Several intriguing opinions on the psychology of exercise and physical activity can be found in the writings of the ancient Greeks (Ekkekakis, Hargreaves, & Parfitt, 2013) and other ancient texts. Reflections on human thoughts and feelings about exercise, some even remarkably detailed and insightful, also feature prominently in the writings of some of the fathers of modern psychology in the 19th century, including Alexander Bain, James Mark Baldwin, and William James (Ekkekakis, 2013). Occasional articles about a postulated role of exercise and physical activity in mental health, written by passionate physical educators and physicians, appeared during most of the 20th century, albeit basing rather bold claims on mere conjectures. Thus, by most accounts, the “dawn” of contemporary exercise psychology as a scientific field is conventionally demarcated by a series of preliminary investigations by William P. Morgan in the late 1960s, focusing on the relationships between exercise, physical fitness, and mental health (Dishman & O’Connor, 2005). This means that exercise psychology as a field of scientific inquiry is now approaching its first half-century mark. Although still very young, exercise psychology has seen rapid growth over these past decades (also see Chapter 3). This growth has been propelled by the widening recognition of the health benefits of physical activity and exercise and, at the same time, the intensifying need to increase the percentage of the population in Western countries who partake in these activities at levels sufficient to yield meaningful benefits. There are now several textbooks devoted exclusively to exercise psychology, some even in their third or fourth edition. Research articles related to exercise psychology are routinely published in a broad range of esteemed scientific journals, spanning the fields of clinical, preventive, and behavioral medicine, nursing, public health, gerontology, psychophysiology,
and neuroscience. The publications of several highly successful researchers in exercise psychology have reached tens of thousands of citations. Some research teams manage multimillion-dollar grants. In several countries, young exercise psychologists beginning their academic careers in major research institutions are expected to procure extramural funding within a fiercely competitive environment, design and conduct large randomized controlled trials, and publish their findings in some of the most prestigious and selective journals in the world. Therefore, by conventional academic metrics, an appraisal of exercise psychology could lead to the conclusion that it is a dynamic, highly prolific, and rapidly growing field of scientific research. On the other hand, a skeptic could argue that an appraisal of the progress of the field should not be limited to academic metrics but must also encompass the crucial question of societal relevance and impact. Specifically, it would be reasonable to ask in what way exercise psychology research has improved the lives of people around the globe. This is not an unfair or unrealistic question. Other subdisciplines of exercise science (or “kinesiology”), despite having histories not much longer than that of exercise psychology, have already produced knowledge that has resulted in changes to practice norms on a global scale. For example, research from biomechanics has taught people to “bend their knees” when lifting heavy objects, thus reducing the rate of back strain injuries. Likewise, research in motor control has transformed several areas of clinical practice, ranging from stroke rehabilitation to the training of surgeons in eye-hand coordination. Research in exercise physiology has demonstrated that regular moderate-intensity exercise is not only safe but highly beneficial for individuals who have suffered a myocardial infarction (eg, exercise stimulates myocardial revascularization, improves contractility, enhances vasodilation, attenuates inflammation, and promotes fibrinolysis and thrombolysis). As a result, exercise-based cardiac rehabilitation has become the global standard of care for postinfarct patients.

One of the primary goals of exercise psychology is to initially understand and ultimately develop methods to influence the psychological processes involved in the decision to engage in, adhere to, and sustain long-term participation in physical activity or exercise. A second major goal is to evaluate and advance the application of physical activity and/or exercise in the promotion of mental health and well-being. A critical examination of practice norms at the societal level does not yield indications that research from exercise psychology has had a broad, meaningful influence. At schools, the practice of physical education still appears, by and large, unaltered and unaffected by developments in exercise psychology. At most schools in the United States, for example, children are still subjected to mandatory testing of their physical fitness (which is strongly influenced by genetics; eg, Maes et al., 1996), commonly resulting in deep-seated and lasting feelings of incompetence and embarrassment (eg, Hopple & Graham, 1995). Gymnasia and fitness facilities still feature wall-to-wall mirrors and typically employ staff members with exceptionally athletic bodies, thus exacerbating feelings of social physique anxiety among many of
their clients. Although the managers of such facilities are greatly concerned about client retention, there is no indication that the fitness industry has considered the use of psychological interventions a worthwhile business investment. Despite evolving into highly sophisticated and laborious processes, the development of exercise prescription guidelines and physical activity recommendations still proceeds without direct input from exercise psychology theory and research. It seems reasonable to suggest that, after its first half century, establishing its societal relevance should be an important, if not urgent, goal for exercise psychology. This goal entails advancing basic research to the point that it can support translational research and, in turn, producing interventions of sufficiently demonstrated efficacy, effectiveness, and cost-effectiveness to support large-scale application.

SOCIETAL IMPACT: WHAT IS OUR TRACK RECORD?

Fig. 18.1 displays the results of an *ad hoc* meta-meta-analysis, synthesizing the pooled effect sizes from 18 meta-analyses from physical activity promotion trials. As can be seen, most pooled effects are “small,” approximating one-fifth to one-fourth of a standard deviation. While this observation may be interpreted optimistically (ie, “better than nothing”), a more critical perspective suggests that these figures should be considered in the context of the following four caveats. First, the participants in all of the trials were volunteers, thus introducing a substantial self-selection bias. Second, in nearly all of the trials, physical activity was assessed by self-report rather than objective measures, thus introducing the possibility of expectancy bias inflating the reports of the intervention groups relative to the control groups. Third, few of the available trials involved truly randomized designs and most of the 18 meta-analyses included both experimental and preexperimental studies. Fourth, most assessments of methodological quality have concluded that the trials are characterized by “moderate” or “high” risk of bias. Each of these caveats likely led to an inflation of the reported effect sizes.

Given these research outcomes, it is unsurprising that participation rates at the population level remain low. What is perhaps surprising is how low these rates are. In the United States, the 2003–04 National Health and Nutrition Examination Survey found that, based on self-reports, 51% of the adult population accumulated 150 min per week of at least moderate-intensity physical activity in bouts of at least 10 min. At the same time, however, the figures based on objective measures (ie, accelerometers) were 3.5% for those 20–59 years of age and 2.4% for those 60 years or older (Troiano et al., 2008). When only activity performed in bouts of at least 10 min was considered, 93.5% of individuals were found to be inactive. More than half (56.1%) averaged approximately 0 min of moderate-to-vigorous activity per day. On 91.1% of days, participants averaged less than 1 min of vigorous-intensity activity. Fewer than 1% of adults registered 20 min of vigorous-intensity activity on at least 3 days per week.
In Canada, based on self-reports collected in 2007, it was estimated that 65% of adults did at least the minimum recommended amount of activity (Bryan & Katzmarzyk, 2009). However, based on data collected with accelerometers between 2007 and 2009, it was found that 4.8% did at least 30 min of moderate-to-vigorous physical activity, accumulated in bouts of at least 10 min, on at least 5 days per week and 15.4% did at least 150 min per week of moderate-to-vigorous physical activity accumulated in bouts of at least 10 min (Colley et al., 2011). Similarly, according to the Health Survey for England, in 2008, based on self-reports, 39% of men and 29% of women aged 16 and over met the public-health recommendations for physical activity. At the same time, the percentages of those meeting the recommendation based on accelerometry data were only 6 and 4%, respectively (National Health Service Information Centre, Lifestyle Statistics, 2012).

The severity of the problem of physical inactivity is even more pronounced among medically vulnerable populations, such as adults with obesity, who could benefit greatly from higher levels of activity. Objective measurements in the United States show that fewer than 2% of adults with obesity are physically active at the level recommended for health promotion (Tudor-Locke, Brashear, Johnson, & Katzmarzyk, 2010). Women with obesity, in particular, show levels of noncompliance with the recommendations that are unmatched in the domain

### FIGURE 18.1

Summary of pooled effect sizes from 18 meta-analyses of intervention trials with physical activity as the outcome variable. Most effects are “small” and the overall average is $d = 0.26$, 95% CI 0.21–0.31. PMID is the record number of the respective meta-analysis in PubMed (http://www.pubmed.gov). DOI is the Digital Object Identifier (http://www.doi.org).

| PMID: 24648017 | - | 0.14 | - |
| PMID: 23107292 | - | 0.16 | - |
| PMID: 19585683 | - | 0.16 | - |
| PMID: 20558196 | - | 0.19 | - |
| PMID: 24065993 | - | 0.19 | - |
| PMID: 23506544 | - | 0.20 | - |
| PMID: 21330590 | - | 0.21 | - |
| PMID: 24065994 | - | 0.21 | - |
| PMID: 19765506 | - | 0.21 | - |
| PMID: 21321008 | - | 0.21 | - |
| PMID: 22451477 | - | 0.25 | - |
| PMID: 12173676 | - | 0.26 | - |
| PMID: 15674903 | - | 0.28 | - |
| PMID: 19916637 | - | 0.32 | - |
| PMID: 21457183 | 0.44 | 0.50 | - |
| PMID: 23452345 | - | 0.52 | - |
| PMID: 23381115 | - | 0.52 | - |

![Graph showing mean effect size and categories](http://www.doi.org)
of public health. According to data from a nationally representative sample of 680 women with obesity from the 2005–2006 NHANES, fewer than 1.5% averaged 30 min of moderate-to-vigorous physical activity per day (Tudor-Locke et al., 2010). Based on the same data set, women with obesity performed, on average, only 13.8 min of moderate and 10.8 s of vigorous-intensity physical activity per day (Archer et al., 2013). Taken together, the data reviewed in this section suggest that the problem of physical inactivity remains poorly understood and resistant to intervention approaches that have been tried thus far.

**WHY ARE WE FAILING? PERFECTING THE ART OF PEEKING AT THE UNIVERSE THROUGH A KEYHOLE**

The main responses to criticisms about the slow rate of progress of the field of exercise psychology in delivering effective interventions are that (1) human behavior is complex and notoriously difficult to change, and (2) despite its importance, physical activity promotion has not received enough funding for research and implementation programs. While both arguments are valid, it should be pointed out that several of the “great public health achievements” recognized by the Centers for Disease Control and Prevention resulted from widespread changes in human behavior, some of them (such as the lowering of the rates of cigarette smoking and the increased use of condoms to prevent the spread of HIV) against considerable resistance (Koppaka, 2011). Moreover, while physical activity indeed receives less funding and fewer resources compared to certain other problematic health behaviors, there is no shortage of high-profile advocacy initiatives and social marketing campaigns (Kohl et al., 2012; Matheson et al., 2013; Trost, Blair, & Khan, 2014). So, why is the promotion of physical activity classified as one of the “catastrophic failures of public health” (Anonymous, 2004)?

This is a multifaceted and immensely complex problem. There can be little doubt, for example, that the layout of modern cities or the persistent unwillingness of traditionally trained medical professionals to recommend physical activity to their patients are partial contributors. Many such factors are outside the purview of exercise psychology. So, the emphasis here is on the theoretical frameworks that the field of exercise psychology has chosen to utilize and the intervention approaches it has developed and tested.

Even a cursory analysis of the research literature reveals that exercise psychology has been trying to understand and change physical activity and exercise behavior through a very small set of theories (see Fig. 18.2). As several theorists have pointed out over the years, these theories overlap to a great extent despite the use of different terms to describe the common constructs (Bandura, 2004; Maddux, 1993; Weinstein, 1993). Importantly, the constructs in question are all cognitive appraisals, thus typically sharing considerable common variance. What is my perception of threat? What is my perceived possible benefit from initiating the healthy behavior or the cost from neglecting it? What is the perceived confidence in my ability to carry out the recommended behavior? What are the perceived
expectations or likely support of important others? Recognizing that existing theories leave most behavioral variation unaccounted, researchers have recently proposed that, to advance the present understanding and possibly improve the quality of interventions, the best path forward would be the development of eclectic amalgamations of cognitive constructs (Hagger & Chatzisarantis, 2014).

What has been strikingly absent from the exercise psychology literature is any discourse at the level of metatheory. As a consequence, the field has not yet confronted the fact that all of its current theories are products of the same metatheoretical perspective, namely of the cognitivist paradigm that has dominated psychological thought since the middle of the twentieth century. Associated with the failure to confront this fact is the failure to consider and debate some of the fundamental assumptions underpinning the cognitivist perspective on human behavior. It is important, for example, to remember that cognitivist theories were inspired by the mind-as-computer analogy. As part of this legacy, cognitivist theories assume that the input is always information (such as the probability of future events), the workings of the mind can be modeled as computer algorithms that process this information, and, based on specific decision rules, produce behavioral decisions (Fig. 18.3). The theories also assume that, as in a computer software program, the algorithms that intervene between the data input and the behavioral output consist of logical and predictable cause-and-effect calculations, the goal of which is to select the option that optimally serves the self-interest of
the individual. These assumptions imply that human beings possess the capacity to collect and retain all pertinent information, that their behaviors result from the informational input in a rational and predictable manner, and that there is no alternative pathway that determines behavior besides the theorized (algorithmic and data-bound) cognitive processes. A further implication is that, if the behavioral output is undesirable (i.e., suboptimal in promoting self-interest), this can be corrected by feeding the system with additional, more accurate, or more compelling data. In other words, the theories assume that, to change physical activity and/or exercise behavior (or any type of behavior for that matter), more information should be provided and subjected to rational cognitive evaluation.

Given that these assumptions form the conceptual foundation of all cognitivist theories presently in vogue within the field of exercise psychology, the fact that their soundness has yet to be debated is surprising. For example, within the Theory of Reasoned Action and the subsequent Theory of Planned Behavior, the reliance of behavior on the informational input and rational processing is explicit:

*The totality of a person’s beliefs serves as the informational base that ultimately determines his attitudes, intentions, and behaviors. Our approach thus views man as an essentially rational organism, who uses the information at his disposal*
Indeed, the assumption of rationality is one of the most fundamental assumptions of these theories. They are both based on the central premise that “people’s behavioral intentions are assumed to follow reasonably from their beliefs about performing the behavior” (Ajzen & Fishbein, 2005, p. 193) and “human behavior can be described as reasoned” (p. 203). If the resultant behavior appears irrational, the theories attribute the apparent failure to the poor informational input, which led to the formation of “inaccurate, biased, or even irrational” beliefs (p. 193). Once beliefs have formed, they serve as “the cognitive foundation from which attitudes, perceived social norms, and perceptions of control—and ultimately intentions—are assumed to follow in a reasonable and consistent fashion” (pp. 193–194).

In Social Learning Theory, and its subsequent evolution into Social Cognitive Theory, people are conceptualized as constant information collectors and processors. Their thoughts and actions again follow rationally and deterministically from that information:

After people acquire cognitive skills and operations for processing information, they can formulate alternative solutions and evaluate the probable immediate and long range consequences of different courses of action. The result of weighing the effort required, the relative risks and benefits, and the subjective probabilities of gaining the desired outcomes influences which actions, from among the various alternatives, are chosen. (Bandura, 1977, p. 173)

Like other cognitivist theorists, Bandura anticipated the doubts about the occasional apparent irrationality of human behavior. He was, for example, well aware of the observation of Janis and Mann (1968) that “although a rational animal, man as a decision-maker can seldom claim to make purely rational judgments,” with many judgments characterized instead by “oversimplifications, distortions, evasions, and gross omissions of relevant considerations” (p. 327). So, Bandura (1977) was quick, immediately after his description of a rational, information-based system for selecting behavioral options, to issue a caveat: “This is not to say that the decisions are necessarily good ones or that reason always prevails” (p. 173). However, like a true cognitivist, the only possible reason he noted for such failures was the unavailability of adequate or accurate information: “Decisions may be based on inadequate assessment of information and misjudgment of anticipated consequences” (p. 173). He further elaborated on this point in the description of his Social Cognitive Theory. In this iteration, seemingly irrational behavior can be attributed to (1) an immature (not fully developed) cognitive system, as in the case of children, (2) inadequate information, (3) incomplete consideration of available options, and (4) the misunderstanding or misinterpretation of information. In other words, in Social Cognitive Theory, adult humans, with fully developed cognitive faculties, if provided...
with adequate and complete information, which they have properly understood, are expected to behave rationally:

To say that people base many of their actions on thought does not necessarily mean they are always objectively rational. Rationality depends on reasoning skills which are not always well developed or used effectively. Even if people know how to reason logically, they make faulty judgments when they base their inferences on inadequate information or fail to consider the full consequences of different choices. Moreover, they often misread events in ways that give rise to faulty conceptions about themselves and the world around them. When they act on their misconceptions, which appear subjectively rational given their errant basis, such persons are viewed by others as behaving in an unreasoning, if not downright foolish, manner. (Bandura, 1986, p. 19)

The Transtheoretical Model, despite incorporating some behaviorist concepts and methods (eg, counterconditioning, reinforcement management), is also, at its core, a cognitivist model. The main mechanism postulated to propel individuals across stages of change is a shift in their perceived “decisional balance,” as conceptualized by Janis and Mann (1968). Specifically, action is predicted to occur after a critical “crossover” point, at which the anticipated pros of acting surpass the anticipated cons: “for most problem behaviors, people will decide that the pros of changing the behavior outweigh the cons before they take action to modify their behavior” (Prochaska et al., 1994, p. 44). With the main domain of application of the transtheoretical model being in smoking cessation, a quintessential example of a seemingly irrational behavior, Prochaska readily acknowledges that “behavioral change decision making is not as conscious or rational as traditional utility function theories would suggest” (Prochaska, 2008, p. 847). However, like other cognitivists, Prochaska attributes any irrationality to faulty information processing (ie, not being fully cognizant of the pros and cons), which the therapist is called upon to help correct. Then, with the proper decisional balance established, the individual should be ready to take appropriate action:

Smokers in the precontemplation stage, for example, are not aware that compared with their peers in other stages, they are underestimating the pros of quitting and overestimating the cons. Without expert help, patients can remain stuck in the precontemplation stage, if they are not particularly conscious that they are underestimating the pros of changing and overestimating the cons. (Prochaska, 2008, p. 847)

Self-Determination Theory is commonly described as a “motivational” and “humanistic” theory, in contradistinction to “cognitive” theories. Deci and Ryan (1985) asserted that, while “cognitive” theories presume that behavior is the result of evaluating the likelihood and desirability of future outcomes and choosing among them, Self-Determination Theory considers the desire to satisfy certain basic needs as the “energy” that powers human motivation. Beyond this difference, however, Self-Determination Theory fully incorporates the cognitivist notions of symbolic representations and humans “striving
to satisfy their needs by setting goals and choosing behavior that they believe will allow them to achieve these goals” (Deci, 1975, p. 16). It should be clear, therefore, that cognitive appraisals (e.g., of autonomy, of competence, of relatedness) underpin the fundamental constructs of the theory. For example, Deci (1975), in describing the concept of intrinsic motivation, arguably the most central element within the theory, acknowledged that his approach focuses on “cognitive processes.” The reasons for this, he wrote, are “simple”: “not only do cognitions affect internal states such as attitudes and motives, but, as this work shows, individuals choose what behaviors to engage in on the basis of their cognitions about the outcomes of those and other behaviors” (Deci, 1975, p. vi). Thus, embedded within Self-Determination Theory are the assumptions that (1) “most behaviors are voluntary,” (2) “people choose which behaviors to engage in,” and (3) “these choices are made because people believe that the chosen behaviors will lead them to desired end states” (Deci, 1975, p. 20).

Most self-determination researchers openly endorse the assumption of rationality as the bedrock of their theorizing. For example, according to Helwig and McNeil (2011), “self-determination theory holds that people are rational, meaning-making agents who are self-governing (autonomous) and who exercise their autonomy and develop their competencies in relations with others” (p. 241, italics added). However, Deci and Ryan themselves have persistently avoided a direct endorsement of the assumption of rationality, presumably due to the association of the term with economic models of human behavior, which posit that humans act to maximize external (e.g., monetary) rewards (e.g., see Vansteenkiste, Ryan, & Deci, 2008).

Nevertheless, closer parsing of self-determination theory reveals its reliance on the assumption of rationality. In the framework of the theory, a dysfunctional motivational system is one in which there is a shift from intrinsic motivation (the optimal form of motivation) to amotivation. This is accompanied by a shift from behavior that is “self-determined” to behavior that is more “automatic.” The distinguishing element between these two modes of behavior is the presence (versus absence) of conscious processing of information: “self-determined behaviors are chosen based on a conscious processing of information whereas automated behaviors are not” (Deci & Ryan, 1980, p. 34). Automatic behaviors are stimulus-bound impulses, such as smoking, nail-biting, and overeating, which will resist change as long as they remain outside conscious awareness. Thus, automatic behaviors are characterized as “mindless,” whereas self-determined behaviors require “the higher cerebral functions” (p. 34). Ryan, Kuhl, & Deci (1997) invoked the ancient concept of “akrasia” (acting against one’s better judgment) to describe the type of motivational failure in which behavior becomes mindless. In such cases, the goal of interventions is to strengthen the “capacity to be self-determining” (Deci & Ryan, 1985, p. 291) by (1) bringing problematic “mindless” behaviors into conscious awareness (Rigby, Schultz, & Ryan, 2014) and (2) providing information in the form of a “meaningful rationale” that focuses on the availability of choice and the controllability of motivational processes (Deci, Eghrari, Patrick, & Leone, 1994; Moller, Ryan, & Deci, 2006).
The cognitivist origins of contemporary theories used to understand exercise and physical activity behavior should be evident from the foregoing review. All these theories postulate that humans act on the basis of the rational analysis of information. Any instances of irrational behavior can be explained by a breakdown of the information-processing system, which can be corrected by supplying more or better information, raising the level of awareness, or correcting the evaluation or interpretation of the information. Not surprisingly, these essential postulates have fully permeated conceptual thinking and intervention approaches in the fields of health promotion and public health. What Weare (2002) calls the “rational educational” model forms the foundation of practice:

The world of health education in practice—in the school, the clinic, or the doctor’s surgery—is still dominated by the commonsense view of “give the learner the facts (e.g. the helpful and informative leaflet, the lecture on the dangers of drugs by the policeman, or the chat on diet from the health professional) and they will surely then follow the advice and be healthy.” This view is based on what is sometimes called the “rational educational” model, the fundamental assumption of which is that people are basically rational, and their behaviour driven by logically derived principles. (p. 107)

Thus, at the core of the “rational educational” model, as the name implies, is the assumption that human beings act on the basis of rational information processing and its corollary, namely that the provision of information is the sole avenue for changing behavior. Whether explicitly stated or implied, these assumptions are ubiquitous in overviews of current theorizing. For example, “these theories are based on the notion that people are rational and that they typically engage in a process of weighing the pros and cons of engaging in any behaviours that affect their health” (Carmody, 2007, p. 106). Moreover, “it is further assumed that once in possession of the information, the clarified norms and values, and the decision-making skills, and with socio-cultural barriers removed, any rational person could not help but make the healthy choice” (Thorogood, 2002, p. 73).

In health promotion practice, the idea that “people need to be given factually correct information and then they will probably make a sensible decision” is increasingly deemed “far too naïve to be of much use to anyone” (Weare, 2002, p. 107). Within exercise psychology, however, although a rising number of investigators are willing to consider the role of nonconscious motivational processes (e.g., Sheeran, Gollwitzer, & Bargh, 2013), the assumption of rationality (e.g., Mogler et al., 2013; Shafir & LeBoeuf, 2002) remains unchallenged.

**AFFECTIVE CONSTRUCTS? WHAT AFFECTIVE CONSTRUCTS?**

Predictably, cognitivist theories have always had an uncomfortable attitude toward affective constructs. Moods, emotions, pleasures, and pains cannot be easily accommodated within conceptual frameworks that assume, as a
fundamental premise, that decisions are based solely on the rational, deliberative analysis and evaluation of information. As a solution, some cognitivist models of behavior and decision making have simply ignored affective constructs altogether. As a case in point, a recent proposal for an integrative model of physical activity behavior (Hagger & Chatzisarantis, 2014) was criticized because it “may lack consideration of the affective domain in physical activity behavior over reasoned approaches to motivation” (Rhodes, 2014, p. 43). In actuality, the same is the case for all cognitivist models of exercise and physical activity behavior (Nigg, Borrelli, Maddock, & Dishman, 2008; Schwarzer, 2008; Spence & Lee, 2003). In other cases, affective constructs are considered either extraneous influences that bias the information-processing system or malleable “raw data,” which are transformed into information meaningful to the individual only through cognitive appraisal (Baumeister, Vohs, DeWall, & Zhang, 2007; Carver & Scheier, 1990; Clore & Huntsinger, 2007; Forgas, 1995; Schwarz & Clore, 2003). According to one prominent such example, “the affect-as-information account posits that the information that affect provides is the key to such effects, not the affect itself” (Huntsinger, Isbell, & Clore, 2014, p. 602, italics in the original).

Similarly, although affective constructs appear in various degrees and forms in the main theories that have been used to understand and change physical activity and exercise behavior, their influence is persistently either devalued or considered subservient to cognitive processes. For example, in the Theories of Reasoned Action and Planned Behavior, affective constructs are described as “background factors” and, as such, their influence “is assumed to be indirect” (Ajzen & Fishbein, 2005, p. 203) in that they can merely color beliefs and evaluations: “people in a positive mood tend to evaluate events more favorably and to judge favorable events as more likely than people in a negative mood” (p. 203). This can “help explain why people sometimes seem to act irrationally” (p. 203). Ajzen has reiterated this point in response to criticisms that the theory of planned behavior overemphasizes rationality to the exclusion of other modes of behavioral decision making. He acknowledges that there may be instances of irrational beliefs and ensuant behavior. However, importantly, he maintains that this is not because the structure of the decision-making system inherently incorporates nonrational pathways but rather because the rational system is fed with faulty information: “Beliefs reflect the information people have in relation to the performance of a given behavior, but this information is often inaccurate and incomplete; it may rest on faulty or irrational premises, be biased by self-serving motives, by fear, anger and other emotions, or otherwise fail to reflect reality. Clearly, this is a far cry from a rational actor” (Ajzen, 2011, p. 1116). Thus, affective constructs are described as “biasing factors” (eg, people in a positive mood may tend to evaluate possible future consequences of a behavior more favorably or be more likely to recall positive events). Ajzen (2011) explicitly rejects the idea that “affect can influence behavior in a more direct fashion” (p. 1116).
In *Social Cognitive Theory*, affective constructs again enter the behavioral decision-making process as secondary and indirect influences. Affective states that generate “emotional arousal” are theorized to serve as information used in the formation of appraisals of efficacy. For example, during a stressful encounter, the emotional arousal associated with fear is *interpreted* as a sign of low efficacy, which in turns disrupts performance:

> Perceived self-efficacy and emotional arousal undoubtedly involve interactive (though asymmetrical) effects, with coping efficacy exercising the much greater sway. That is, perceived inefficaciousness in coping with potential threats leads people to approach such situations anxiously, and experiencing disruptive arousal may further lower their sense of efficacy that they will be able to perform skillfully. *(Bandura, 1982, p. 140)*

It is important to emphasize that the influence of affective constructs on behavior within the Social Cognitive Theory is *indirect* not only because they are theorized to operate through self-efficacy but also because they are thought to acquire meaning only through cognitive appraisal: “Information that is relevant for judging personal capabilities is not inherently enlightening. Rather, in the self-appraisal of efficacy these different sources of efficacy information must be cognitively processed, weighed, and integrated through self-reflective thought” *(Bandura, 1989, p. 1179).*

Many researchers within exercise psychology tend to think that *Self-Determination Theory* is different in that it assigns a central role to intrinsic motivation, a construct that is typically operationalized through assessments of the degree of enjoyment associated with various behavioral options. Closer reading of the theory, however, again reveals important nuances. As a fundamentally cognitivist theory, Self-Determination Theory assumes that affective constructs constitute *information* that is subjected to cognitive processing. For example, emotions are theorized to serve “as cues which provide information to the central information processing system to the effect that satisfaction can be experienced” *(Deci, 1975, p. 97).* What makes Self-Determination Theory different from other cognitivist theories is that it does recognize the possibility of affect having a direct influence on behavior, through the formation of associative bonds (eg, pleasant or unpleasant memories motivating the pursuit or avoidance of certain behavioral options). However, in the context of the theory, these inherent associations render the resultant behaviors non-self-determined. This is because the notion of the “self” is defined in terms of the involvement of “the higher cerebral functions” and, thus, by the mediation of conscious and deliberative cognitive processes:

> We suggest that when cues reintegrate affective experiences, the current affective experience is information that could lead to the formation of a motive and in turn to behavior. The behavior can be mediated by information processing and choice. This is in fact the critical point in self-determined versus non-self-determined,
affectively motivated behavior. If the behavior follows directly from an emotion, because of associative bonds for example, the behavior is not self-determined. (Deci & Ryan, 1985, p. 234)

With the reemergence of discussions on the Aristotelian distinction between hedonic and eudaimonic motives and well-being within positive psychology, Deci and Ryan have even added a moral dimension to the distinction between cognitively mediated (i.e., “self-determined”) and unmediated (non-“self-determined”) affective motives. Thus, although the pursuit of pleasure and the avoidance of displeasure are considered possible motives, both their meaningfulness and their morality are evaluated as inferior to those that involve rationality and reflection:

The more directly one aims to maximize pleasure and avoid pain the more likely one is to produce instead a life bereft of depth, meaning, and community. Prescriptions based on maximizing pleasure are too often associated with dead-end routes to wellness such as selfishness, materialism, objectified sexuality, and ecological destructiveness, thus demonstrating how easily a map derived from hedonic thinking can mislead. By contrast, specification of eudaimonic living might not only be of value as a guide to a more complete and meaningful life; it should also yield more stable and enduring hedonic happiness. (Ryan, Huta, & Deci, 2008, pp. 141–142)

In summary, affective constructs have either been altogether omitted from the main theories used in the study of physical activity and exercise behavior or subjugated to an omnipotent cognitive apparatus. Consequently, the idea that affective constructs can serve as motivational forces has yet to enter mainstream thinking within the field of exercise psychology. Because the idea is incompatible with the current cognitivist paradigm, it is absent from most student textbooks and practitioner guidebooks. Most students graduating with doctoral degrees in exercise psychology remain uninformed about the essential theories of affect, mood, and emotion, thus perpetuating the narrowing of the conceptual perspective within the field (Ekkekakis & Dafermos, 2012).

DUAL-PROCESS CONCEPTUALIZATIONS OF HUMAN MOTIVATION AND DECISION MAKING

Given the failure to promote physical activity and exercise at the population level, it is reasonable to propose that a substantial expansion of the conceptual perspective may prove fruitful. It seems unlikely that exercise psychology research can produce the dramatic advances required to attain societal relevance by refining, expanding, or merging cognitivist models.

By most indications, postcognitivist theorizing will likely reflect a “dual-process” conceptualization. This approach suggests that two main classes of processes are involved in the decision-making process. These classes have been referred to by a variety of labels in the literature over the years. Evans (1984)
used the terms \textit{heuristic} and \textit{analytic}. Heuristic processes were theorized to be “pre-attentive, rapid and indescribable by the person using them” (p. 452). Their function is “to select ‘relevant’ information for analytic processing” (p. 452). In contrast, “the function of analytic processes is to generate some form of inference or judgement from the information selected” (p. 451). 

Evans (1984) asserted that “arguments for rationality should center on the nature of analytic processes, but without an understanding of heuristic processes they are doomed to failure” (p. 452). Since then, authors have used a plethora of terms to describe pathways postulated to function analogously to heuristic and analytic processes, including \textit{experiential} versus \textit{rational} (Epstein, 1994), \textit{associative} versus \textit{rule-based} (Sloman, 1996), \textit{affective} versus \textit{analytical} (Peters & Slovic, 2000), \textit{experiential} versus \textit{analytic} (Slovic, Finucane, Peters, & MacGregor, 2002), \textit{affective} versus \textit{deliberative} (Figner, Mackinlay, Wilkening, & Weber, 2009), and \textit{impulsive/reactive} versus \textit{reasoned/reflective} (Alós-Ferrer & Strack, 2014; Strack & Deutsch, 2004).

In an effort to organize these proposals and help highlight their commonalities, Stanovich and West (2000) proposed the generic labels “System 1” to refer to heuristic processes and their analogues and “System 2” to refer to analytic processes and their analogues (for similar efforts at synthesis, see Evans, 2008; Sanfey & Chang, 2008). In an effort to provide further clarity, Evans and Stanovich (2013) suggested the adoption of the terms “Type 1” and “Type 2” to replace “System 1” and “System 2,” respectively. Type 1 processes are intuitive, nonconscious, automatic, experience-based, and tend to rely on tacit knowledge and affective associations. On the other hand, Type 2 processes are slower, conscious, reflective, controlled, rule-based, require working memory, rely on explicit knowledge, and can involve inferential reasoning, mental simulation, and probabilistic predictions. Type 1 processes are theorized to be evolutionarily more primitive and to represent the default response mode unless overridden by the evolutionarily more recent Type 2 processes (Evans & Stanovich, 2013). However, because of the automaticity and effortlessness of Type 1 processes, Type 1 processes are thought capable of always modifying and biasing Type 2 processes. Further, the biases stemming from Type 1 processes may not always be apparent to the slower and more controlled Type 2 processes, thus potentially enhancing their biasing powers (Kahneman, 2011).

Type 1 processes are fast and efficient. They are assumed to be associated with the use of \textit{heuristics} (Evans & Stanovich, 2013), namely simplified rules that help people make judgments and decisions efficiently, without the need for analysis of all possible alternative outcomes. In their seminal work on this subject, Tversky and Kahneman (1974) noted:

\begin{quote}
People rely on a limited number of heuristic principles which reduce the complex tasks of assessing probabilities and predicting values to simpler judgmental operations. In general, these heuristics are quite useful, but sometimes they lead to severe and systematic errors. (p. 1124)
\end{quote}
Despite seemingly violating rationality and occasionally leading to “severe and systematic errors,” heuristics and Type 1 processes have been preserved because they did offer advantages within the environment that shaped animal and hominid evolution (De Martino, Kumaran, Seymour, & Dolan, 2006; Evans & Stanovich, 2013; Kenrick et al., 2009; Santos & Rosati, 2015; Waksberg, Smith, & Burd, 2009). Theorists have argued that, within the modern, highly complex world, heuristics and Type 1 processes remain a necessity despite being nonoptimal. Such arguments follow from the notion of “bounded rationality” attributed to Simon (1978). According to Simon (1983), “human beings have neither the facts nor the consistent structure of values nor the reasoning power at their disposal” (p. 17). Thus, given their “bounded rationality,” humans tend to “satisfice” rather than optimize. This notion gained acceptance within the fields of behavioral economics (Kahneman, 2011), psychology (Shafir & LeBoeuf, 2002), and medicine (Corrigan, Powell, & Michaels, 2015; Wegwarth, Gaissmaier, & Gigerenzer, 2009), in which authors increasingly recognize that real-world decisions are made under substantial, often insurmountable, constraints. Gigerenzer and Goldstein (1996) explain “satisficing” as follows:

Satisficing, a blend of sufficing and satisfying, is a word of Scottish origin, which Simon uses to characterize algorithms that successfully deal with conditions of limited time, knowledge, or computational capacities. His concept of satisficing postulates, for instance, that an organism would choose the first object (a mate, perhaps) that satisfies its aspiration level—instead of the intractable sequence of taking the time to survey all possible alternatives, estimating probabilities and utilities for the possible outcomes associated with each alternative, calculating expected utilities, and choosing the alternative that scores highest (p. 651).

In summary, dual-process theories, which emerged from fields that operate (at least in part) outside of the confines of the cognitivist paradigm, acknowledge the role of nonrational, heuristic, automatic, and affective influences on decision making and behavior. This is in stark contrast to theories of physical activity and exercise behavior, which still focus on rational, deliberative, and controlled influences, as detailed in previous sections.

TOWARD A DUAL-PROCESS CONCEPTUALIZATION OF PHYSICAL ACTIVITY AND EXERCISE BEHAVIOR

A crucial step in the transition of exercise psychology to the postcognitivist era will be a broad agreement on the need to develop physical activity- and exercise-specific theoretical models, recognizing the unique features and challenges of these particular behaviors. This is a position also espoused by other authors, who have noted that “there is adequate, if not overwhelming, evidence to suggest that unique theories of [physical activity] should be pursued” (Rhodes & Nigg, 2011, p. 114). However, the arguments forwarded thus far, although correct (eg, exercise is an adoption rather than a cessation behavior, it
is not necessary for immediate survival, it requires a significant time commitment, it is long-term), are incomplete. An important aspect of the “uniqueness” not addressed in previous accounts is the extent to which physical activity and exercise engage the affective system. Although Dishman (2003) had also made a related point, noting that “physical activity arguably offers more opportunities for pleasure than do most other health-related behaviors (compared to brushing, flossing, buckling up, and seeing the doctor, for example)” (p. 46), our view is different. From our perspective, at the core of the uniqueness lies a profound conflict between “Type 1” and “Type 2” processes, such that although most individuals recognize the health benefits of physical activity and exercise, they tend to regard them as unpleasant or inadequately pleasant to compete against other, more pleasant options vying for a portion of their discretionary time.

While knowledge and appreciation of the health benefits and rational, analytical, and deliberative reasons for exercising may influence behavior through Type 2 processes, automatic, affective processes can influence behavior through Type 1 processes. Unless these influences are congruent (i.e., exercise is cognitively appraised as beneficial for health and well-being and is also experienced as pleasant), a conflict emerges. Because of the presumed default-nature of Type 1 processes, it is likely that a negative hedonic tone associated with exercise will prove to be a stronger determinant of behavior than the rational reasons for exercising (Loewenstein, Weber, Hsee, & Welch, 2001). Evidence indicates that time pressure and cognitive load, which enhance the salience or primacy of Type 1 processes, shift decision making in favor of hedonic options rather than “rational” or “cognitively favorable” options (Cabanac & Bonnioni-Cabanac, 2007; Shiv & Fedorikhin, 1999). Exercise-specific dual-process theoretical models must account for the complex interplay between Type 1 and Type 2 processes (see Fig. 18.4).

The “affect heuristic” (Finucane, Alhakami, Slovic, & Johnson, 2000; Slovic et al., 2002) reflects the basic hedonistic premise that affect guides behavior, such that humans gravitate toward behavioral decisions likely to increase pleasure and

FIGURE 18.4 Dual-process models of physical activity and exercise will have to recognize the effect of noncognitive and nonrational processes on behavior. Moreover, physical activity and exercise will have to be conceptualized as stimuli that dynamically reshape Type 1 and Type 2 processes, rather than merely as the outcomes of information processing. Accordingly, the research agenda will have to encompass questions pertaining to (1) how physical activity and exercise can be modified to optimize both Type 1 and Type 2 processes and (2) how Type 1 and Type 2 processes can be modified to facilitate physical activity and exercise behavior.
tend to avoid those likely to decrease it (Ekkekakis & Dafermos, 2012). The affect heuristic has been called “probably the most important development in the study of judgment heuristics in the past few decades” (Kahneman, 2003, p. 710). In the conceptually similar risk-as-feelings model, both cognitive factors related to anticipated outcomes (eg, benefits and risks) and anticipatory affective responses felt at the time of decision making are theorized to influence behavior. These anticipatory affective responses are thought to (1) occur independently of Type 2 processes and (2) mediate the impact of Type 2 processes on behavior (Loewenstein et al., 2001). Applied to physical activity and exercise, the affect heuristic would suggest that automatically evoked (ie, cognitively unmediated) affective reactions at the moment of decision making, presumably stemming from a history of past experiences, would influence the behavioral decision. Given the presumed automatic evocation of such affective reactions, and the theorized “default” nature of the affect-centric Type 1 processes, negative past experiences could bias, override, or overpower a positive rational cost-benefit analysis under most circumstances.

This idea draws on a substantial body of research and theorizing over the past 30 years, albeit one that has been neglected within exercise psychology. The foundation was laid by Zajonc (1980, 1984), who questioned the assumption that “affect, such as that contained in preferences, is necessarily postcognitive” (Zajonc & Markus, 1982, p. 125, italics in the original). Further, he not only suggested that “affective responses, including preference judgments, may be fairly independent of cognition” but even went as far as to argue that “under some circumstances, affect or preference comes as the first experience,” whereas “the cognitions that have generally been taken to be the very basis of this preference can actually occur afterwards—perhaps as justification” (p. 125).

Zajonc also wrote of the formation of associations in memory linking ideas or past experiences with their attendant affective responses, as well as their associated “motor tendencies and other somatic manifestations” (Zajonc & Markus, 1982, p. 129). Thus, for example, whenever the idea of exercise is presented and a decision is made to engage in or refrain from exercise, the representation of exercise triggers the recollection of the associated affect, motor tendencies, and somatic manifestations. If positive (pleasure, eagerness, “endorphin high”), these recollections (presumed to be instantaneous and possibly intense) could precede and overpower any counteracting cognitive appraisals (eg, other commitments, such as work deadlines or social obligations). Conversely, if negative (displeasure, aversion, breathlessness), these recollections could again precede and overpower any counteracting cognitive appraisals (eg, awareness of health benefits). Zajonc postulated that the affective and somatic components may become independent of the associated cognitions, raising the possibility not only of substantial discrepancies but even of conflicts (eg, “I know exercise is good for me but I hate it”; see Bluemke, Brand, Schweizer, & Kahlert, 2010). In such cases, interventions are bound to face significant challenges. Those that exclusively target cognitions (eg, education campaigns, advice, counseling) are unlikely to be effective. Instead, a multipronged approach
that seeks to change the affective experience and the associated action tendencies would be necessary:

*While preferences have cognitive correlates, they may become functionally autonomous of these cognitive correlates and persist merely by virtue of the behavioral tendencies that have become their expressions. Once they are autonomous, behavioral tendencies that represent attitudes and preferences are hard to change, particularly if only cognitive means are to be employed. A simple communication is seldom sufficient to change a well-established behavioral habit. Methods are needed that can reach habitual behavior and motor output.* (Zajonc & Markus, 1982, p. 129)

If past affective experiences and established action tendencies are indeed as influential and as autonomous as Zajonc suggested, the implication for the promotion of physical activity and exercise is that interventions that merely seek to alter or strengthen cognitions (eg, of benefits, of efficacy, of social approval or support) have a limited possibility of success as long as these behaviors trigger memories of displeasure, embarrassment, pain, or exhaustion.

Although Zajonc’s ideas, proposed at the height of the cognitivist revolution, were considered unorthodox and iconoclastic at the time, they are consistent with modern theorizing and clinical observations from the field of neurology (and subsequently endorsed by researchers in fields as diverse as addictions, eating behavior, and economic decisions). In a series of groundbreaking and compelling observations, Damasio (1996) described cases of patients with focused lesions in brain areas involved in linking stimuli to certain configurations of somatic state, namely the amygdala and the ventromedial prefrontal cortex. The amygdala is believed to be a critical neural substrate for activating somatic responses resulting from what Damasio labeled *primary inducers* (eg, seeing a snake, hearing a loud noise, experiencing dyspnea during exercise). In contrast, the ventromedial prefrontal cortex is believed to be critical in inducing somatic responses from *secondary inducers* (eg, watching the video of a mugging, hearing about a sick baby, thinking about exercising). Patients with lesions in these areas, despite exhibiting no cognitive deficits and being fully capable of enunciating the pros and cons of various behavioral options, manifest profound difficulties in making life decisions (eg, planning their day; choosing friends, partners, or activities). To explain this pattern of observations, Damasio (1996) proposed the somatic marker hypothesis: “The hypothesis attributes these patients’ inability to make advantageous decisions in real life to a defect in an *emotional* mechanism that rapidly signals the prospective consequences of an action, and accordingly assists in the selection of an advantageous response option” (Bechara & Damasio, 2005, p. 339, italics added). The rationale for the function of this system incorporates the notions of “bounded rationality” and the “affect heuristic”:

*Deprived of this emotional signal, these patients rely on a reasoned cost-benefit analysis of numerous and often conflicting options involving both immediate and future consequences. The impairment degrades the speed of deliberation*
(e.g., choosing between two brands of cereal may take a patient a very long time because of endless reasoned analyses of the pros and cons of each brand), and also degrades the adequacy of the choice, i.e., patients may choose disadvantageously. (Bechara & Damasio, 2005, p. 339)

Damasio (1996) believes that, in decision making, different options may activate the “somatic marker” via one of two routes. In the so-called “body loop” scenario, there is an actual elicitation of a configuration of somatic state resembling that elicited during previous engagements in that option. For example, when asked whether one wants to ride a roller-coaster, one may get the same overall pattern of sympathetic activity elicited during previous rides (e.g., racing heart, dilated pupils, clenched muscles), albeit perhaps a more faint version of it. All of these physiological responses are then relayed (looped) back to the brain (particularly the somatosensory and insular cortices) and are collectively felt as a particular affective cue (somatic marker) that sways the behavioral decision in one or the other direction, depending on whether the somatic marker is positively or negatively valenced. The alternative scenario is known as the “as-if body loop,” as it does not involve the body proper. Instead, the relevant areas in the somatosensory and insular cortices are activated “as if” an actual configuration of somatic state was taking place, even though the body itself is bypassed.

CONCLUSIONS

Establishing its societal relevance should be a strategic target for exercise psychology. Progress toward this goal, however, has been slower than anyone in this field would have liked. In this chapter, we argued that, in part, the failure to deliver intervention methods that can reliably and meaningfully increase the level of physical activity may be due to an overly narrow metatheoretical perspective. We illustrated that all major theories in vogue within exercise psychology over the past decades are derivatives of the same (cognitivist) metatheoretical framework. As such, they all exhibit a crucial limitation, namely the relative disregard for the motivational properties of affective constructs, such as core affect, moods, and emotions.

Research over the past 15 years has demonstrated that the old adage of “exercise makes people feel better” is inaccurate. A description that is more in line with the empirical evidence is that the widely touted “feel-better” effect is conditional and relatively rare (i.e., exercise can make some people feel better, given certain conditions). In actuality, many types and amounts of exercise make most people in western countries, who happen to be overweight and chronically sedentary, feel worse rather than better (Ekkekakis, Parfitt, & Petruzzello, 2011). In turn, a growing body of evidence indicates that affective responses to bouts of exercise are reliable correlates and predictors of the amount of physical activity people choose to do in their daily lives (Ekkekakis & Dafermos, 2012; Rhodes & Kates, 2015).

Thus, the central thrust of this chapter was to underscore the urgent need for the field of exercise psychology to transition to the postcognitivist era. This means acknowledging and testing dual-process models of behavioral decision
making, which recognize and integrate nonrational and affective influences (Fig. 18.5). We especially highlighted the possibility that physical activity and exercise may be characterized by a profound conflict between “Type 1” (eg, prevalent nonpositive or even negative affective experiences) and “Type 2” processes (eg, awareness of significant health benefits). According

![Diagram of behavioral decision making models](image)

**FIGURE 18.5** The role of affect within conceptual models of behavioral decision making that have been considered in the field of exercise psychology varies from (a) complete disregard, to (b) an inconsequential side-effect, to (c) an indirect influence entirely under the control of cognitive appraisal. Variations that have not been considered thus far include those suggested by dual-process models, namely (d) a direct influence parallel to a cognitive pathway but with cognition maintaining primacy, and (e) as a direct and primary influence, such as the versions proposed by Zajonc and Damasio.
to dual-process models, behavioral decisions in favor of physical activity or exercise should be considered unlikely unless the affective experiences are positive. The persistent failure to promote physical activity and exercise to larger segments of the population underscores the need for exercise psychology to reconceptualize its core phenomena of interest, namely physical activity and exercise, as hedonic experiences and, in turn, pursue a research agenda aimed at developing ways to enhance these experiences for the population at large, including individuals who are overweight and chronically sedentary.

REFERENCES


