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# Predictive Ability of Social Cognitive Theory in Exercise Research: An Integrated Literature Review

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Volume 6

January 5, 1999

Document Number 2

*Indexing terms: self-efficacy, physical activity, exercise, systematic review, research based/ut*

## Abstract

(1) The mechanisms that underlie successful initiation and adherence to physical activity regimens are not well understood. Few theoretical models have used consistent explanatory variables that are theory-driven and many findings that use extant models are equivocal. Social Cognitive Theory (SCT) as presented by Bandura (1986 [4], 1997 [5]) appears to have strong promise as a guide to understanding physical activity behaviors and developing clinically relevant interventions to promote the initiation and maintenance of physical activity. This critical systematic review of research using SCT was completed to determine the predictive ability of model constructs in explaining physical activity behavior and in identifying key intervention components found to enhance physical activity initiation and maintenance. Following review for quality and adequacy, published research during the years 1990-1998 contained 27 studies that examined the relationship between the construct of SCT, self-efficacy, and physical activity. All of the descriptive studies found a statistically significant relationship between self-efficacy and exercise behavior. Intervention studies demonstrated that participation in an exercise program promoted self-efficacy, and that programs designed to increase outcome expectations and self-efficacy significantly increased exercise behavior.

(2) Due to the centrality of self-efficacy in many of the social psychological theories that help explain the attitude-intention-behavior triad, a strong need remains to design interventions to maximize its usefulness. Clear, generalizable, systematic and theoretically comprehensive, randomized, controlled studies are needed to understand the usefulness of the construct.

## Statement of the Practice Problem

(3) In spite of the well documented beneficial effects of physical activity on health outcomes, only 15% of Americans regularly participate in vigorous physical activity during leisure time (USDHHS, 1996 [55]). Fifty percent of people who start

an organized fitness or exercise program drop out within six months (Dishman, 1994 [19]; McAuley, Coumeya, Rudolph, & Lox, 1994 [41]). The mechanisms that underlie successful initiation and adherence to physical activity regimens are not well understood. A strong theoretical basis that has been shown to be effective in promoting physical activity has not been established. Few theoretical models have used consistent explanatory variables that are theory-driven and many findings that use extant models are equivocal (McAuley, 1992 [37]). To assist patients to develop and maintain physical activity behavior, effective strategies and techniques must be developed which acknowledge the weaknesses and the strengths of existing theoretical models (Dishman, 1994 [19]). Social Cognitive Theory (SCT) as presented by Bandura (1986 [4], 1997 [5]) appears to have strong promise as a guide to understanding physical activity behaviors and developing clinically relevant interventions to promote the initiation and maintenance of physical activity (Holden, 1991 [30]). Social Cognitive Theory defines perceived behavioral control as being comprised of expectations about outcomes (outcome expectations) and one's confidence in ability to perform a certain behavior (self-efficacy). The key construct in the SCT is self-efficacy; this construct has been used extensively to describe health promotion efforts in a variety of outcome behaviors, such as weight loss (Fontaine & Cheskin, 1997 [24]), smoking cessation (Nicki, Remington, & MacDonald, 1984 [46]), and diabetes self care (Clark, 1997 [14]). Many conceptual models of health behavior now include self-efficacy as an integral influence in the adoption and maintenance of behavioral change related to a wide array of health promotion behaviors (Ajzen, 1985 [1]; Bandura, 1997 [5]; Rosenstock, Strecher, & Becker, 1988 [51]). So frequent is the use of the self-efficacy construct that we chose to examine critically the application of SCT as it relates to physical activity behavior. Thus, this critical review of research using SCT was completed to determine the predictive ability of model constructs in explaining physical activity behavior and in identifying key intervention components found to enhance physical activity initiation and maintenance.

(4) Overview of social cognitive theory. The theoretical tenets underpinning SCT suggest that behavior change and maintenance of that behavior are a function of expectations about one's ability to perform a certain behavior (self-efficacy or efficacy expectation) and the expectation regarding the outcome

resulting from performing that behavior (outcome expectations). Efficacy expectations are based on the individual's belief or perception in their capability to perform a certain activity or behavior. Outcome expectations are also based on the individual's belief regarding the behavior-outcome relationship. Perceived self-efficacy influences all aspects of behavior, including its initiation and cessation. Further perceptions of self-efficacy affect the amount of effort people spend on a task, and the amount of time they will persist at a task while facing obstacles (Bandura, 1977 [3]).

(5) **Self-efficacy.** As a construct within SCT, self-efficacy attempts to explain how individual perceptions of ability affect behavior, level of motivation, thought patterns, and emotional reactions (Bandura, 1997 [5]). Self-efficacy is specific to a given situation and does not refer to a personality characteristic or trait. A person's self-efficacy may vary depending on the specific task and context (Bandura, 1997 [5]).

(6) Self-efficacy is learned or developed from four primary sources: 1) performance accomplishments, 2) verbal persuasion or encouragement from others, 3) social modeling or vicarious experiences, 4) physiological states or cues.

(7) **Performance accomplishment** refers to achieving mastery over a certain task through personal experience. Performance accomplishments gained through personal experience are the strongest sources of self-efficacy since the person has developed and refined their skills through practice. Successful performance will enhance self-efficacy only if it is attributed to one's own skill and ability, rather than chance or external or temporary factors (Strecher, DeVellis, Becker, & Rosenstock, 1986 [54]). **Verbal persuasion** refers to the use of strong verbal encouragement regarding the benefits of the behavior, and the progress the individual makes in achieving the behavior. **Social modeling** is the third strategy used to enhance self-efficacy. This includes observing another's success, or by verbal persuasion or encouragement to perform a specific behavior (Bandura, 1997 [3]; McAuley & Jacobson, 1991 [36]; McAuley, 1992 [37]; McAuley, Lox, & Duncan, 1993 [42]). **Physiological arousal** includes feedback to the individual concerning how he/she is responding to the effects of the behavior; for example, reassurance that the elevated heart rate experienced during vigorous physical activity is an expected and appropriate response (McAuley et al., 1994 [41]).

(8) **Outcome expectations.** The SCT incorporates both self-efficacy and outcome efficacy, and outcome expectations when attempting to explain and predict the attitude-intention-behavior relationship. For many behaviors, which have generally accepted outcome expectations, frequently only self-efficacy is examined. However, Bandura believes that in studying health behavior both efficacy expectations and outcome expectations need to be examined.

(9) Outcome expectations may play the greatest role in influencing initial motivation and decisions to change a health behavior (Bandura, 1997 [5]). Health practices that are not very difficult to change, but whose perceived consequences are uncertain may largely depend on high outcome expectations. When health behavior is thought to lead to a desired consequence but the change is difficult to make, high self-efficacy is crucial to incorporate change (Strecher et al., 1986 [54]). Finally, for those health practices where the effect is uncertain, high self-efficacy is important to facilitate behavioral change.

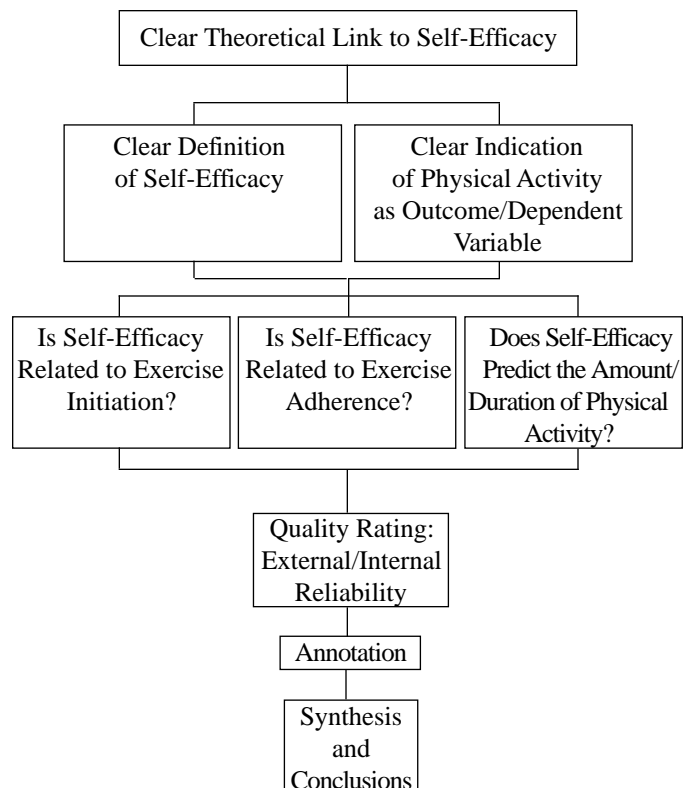
## Method

(10) **Literature identification and evaluation.** Integrative literature reviews examine and summarize past research by drawing a comprehensive conclusion from many separate studies that are believed to address related hypotheses (Cooper, 1989 [17]). While the meta-analytical approach to knowledge synthesis is the most recognized approach to integrating research, the design of studies in some content areas do not lend themselves to a meta-analytic approach. A variation to the meta-analytic approach has been developed to allow a rigorous examination of reports in these additional areas. This approach, developed by Bland, Meurer, and Maldonado (1995 [8]) called nonstatistical meta-analysis, was adapted for the current report. The technique is presented fully elsewhere, but briefly includes 1) literature retrieval, 2) literature coding, 3) rating for quality, 4) annotation of high quality references, and 5) synthesis of the basic results of each study.

(11) **Retrieval of literature.** A literature search was made of physical activity and exercise studies from 1990 through June, 1998 using the SCT as a theoretical framework. Sources for review included MEDLINE, Cumulative Index to Nursing and Allied Health Literature and Psychological Abstracts, tracking relevant citations in published articles, and the Internet. In order to maintain clarity and focus in the integrative review, a model to guide the retrieval and selection of articles appropriate was developed *a priori*. This model guided the search terms used to retrieve relevant research; after all relevant studies were reviewed once, the more refined model was used to guide the review of the articles identified as being of sufficient quality to include in the final synthesis. Figure 1 describes the final search model.

Figure 1

Theoretical Model for Analysis of SCT and Physical Activity



(12) Key words used in the search were “social cognitive theory,” “self-efficacy,” “physical activity,” and “exercise.” The search reflected an emphasis on physical activity in both primary and secondary prevention, and while there were differences in SCT constructs, self-efficacy was the target construct sought. The literature search yielded a total of 44 publications that focused on self-efficacy and physical activity in primary and secondary prevention in adults.

(13) The retrieved articles were first considered with respect to their clear delineation of the use of the theoretical model, or the construct of self-efficacy. Three elements were considered initially for inclusion in the literature retrieved: the theoretical link to SCT, a specified definition of self-efficacy, and a specified outcome of physical activity or exercise. Articles that reported surrogate measures of self-efficacy, such as locus of control, and embedded physical activity in the outcomes, such as general health promotion behavior, were not included in this review.

(14) Coding the retrieved literature. The retrieved literature was coded according to the model’s *a priori* decision step. The articles were sorted according to three questions: Was the concept self-efficacy related to the initiation of physical activity? Was self-efficacy related to adherence to physical activity? Did self-efficacy predict or explain the amount or duration of physical activity?

(15) Rating for quality. The methodological quality of each study was judged to ensure internal and external validity of the data. A validity framework developed by Cook and Campbell (1979 [16]) was used to rate the quality of the studies in the retrieved search. This framework included four categories: internal validity (ambiguity about the direction of the causal influence), construct validity (adequacy of the cause-and-effect variables and their associated measures), external validity (inability to generalize to other samples or settings), and statistical conclusion validity (small sample size; inappropriate use of statistics) (Bland et al., 1995 [8]). Each study was given a score from 0 to 5 in each area, based on the extent of detail presented and fulfillment of the criteria being evaluated, for a possible range in total score from 0-25. A quality score of 10 was established as the limit for acceptable quality to be included for further analysis in the integrative review. The quality score of the studies included in the review ranged from 10 to 20, with an average quality score of 14.9.

(16) Overall, 16 studies were excluded based on lack of quality, lack of clear specification of the use of SCT as a theoretical focus (Biddle, Goudas, & Page, 1994 [7]; Lechner & DeVries, 1995 [33]; Marcus, Selby, Niaura, & Rossi, 1992 [34]), lack of specificity in both physical activity and construct measurement (Beniamini, Rubenstein, Zaichkowsky, & Crim, 1997 [6]; Gill, Kelley, Williams, & Martin, 1994 [27]; Rabinowitz, Melamed, Weisberg, Tal, & Ribak, 1992 [48]; Sharpe & Connell, 1992 [53]), and physical activity embedded in other health promotion outcomes (Buckelew, Huyser, Hewett, Parker, Johnson, Conway, & Kay, 1996 [10]; Buckelew, Murray, Hewett, Johnson, & Huyser, 1995 [11]; King, Marcus, Pinto, Emmons, & Abrams, 1996 [32]; McAuley, Mihalko, & Bane, 1997 [43]; Muto, Saito, & Sakurai, 1996 [45]). Based on sample size and characteristics, six articles were determined to be publications using the same sample/study design (Duncan, McAuley, Stoolmiller, & Duncan, 1993 [22]; Duncan & McAuley, 1993 [21]; McAuley, Bane, & Mihalko, 1995 [39]; McAuley et al., 1994 [41]; McAuley, Courneya, & Lettunich, 1991 [40]; McAuley, 1993 [38]). However, all were included in the review because the interpretation of the results had theoretical significance.

(17) Through the process of data collection and evaluation, the final data set of 27 studies examining physical activity and self-efficacy were reviewed (Table 1). Where reported, sample size and characteristics, such as sex, and setting, such as rehabilitation, were included. Most studies described subjects as predominantly Caucasian; only Broman (1995 [9]) focused on African Americans. The research designs, measurement of theoretical constructs, and results will be the focus of the discussion.

## Summary of Research

(18) Research design. In this integrative review, the majority of studies (n=14) were descriptive correlational or observational (Broman, 1995 [9]; Carroll, 1995 [13]; Conn, 1998 [15]; Cousins, 1996 [18]; DuCharme & Brawley, 1995 [20]; Duncan et al., 1993 [22]; Fontaine & Shaw, 1995 [25]; Foster, Oldridge, Dion, Forsyth, Grevenow, Hansen, Laughlin, Plichta, Rabas, Sharkey, & Schmidt, 1995 [26]; Grembowski, Patrick, Diehr, Durham, Beresford, Kay, & Hecht, 1993 [28]; Hellman, 1997 [29]; Marcus, Pinto, Simkin, Audrain, & Taylor, 1994 [35]; Sallis, Hovell, Hofstetter, & Barrington, 1992 [52]; Oka, Gortner, Stotts, & Haskell, 1996 [47]; Wilcox & Storandt, 1996 [57]). Eleven were pre- or quasi-experimental (Calfas, Sallis, Oldenburg, & French, 1997 [12]; Duncan et al., 1993 [22]; Duncan & McAuley, 1993 [21]; Jeng & Braun, 1997 [31]; McAuley, 1993 [38]; McAuley et al., 1995 [39]; McAuley & Jacobson, 1991 [36]; McAuley et al., 1991 [40]; McAuley et al., 1993 [42]; Conn, 1998 [15]). Several studies employed explanatory models (Conn, 1998 [15]; Robertson & Keller, 1992 [49]). However, only two intervention studies used randomly assigned control groups (Allen, 1996 [2]; McAuley et al., 1994 [41]).

(19) Measurement of theoretical constructs. The adequacy of variable measurement was evaluated across studies. Bandura’s theoretical model is considered to be the gold standard for the definition and operationalization of the variables of self-efficacy and outcome expectations (Bandura, 1997 [5]). Self-efficacy is a construct used to estimate people’s beliefs in their capabilities to accomplish specific behaviors or attainments. Therefore self-efficacy for a given behavior must have its own measure and must be tested consistently to determine valid and reliable estimates in each behavioral situation (Fleury, 1992 [23]). Seven studies assessed self-efficacy dynamically over time periods ranging from 2 months to 2 years.

(20) The majority of studies used the 100% confidence scale recommended by Bandura. Of these, seven used a scale designed by Bandura. Measurement scales developed for particular study groups were frequent. For example, Calfas et al. (1997 [12]) and Hellman (1997 [29]) used a 5 point Likert scale developed by Sallis et al. (1992 [52]). The Jenkins self-efficacy scale for physical activity was reported, as well as a scale developed by McAuley (1993 [38]), Carroll (1995 [13]), and Conn (1998 [15]). The majority of studies stated reliability of the self-efficacy instruments as ranging from .53-.96. There was considerable variation in the self-efficacy scales used in these studies. For example, most scales failed to differentiate between exercise and physical activity, work and leisure time activity, and aerobic and isometric activities (e.g. “lifting” and “walking”). The lack of specificity in measuring specific types of exercise self-efficacy is a limitation as to the generalizability of these reviewed study results.

(21) Measurement of physical activity. Throughout the review, one consistent problem in data collection was the differential focus on physical activity versus exercise (Dishman, 1994 [19]). The outcome measure of interest, physical activity, was measured in a variety of ways, and included vigorous aerobic activity, general self-efficacy, barriers to exercise self-efficacy, scheduling to exercise self-efficacy, and weight lifting self-efficacy. Most measures of physical activity were self-reported.

(22) Eight of the studies used participation in a formal aerobic exercise program as the measure of exercise, fifteen measured leisure time activity, while four examined exercise following cardiac rehabilitation. Two studies used cycle ergometry and symptom limited treadmill to assess physical activity (McAuley, Shaffer, & Rudolph, 1995 [44]; Oka et al., 1996 [47]).

(23) Threats to validity. This integrative review is limited by the lack of intervention studies that examine self-efficacy and physical activity as well as the lack of randomized, controlled studies. Without studies displaying this type of rigorous methodology, generalizability of findings, and prediction of cause and effect are difficult. In addition, the lack of randomized, controlled intervention studies makes it difficult to determine direction for the development of relevant, clinically focused interventions.

(24) The subjects from the studies examined were healthy adults, chosen with a physical activity focus of primary and secondary prevention, and were heterogeneous for gender and age, but homogeneous in their racial, educational, and income makeup. Unfortunately, it is not uncommon to see a lack of minorities, and the less educated are represented in scientific studies. The sociodemographic factors of gender, race, age, and socioeconomic status have been identified as related to participation in leisure time physical activity (Broman 1995 [9]). Studies have shown that men, the young, Caucasians, and those of higher socioeconomic status are more likely to participate in leisure time physical activity (Washburn, Kline, Lackland, & Wheeler, 1992 [56]).

(25) No studies reported estimates for appropriate sample size acquisition. The generalizability of the information synthesized is therefore limited, as is the external validity of the integrative review.

## Annotated Critical References

(26) **Allen, J.K.** (1996 [2]). Coronary risk factor modification in women after coronary artery bypass surgery. *Nursing Research*, 45(5), 260-265.

(27) This two group randomized clinical trial (n=59 experimental; n=57 control) examined the effects of the tenets underpinning self-efficacy enhancement on behavior changes related to cardiovascular risk reduction. Following one year, both the usual care and intervention group reported improvement in exercise, with slightly higher exercise levels in the experimental group. While this article did not report the use of self-efficacy as a named construct, it is significant in that it is one of three in the self-efficacy exercise literature that uses the SCT as a basis for the development and testing of an intervention.

(28) **Calfas, K.J., Sallis, J.F., Oldenburg, B., & French, M.** (1997 [12]). Mediators of change in physical activity following an intervention in primary care: PACE. *Preventive Medicine*, 26(3), 297-304.

(29) In a nonrandom intervention, control-group clinical trial (n=255), healthy sedentary adults received behaviorally based counseling by physicians. Depending upon the experimental group participant's stage of change, cognitive interventions (identification of barriers, goal setting, verbal persuasion) were applied to individual patients. Analysis focused on both changes in the mediators as a result of the intervention (self-efficacy), and changes in physical activity. The behavioral processes of change and self-efficacy made significant contributions to the model that explained both self-report and objective measures of physical activity.

(30) **McAuley, E., Courneya, K.S., Rudolph, D.L., & Lox, C.L.** (1994 [41]). Enhancing exercise adherence in middle-aged males and females. *Preventive Medicine*, 23(4), 498-506.

(31) In a randomized clinical trial (n=114), subjects received a 5 month walking program supervised by trained leaders. The adherence intervention group received treatment based on the tenets of SCT: mastery accomplishments, social modeling, social persuasion, and physiological arousal. Participants in the treatment group exercised more frequently, for longer duration, and walked greater distances. Self-efficacy was a significant predictor in the early and middle stages of the exercise program, but not during the last month.

## Synthesis of the basic results of each study

(32) In those studies that examined the relationship between exercise self-efficacy and exercise behavior, all found that self-efficacy was significantly related to exercise behavior. In those studies that used multiple regression as part of their statistical analysis, the explained variance of self-efficacy for exercise behavior ranged from 4% to 26%. The role of self-efficacy in the adoption and maintenance of exercise behavior was variable. While efficacy was found to be related to exercise initiation in only one study (DuCharme & Brawley, 1995 [20]), it was related to the maintenance of exercise in many others (Calfas et al., 1997 [12]; Duncan et al., 1993 [22]; Duncan & McAuley, 1993 [21]; Fontaine & Shaw, 1995 [25]; McAuley, 1993 [38]; Marcus et al., 1994 [35]). Significant relationships were identified between outcome expectations and physical activity (Broman, 1995 [9]; Conn, 1998 [15]; Rogers & Brawley, 1996 [50]; Grembowski et al., 1993 [28]; McAuley et al., 1995 [39]; Wilcox & Storandt, 1996 [57]). However, Cousins (1996 [18]) found that outcome expectations failed to predict exercise behavior. Rogers and Brawley (1996 [50]) found that primary physical health outcomes predicted behavioral intention to exercise, whereas secondary, or long-term, health outcomes failed to predict behavioral intention to exercise.

(33) A number of studies examined the relationship between exercise behavior and self-efficacy. These found that exercise was a significant predictor of self-efficacy (McAuley et al., 1991 [40]; McAuley, 1993 [38]; Wilcox & Storandt, 1996 [57]). Sustained exercise was found to be more efficacious in increasing self-efficacy compared to acute bouts of exercise (McAuley et al., 1995 [39]). There were no differences in the magnitude of relationships between self-efficacy and exercise or between primary and secondary prevention measures.

(34) Statistically significant increases in exercise self-efficacy were found following participation in an exercise

intervention (McAuley, 1993 [38]; McAuley & Jacobson, 1991 [36]; McAuley et al., 1994 [41]; Rogers & Brawley, 1996 [50]). However, only three studies were found to use the strategies theoretically hypothesized to enhance self-efficacy as the framework of the intervention. The intervention studies demonstrated that participation in an exercise program, which included self-efficacy enhancement strategies, promoted subsequent exercise participation (Allen, 1996 [2]; Calfas et al., 1997 [12]; McAuley et al., 1994 [41]). These investigations are worth examining a bit further. Allen (1996 [2]) and McAuley et al. (1994 [41]) developed specific strategies based on verbal persuasion, social modeling, vicarious experience, and physiological arousal. McAuley and colleagues, in their randomized control group clinical trial, found that self-efficacy was a significant predictor of exercise adherence. Allen, while reporting in detail on the self-efficacy enhancing strategies, failed to report the measurement of self-efficacy. Calfas and colleagues (1997 [12]) examined self-efficacy enhancement by affecting the social support domain of social cognitive theory and verbal persuasion, with cognitive interventions demonstrating significant improvement in physical activity.

(35) Following review for quality and adequacy, published research during the years 1990-1998 contained 27 studies that examined the relationship between the construct of SCT, self-efficacy, and physical activity. All of the descriptive studies found a statistically significant relationship between self-efficacy and exercise behavior. Intervention studies demonstrated that participation in an exercise program promoted self-efficacy, and that programs designed to increase outcome expectations and self-efficacy significantly increased exercise behavior.

(36) Four studies found that exercise was a significant predictor of self-efficacy. Only seven studies examined outcome expectations, six found a significant relationship between outcome expectations and physical activity (Broman, 1995 [9]; Conn, 1998 [15]; Cousins, 1996 [18]; Grembowski et al., 1993 [28]; McAuley et al., 1995 [39]; Rogers & Brawley, 1996 [50]; Wilcox & Storandt, 1996 [57]).

## Research Implications

(37) The use of theoretical models and constructs are necessary in the design of health promotion interventions. Theory-driven approaches avoid the “black-box” approach in that they provide an analysis of the causal mechanisms underlying the relationships between variables in the theory and the treatment components (Fleury, 1992 [23]). The comprehensiveness in application of the SCT is crucial in determining whether self-efficacy and outcome expectations explain or predict “truth” regarding the initiation or maintenance of physical activity. While all the studies included in this integrative review demonstrated fair to strong correlations between the construct self-efficacy and physical activity, only three investigators pursued the construct to its logical conclusion and asked the question “Will an intervention that enhances self-efficacy contribute to an increase in the outcome behavior (physical activity)?” Except for these most recent intervention studies, investigators have theorized that self-efficacy somehow contributed to the pursuit of physical activity simply because, in these investigations, the measurement of the construct increased over the course of the intervention.

(38) According to Bandura (1997 [5]), both self-efficacy and outcome expectations need to be high in order to be strong motivators for behavior. However, most studies fail to include outcome expectations when examining SCT (Strecher et al., 1986 [54]). Those investigators who examined this necessary component of the SCT defined outcome expectations as barriers and benefits to the health behavior, physical activity. While few studies assess outcome expectations along with self-efficacy, they both have potential for making contributions in predicting behavioral change (Fleury, 1992 [23]). Rogers and Brawley (1996 [50]) have suggested that the reason for the lack of research attention to outcome expectation results from the assumption that people are aware of beneficial lifestyle behaviors and agree with the health education they have heard.

## Research Needed

(39) Due to the centrality of self-efficacy in many of the social psychological theories that help explain the attitude-intention-behavior triad, a strong need remains to design interventions to maximize its usefulness. Clarifying how to enhance self-efficacy by clear, generalizable, systematic and theoretically comprehensive, randomized, controlled studies is the critical “next step” in understanding the usefulness of the construct. For now, the lack of completeness in examination of SCT makes assessment of the role of self-efficacy and outcome expectations in predicting and explaining physical activity difficult.

## Practice Implications

(40) Advanced practice nurses and clinicians can use the results of this integrative review in a number of ways. Individual perceptions of self-efficacy (“I believe that I can exercise regularly”) are important and strongly related to exercise behavior. Clinicians can facilitate perceptions of self-efficacy by verbal persuasion, modeling exercise behavior, and discussing the positive physical effects of physical activity. These strategies to enhance self-efficacy can facilitate the maintenance of the physical activity prescription for individuals who require support and motivational enhancement to exercise. Using information from investigations in the literature can assist the clinician in developing interventions that are based on established relationships between factors that “work” in physical activity interventions.

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## Search Strategies

(41) A literature search was made of physical activity and exercise studies from 1990 through June, 1998 using the SCT as a theoretical framework. Sources for review included MEDLINE, Cumulative Index to Nursing and Allied Health Literature and Psychological Abstracts, tracking relevant citations in published articles, and the Internet. Key words used in the search were “social cognitive theory,” “self-efficacy,” “physical activity,” and “exercise.”

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**Table 1: Summary of Exercise Research Using SCT**

<b>Authors</b>	<b>Sample</b>	<b>Scale</b>	<b>Reliability/ Validity</b>	<b>Intervention/ Design</b>	<b>Results</b>
Allen, (1996 [2])	N=138; women, following CABG	Not reported	Not reported	Randomized clinical trial to determine if an inter- vention based on Social Cognitive Theory would increase exercise behavior, smoking, diet/calories, diet/sat. fat	54% of women in the Social Cognitive Intervention group compared to 51% of women in the control group reported participation in exercise after 1 year
Broman, (1995 [9])	N = 496; African- American, community dwelling, healthy adults, ages 18-94	Belief in the efficacy of preventive health behaviors	None reported	Survey to examine the effects of self-efficacy on leisure time physical activity in African Americans	Belief in the efficacy of preventive health (outcome expectations) predicted leisure time physical activity (p<.05)
Calfas et al., (1997 [12])	N=98 intervention, 114 control; community dwelling adult men and women	Self-Efficacy for Physical Activity Scale, 12 items, 1-5 Likert scale	Not reported	Quasi-experimental design to examine the extent to which a staged-matched physical activity intervention produces changes in mediators from Social Cognitive Theory, and to what extent mediators explain changes in physical activity	Percent increase for walking for intervention group was 100% compared to control 27%; the intervention group had higher scores on cognitive processes of change (f(1,206)= 4.57, p<.04)
Conn, (1998 [15])	N=147; healthy, community dwelling men and women, ages 65-100	Outcome expectancy measured with the Exercise Benefits/Barriers Scale, Exercise Specific Efficacy Scale	Benefits/barriers internal consis- tency .95; test- retest .89; Exercise self- efficacy internal consistency .85	Cross-sectional correla- tional design to examine hypothesized relationships among age, health, life- long exercise, barriers, outcome expectancy, self- efficacy, and exercise behavior	The explanatory variables accounted for 60% of variance in exercise behavior; Self- efficacy expectations had a direct and significant effect on exercise behavior (R <sup>2</sup> .35, p<.0001); Outcome expectancy had a modest path coefficient beta (17, p<.05)
Cousins, (1996 [18])	N=327; ages 70-98, community dwelling women	Movement Confidence Now Scale; risk and benefits for outcome expectations	r=p<.001- movement; Benefits/risk- p<.001	Survey to determine which cognitive variables of the Social Cognitive Theory were most important determinants of exercise among older women	Self-efficacy (p<.01, r=.405) and social support (p<.01, r=.364) were best predictors of exercise; Outcome expectations and incentives failed to predict exercise; Efficacy alone (b=.28) had a positive relationship with exercise level

*Table 1 continued on next page...*

**Table 1: (cont) Summary of Exercise Research Using SCT**

Authors	Sample	Scale	Reliability/ Validity	Intervention/ Design	Results
Carroll, (1995 [13])	N=133; 32 women, 101 men, following CABG	Jenkins Self- Efficacy Expect- ation Scales, 0=no confidence; 100=total confidence	Chronbach's alpha all scales =.76-.96; activity=.53-.92	Walking, climbing stairs, general activities	Self-efficacy expectation did not increase for all behaviors
DuCharme & Brawley (1995 [20])	N=63; healthy, adult females, first time enrollees in fitness club (16 weeks)	Barrier efficacy (BE) 7 items; Scheduling efficacy (SE) 12 statements; Behavioral intention (BI) 3 intention statements	Chronbach's alpha: self- efficacy .89-.90; barrier efficacy .76-.90	Examined the influence of self-efficacy (barrier and scheduling efficacy) on behavioral and exercise attendance rates; self-initiated exercise at a club; outcome-weekly attendance	Attendance rates were less than confidence levels in attendance; correlation between scheduling efficacy at week 1 ( $r=.12$ , $p>.05$ ); week 9 ( $r=.40$ , $p<.05$ )
Duncan et al., (1993 [22])	N=86; men and women, ages 45-64, healthy, sedentary, community dwelling	Self-efficacy (barrier) 19 item confidence scale	Reliability= .820-.957	Pre-experimental design to examine the relation- ship of self-efficacy to serial fluctuations in maintenance of exercise	Chronic levels of efficacy are related to chronic levels of exercise attendance - higher levels of efficacy implies higher attendance ( $r=.15$ , $p<.05$ )
Duncan & McAuley, (1993 [21])	N=85; sedentary, healthy, asymp- tomatic men and women, ages 45-64	Two self-efficacy measures 1) Hierarchical 10 point interval percentage scale ranging from 0-100 2) Perceptions of compliance with exercise 3) Social barriers to exercise	Not reported for self-efficacy; barriers, Chronbach's alpha=.93	One group, longitudinal design to examine the extent to which efficacy cognitions influenced the maintenance of exercise behavior	Indirect support for social support and self-efficacy to exercise adherence ( $f_2, f_3=.582$ , $t=2.533$ )
Fontaine & Shaw, (1995 [25])	N=154; University students/staff	5 item scale developed specifically for this study; bipolar 100 point	Alpha reliability =.96	Cross-sectional correla- tion design to examine the relationship between self- efficacy and exercise adherence; step aerobic exercise classes	T tests between drop outs and adherers - adherers scored significantly higher on self- efficacy than did drop outs ( $t_{147}=2.31$ , $p=.02$ )
Foster et al., (1995 [26])	N=26; post acute MI, CABGs, valve surgery, 19 men, 7 women, mean age=57.4 years	Ewart question- naire for ambulatory items; 7 items, 0-100 on walking distance, time	Not reported	Participation in formal cardiac rehabilitation program; examined changes in objective self- efficacy (cycle ergometry) and subjective self- efficacy during recovery over 12 weeks	Significant changes in self- efficacy - cycle, ambulatory, muscular analyzed by mean changes
Grembowski et al., (1993 [28])	N=2,524; Medicare enrollees	Mail question- naire 0 to 10 scale measuring efficacy expecta- tions and outcome expectations	Not reported	Survey of exercise, dietary fat intake, weight control, alcohol intake, smoking behaviors	Older adults with high efficacy expectations were more likely to perform those behaviors; correlation between efficacy expectations and exercise .53

*Table continued on next page...*

**Table 1: (cont) Summary of Exercise Research Using SCT**

<b>Authors</b>	<b>Sample</b>	<b>Scale</b>	<b>Reliability/ Validity</b>	<b>Intervention/ Design</b>	<b>Results</b>
Hellman, (1997 [29])	N=349; cardiac rehabilitation participants, aged >65	Self-Efficacy for Exercise Questionnaire, 12 items	Internal consistency - alpha=.85; test-retest .68	Cross-sectional assess- ment of respondent's perceived capabilities to exercise three times per week in the face of barriers to participation	Self-efficacy, perceived benefits, barriers, and support explained 50% of the variance in exercise behavior
Marcus et al., (1994 [35])	N=431; women, healthy, worksite participants	Self-efficacy for Exercise scale - 5 item Likert	Reliability=.84	Cross-sectional descriptive to examine self-efficacy as a means to understand exercise behavior among women	Those in precontemplation for exercise scored the lowest on self-efficacy (t score=45.95); those in maintenance scored the highest (t score 58.32, p<.001)
McAuley, (1993 [38])	N=103; sedentary, middle-aged, men and women, community dwelling	Perceived physical ability subscale of Physical Self- Efficacy as general self-efficacy; exercise specific self-efficacy scale	General self- efficacy reliability alpha =.89; exercise specific reliability alpha=.88	Quasi-experimental; examined the role of self- efficacy in the process of adopting and maintaining exercise	Initial self-efficacy had a significant effect on exercise frequency and intensity at 12 weeks, but not at 20 weeks (R <sup>2</sup> =.219); Self-efficacy predicted adoption, but previous behavior was the strongest predictor of maintenance (R <sup>2</sup> =.125)
Jeng & Braun, (1997 [31])	N=33; with CAD, men and women, ages 45-80	Exercise Confidence Scale measures beliefs that individual can walk or bike certain distance in 15 minutes, 0-5 scale	Internal consistency .93 walk subscale; .96 for bike; One week test-retest r=.95, walk; .87 bike	Pre-experimental one group, pre-post design 12 week exercise training program	Mean self-efficacy pre-program 43 (sd 18.9); week 4, 45.9 (sd 17.7); 50.5 (sd 15.1) week 8; 54.5 (sd 12.4) week 12; Significant differences (f=12.578, p=.0001)
McAuley et al., (1995 [44])	N=32; older males, in- and outpatients from a VAMC	10 item measure of confidence in ability to exercise at moderate intensity for an increasing number of minutes; 100 point scale with 10 point incre- ments	Not reported	Upper body cycle ergometry for 10 minutes, then at 75% mhr for 2 minutes; self- efficacy was measured pre/during/post exercise	Exercise efficacy mean pre- exercise=38.3 (28.7) after exercise mean 49.2 (35.3) in older sample
McAuley, (1993 [38])	N=66; sedentary, ages 45-65	Exercise 3 times per week in face of barriers, 10 items; exercise self-efficacy/ long-term exercise	All alphas=.85	Follow-up of 20 week exercise intervention after 4 months	Only exercise self-efficacy explained a significant portion of the variance in overall exercise behavior (R <sup>2</sup> = .125, p<.01)

*Table 1 continued on next page...*

**Table 1: (cont) Summary of Exercise Research Using SCT**

Authors	Sample	Scale	Reliability/ Validity	Intervention/ Design	Results
McAuley et al., (1994 [41])	N=114; sedentary, 45-64 years	Adherence efficacy; 10 items	Internal consistency r=.92	Randomized, controlled design; provision of efficacy-based information from the 4 sources: mastery accomplishments, social modeling, social persuasion and interpretation of physiological states; Twenty week exercise program	No significant direct effect on the intervention on self-efficacy; effects of treatment and preexisting self-efficacy accounted for significant variance in exercise participation ( $R^2=.23$ , $p<.0001$ ); self-efficacy was a significant predictor of exercise in the early and middle stages of the program, but not in the last month; path analysis showed effect of treatment adherence was direct rather than through self-efficacy
McAuley & Jacobson, (1991 [36])	N=58; sedentary, community dwelling women	Exercise Self-Efficacy Scale	Reliability alpha=.68	Quasi-experimental design to examine the importance of exercise behavior and instructor influence, self-efficacy to predict exercise participation	Good and poor attenders did not differ on preprogram self-efficacy; difference in self-efficacy between good and poor overall exercise participants ( $p<.05$ ); Pre-program self-efficacy contributed to a significant amount of variance to total exercise participation ( $R^2=.125$ , $p<.05$ ); efficacy cognitions correlated with perceived regularity ( $r=.28$ , $p<.05$ ) and duration of exercise ( $r=.32$ , $p<.05$ )
McAuley et al., (1995 [39])	N=114; 56 males, 58 females, middle-aged, sedentary	Three measures of self-efficacy: bicycle, walk/jog, and Perceived Physical Ability subscale of the Physical Self-Efficacy Scale; outcome expectancy measured with 5 item Likert scale	Reliability - all alphas>.90	One group pre-post test design to examine the effects of acute and chronic exercise on self-efficacy 20 week exercise program, measured by daily attendance; individualized exercise prescription, supervised, 3 times per week for 1 hour	General self-efficacy showed a multivariate increase for time ( $f(3,267)= 40.94$ , $p<.0001$ ); outcomes were significant predictors of physique anxiety
McAuley et al., (1991 [40])	N=103; healthy, community dwelling adult men and women	Self-efficacy sit up scale, bike efficacy scale, walk, jog self-efficacy scale	Reliability alpha .80	Quasi-experimental design to examine if self-efficacy mastery experience will enhance self-efficacy; 3 times per week exercise; 20 week program	Acute and long-term exercise exposure increased self-efficacy ( $p<.05$ )

*Table 1 continued on next page...*

**Table 1: (cont) Summary of Exercise Research Using SCT**

Authors	Sample	Scale	Reliability/ Validity	Intervention/ Design	Results
McAuley et al., (1993 [42])	N=44; sedentary, ages 45-65, 26 females, 18 males	1) Physical activity efficacy; 3 measures of beliefs in capabilities 2) Adherence efficacy; administered at the end of the program and assessed beliefs in capability to continue exercising	Physical activity efficacy internal consistency - alphas >.85; adherence efficacy - alphas >.82	Quasi-experimental - increases in self-efficacy would result from exposure to exercise; 20 week structured exercise program	Multivariate analysis for three times measured ( $f(9, 29)=9.91$ , $p<.0001$ ); exercise efficacy was the only variable that predicted exercise adherence during follow-up
Rogers & Brawley, (1996 [50])	N=51; 31 female, 20 male, registered in an introductory weight-training clinic	Self-efficacy scale, 100% confidence scale, 7 items; outcome value (incentive) 13 primary outcomes, 12 secondary outcomes	Chronbach's alpha .82-.92	Examined the extent to which participation in physical activity was a function of both the desired outcome and efficacy to achieve those outcomes; examined before class, after 2 <sup>nd</sup> class	Self-efficacy contributed to the pre-clinic prediction less than behavioral intention (beta .25); post clinic, outcome and self-efficacy accounted for 33% of the variance in weight training
Sallis et al., (1992 [52])	N=1,739; adults, community dwelling	Assessment of cognitive, social, and environmental variables	Test-retest reliability "acceptable"	Cross-sectional survey to evaluate exercise determinants based on Social Learning Theory to explain vigorous physical activity during previous 24 months	Self-efficacy ( $r=.221$ , $p<.001$ ) was a predictor of exercise; along with barriers, friend support, family support, accounted for 12% of the variance
Oka et al., (1996 [47])	N=43; CHF patients, ages 33-91	Self-efficacy expectation scale 0 (cannot do) to 10 (can do)	Internal consistency .82-.99	Cross-sectional survey to explain performance of physical activity; symptom limited exercise treadmill test; physical activity models were developed from perceived exertion, attitudes, and self-efficacy	Self-efficacy was the strongest predictor in the group of variables ( $p=.015$ ); self-efficacy beliefs for activity and physical activity ( $r=.46$ , $p=.003$ ) lack of association between self-efficacy for general activity and self-reported general activity
Wilcox & Storandt, (1996 [57])	N=121; random women participants	5 specific exercise self-efficacy scores	$r=.86$ $p<.0001$	Descriptive examination of differences between exercisers and non-exercisers on self-efficacy	Exercisers had higher self-efficacy ( $R^2=8\%$ , $p<.001$ ); belief that exercise would be beneficial decreased among nonexercisers, was not correlated among exercisers ( $r=.06$ , ns)

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