

Theoretical Framework to Study Exercise Motivation for Breast Cancer Risk Reduction

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Purpose/Objectives: To identify an appropriate theoretical framework to study exercise motivation for breast cancer risk reduction among high-risk women.

Data Sources: An extensive review of the literature was conducted to gather relevant information pertaining to the Health Promotion Model, self-determination theory, social cognitive theory, Health Belief Model, Transtheoretical Model, theory of planned behavior, and protection motivation theory.

Data Synthesis: An iterative approach was used to summarize the literature related to exercise motivation within each theoretical framework.

Conclusions: Protection motivation theory could be used to examine the effects of perceived risk and self-efficacy in motivating women to exercise to facilitate health-related behavioral change.

Implications for Nursing: Evidence-based research within a chosen theoretical model can aid practitioners when making practical recommendations to reduce breast cancer risk.

Key Points . . .

- No general consensus exists regarding which theoretical framework is best used to study exercise motivation and adherence in women.
- Perceived risk is a central concept of many theoretical models used to explain and predict health behavior.
- Perceived self-efficacy from the social cognitive theory appears to be the most common factor in increasing the likelihood of commitment to exercise behavior.
- Further research is needed about specific interventions that might motivate women to exercise to reduce their risk of developing breast cancer.

One in eight women in the United States will be diagnosed with breast cancer, with 95% of all breast cancer being diagnosed in women aged 40 years or older. In 2007, an estimated 240,510 women will be diagnosed and 40,460 will die from breast cancer in the United States (American Cancer Society, 2007). The incidence of breast cancer has risen steadily during the past century; breast cancer is considered the most common cancer and the second-leading cause of cancer death among women in the United States.

According to the U.S. Department of Health and Human Services (1996, 2000, 2007), physical activity reduces the risks associated with a variety of diseases, including breast cancer. Individuals who participate in the greatest amount of physical activity seem to have the lowest risk. Studies show that women who participate in moderate to vigorous activity at least three to four hours per week have a 30%–40% reduction in breast cancer risk over sedentary women, regardless of their menopausal status (John, Horn-Ross, & Koo, 2003; McTiernan, 2003). Despite the growing evidence, many women choose not to exercise. Data show that less than 50% of women participate in physical activity as recommended by the Centers for Disease Control and Prevention (CDC) and the American College of Sports Medicine. More than 25% are not active at all (CDC, 2005).

Difficulty with exercise initiation and adherence among women has been attributed to a variety of factors. Motivation, in particular, consistently has been a strong indicator (Dishman, 1991; Girvin & Reese, 1990), with outcome expectations playing a major role (Bandura, 1977, 1982; Dishman & Buckworth, 2001; Schwarzer & Fuchs, 1995). Several theoretical frameworks have been applied to investigate women's motivation

to exercise, identify what factors most predict initiation and adherence, and plan appropriate interventions to increase participation in physical activity. No general consensus exists at this time as to which theoretical framework is best used to guide research. This article explores the contributing factors to exercise adherence, specifically motivation, within the context of several theoretical frameworks (see Table 1) which can be used to identify an appropriate model to guide research in exercise motivation for breast cancer risk reduction among high-risk women.

Health Promotion Model

According to Pender's (1996) Health Promotion Model, health promotion is directed toward behaviors that optimize well-being, personal fulfillment, and self-actualization. Pender's original model emphasized seven cognitive-perceptual factors that directly affect the likelihood of engaging in health-promoting behaviors and five modifying factors that indirectly influence health behaviors. The seven cognitive-perceptual factors are the importance of health, perceived control of health, perceived self-efficacy, definition of health, perceived health status, perceived benefits of health-promoting behaviors, and

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perceived barriers to health-promoting behaviors. The five modifying factors consist of demographic characteristics, biologic characteristics, interpersonal influences, situational factors, and behavioral factors. Internal and external transient cues to action promote participation in health-promoting behaviors. Levels of health exist along a continuum in which individuals strive for optimum well-being. Individuals are motivated to participate in health-promoting behaviors by the desire to increase well-being and self-actualization. Bandura's (1986) social cognitive theory is central to the Health Promotion Model; the greater the perceived efficacy, the more persistent an individual will be to engage in a behavior. Perceived self-efficacy increases the likelihood of commitment to action and performance of behavior.

Model Application

Application of the Health Promotion Model with regard to exercise adherence is limited, mostly focusing on the relationship between health-promoting behaviors and well-being. Pender (1996) studied health-promoting lifestyles and frequency of exercise among white-collar workers, suggesting a positive correlation between increased activity and optimal well-being. Employees participating in wellness programs improved their overall health (Elbertson, Daniels, & Miller, 2001). The 374 participating employees, with an average age of 39.51 years, took part in 12 months of structured or nonstructured exercise. The groups were compared and both showed physiologic improvement ($p < 0.05$), suggesting that exercise can be beneficial, regardless of the type of exercise program.

Self-Determination Theory

According to Deci and Ryan's (1985) self-determination theory, individuals have three basic needs (autonomy, competence, and relatedness) that must be satisfied socially to facilitate motivation, performance, and well-being. The three types of motivation are amotivation, extrinsic motivation, and intrinsic motivation. Amotivation is a lack of intention toward a behavior; extrinsic motivation is performance of an activity to attain an outcome; and intrinsic motivation is participation in an activity for the pure enjoyment of the activity. A continuum of self-determination guides motivation from amotivation to intrinsic motivation. As individuals move toward intrinsic motivation, they possess stronger feelings of personal achievement, autonomy, and self-confidence, as well as a sense of well-being. Intrinsic motivation is the critical variable to fostering exercise adherence (Ryan & Deci, 2000).

Model Application

Self-determination theory has been used as a theoretical framework to study exercise motivation, particularly among sports enthusiasts. Physical activity that focuses on enjoyment, competence, and social interaction leads to long-term exercise adherence (Ryan, Frederick, Lepes, Rubio, & Sheldon, 1997). Exercise motives between participants of tae kwon do and aerobic exercise were compared to predict adherence. Tae kwon do participants rated higher in enjoyment and competence motives and showed better long-term exercise adherence ($p < 0.001$) than aerobic exercise participants, who rated higher on fitness or appearance motives. An activity that is intrinsically motivating and vigorous enough to promote health and well-being is critical for building exercise motivation (Iso-Ahola & St. Clair, 2000). Unfortunately, when women perceive a lack of control,

competence, or relatedness to social roles or relationships, such as marital or parental obligations, they are unlikely to find the internal motivation to participate in physical activity (Landry & Solmon, 2002).

Social Cognitive Theory

Bandura's (1986) social cognitive theory focuses on an individual's perception of his or her skills and abilities to act effectively and competently in performing a specific behavior to produce a desirable outcome. According to Bandura (1977), self-efficacy, a central construct in the theory, is positively related to motivation and extensively regulated by behavioral intention and planning. Assumptions about possible outcomes of behavior, as well as the belief in the ability to perform a specific behavior, are based on personal self-efficacy beliefs (Bandura, 1977, 1982).

An individual's belief in being capable of performing a particular action is task self-efficacy, and the individual's belief in the ability to perform the task despite environmental demands and obstacles is coping self-efficacy (Rodgers, Munroe, & Hall, 2002). Individuals who are confident about their ability

Table 1. Theoretical Frameworks

Model	Descriptive Factors and Outcomes
Health Promotion Model	Modifiers (demographic characteristics, biologic characteristics, interpersonal influences, situational factors, and behavioral factors), cognitive-perceptual factors (importance of health, perceived control of health, perceived self-efficacy, definition of health, perceived health status, perceived benefits of health-promoting behaviors, and perceived barriers to health-promoting behaviors), and internal and external cues to action lead to a likelihood of engaging in health-promoting behavior.
Self-determination theory	Three basic needs (autonomy, competence, and relatedness) and motivation (amotivation, extrinsic motivation, and intrinsic motivation) are formed along a continuum of self-determined health behavior.
Social cognitive theory	Modeling, verbal persuasion, emotional arousal, and mastery experiences lead to self-efficacy and outcome expectancies, which enforce behavior.
Health Belief Model	Demographic variables, cues to action, perceived susceptibility, and perceived seriousness coupled with perceived threat of disease and perceived benefits minus perceived barriers dictate the likelihood of taking healthful actions.
Transtheoretical Model	Precontemplation, contemplation, preparation, action, and maintenance are steps toward behavior change over time.
Theory of planned behavior	Attitude, subjective norm, and perceived behavioral control strengthen intention and reinforce behavior.
Protection motivation theory	Environmental and interpersonal sources of information initiate threat appraisal and coping appraisal, build protection motivation, and lead to adaptive and maladaptive coping.

to achieve a particular goal have optimal motivation for maintaining exercise (Dishman & Buckworth, 2001). Self-efficacy is based on an individual's perception of his or her skills and abilities to act effectively and competently in performing a specific behavior (Bandura, 1986).

Self-efficacy has several determinants: performance accomplishment (mastery of a previous task), vicarious experiences (participation modeling), verbal persuasion (positive feedback), emotional arousal (emotional control techniques through relaxation, biofeedback, and desensitization), physiologic state (readiness to rise to the occasion), and imaginable experiences (envisioning success). Self-efficacy is positively related to motivation and extensively regulated by behavioral intention and planning (Bandura, 1977, 1982).

Model Application

The social cognitive theory has been shown in several studies to predict exercise behavior. Self-efficacy was the strongest predictor of exercise behavior among 328 male and female undergraduate students enrolled in vigorous physical education classes. Individuals who felt more confident about their abilities to exercise, despite barriers to participation, exercised more days per week than those who felt less confident (Dzewaltowski, 1989). Accurate exercise knowledge was shown to enhance self-efficacy in the adoption and maintenance of regular exercise among African American and Caucasian women, aged 50–80 years, although perceived time constraints were a barrier to exercise, regardless of the acknowledged benefits (Fitzgerald, Singleton, Neale, Prasad, & Hess, 1994). Age was deemed to be the best predictor of self-efficacy in relation to physical activity among evenly distributed male and female adult participants, aged 18–78 years, suggesting a positive correlation among physical activity, level of education, and self-efficacy, particularly among the male participants (Netz & Raviv, 2004).

Health Belief Model

The Health Belief Model was formulated in 1966 by Rosenstock (1974) and further developed in 1975 by Becker, Maiman, Kirscht, Haefner, and Drachman (1977). Rosenstock, Strecher, and Becker (1988) proposed that self-efficacy be integrated into the Health Belief Model, and it has since been used as a supplementary component, particularly in exercise adherence (Landry & Solmon, 2002). Within the theoretical context of the Health Belief Model, adherence is determined by the individual's perception of a health threat and the value of a behavior to reduce the threat, weighed against the perceived benefit. A perceived threat is directly related to perceived severity and susceptibility. Perceived severity is an individual's perception concerning the seriousness of a health condition; perceived susceptibility reflects an individual's perception of the risk of contracting the health condition. A disease or other health threat may predict adherence behavior. Perceived benefits are beliefs that various actions or behaviors taken by an individual will be effective in reducing a threat.

Model Application

The Health Belief Model has been used widely to study risk behaviors such as smoking and alcohol use, dental hygiene, contraceptive use, medication compliance in diabetes and hypertension, and dietary compliance (Becker et al., 1977;

Sheeran & Abraham, 1996). The model has been used to examine common factors that influence women to comply with current mammography screening guidelines. Provider recommendations, along with education about the risks and benefits of screening, were shown to increase compliance ($p = 0.05$) among 179 female participants (Vienot & Manderachia, 2004). Perceptions of increased personal risk, greater perceived benefits, and fewer perceived costs were associated with interest in gene testing in 193 women, some of whom were at high risk for breast cancer. More women from the high-risk group preferred being tested ($p < 0.05$) as compared to those in the general population (Cappelli et al., 2001).

Motivation to exercise using the original theoretical framework of the Health Belief Model has had limited application. The addition of self-efficacy into the model has improved its applicability (Janz & Becker, 1984; Landry & Solmon, 2002). Perceived barriers to exercise accounted for 22% of the variance in 159 prospective health education teachers (72% female) and were considered the most powerful predictor of exercise participation in a survey conducted at a medium-sized university. Motivation contributed another 2% to the variance between the exercisers and nonexercisers (Girvin & Reese, 1990), which was significant ($p < 0.05$). Perceived benefits and benefits of exercise between women who have experienced breast cancer and those who have not indicate that participation in health-promoting behaviors, such as exercise, provides breast cancer survivors with a sense of control over their lives. Perceived benefits and barriers to exercise were found to be even more significant among women who have not experienced breast cancer (Nelson, 1991). Corwyn and Benda (1999) studied determinants of male and female participation in vigorous exercise among three different age groups (18–39, 40–59, and 60 and older) and indicated that the strongest predictor was perceived benefits of exercise; modeling others who regularly engage in exercise was the second strongest, accounting for 41.8% of the total variance. Health information was a significant predictor of exercise among the two youngest groups. Healthcare advice predicted exercise participation among those 60 and older, suggesting that healthcare support can play a major role in exercise motivation.

Transtheoretical Model

The Transtheoretical Model, otherwise known as the Stages of Change Model, evaluates an individual's motivational readiness to move through stages of behavioral change (Prochaska, DiClemente, & Norcross, 1992). The five behavioral stages are precontemplation, contemplation, preparation, action, and maintenance. In the model, changes occur when a patient acquires and adopts a new behavior. In precontemplation, an individual has no intention of changing a behavior anytime soon. In the contemplation stage, an individual has given some consideration to change. Preparation occurs when an individual has made a commitment to change in the near future. An individual becomes actively involved in change in the action state, but with significant energy expenditure. Maintenance is achieved when an individual has sustained the change over a period of time, usually at least six months.

Model Application

The Transtheoretical Model has been applied in several different studies involving exercise adherence. Women, aged

59–78 years and diagnosed with low bone density, were asked to participate in a 12-month study to determine whether self-efficacy, readiness for change, and social support would predict exercise behavior. The variables were found to be significant predictors of exercise behavior ($p < 0.05$), supportive of the model (Litt, Kleppinger, & Judge, 2002). Self-efficacy was considered the best predictor of adherence among a relatively small sample of 30 cardiac and pulmonary rehabilitation program participants ($p < 0.01$) over a period of 12–18 weeks (Guillot, Kilpatrick, Hebert, & Hollander, 2004). Exercise motives were measured across the stages of change among 425 male and female participants who regularly engaged in leisure time exercise two to three times per week (Inglelew, Markland, & Medley, 1998). Exercise motives were found to differ among individuals throughout the stages of change, suggesting that extrinsic motives dominate during the early stages of change whereas intrinsic motives seem to be important for progression and maintenance ($p < 0.05$). Although the model has been used to study exercise motivation, it also has been criticized for its inability to measure specific changes within each stage and adequately predict exercise behavior (Renner & Schwarzer, 2003).

Theory of Planned Behavior

The theory of planned behavior is an extension of the theory of reasoned action (Ajzen, 1988; Fishbein & Ajzen, 1975). This theory is more predictive of intentions and goal attainment than the theory of reasoned action (Ajzen & Madden, 1986). According to the theory of planned behavior, intention to perform a behavior is the proximal determinant of behavior. The theory of planned behavior suggests that three conceptually independent determinants of intention exist: attitude, subjective norm, and perceived behavioral control. Attitude is the individual's perceived positive or negative evaluation of performing the behavior. Subjective norm reflects the perceived social pressure as to whether to perform the behavior. Perceived behavioral control considers the resources and opportunities available to perform the behavior.

Model Application

The theory of planned behavior explains and predicts health-related behaviors and has been used in a number of settings and populations to demonstrate its predictive capacity in exercise research. Intentions to exercise are based on fitness attitudes and the ability to try, whereas exercise behavior is defined by one's perceived behavioral control or ability to perform the behavior and ultimately control exercise behavior (Kerner, Grossman, & Kurrant, 2001). Perceived behavioral control can predict the initiation and maintenance of exercise behavior over a relatively short period of time (Armitage, 2005). In a meta-analysis conducted by Godin and Kok (1996), the theory of planned behavior accounted for 41% of the variance in behavioral intentions and 34% of the variance in behaviors among various health-related behavior categories, including exercise. Blue's (1995) integrative review demonstrated that attitude was predictive of intention in all of the studies, suggesting that individuals may be more likely to exercise when they hold a positive evaluation of exercise. In a more

recent meta-analysis (Hagger, Chatzisarantis, & Biddle, 2002), attitudes were shown to carry the strongest weight in determining physical activity intentions. Participants presented with a persuasive message targeting salient beliefs produced more positive attitudes toward health behavior ($p < 0.05$) and stronger intentions ($p = 0.059$) than those presented with a message targeting nonsalient behavioral beliefs (Chatzisarantis & Hagger, 2005); however, neither message influenced participation in physical activity ($p > 0.05$) over a five-week interval of time. However, the study is one of the first to suggest that intentions can be influenced by targeting only attitudes.

Protection Motivation Theory

The protection motivation theory proposes that intention to perform a recommended protective health behavior is determined by an individual's perceived vulnerability, perceived severity, response efficacy, and self-efficacy, collectively known as threat and coping appraisal (Rogers, 1983). The amount of protection motivation that arouses, sustains, and directs attitudes and behavior is a function of the threat and coping appraisal processes.

Threat appraisal consists of perceived vulnerability, perceived severity, and fear arousal, whereas coping appraisal involves response efficacy and self-efficacy. Perceived vulnerability reflects an individual's perception of developing a health condition, and perceived severity reflects the individual's belief that the consequences imposed by the health condition will be severely disabling or life threatening. Fear arousal implies that the potential for harm is significant enough to motivate behavioral change. Response efficacy is the belief that the behavior undertaken by the individual to reduce the threat will alleviate or reduce his or her risk associated with the health condition. Self-efficacy is the belief by the individual that the modifying behavior can be performed successfully.

Antecedents of Protection Motivation

Environmental and intrapersonal information sources are responsible for initiating the two cognitive-mediating processes, threat appraisal and coping appraisal (Rogers, 1983). Environmental sources consist of verbal persuasion, such as fear appeals, and observational learning, which consists of watching what happens to others. Intrapersonal information includes personality variables or characteristics and the individual's prior experience with similar threats.

Outcomes of Protection Motivation

The cognitive-mediating processes appraise a maladaptive or adaptive response (Rogers, 1983). More than one maladaptive or adaptive response may be possible depending on the circumstances (e.g., smoking, exercise). Threat appraisal evaluates the likelihood of making the maladaptive response, whereas coping appraisal evaluates the likelihood of making the adaptive response.

Threat appraisal suggests that, as perceived vulnerability and perceived severity increase, the likelihood of engaging in an unhealthful behavior decreases unless the unhealthful behavior is increased by the perceived intrinsic rewards (e.g., physical, psychological pleasure) and extrinsic

rewards (e.g., peer approval, social norms) that result from the behavior (Maddux, 1993). The perception of threat (severity and vulnerability) will decrease the likelihood of the maladaptive response. Intrinsic rewards (e.g., physical, psychological pleasure) and extrinsic rewards (e.g., peer approval, social norms) increase the likelihood of the maladaptive response.

Coping appraisal comprises response efficacy and self-efficacy and response costs. Although response efficacy and self-efficacy will increase the likelihood of an adaptive response, response costs such as inconvenience, difficulty, personal time, and effort are costs that will decrease the likelihood of selecting the adaptive response (Rogers & Prentice-Dunn, 1997). Coping appraisal suggests that, as response efficacy and self-efficacy increase, so does the likelihood of engaging in the recommended health behavior unless the coping response is decreased by the perceived costs (Maddux, 1993).

Model Application

Protection motivation theory has been applied successfully in several contexts, including cancer prevention, exercise and lifestyle, smoking, AIDS prevention, alcohol consumption, medical treatment compliance, antinuclear behaviors, environmental protection, emergency assistance, and bicycle and transportation safety (Floyd, Prentice-Dunn, & Rogers, 2000). Within the realm of exercise, undergraduate participants at a British university, 73% of whom were women, were randomly assigned to one of three groups—one group receiving a motivational intervention, one group receiving a motivational and volitional intervention, and one group receiving no intervention (Milne, Orbell, & Sheeran, 2002). Motivational interventions using health education teaching to promote exercise participation in young adults over a two-week period suggest that interventions designed to affect response efficacy had the greatest impact on exercise adherence ($p < 0.001$). In perhaps one of the most significant studies, Courneya and Hellsten (2001) found that individuals were motivated to exercise to reduce their risk for cancer. Undergraduate students who perceived that colon cancer was a severe disease were more motivated to exercise if they felt that their risk for developing colon cancer could be reduced. Perceived severity and response efficacy were positively correlated with exercise motivation ($p \leq 0.01$), suggesting that cancer prevention strategies and teaching may promote exercise behavior.

Implications for Practice and Research

Perceived risk is a central concept used to explain and predict health behavior in many theoretical models (Becker et al., 1977; Fishbein & Ajzen, 1975; Rogers, 1975; Schwarzer, 1992). Research suggests that, until individuals perceive their own personal risk from a health threat, they do not have reason to consider modifying behavior (Courneya & Hellsten, 2001; Janz & Becker, 1984; Rippetoe & Rogers, 1987; Skinner, Kreuter, Kobrin, & Strecher, 1998). An individual must believe in the value of a behavior in reducing the threat and the efficacy in affecting the outcome. A woman who thinks she is likely to develop breast cancer in the near future may choose to exercise if she believes it will significantly reduce or eliminate her risk.

Perceived self-efficacy appears to be the most common factor in increasing the likelihood of commitment to action and performance of exercise behavior, and it has been noted as a central construct in each of the theoretical frameworks (Bandura, 1986; Dishman & Buckworth, 2001; Dziewaltowski, 1989; Guillot et al., 2004; Schwarzer & Fuchs, 1995). Readiness for exercise, self-efficacy, and social support were found to be significant predictors of exercise behavior (Litt et al., 2002). Health information and accurate exercise knowledge have been shown to enhance self-efficacy in the adoption and maintenance of regular exercise (Corwyn & Benda, 1999; Dishman & Buckworth; Fitzgerald et al., 1994; Netz & Raviv, 2004).

Research has been limited regarding risk perception and self-efficacy in motivating women to exercise within a healthcare setting, particularly among high-risk women. Whether a woman accurately perceives her risk of developing breast cancer has become increasingly important as more options become available for primary prevention based on her Gail risk score (Gail et al., 1989; Quillin, Fries, McClish, Shaw de Paredes, & Bodurtha, 2004). Although health information and accurate exercise knowledge have been shown to enhance self-efficacy and increase the likelihood of commitment to action and performance of exercise behavior, more studies are needed to explore the direct and indirect effects that healthcare providers can have on exercise motivation (Dishman & Buckworth, 2001; Fitzgerald et al., 1994).

Health behavior is determined by perceived vulnerability, perceived severity, response efficacy, and self-efficacy, and each component can influence health-related intentions and behaviors as suggested by the theory of protection motivation (Courneya & Hellsten, 2001; Maddux & Rogers, 1983; Wurtele & Maddux, 1987). Protection motivation theory could be used to examine the effects of perceived risk and self-efficacy in motivating women to exercise to facilitate health-related behavioral change and reduce their risk for developing breast cancer. Behavioral change is more likely if a woman believes that, by changing her behavior, the risk of an adverse health outcome can be reduced, particularly in women who are deemed to be at high risk for breast cancer (Helmes, 2002; Marteau & Lerman, 2001; Prentice-Dunn, Floyd, & Flournoy, 2001).

Conclusion

Theoretical predictors of exercise should increase the understanding of determinants of exercise behavior so as to enhance participation. The conceptual framework of protection motivation theory, one of several theoretical frameworks discussed in this article, can be used to examine the effects of risk and self-efficacy in motivating women to exercise. Patients need a strong incentive to change behavior that threatens or affects their health status. Such evidence-based research can aid nurses in making appropriate recommendations to women to reduce their risk of developing breast cancer.

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