is far from easy. For example, what should the members of the control group do? Would it be appropriate to measure their anxiety or depression, then send them home for a few months, and then measure their anxiety and depression again to see if they changed? A good control group is one that does everything that the experimental group does except for what is presumed to be the “active ingredient” of the treatment; in this case, physical activity. In other words, the participants assigned to the control group must meet each other with the same frequency and for the same length of time as the participants in the experimental group, they must receive the same amount of attention from the investigators and, ideally, they must be doing something that creates in them the same expectation of benefit as the physical activity presumably creates in the members of the experimental group. This “expectation of benefit” is what is commonly referred to as the “placebo” effect.

It is crucial for this “expectation of benefit” to be controlled for at least two reasons: (a) because most people are aware that physical activity is supposed to benefit health; and (b) because most mental health variables (such as anxiety and depression) are measured by self-

reports and reflect subjective thoughts and feelings that cannot be corroborated by other, more objective, evidence. Therefore, it is possible that some of the participants in the experimental group will report that they feel better solely because they are taking part in an activity they know to be good for them. For this reason, in well-designed studies, the members of the control group are not simply sent home but they engage in activities that should make them believe that they are doing something positive and beneficial, such as attending informational seminars, doing very low amounts of physical activity, or even taking a placebo “drug” (e.g., a sugar pill).

The challenge of designing a good experiment does not end here. Besides having a good control group, a well-designed study should also satisfy several other requirements. For example, it is important that the researchers in charge of administering the questionnaires or conducting the interviews for the assessment of the mental health variables be unaware of whether the participants they interact with were members of the experimental or the control group. The reason is that this knowledge could bias their behavior (e.g., they may smile more or provide more thorough explanations to members of the experimental group). A good study should also provide convincing evidence that any positive effects can be attributed specifically to the physical activity, not to other aspects of the treatment. For example, it is well established that social interaction and group support can help reduce depression and improve perceived quality of life. If a physical activity intervention is administered in groups, as is usually done, one cannot be certain whether any positive outcomes can be specifically attributed to the physical activity as opposed to socializing among group members. How the study is advertised and how participants are recruited into the study is also important. For example, if a study is advertised as an investigation of “exercise for treating depression,” it would be more likely to attract individuals with a positive view of exer-

cise or individuals who believe in the potential therapeutic effects of exercise. Another crucial consideration is how to handle those study participants who are allocated to the physical activity group but drop out before the end of the intervention. If these individuals are ignored, and only those who persist until the end are included in the statistical analyses, the results would reflect only the “best case scenario,” namely, what happens to those individuals who are willing to accept the treatment (possibly because the treatment was effective for them). So, to reduce this potential bias, in well-designed studies, dropouts are included in the analyses, often substituting their missing values by carrying forward their last valid score. This type of analysis is known as “intention to treat” analysis.

Even if all of these precautions are taken, however, physical activity interventions still face some insurmountable challenges. Ideally, a research participant should not be aware of whether she or he was assigned to the experimental group and is, therefore, receiving the “active ingredient,” the treatment that is supposed to produce benefits. Likewise, the person administering the treatment should not be aware of whether the treatment contains the active ingredient or is simply a placebo. Such experimental designs, which are standard in drug research, are called “double-blind” since both the participants and the experimenters who come in contact with the participants are unaware of group assignment. Clearly, this type of blinding is impossible in physical activity studies. A person who is exercising knows that she or he was assigned to the exercise group and, conversely, the person who is not exercising knows that she or he was not assigned to the exercise group. Furthermore, the person leading the exercise also knows that all those taking part in the exercise program were assigned to the exercise group. Therefore, there is no way to fully control for the expectation of benefits associated with exercise (since the members of the control group cannot be doing the exact same thing)

and no way to be sure that exercise leaders maintain perfect impartiality (i.e., do not exhibit some level of pro-exercise bias through verbal or non-verbal cues). For these reasons, from a strictly methodological standpoint, the quality of physical activity experimental studies will never be as high as that which clinicians have come to expect of drug studies.

Studies investigating the effects of physical activity on mental health have typically addressed some of these methodological issues, but not all. In many studies, for example, recruitment procedures favored individuals with pro-exercise attitudes, outcome assessors were not blinded to group assignment, and dropouts were simply excluded from the analyses. These weaknesses allow alternative explanations for the findings, enabling skeptics to speculate that perhaps any positive changes were not due to physical activity but some source of bias in the experimental design.

Besides strong experimental studies, another source of evidence that can be used to support the establishment of a cause-and-effect relation between physical activity and mental health is the study of neurobiological mechanisms. If studies using modern neuroimaging methods with humans or more invasive neuroscientific methods with experimental animals show changes in the brain

that are consistent with a therapeutic effect, this would strengthen the argument for a causal relation. For example, the main approach used in the treatment of depression is to administer drugs that correct deficiencies in serotonin neurotransmission (called selective serotonin reuptake inhibitors or SSRIs). Studies with experimental animals have shown that exercise also raises the levels of serotonin, essentially mimicking the effect of the drugs but doing so naturally and without harmful side effects. Although this type of evidence is very informative, it is also subject to certain limitations. Animals cannot provide self-reports, so one cannot be certain whether observed changes in brain chemistry truly translate to better mental health. Scientists have to infer how the animals feel from their overt behavior. However, drawing analogies between animal behavior and human feelings, such as depression or anxiety, relies on assumptions that may or may not be true.

Overall, providing strong evidence of a causal relation between physical activity and mental health is very challenging. Exercise scientists have been trying to improve the quality of experimental studies for decades but there is still considerable ground to cover. Therefore, exercise practitioners should approach the available evidence cautiously and critically.

PHYSICAL ACTIVITY AND ANXIETY

Anxiety is an unpleasant emotional state characterized by multiple clusters of symptoms: (a) cognitive, including thoughts of failure and negative future consequences; (b) emotional, including fear and distress; (c) behavioral, including nervousness and tension; and (d) physiological, including the activation of the sympathetic branch of the autonomic nervous system (which speeds up the heart and raises blood pressure) and the activation of the major neuroendocrine stress systems (the sympathetic adrenal-medullary system and the hypothalamic pituitary adrenal-cortical system).

What determines whether an anxiety response is induced is the cognitive appraisal of threat (see Figure 44.2). This appraisal is a process in which two subjective quantities are weighed against each other: on one hand is the perception of what the situation demands of the person (e.g., how much skill or preparation is required to succeed) and, on the other hand, is one's perceived preparedness to meet these demands. For example, in the case of academic examination anxiety, an anxiety response is induced when one perceives that the exam will be difficult and that one's level

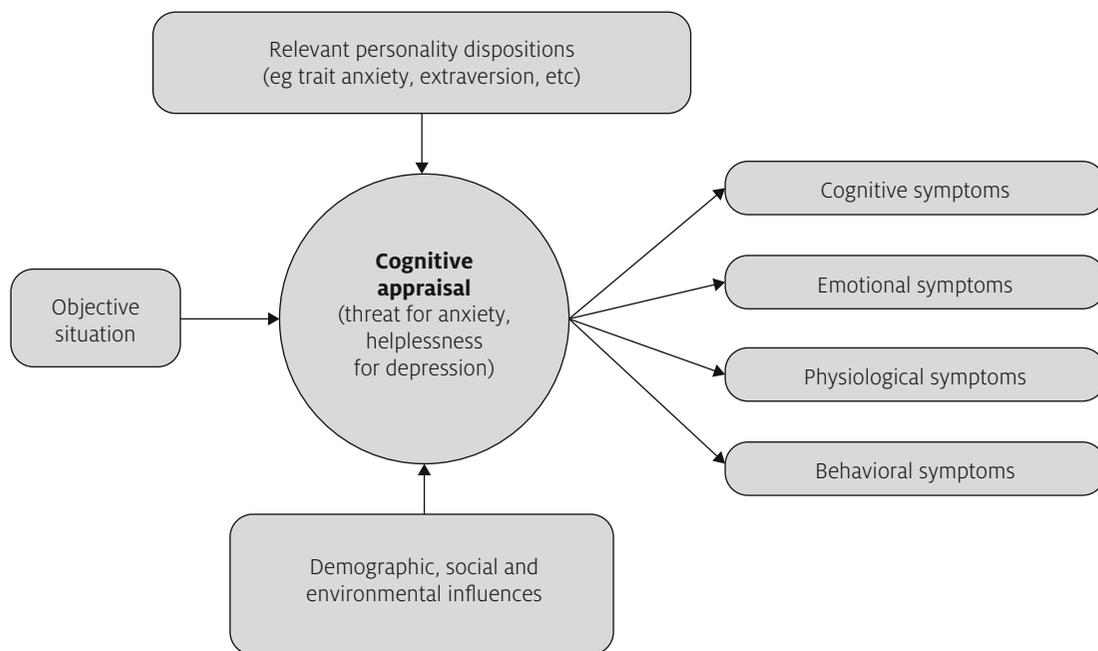


Figure 44.2 The defining element in the process of unpleasant emotions, such as anxiety, and unpleasant moods, such as depression, is the cognitive appraisal. In the case of anxiety, what is appraised is threat, usually against one’s goals, self-image, and overall well-being. In the case of depression, what is appraised is helplessness (i.e., that there is no solution or escape). Such appraisals are under the influence of a multitude of factors, including personality dispositions, developmental histories, and environmental conditions. The outcomes of such appraisals are clusters of symptoms that are collectively recognized as the experiences of anxiety or depression.

of preparation is inadequate given the anticipated degree of difficulty. This appraisal process is influenced by such factors as the perceived unpredictability of the situation, the value or importance that is placed on the outcome, one’s past history and experience with similar situations and, critically, one’s personality. Specifically, some individuals are predisposed to detect threat even in situations that are objectively innocuous or to exaggerate the degree of the threat that the situations pose. This predisposition is called trait anxiety. High trait-anxious individuals tend to experience anxiety more frequently and more intensely than low trait-anxious individuals.

Some degree of anxiety is a common part of daily life. Even a high level of trait anxiety does not necessarily entail a disorder. Anxiety

is diagnosed as a disorder if it becomes so frequent, intense, persistent, and uncontrollable that it has a significant debilitating effect across multiple domains, including one’s professional career, family life, and social activities. According to the *Diagnostic and Statistical Manual of Mental Disorders*, which is published by the American Psychiatric Association and is the main clinical guide for diagnosing psychological disorders, the category of anxiety disorders includes multiple types of anxiety that differ in important respects. For example, a panic attack is characterized by intense apprehension and is often accompanied by fear of impending doom and very unsettling physiological symptoms (e.g., shortness of breath, chest pains, choking sensations). Agoraphobia is anxiety about

being in places or situations (particularly those involving large crowds) from which escape might be difficult. Specific phobias are fears provoked by exposure to various specific objects or situations (e.g., snakes or hot irons). Social phobia is a fear of situations in which other people are present, particularly if those people are perceived as being there to evaluate one's performance or worth. Obsessive-compulsive disorder is characterized by persistent obsessive fear (e.g., of being contaminated) accompanied by compulsions aimed at controlling the cause of the obsession (e.g., constantly washing one's hands). Post-traumatic stress disorder is characterized by episodes during which one relives a past traumatic event, such as war, a mugging, or a rape. Generalized anxiety disorder is characterized by excessive worry and apprehension about the likelihood of undesirable outcomes in one's life; this worry is present more days than not for a period of at least six months and the person, despite efforts, finds it hard or impossible to control it.

Accurate estimates about the prevalence of mental health disorders are extremely difficult to obtain. The main reason is that there can only be a record that someone is suffering if she or he asks for professional help. However, many individuals suffering from mental health problems, including clinical anxiety, do not ask for help. There are several possible explanations for this but perhaps the most likely ones relate to the stigma still attached to receiving a diagnosis for a mental disorder and the high cost of treatment. Consequently, most official figures significantly underestimate the actual extent of the problem. One exception is a study conducted in the United States (called the National Comorbidity Survey Replication), in which trained clinicians traveled the country and conducted in-home diagnostic interviews with over 9,000 people, selected to be a representative sample of the entire population. That study showed that the lifetime prevalence of anxiety disorders was 28.2% in 2001–03, up from 24.9% in 1990–92. The

12-month prevalence was 18.1% in 2001–03, up from 17.2% in 1990–92. As high as these percentages are, one should keep in mind that the frequency of anxiety problems increases in response to such events as economic downturns, natural disasters, acts or terrorism, or large-scale accidents.

Several reviews of the research literature conducted in recent years converge on the same conclusion: exercise is associated with reductions in anxiety (Herring, O'Connor, & Dishman, 2010). These reductions are typically not large (they are closer to what researchers characterize as medium-sized effects) but they are clinically meaningful (i.e., they are considered large enough to have an appreciable beneficial effect on people's quality of life). By all indications, men and women experience reductions in anxiety of equal magnitude. Contrary to some initial assumptions that only aerobic exercise is effective, it appears that both aerobic and resistance training may be equally effective, but the number of studies examining the effects of resistance training remains low. The degree of improvement in aerobic capacity (i.e., maximal oxygen uptake) and, therefore, the adaptation of the cardiovascular system to exercise training, is not correlated with the degree of anxiety reduction. This means that experiencing gains in fitness is not a prerequisite for experiencing reduced levels of anxiety. However, how different levels of activity frequency, duration, and intensity influence the degree of anxiety reduction remains unknown. There are some indications that shorter activity interventions (e.g., 8–10 weeks) may result in larger reductions in anxiety than longer interventions. However, this finding may be confounded by different levels of adherence; adherence is known to progressively decline as activity interventions get longer, but not all published reports have provided information on program adherence. So, it is possible that shorter interventions appear to be more effective only because the participants were still exhibiting high levels of adherence to the program.

The mechanism by which physical activity can lower anxiety is not fully understood. A reasonable hypothesis is that physical activity may influence the pattern of cognitive appraisal that is at the core of anxiety. As discussed earlier, an anxiety response is induced when the individual perceives that what is expected in a particular situation exceeds his or her perceived ability. Physical activity has been shown to raise people's level of self-confidence. This effect starts with what people believe that they can do physically and, in most cases, it expands to cover more domains of human function. In a word, people who exercise begin to develop a sense of empowerment, a belief that they are in control of their lives. As plausible as this hypothesis is, it is unlikely to fully explain why physical activity reduces anxiety levels. It is interesting

to note, for example, that after programs of exercise training, experimental animals, such as mice, also show significant reductions in behaviors considered indicative of anxiety. Because these results are unlikely to be caused by changes in cognitive appraisals similar to those made by humans, the animal studies suggest that biological mechanisms (such as positive changes in brain neurotransmitters) may also account for the anxiety reductions.

As noted in the previous section, the challenge of improving the methodological quality of studies investigating the effects of exercise on anxiety remains. Therefore, although the research results that have been obtained so far are clearly promising, they should not be considered definitive. Many important questions remain unanswered and should be investigated through well-designed studies in the future.

PHYSICAL ACTIVITY AND DEPRESSION

Depression is a mental health disorder characterized by disturbed mood. Depression typically occurs in recurring episodes. What clinicians call a major depressive episode is a period of at least two weeks, during which an individual experiences deep sadness and a loss of interest in or an inability to derive pleasure from almost all activities, including those that the individual used to find interesting and pleasurable. Furthermore, during a major depressive episode, the individual exhibits significant changes in appetite and eating behaviors (and, therefore, visible changes in body weight), disturbed sleep (either too much or too little), noticeable changes in activity patterns (either significant reductions in activity or restlessness and agitation), feelings of decreased energy, perceptions of worthlessness or guilt, disruptions of cognitive patterns (difficulty maintaining concentration or making decisions), and thoughts of suicide.

Like anxiety, a core characteristic of depression is a problematic pattern of cognitive appraisal. Unlike anxiety, however, the type of appraisal that is the hallmark of depression is

not just that more is expected of the individual in a particular situation than what the individual can offer. In depression, an individual believes that there is no solution, no recourse, no escape, nothing that can be done and no one that can help. This pattern of appraisal is termed "learned helplessness" (see Figure 44.2). The individual who perceives a problem (e.g., foresees layoffs) may initially respond with anxiety and try to react (e.g., by preparing a résumé and submitting it to many potential new employers). However, after multiple failures despite what one perceives to be decent effort, one starts to develop a more passive outlook, being led to believe that there will never be a way out of the impasse. In other words, many individuals whose mental health is initially affected by anxiety, later transition to depression. This accounts for the high comorbidity between anxiety and depression (at rates of 50% or higher).

Individuals suffering from depression often tend to develop some "irrational beliefs"; that is, thoughts that represent exaggerations or over-generalizations, with no basis in fact. For example, one may believe that she or he is the

“unluckiest person on the planet” or that “everything will always go wrong for me.” Perceived failures in one domain (such as employment) or at one point in time are generalized to one’s life overall (e.g., “I am a failure, I have always been a failure, I will always be a failure”). Such dysfunctional cognitions lead to the conclusion that there is no point in even trying, which ultimately results in passivity. Consequently, depression can have a devastating effect on quality of life.

In the most severe cases, depression may lead to suicide, making depression a potentially lethal disorder. In fact, up to 15% of individuals with severe depressive episodes die by suicide. Among individuals with major depression over the age of 55 years, suicide death rates quadruple. Among elderly individuals with major depression who are admitted to nursing homes, the risk of death by suicide increases substantially during the first year.

If an individual experiences one or more major depressive episodes (based on the diagnostic criteria mentioned earlier), a clinical diagnosis of major depressive disorder can be issued. If the depressed mood lasts for a long time (at least two years) but other symptoms are below the threshold required for a diagnosis of major depressive disorder, the condition is diagnosed as dysthymic disorder. If major depressive episodes alternate with manic or milder (so-called “hypomanic”) episodes, then the individual is diagnosed with bipolar disorder (I or II, respectively). Manic episodes are characterized by unusually and inappropriately elevated mood and, occasionally, high levels of irritability, or even violence and abuse, lasting for at least one week. Furthermore, during manic episodes, individuals may show disproportionately inflated self-esteem (even reaching delusional levels, such as believing that one is an expert on issues that one knows nothing about), decreased need for sleep, accelerated but incoherent speech (with multiple, disconnected but intermingling, lines of thought), distractibility, excessive involvement in goal-directed activities (e.g.,

starting multiple projects simultaneously, without regard about their feasibility), general agitation, and increased susceptibility to pleasurable activities without considering costs or consequences (e.g., gambling one’s life savings or purchasing unnecessary goods on credit).

In the United States, the lifetime prevalence of mood disorders is 20.8% (major depressive disorder, 16.6%; dysthymia, 2.5%; bipolar disorder I and II, 3.9%). Within a 12-month period, the prevalence is 9.5% (major depressive disorder, 6.7%; dysthymia, 1.5%; bipolar disorder I and II, 2.6%). Of those individuals with major depressive disorder, the severity of the disease is characterized as mild in 10.4%, moderate in 38.6%, severe in 38.0%, and very severe in 12.9% of the cases. On average, major depressive episodes last for 16 weeks. In 59.3% of cases, patients reported severe or very severe impairment in important life roles (e.g., as professionals, parents, or spouses). Importantly, fewer than half (41.9%) of individuals with major depressive disorder receive adequate treatment.

Numerous epidemiological studies, involving thousands of participants, have shown that there is a significant inverse correlation between the amount of physical activity and the severity of depressive symptoms that people report. Furthermore, as explained in more detail in Chapter 51, experimental studies of increasingly improving methodological quality show that activity interventions can significantly lower depression among individuals with mood disorders (primarily major depressive disorder and, more recently, bipolar disorder). These reductions are typically large and clinically meaningful (Greer & Trivedi, 2009). They also appear regardless of whether the depressive symptomatology was assessed via self-report questionnaires or via clinical interviews by expert assessors. Two additional observations appear consistently across studies. First, levels of depression become progressively lower, so longer programs typically lead to larger reductions. Second, the magnitude of the reductions is larger for those participants who report higher levels of depression at base-

line, which is not surprising since these individuals have more room for improvement. Neither the minimum dose of activity that is necessary for lowering depression nor the dose that maximizes this effect is presently known. Preliminary studies, however, show that the frequency, duration, and intensity of exercise that is presently recommended for general health benefits (i.e., 5–7 days per week, at least 30 minutes per day, moderate intensity) suffice to lower depression. Recent studies have also provided evidence that the effects of exercise are considerably larger than those associated with a placebo drug. Furthermore, the benefit cannot be attributed to social interaction since even exercising alone (in a room with no one else present) is still effective for lowering depression. In addition, the argument that exercise is causally related to reductions in depression is strongly supported by animal research, which shows that exercise induces specific measurable changes in brain function that can account for its antidepressant effects.

Three main criticisms have been leveled against this research. First, there are persistent questions about the methodological quality of the available studies. These questions focus on such issues as whether the outcome assessors were blinded to group allocation or whether the results were biased by the exclusion of those participants who were initially allocated to the exercise group but later withdrew. Second, researchers have raised the possibility that the willingness to be physically active and the tendency to respond positively to an activity intervention (e.g., by experiencing an antidepressant effect) reflect a common genetic predisposition rather than the postulated causal effect of activity. Third, practitioners often raise questions about the practical meaningfulness of these results given that most depressed individuals tend to avoid physical activity. These are all substantive criticisms that warrant close scrutiny in future studies.

These lingering questions notwithstanding, the evidence supporting an antidepressant

effect of physical activity is now strong enough to substantiate a case for using physical activity in clinical practice. This is especially important in light of growing indications that antidepressant medications, despite high cost and considerable risk of adverse side-effects (including increased risk of suicidal thoughts), are no more effective than placebo for cases of mild to moderate depression. However, cases of mild to moderate depression currently account for the majority of prescriptions for antidepressant medications. Thus, recent clinical guidelines issued by the National Institute for Health and Clinical Excellence in the United Kingdom recommend that for “people with persistent subthreshold depressive symptoms or mild to moderate depression” clinicians should consider offering options that do not involve medications, including “a structured group physical activity programme.”



Figure 44.3 Anxiety and depression are prevalent mental health problems in industrialized countries. Standard treatment approaches, namely psychiatric drugs and psychotherapy, incur a high economic cost and are associated with wide-ranging side-effects. Physical activity is an effective alternative that is free, safe, and associated with numerous collateral health benefits.

PHYSICAL ACTIVITY AND “FEELING BETTER”

Anxiety and depression are mental health problems that can escalate to severe levels and have a devastating effect on quality of life. Besides those, however, daily function and satisfaction with life are also affected by a variety of feelings that humans find unpleasant and wish to change. For example, people smoke cigarettes and drink alcohol to relieve tension and relax, or consume caffeinated beverages and eat sugary snacks to get a boost of energy. These methods rely on external chemical agents (nicotine, alcohol, caffeine, sugar) to alter one's affective state. Unfortunately, all of these methods are costly and none can be considered healthful. Especially when overused, all of them have long-term negative consequences.

A growing evidence base demonstrates that physical activity is a very potent alternative regulator of affect, which is made even more appealing if one considers that physical activity produces numerous additional benefits for the body and mind, is free, and has virtually no negative side-effects (Puetz, O'Connor, & Dishman, 2006; Reed & Buck, 2009; Reed & Ones, 2006). Numerous studies have shown that bouts of physical activity, particularly if the intensity is self-selected (as in a self-paced walk), cause individuals to experience a pleasant high-activation state (energy and invigoration). If the intensity is somewhat vigorous (as in a brisk walk or a jog), the pleasant high activation that is experienced during the activity is typically followed by a pleasant low-activation state (calmness and serenity) that may last for some time thereafter.

Because of these powerful effects, researchers have begun exploring the potential of using

physical activity for alleviating urges to consume the aforementioned potentially harmful substances typically used as mood regulators. This may be especially significant for individuals seeking to disentangle themselves from those substances, such as nicotine or ethanol, which can be addictive. These studies are based on a “hedonic competition” or “hedonic substitution” hypothesis, according to which the reason why people feel the urge to consume these substances, and the reason they may even become addicted, is because they desire the pleasant changes in their affective states that these substances produce. If, however, physical activity can successfully compete with these substances in inducing these desirable affective changes, then it may eventually replace them as an equally effective substitute. While the evidence base supporting this hypothesis is still growing, the results are promising. For example, bouts of physical activity can attenuate urges for cigarettes, alcoholic drinks, or sugary snacks, substantially extend the time between irrepressible urges, and effectively reduce the daily consumption of these products. In animal research, it has been found that animals that were made to be dependent on alcohol and illicit drugs, such as cocaine, amphetamine, and “ecstasy,” lowered their dependence as they gained access to a running wheel. Studies on humans who are recovering from alcoholism, smoking, or drug addiction similarly show that the incorporation of physical activity in their treatment program facilitates the recovery process.

LIMITS OF THE FEEL-BETTER EFFECT

Skeptics of the physical activity-induced “feel-better” phenomenon often pose this challenging question: if physical activity is as pleasant as its supporters claim, then why are the rates of physical activity participation so low? After

all, it is clear that humans enthusiastically pursue all sorts of endeavors that make them feel better, from eating and drinking (often to excess) to engaging in intimate relationships.

This is a reasonable and intriguing question, so it has forced researchers to consider whether there are limits to the “feel-better” effects described earlier in this chapter. Indeed, studies have shown that several factors may contribute to experiencing reduced levels of pleasure during physical activity. These factors pertain to the attributes of the physical activity itself, the characteristics of the individuals, the physical properties of the environment, and the perceived features of the social context. For example, reductions in pleasure have been observed when the intensity of physical activity exceeded the ventilatory threshold (the level at which one starts to breathe more heavily and describes the effort as “somewhat hard” or “hard”). If, however, an individual is overweight or obese, has been sedentary for a long period of time, lacks confidence in her or his physical ability, or is self-conscious about negative evaluations that others may make about her or his physical appearance, then reductions in pleasure during physical activity may occur even with lower levels of intensity. Likewise, reductions in pleasure may occur if the environmental conditions are adverse (e.g., high heat or humidity). The social environment is also

crucially important. Participants feel better when the exercise leader provides positive feedback and supports a sense of autonomy (i.e., that one does what one wants, not what one is instructed to do) or when other members of the group show enthusiasm and willingness for social interaction. On the other hand, if the leader emphasizes appearance-related rather than health-related benefits or the social setting exacerbates concerns about physical appearance (e.g., if one is surrounded by wall-to-wall mirrors and super-fit individuals in tight clothing), the possibility of negative affective changes is increased.

Unfortunately, conditions that may make physical activity an unpleasant experience occur often in practice. In other words, the “feel-better” effect associated with physical activity should not be considered automatic but rather conditional. The factors that can reduce the pleasure associated with physical activity may collectively explain the currently low levels of physical activity participation and the high rates of dropout. As noted in the introduction of this chapter, in the long run, human beings tend to gravitate toward pursuits that make them feel better and tend to avoid those that make them feel worse.

GUIDELINES FOR OPTIMIZING THE AFFECTIVE RESPONSES TO PHYSICAL ACTIVITY

Researchers are only now beginning to explore the conditions that make it more likely to experience increased pleasure during and following physical activity. Much remains to be discovered. Nevertheless, some preliminary recommendations can be issued based on what is known up to this point.

First, the importance of monitoring the affective responses of participants during and after physical activity cannot be overemphasized. Oftentimes, what the exercise professional believes that the participant is feeling and what the participant is actually feeling might not agree. So, the systematic use of stan-

dardized rating scales that allow the participants to describe their feelings can promote communication and provide a basis for adjustments before it is too late. The simple rating scales presented in Chapter 6 (i.e., the Feeling Scale and the Felt Arousal Scale) can be used for this purpose. These measures are short enough (they consist of one question each) that they can be used repeatedly without becoming intrusive. Maintaining records of affective responses for each participant, and comparing the effects of different activity programs on those responses, provides the exercise professional with an invaluable



Figure 44.4 Physical activity can make people feel better. However, this feel-better effect is not experienced by everyone in every situation. Exercise professionals should ensure that the conditions are conducive to a pleasurable response by following the guidelines for optimizing the affective responses to physical activity.

evidence base for offering individualized recommendations (e.g., designing tailor-made physical activity programs that promote pleasant experiences and, therefore, motivation for continued participation).

Second, it is important for participants to feel in control of their physical activity and confident that they can do it. Therefore, it is crucial that professionals allow participants as much autonomy as possible in selecting the types and amounts of physical activity they wish to do. Evidence, for example, demonstrates that individuals may feel pleasant at higher levels of intensity if they control the intensity. On the other hand, if they perceive that the intensity is controlled by the exercise professional, the same level of intensity may lead to reduced pleasure. Considerable evidence also demonstrates that the intensity

most individuals select on their own is not only experienced as pleasant but it also suffices to produce gains in cardiorespiratory fitness. Similarly, studies have shown that, when individuals are instructed to select an intensity that makes them feel “good,” the intensity they select is sufficient to elicit fitness gains. When individuals are “pushed” to exceed the intensity that they would have self-selected, even by a small amount (e.g., walk 10% faster), they reach intensities that are not only experienced as significantly less pleasant but are also unnecessarily high and potentially risky. Therefore, exercise professionals should reconsider their role: they should refrain from dictating what participants should be doing and, instead, enable participants to do what they prefer. Exceptions should be made only in cases in which factors such as unreasonable fear or misinformation cause individuals to select either activities that are unlikely to produce any benefits or activities that may be unsafe given their capabilities or health condition. To foster confidence, professionals should also ensure that, whatever participants choose to do would not cause them to perceive their performance as a failure (e.g., if the participant expresses the wish to do something that the professional knows to be grossly unrealistic). To meet this goal, participants should be encouraged to progress in small increments, preferably by increasing duration and frequency (which are less likely to have a negative impact on pleasure) before increasing intensity (which is more likely to have a negative impact on pleasure).

Third, exercise professionals must be aware of the limitations of cognitive techniques that are often used as means of “manipulating” how participants, especially novice ones, feel during physical activity. Due to some of the aforementioned factors (i.e., high body weight, low cardiorespiratory fitness), many individuals may experience displeasure and discomfort during the early stages of their participation. The recommendations that are

typically offered to participants for dealing with these negative affective experiences include: (a) using music or television to turn their attention away from bodily symptoms of strain and fatigue (called “attentional dissociation”); (b) convincing themselves that they “can do it” (i.e., boosting their self-efficacy); and (c) viewing these unpleasant feelings as “a good thing,” a sign that their body is getting stronger (i.e., using what is known in psychotherapy as “cognitive reframing” or “reappraisal”). Although there is at least some evidence that these techniques can be effective in improving how one feels during a bout of strenuous activity, their effectiveness is limited. When the intensity is high enough that participants cannot keep their heart rate steady (i.e., they are close to “maxing out” physiologically), these techniques are very unlikely to help participants feel better. Both the participants themselves and the professionals supervising them should be realistic in this regard. If the negative affective responses cannot be controlled, the best solution is to lower intensity (see previous point).

Fourth, although research on how personality influences affective responses to physical activity is still at an early stage, there is compelling evidence that different individuals may exhibit different affective responses to the same physical activity stimulus. These individual differences may reflect a variety of factors, from different genetic makeups to different prior experiences with physical activity. Regardless of the source of these differences, exercise professionals should be aware that participants, even of the same gender, age, health status, and level of physical conditioning, will likely differ in what types and amounts of physical activity they prefer or they can tolerate without experiencing adverse affective changes. For example, although all individuals will find certain intensity levels “too low” and others “too high,” the percentages of their maximal physiological capacity to which these labels apply will likely differ considerably between different individuals.

For exercise professionals, this means that they should not operate under the assumption that what one participant finds pleasant will also be found pleasant by another participant.

Fifth, extra care must be taken if the physical activity is to take place in the presence of others who might be perceived as critical observers (e.g., individuals of vastly superior levels of physical ability). Especially for individuals who have the tendency to appraise situations as posing an evaluative threat (e.g., individuals with a high degree of social anxiety, including anxiety about their physique), it is important to eliminate from the environment elements that might trigger such appraisals. Therefore, exercise professionals should be careful to avoid making interindividual comparisons, placing emphasis on appearance-related motives for participation, or drawing attention to individuals. Instead, an effort should be made to define success as progressing in comparison to self-referenced baselines, emphasizing health over appearance as the prime motive for participation, and cultivating a cooperative team atmosphere by encouraging group cohesion (e.g., by building social support dyads or networks and promoting the idea of shared goals).

Sixth, exercise professionals should be aware that certain categories of participants face special challenges and should be considered “high risk” for experiencing negative affective responses and dropping out. These include individuals who are obese or severely deconditioned after long periods of sedentary living and individuals with mental health problems, such as anxiety and depression. Individuals in these categories may approach physical activity with negative preconceptions, possibly stemming from negative previous experiences (e.g., memories of exhaustion, pain, or public embarrassment). Obesity, extreme deconditioning, and negative affectivity have all been shown to be associated with exaggerated perceptions of exertion during physical activity and with increased risk of dropout. Conducting an initial inter-

view aimed at uncovering fears associated with physical activity can provide the exercise professional with information that can be used to prevent the inadvertent reinforcement or exacerbation of these fears.

In closing, it is important for exercise professionals to remember that pleasure and displeasure are powerful motives in human behavior (see Figure 44.5). Physical activity can make participants feel better, an effect that can have wide-ranging and life-changing applications, from promoting mental health to aiding individuals deal with harmful addic-

tions. However, this “feel-better” effect is neither automatic nor guaranteed. Unless the physical activity is properly implemented and calibrated for each individual participant, it may result in a range of unpleasant experiences, from exhaustion to shame, which may, in turn, lead to long-term avoidance of activity. For this reason, the systematic monitoring of the pleasure and displeasure that participants experience in response to physical activity should become an integral component of daily practice for all responsible exercise professionals.

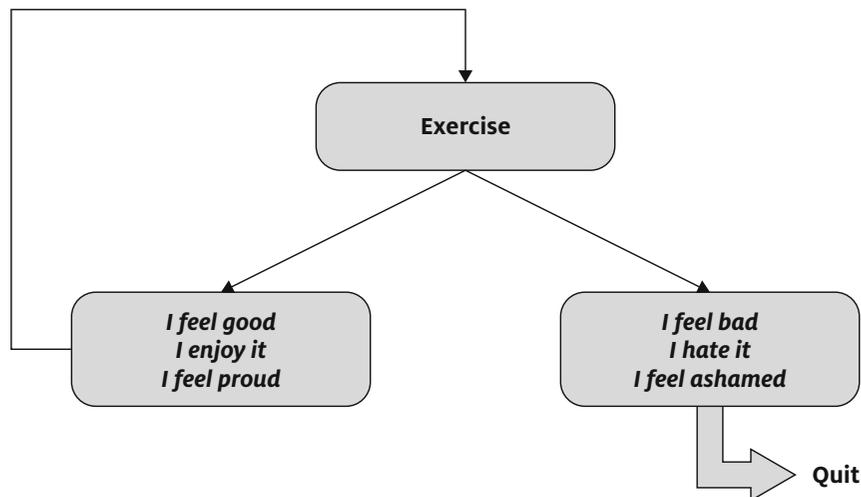


Figure 44.5 Humans generally tend to do what makes them feel better and avoid what makes them feel worse. This is also the case in the domain of physical activity. Therefore, if participants consistently experience reduced pleasure from physical activity, the likely outcome is non-adherence and dropout. If, on the other hand, participants feel better during and after physical activity, there is a strong possibility that they will make physical activity a regular part of their daily lives.



LEARNING AIDS

- 1 Summarize the key characteristics of a well-designed experimental study.

The most crucial feature of a well-designed experiment is the random allocation of participants to the experimental and control groups. A successful control condition is one that matches the experimental condition in everything but the “active ingredient” whose effectiveness is investigated (e.g., the physical activity). This includes the characteristics of the participants, the extent of the interactions the participants have with the investigators, and, crucially, the expectation of benefit. Furthermore, in well-designed experimental studies, the group to which a participant has been allocated should be concealed from those investigators responsible for assessing the outcome(s) and, ideally, from all investigators that come in contact with participants and even from the participants themselves (“double-blind”). Finally, statistical analyses should not be limited only to those participants who completed the study but should include all participants initially randomized to conditions (“intention to treat” analysis).

- 2 Explain what the “placebo” effect is.

The placebo effect is a phenomenon in which perceived and even actual improvement occurs in a certain outcome (e.g., anxiety or depression symptoms) even in the absence of an active treatment, merely as a result of an expectation of benefit. Placebo (i.e., physiologically inert) treatments are commonly used as controls in experimental research (e.g., to control for the fact that participants who exercise are expecting to benefit because they believe exercise to be beneficial).

- 3 Define “anxiety” and “depression”.

Anxiety is an unpleasant emotional state characterized by cognitive, emotional, behavioral, and physiological symptoms. It is elicited following a cognitive appraisal of threat (that more is expected of the individual in a given situation than what the individual can do). Depression is a mood disturbance characterized by deep sadness, loss of interest, and inability to derive pleasure from almost all activities. The cognitive appraisal that typically underlies depression is “learned helplessness,” the belief that there is nothing one can do to improve one’s current condition.

- 4 Identify the criteria for the diagnosis of a major depressive episode.

During a major depressive episode, an individual may experience depressed mood, loss of interest or pleasure in nearly all activities, changes in appetite and eating behaviors, disturbed sleep, noticeable changes in activity patterns, feelings of decreased energy, perceptions of worthlessness or guilt, disruptions of concentration or making decisions, and thoughts of suicide.

- 5 Summarize what the exercise professional can do to make it more likely that physical activity will be experienced as pleasant.

Exercise professionals should: (a) consistently monitor the participants’ affective responses and maintain a record of how these change in response to modifications in the exercise program; (b) promote a sense of autonomy (the belief that the exerciser is in control); (c) minimize the chances of early failure experiences, to build confidence; (d) respect the limits of cognitive regulation techniques

(e.g., attentional dissociation, cognitive reframing, boosting self-efficacy) by ensuring that exercisers do not reach unnecessarily high levels of intensity; (e) exhibit sensitivity to individual differences by avoiding one-size-fits-all exercise prescriptions; (f) emphasize self-improvement and health-and-wellness-related motives for participation; and (g) maintain a safe social environment, without elements that could be perceived as posing an evaluative threat (e.g., mirrors, other individuals of vastly superior fitness, interindividual comparisons, emphasis on physical appearance or skill).



REVIEW QUESTIONS

- 1 What is a “double blind” experimental design and what advantages does it have?
- 2 How is an anxiety response induced?
- 3 How is the cognitive appraisal associated with depression different from that associated with anxiety?
- 4 What is the “hedonic competition” or “hedonic substitution” hypothesis?



EXERCISE

- 1 During the week, choose two different physical activity sessions (we assume that you are physically active at least twice per week). These sessions should be as different as possible but you can choose in what way they differ (e.g., in terms of mode, duration, or intensity). For example, one activity might be going for a walk in the park with your dog and the other might be a basketball game. When you do each activity take three copies of the Feeling Scale and the Felt Arousal Scale with you (see Chapter 6). Rate how you feel before, once during (preferably near the middle of the session), and after these sessions. Then, use graphing software to plot your results. Discuss which session made you feel more pleasant high activation during the activity and more pleasant low activation afterwards, as well as possible reasons for the differences.



ADDITIONAL READING

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