# A Review of the Outcome Expectancy Construct in Physical Activity Research

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## ABSTRACT

***Background:*** *Outcome expectancy is a central construct in social cognitive models of health behavior widely used as frameworks for physical activity research.* ***Purpose:*** *This article provides a review of the outcome expectancy construct and its application to research on physical activity.* ***Methods:*** *Theoretical articles describing definitions and placement of outcome expectancy within social cognitive models, as well as empirical research on outcome expectancy and physical activity, were reviewed.* ***Results:*** *Self-efficacy theory, the transtheoretical model, the theory of planned behavior, and protection motivation theory differ in their labeling and conceptualization of outcome expectancy but unanimously include expected outcomes of behavior. Preliminary empirical investigation of the role of outcome expectancy in understanding physical activity has yielded mixed results. Positive outcome expectancy appears to be more predictive of physical activity in older adults than in young to middle-aged adults, and personal barriers appear to be the most predictive subtype of negative outcome expectancy. In addition, a small number of studies indicate relations between outcome expectancy and other theoretical variables, including behavioral intention, stage of change, and self-efficacy.* ***Conclusions:*** *Further research on the role of outcome expectancy is necessary to design effective physical activity interventions. New directions in outcome expectancy research could involve (a) expanding the conceptualization of outcome expectancy to include expected outcomes of sedentary behavior and affective responses to physical activity, (b) further examination of potential moderators of the relation between outcome expectancy and physical activity (such as outcome value and outcome proximity), (c) distinguishing between the role of outcome expectancy in behavior onset versus behavior maintenance, (d) examining outcome expectancy as a mechanism of change in environmental intervention approaches, and (e) further analysis of interrelations between outcome expectancy and other social cognitive variables.*

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## INTRODUCTION

Despite the known benefits of physical activity, nearly 70% of American adults do not engage in regular leisure-time physical activity (1). Many attempts have been made to use theoretical models to explain physical activity behavior to validate frameworks for effective interventions. Social cognitive models of behavior change, such as self-efficacy theory (2), the transtheoretical model (3), the theory of planned behavior (4), and protection motivation theory (5) have been especially popular. Researchers agree these models share overlapping constructs and are more similar than dissimilar (e.g., 2,6–8); however, a more thorough understanding of social cognitive constructs is needed if interventions are to effectively produce physical activity adoption (9). Although much attention has been given to the role of self-efficacy within social cognition models (10–12), less attention has been paid to outcome expectancy (13,14). In this article we review the role of outcome expectancy in explaining physical activity behavior; specifically, we (a) briefly describe the conceptualization and placement of outcome expectancy within the major social cognitive models, (b) review empirical findings on outcome expectancy and physical activity, and (c) propose new directions for outcome expectancy research. We hope that the article enhances the use of the outcome expectancy construct to improve the design of theoretically based physical activity interventions.

## CONCEPTUALIZATIONS OF OUTCOME EXPECTANCY

As far back as the 1930s, theorists wrote about what is now commonly referred to as outcome expectancy (15–19). Despite subtle variation in terminology and definitions (8,20), *outcome expectancy* is generally defined as an expectation that an outcome will follow a given behavior. Outcome expectancy has played a crucial role in the development of cognitive explanations of behavior. For example, outcome expectancy has been theorized to explain the association inherent in stimulus–response theory (19) and as the mechanism of classical and operant conditioning (15). In addition, beginning in the 1950s, outcome expectancy was a central tenet in expectancy-value theories (e.g., 16) that formed cognitive psychology's answer to drive theories of motivation (e.g., 21). Expectancy theorists posited that, based on past experience, individuals expected certain outcomes to occur as a result of a particular behavior in a given situation (15,19). Moreover, according to expectancy-value the-

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ory, behavior could be predicted by the multiplicative combination of outcome expectancies and corresponding *outcome values* defined as the subjective value or perceived importance of an expected outcome (for a review of expectancy-value theories, see 2,22–25). This basic expectancy-value formula served as the foundation for the development of several theoretical models used to explain health behavior, including social learning theory (18,26), the theory of reasoned action (24), and protection motivation theory (27).

The subsequent introduction of self-efficacy and social cognitive theory (26,28) led to a reformulation of each of these models, reflecting a stronger emphasis on personal control of behavior through the addition of a self-efficacy component to the original expectancy-value formulations. Social cognitive theory posited that behaviors, environmental factors, and personal factors, such as cognitions, affect, and biological events, are reciprocal determinants, such that each class of determinant influences the other two. Today's health behavior models fit within this larger social cognitive framework, in which outcome expectancy remains an integral part. In the sections that follow, we describe the conceptualization and theoretical placement of outcome expectancy within each of the health behavior models.

### Self-Efficacy Theory

Self-efficacy theory represents a portion of social cognitive theory that focuses on self-efficacy and outcome expectancy (2). "Perceived self-efficacy refers to beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (2, p. 3). Self-efficacy is a judgment about one's abilities related to performance attainments; whereas outcome expectancy is the expectation of positive and negative outcomes that flow from performance attainments (2). Within self-efficacy theory, outcome expectancy flows from self-efficacy and directly impacts behavior, with positive outcome expectancy increasing behavior and negative outcome expectancy decreasing behavior. Consistent with expectancy-value theory, in self-efficacy theory outcome value moderates the effect of outcome expectancy on behavior (e.g., a valued positive outcome will increase behavior more than an outcome that is not valued).

### Transtheoretical Model

The transtheoretical model posits that behavior change follows a series of stages: precontemplation, contemplation, preparation, action, and maintenance (3). Individuals move through the stages in a cyclical pattern, often relapsing to a previous stage before moving forward. A number of factors determine movement through the stages, including cognitive and behavioral processes of change, self-efficacy, and decisional balance. In the transtheoretical model, outcome expectancy is part of the decisional balance construct, which has its roots in decision-making theory (29). Physical activity decisional balance involves the rating of perceived pros and cons of physical activity, with a positive balance leading to a greater likelihood that individuals will be physically active (30). The distinguishing feature of the decisional balance approach is the assessment of *importance* of potential outcomes rather than expectation of those outcomes. When measuring outcome expectancy in the transtheoretical model, for example, we ask, "How important is X outcome?" rather than "How likely is X outcome?"

### Theory of Planned Behavior

The theory of planned behavior posits that attitudes, subjective norms, and perceived behavioral control determine behavioral intention, the most proximal determinant of behavior (4). Within the theory of planned behavior, outcome expectancy is incorporated in the behavioral beliefs underlying the attitude construct—specifically the belief (or expectation) that a behavior will produce a given outcome (4). Behavioral beliefs are combined with judgments about the value of each expected outcome of the behavior to form the attitudes construct. Normative beliefs, which underlie the subjective norms construct of the theory of planned behavior, "concern the likelihood that important referent individuals and groups approve or disapprove of performing a given behavior" (4, p. 195) and can also be viewed as reflecting outcome expectancy. Normative beliefs are combined with individual's "motivation to comply with referents in question" to form the subjective norm construct. Unlike other expectancy-value models (e.g., social learning theory), behavioral beliefs, which represent attitudes in the theory of planned behavior, and normative beliefs, which represent subjective norms, influence behavior *indirectly* through behavioral intention (31). Although the theory of planned behavior allows for analysis of both positive and negative expected outcomes, physical activity studies employing the theory of planned behavior have generally assessed only expected positive outcomes of physical activity.

### Protection Motivation Theory

Protection motivation theory, a derivative of the health belief model (32), was developed to explain how health behavior is motivated by fear appeals (27). Protection motivation theory posits that people appraise the threat posed by an unhealthy behavior (e.g., sedentary behavior) as well as their abilities to cope with that threat. These appraisals indirectly influence health behavior by increasing individuals' protection motivation—their intentions to perform the health behavior (e.g., physical activity [5,33]). Each type of appraisal is influenced by a number of cognitive constructs. Threat appraisal is increased by the *perceived severity* of the threat and by the *perceived vulnerability* to the threat; it is decreased by the expectation of benefits that might result from the unhealthy behavior. Perceived benefits of the unhealthy behavior and perceived vulnerability to the health threat, then, reflect expected positive and negative outcomes of the unhealthy behavior (e.g., sedentary behavior), whereas perceived severity reflects the importance or value of the threat. Finally, in protection motivation theory, coping appraisal is influenced by, among other factors, response-efficacy and response costs, which reflect expected positive and negative outcomes of the health behavior (e.g., physical activity).

### A Note on Perceived Benefits and Barriers

A number of researchers working within the social cognitive framework have studied perceived benefits and barriers specific to physical activity (34–39). Although perceived benefits of physical activity are the same as positive outcome expectancies, perceived barriers are not the same as negative outcome expectancies. Although both constructs are theorized to impede behavior (2), barriers are perceived to prevent behavior, whereas negative outcomes are expected to result from behavior. Nonetheless, the two constructs overlap in that perceived barriers are often based in part on expected negative outcomes. The perception of bad weather as a barrier to walking outside, for example, is based on the expectation of feeling cold or wet. Similarly, lack of time or money can be a barrier to physical activity when it is expected that using existing resources to be physically active would not leave enough resources for higher priority needs. Assessment of perceived barriers, then, taps into negative outcome expectancy; hence studies evaluating perceived barriers to physical activity are included in this review.

In summary, outcome expectancy has been labeled and conceptualized in a number of ways within social cognitive models. These conceptualizations overlap, however, and all involve expected outcomes of behavior. In the next section we review empirical findings linking outcome expectancy to physical activity and to other important theoretical constructs.

## EMPIRICAL EVIDENCE REGARDING OUTCOME EXPECTANCY

### Outcome Expectancy and Physical Activity

*Positive outcome expectancy.* Studies analyzing direct relations between outcome expectancy and physical activity are typically based on social cognitive theory or self-efficacy theory. Among studies reporting bivariate correlations between outcome expectancy and physical activity, four studies of young to middle-aged adults have shown small, but significant, associations ($r$ = .15 to .24 [36,40–42]). Other studies of adults (37), rural youth (43), HIV-positive men and women (44), and overweight sedentary adults (39) failed to find evidence of an association between the two variables. The relation between positive outcome expectancy and physical activity may be stronger ($r$ = .35 to .66) among older adults (45–51), older women (52), and among generally older, adult diabetics (53). This age-dependent effect may be due to the influence of moderating variables, such as outcome value or outcome proximity, which may also vary with age (see the following).

*Negative outcome expectancy.* The few studies directly measuring negative outcome expectancy and physical activity have indicated small associations ($r$ = –.25 to –.27 [42,54]). More research, however, has been conducted on perceived barriers to physical activity and has yielded mixed results. A study among adults in a large community sample revealed a small association ($r$ = –.22) between perceived barriers and physical activity (36), and at 2-year follow-up, change in perceived barriers contributed to the prediction of change in physical activity and number of months active (37). However, in another analysis of the follow-up data, baseline barriers did not predict movement across sedentary, intermediate, or active fitness categories (55). Similarly, among a sample of Belgian adults, significant negative relationships were found between perceived barriers and physical activity among males ages 16–25 and females ages 50–65, but not among females ages 16–25 or 35–45, or males ages 35–45 or 50–65 (34). Finally, among overweight, sedentary adults participating in a study of behavioral counseling in primary care, perceived barriers predicted physical activity at baseline, but not at 4- and 12-month follow-up (39).

When specific types of barriers were investigated, moderate associations were found between physical activity and external ($r$ = –.28) and internal barriers ($r$ = –.31), among a worksite sample but not between physical activity and barriers specific to the workplace (35). Similarly, among university students, a moderate association was found between personal barriers (including laziness and lack of time) and physical activity at baseline ($r$ = –.41) and 3-week follow-up ($r$ = –.44 [56]). Among middle-aged to older women, a negative association was found between physical activity and 3 of 10 perceived barriers, namely, lack of energy, feeling too tired, and health problems (57). In a sample of adult Australians, out of 13 perceived barriers, cost, work commitments, and feeling tired predicted lower levels of physical activity (58). Finally, among U.S. adults, 6 of 12 barriers were inversely related to physical activity, including lack of time, feeling too tired, health problems, lack of energy, lack of motivation, and dislike of exercise (59). Although the theorized effect of perceived barriers on physical activity is based in part on expected negative outcomes (see previous note), more research on these specific negative outcome expectancies is necessary before definitive patterns of influence can be recognized. These preliminary findings suggest that personal barriers (i.e., lack of time and feeling tired and, presumably, the negative outcomes associated with them) are consistently related to decreased physical activity.

### Outcome Expectancy and Behavioral Intention

In the theory of planned behavior and in protection motivation theory, outcome expectancy variables influence behavior indirectly through behavioral intention. Studies based on the theory of planned behavior have consistently shown that outcome expectancy (i.e., behavioral beliefs) has a small to moderate association with physical activity intention ($r$ = .21 to .50 [40,60–65]). Studies based on protection motivation theory have yielded less consistent results; in two studies some outcome expectancies (i.e., response efficacy and response cost) were not found to be related to exercise intention (66,67), whereas others (i.e., perceived vulnerability) were (67).

The relation between outcome expectancy and physical activity intention has also been analyzed in tests of broader social cognitive theory. For example, in two studies comparing the theory of planned behavior and self-efficacy theory (40,41), small to moderate associations were found between outcome expectancy and physical activity intention ($r$ = .18 to .28). Other studies suggested that outcome expectancy predicts physical activity intention even when self-efficacy and other social cogni-

tive variables are controlled (68,69). In addition, moderate associations have been found between physical activity intention and personal barriers ($r = –.45$ [56]), internal barriers ($r = –.41$), and external barriers ($r = –.39$ [35]).

### Outcome Expectancy and Stage of Change

Numerous studies based on the transtheoretical model have analyzed the relation between outcome expectancy (i.e., decisional balance) and stage of change. These studies have consistently shown that decisional balance is related to exercise stage of change among adults (30,70–74). One study, however, indicated that associations between decisional balance and physical activity are not as strong (75). This disparity may be due to the increased importance of outcome expectancy during intention formation (73,76), a process included in stage-of-change measures, but not in traditional measures of physical activity.

### Outcome Expectancy and Self-Efficacy

Self-efficacy theory posits that self-efficacy influences behavior both directly and indirectly through outcome expectancy. In addition, when outcomes are closely tied to behavior, outcome expectancy would be expected to explain little additional variance in behavior after self-efficacy is considered (2). For example, a person may expect to feel a sense of accomplishment if they meet their goal of running a 6-min mile. The feeling of accomplishment is contingent on attaining the goal—running a 6-min mile—thus expectancy of the feeling would add very little to the prediction of behavior beyond that accounted for by the person's belief in his or her ability to attain it. However, many outcomes of physical activity are not as closely tied to performance. For example, many people exercise in an attempt to lose weight. Weight loss is certainly not a definite outcome of exercise. Therefore, the expectation that weight loss will result from exercise should account for additional variance in exercise behavior beyond that accounted for by the belief that the exercise can be performed.

A lack of research limits our ability to fully understand how self-efficacy and outcome expectancy operate together to determine physical activity; however, a small number of studies in this area have begun to shed light on this complex relation. A number of studies of older adults, for example, have shown that outcome expectancy is related to self-efficacy ($r = .24$ to $.70$) and that outcome expectancy accounts for at least some variation in physical activity beyond that accounted for by self-efficacy (46–52). Studies of young to middle-aged adults, on the other hand, have revealed divergent results, with some studies finding that outcome expectancy predicts variance in physical activity, or physical activity intentions, beyond that accounted for by self-efficacy (68,77,78), and other studies finding outcome expectancy to contribute little in addition to self-efficacy (40–42). The findings in the latter group of studies could be partially attributable to small bivariate associations between outcome expectancy and physical activity.

Although self-efficacy theory posits that self-efficacy causally precedes outcome expectancy (2), others have argued that the reverse is true for behaviors, such as exercise, that are within our motor capabilities, and that may lead to immediate unpleasant feelings (7,8,20,79). For behaviors such as exercise, increases in expected positive outcomes can outweigh expectations of aversive outcomes and thus make people more likely to perceive they are able to perform the behavior. Research has shown, for example, that when valued incentives are offered, self-efficacy ratings can be increased for behaviors such as snake handling and smoking cessation (80,81). It follows that decreasing expected aversive outcomes or barriers of physical activity and increasing expected positive outcomes of physical activity would increase self-efficacy for physical activity; therefore, it is possible that for physical activity, outcome expectancy operates to influence self-efficacy.

### Attempts to Change Outcome Expectancy

A number of studies have investigated the effects of multifaceted social cognitive interventions on theoretical mediators of exercise behavior, including outcome expectancy (38,82–88). A majority of these interventions included components focusing on increasing awareness of the potential benefits of physical activity, but were unsuccessful in changing outcome expectancies (38,82,86,87). One study employing physician counseling, showed increases in outcome expectancy (i.e., decisional balance) at 6 weeks, but not at 8-month follow-up (88). Another showed that outcome expectancy (decisional balance) increased among participants in a lifestyle intervention, but not among those enrolled in a structured exercise program (84). Lifestyle interventions focus on incorporating physical activity into everyday life and, thus, may reduce the actual and perceived costs associated with more structured exercise programs. These findings suggest interventions may be more successful by shifting from educating on naturally occurring outcomes of exercise to creating environments that produce incentives for, or reduce barriers to, physical activity. Further ideas about outcome-expectancy change strategies, as well as other new directions in outcome expectancy research, are discussed in the next section.

## NEW DIRECTIONS IN OUTCOME EXPECTANCY RESEARCH

### Broadening the Conceptualization of Outcome Expectancy

The social cognitive conceptualization of outcome expectancy includes expected positive and negative outcomes of physical activity. However, a broader conceptualization may increase the explanatory power of the construct. Other outcome expectancy theories, such as subjective expected utility theory (16) and behavioral economics theory (89), posit that an individual's decision to behave in a certain way is a function of the individual's expected outcomes of *possible behavioral alternatives.* Because sedentary behavior is almost always an alternative to physical activity, it makes sense to broaden the conceptualization of physical activity outcome expectancy to include expectations of the outcomes of sedentary behavior. As discussed earlier, protection motivation theory includes two vari-

ables, perceived benefits of unhealthy behavior and perceived vulnerability to the health threat, that tap expected positive and negative outcomes of sedentary behavior (5). Although these variables have received very little attention in physical activity research, behavioral economics models indicate that access to and preference for sedentary behaviors influence time spent in physical activity (58,90,91). These findings suggest that the explanatory power of outcome expectancy may be improved by broadening the conceptualization to include expected positive and negative outcomes of sedentary behavior.

Anticipated affective responses to physical activity represent another understudied class of outcome expectancy (20,92). Most research on affective responses to exercise has focused on the mental health benefits of physical activity (e.g., 93), rather than on affective responses as determinants of future physical activity behavior. For example, a number of studies have shown increases in specific emotional responses to acute exercise (such as revitalization and positive engagement; 94–98), whereas others have shown that there is tremendous variability in individuals' general affective responses to moderate-intensity physical activity (99). According to social cognitive theory, expectations of these affective responses to physical activity should influence physical activity behavior (20,92), although little research exists to support this. A notable exception is research on perceived enjoyment, an affective response to physical activity (100,101) that is related to increased physical activity in youth (102) and adults (42,58,103). Research on perceived enjoyment has typically used one- or two-item measures that differ from one study to the next (104). However, the Physical Activity Enjoyment Scale (PACES; 105) is a multi-item measure, which has been validated in a number of studies (104–106). The PACES is especially useful because it also assesses negative affective responses, such as dislike of exercise, that have previously been shown to predict physical activity (59). Further measure development and research is needed to determine the impact of other affective variables on physical activity behavior.

### Potential Moderators of Outcome Expectancy

Research on when and in what situations outcome expectancy predicts physical activity is also needed. Although outcome expectancy is an important component of health behavior models, on its own, it does not include motivational properties. Therefore, one or more motivational variables may moderate the effects of outcome expectancy on physical activity. Recall that expectancy-value theory and social cognitive theory posit that behavior is motivated by the values individuals place on expected outcomes of behavior. Intuitively, this appears to fit the existing data. For example, this review indicates that outcome expectancy is a better predictor of physical activity in older adults. Older adults may value the positive, health-related outcomes of physical activity more than younger adults, and therefore the expectation of positive outcomes may be more likely to motivate older adults to be physically active. On the other hand, we may not be tapping the positive outcomes that motivate younger adults.

Despite the intuitive appeal of this explanation, we found no physical activity research investigating the interaction between outcome expectancy and outcome value. Generally, outcome value is incorporated into the measurement of outcome expectancy. These measurement procedures have generally taken one of two forms. First, in the *outcome-expectancy value* scale participants are asked to rate their agreement with potential benefits of physical activity, such as "A major benefit of physical activity for me is good health" (107, p. 538). This approach includes an outcome value component that is inextricably tied to the expectancy component. In such items participants must consider both the probability that physical activity will lead to good health and the extent to which good health institutes a "major benefit." If outcome value influences the impact of outcome expectancy on physical activity, we would expect the outcome-expectancy value approach to predict physical activity better than measures that tap only perceived likelihood of potential outcomes (e.g., 36). The outcome-expectancy value approach has been used to predict physical activity in younger, middle-aged adults and older adults (50,107); however, the magnitude of these findings have been no more impressive than findings from studies employing traditional perceived likelihood approaches (e.g., 36,45).

The second methodology that incorporates outcome value into outcome expectancy measurements involves the multiplicative combination of perceived likelihood and subjective value of a number of potential outcomes, followed by summation of the resulting products. This methodology is consistent with expectancy value theory (e.g., 24) and is used in measuring behavioral beliefs within the theory of planned behavior (4). The *incentives* approach uses the same methodology but applies it to self-efficacy theory (68,108). Although behavioral beliefs consistently predict physical activity intentions (e.g., 61), the incentives approach has not faired any better than traditional perceived likelihood approaches in predicting physical activity (40,42,44,68,78). Moreover, some authors (14,109) have argued that the multiplicative combination of perceived likelihood and subjective value used in measures of behavioral beliefs and incentives is statistically unsound, and they have instead suggested traditional methods to test for interaction effects (i.e., 110).

Perceived outcome proximity is another variable that may interact with outcome expectancy to motivate physical activity behavior (68,89,108). Perceived outcome proximity is different from outcome value. For example, one might expect and value that physical activity will help prevent heart disease; however, the perceived temporal proximity of acquiring heart disease may be so distant that this expected outcome is not salient and therefore does not motivate behavior (24). Such expectations of the positive health effects of physical activity may be seen as more proximal by older adults and may help to explain the stronger relation observed between outcome expectancy and physical activity in this population (e.g., 46). In addition, the expected positive outcomes of physical activity are less proximal than many expected negative outcomes (10). This may help explain why perceived personal barriers have predicted physical

activity in adults better than other negative and positive outcome expectancies. Specifically, personal barriers, such as lack of time, tiredness, and dislike for exercise, are more temporally proximal and, therefore, may be more likely to motivate physical activity than other expected negative outcomes or environmental barriers, such as muscle soreness or bad weather. Similarly, more proximal positive outcomes, such as enjoyment, are more likely to influence physical activity in adults than more distal positive outcomes such as health benefits (e.g., 42).

### Role of Outcome Expectancy in Behavior Initiation Versus Maintenance

It has been argued that different processes explain initial behavior change versus behavior maintenance (111). Indeed, social cognitive theory suggests that outcome expectancy plays a larger role in the initiation of novel behaviors and less of a role in behavioral maintenance (12,28). For example, in one study higher positive outcome expectancy led to increased attendance at an initial exercise test but was not related to subsequent class participation (112). It may be that expectations are important in predicting behavioral initiation, but that perceived satisfaction with actual outcomes better explains physical activity maintenance (111). Specifically, initially high positive outcome expectancy may increase physical activity adoption but may *undermine* behavioral maintenance if perceived satisfaction with actual outcomes falls short of expected outcomes (111). Some researchers have referred to this phenomenon as the *false hope syndrome* (113) or *expectancy violation* (114). Indeed, it has been found that those whose initially high positive outcome expectancies were violated by later dissatisfaction were less likely to maintain physical activity than those whose outcome expectancies were not violated (114). Therefore, outcome expectancy may be a more potent predictor of physical activity maintenance when analyzed in conjunction with perceived satisfaction.

### New Directions in Changing Outcome Expectancy

Attempts to change outcome expectancy through educating and increasing awareness of naturally occurring benefits of physical activity have met with little success (38,82,86,87). As discussed earlier, naturally occurring benefits of physical activity tend to me more distal (10) and, therefore, may not be strong enough to overcome the perceived costs. However, a reexamination of expectancy theory offers some insight into how outcome expectancy may be successfully modified. Recall that outcome expectancy is the theorized mechanism of behavioral conditioning, such that behaviors that have resulted in certain outcomes in the past are expected to result in similar outcomes when performed again (15,19). Therefore, to create favorable physical activity outcome expectancies, it is necessary for people to experience more positive and fewer negative outcomes of physical activity. For example, laboratory studies on behavioral choice theory have shown that physical activity increases when it is reinforced by preferred sedentary activities (115) and when it is made more accessible (91). Similarly, monetary incentives for attendance at an aerobics class have been found to increase attendance (116). According to expectancy theory, outcome expectancy provides the mechanism for behavior change in these examples of behavioral conditioning (15).

However, it is not efficient to wait for people to be physically active and then reinforce them for their behavior. Social cognitive theory posits that in addition to learning from experience, we learn through the social environment, via modeling or persuasion (28). For example, rather than simply delivering monetary rewards when people attend an aerobics class, we might create a contract specifying the reinforcers that will be delivered once the behavior has been carried out (117). Such contracts can be designed for individuals to increase expected positive outcomes of physical activity; however, to make a public health impact we must create the environmental conditions under which people expect to get reinforced for physical activity.

Recently, there has been increased attention on shaping the environment so as to increase benefits and decrease costs associated with physical activity (for a review, see 118). Studies of environmental variables have shown relations between physical activity and accessibility and convenience of walking paths or fitness facilities, environmental safety, and aesthetically pleasing environments, as well as associations between urban sprawl and lower rates of physical activity (118). However, these studies often lack a theoretical framework (119). According to expectancy theory, environmental variables may impact physical activity through their influence on outcome expectancy, rather than directly. Indeed, recent data indicate that perceptions of access to natural and constructed exercise facilities may be more predictive of physical activity than objective measures of those same variables (120–123). Interventions that create environments in which individuals expect to be reinforced for physical activity have shown promising results (for a review, see 124). For example, a 6-month, multicomponent environmental intervention among 1,256 employees in Finland, which included attendance lotteries and more accessibility to showers and change rooms, resulted in significant increases in active commuting to work (125). Proponents of this ecological approach recommend that critical environmental changes be made before attempts at educational interventions (124).

## CONCLUSIONS

Outcome expectancy is a central construct in expectancy-value theory and current health behavior models, such as self-efficacy theory, the transtheoretical model, the theory of planned behavior, and protection motivation theory, that are often used as frameworks for understanding physical activity. Although outcome expectancy is conceptualized differently within each of these models, there is considerable overlap. Tests of the predictive power of outcome expectancy have been mixed; however, a number of patterns have been identified. First, associations between positive outcome expectancy and physical activity are stronger among older adults than among young to middle-aged adults. Second, certain perceived barriers have been more predictive than others, especially personal barriers, such as lack of time, tiredness, and dislike for exercise. Third, as posited by their respective theories, behavioral beliefs

consistently predict physical activity intention and decisional balance consistently predicts stage of change. Fourth, as posited by the self-efficacy theory, self-efficacy and outcome expectancy are correlated. Finally, attempts to change outcome expectancy have focused on educating and increasing awareness of naturally occurring benefits of physical activity and have been largely unsuccessful.

Although outcome expectancy variables have shown some promise in predicting physical activity, much work remains to be done. Specifically, we recommend further exploration into a number of new research areas:

- Expected outcomes of sedentary behavior as a predictor of physical activity (e.g., 58).
- Expected affective responses to physical activity, such as perceived enjoyment (e.g., 42).
- Further and more statistically sound analysis of the moderating role of outcome value (e.g., 107).
- Perceived outcome proximity as a potential moderator of the relation between outcome expectancy and physical activity (e.g., 68,108).
- The role of perceived satisfaction with the outcomes of physical activity in determining behavioral maintenance (e.g., 114).
- The role of outcome expectancy in determining physical activity beyond the influence of self-efficacy and the direction of the relation between outcome expectancy and self-efficacy (e.g., 78).
- The role of outcome expectancy in mediating the impact of environmental change on increases in physical activity, as indicated by expectancy and social cognitive theories.

More effective and widely disseminable interventions may be possible through new technologies (i.e., Internet) that can provide individually tailored interventions based on important theoretical mediators (126). However, better understanding of how social cognitive variables operate in determining physical activity is essential if we are to take advantage of these new intervention technologies. Further research on outcome expectancy, a central theoretical construct in a number of widely used health behavior models, is an important step in this direction. The findings reviewed in this article have implications for improving intervention design. First, increasing awareness of naturally occurring benefits of physical activity may be more effective in older adults for whom these health outcomes may be more proximal and highly valued. Second, decreasing barriers to physical activity appears to be important. Although interventions have typically focused on overcoming barriers through increasing self-efficacy, environmental changes should be considered a promising alternative with a potential for greater public health impact. Finally, more than education and increasing awareness is needed to change expected outcomes. Environmental changes must be made to create conditions under which the expected benefits of physical activity outweigh expected costs.

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