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Integrated model: Adherence to activity

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INTEGRATED MODEL:
ADHERENCE TO ACTIVITY

by

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Bachelor of Science, Boise State University, 1992

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INTRODUCTION

"If at first you don't succeed try, try again." This old adage holds true in most aspects of life. Why then, do more than 50 percent of Americans who energetically embark on activity programs lose enthusiasm and cease exercising? Further mystifying is the fact that the health benefits of activity have been widely published and promoted in the workplace and via the almost inescapable American media. Millions of Americans are aware of the health-benefits of activity.

PURPOSE

The purpose of this paper is to: 1) present a thorough review of the literature available regarding activity adherence, 2) develop an interactional model of the variables affecting activity adherence, and 3) make recommendations in regard to facilitating activity adherence.

SIGNIFICANCE

Sedentariness presents a problem in contemporary America. Currently two-thirds of the adult population are not active on a regular basis. Nearly half of American adults do not engage in physical activity at all. In and of themselves these statistics do not pose a problem, but considering that coronary artery diseases, obesity, and other sedentary lifestyle related diseases are prevalent in millions of adult Americans, lack of activity becomes a problem (Dishman, 1987). Examples of sedentary lifestyle

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related health problems are abundant in the American population: 1) an estimated 30 million Americans each year are afflicted with coronary artery disease, 2) low back injuries affect 75 million Americans, and 3) 25 million suffer some various type of mental disorder (Dishman, 1984). While additional research is needed, many of these diseases and disorders seem to be associated with inactive lifestyle and non-adherence to activity programs. Physical activity, therefore, may be a somewhat successful means of treatment.

A study completed in 1980 estimated approximately 50 percent of the individuals beginning an activity program will discontinue exercising in the first six months of the program (Epstein, Wing, Thompson, & Griffin, 1980). Adherence to activity programs has been considered important for two reasons: 1) prescribed treatment cannot be properly evaluated unless the individual faithfully attends the activity sessions, and 2) physical fitness increases seem to be a direct function of program participation. The two rationales for the importance of activity adherence described previously need to be expanded. Also important are activity related reductions in cardiovascular disease, blood cholesterol levels, depression, and stress and anxiety levels. Increases in cognitive functions, immune system function, bone density, self-efficacy, energy levels, and self-esteem are some of the additional benefits that have
been associated with activity (Ornstein & Sobel, 1989). Most important is the additive affect these benefits have upon improving quality of life.

The interactional model introduced in this paper provides a broadbased conceptual framework recognizing the multidimensional nature of activity adherence. In a review of the literature no model of activity adherence variables was found. Such a model will provide activity specialists with a structure in assessing a particular client's susceptibility to program non-adherence. Moreover, upon identifying the client's adherence obstacles, the activity specialist may then assist the client in developing a strategy to overcome these adherence obstacles. Activity specialists, therefore, may begin to offset the sedentariness exhibited in America today and improve the quality of life for millions of Americans.

In addition, while the model relates to activity adherence, there is evidence the model may lend itself useful to a variety of health specialists. There exists a considerable correlation between activity program adherence rates and adherence to psychotherapy, drug, alcohol, smoking, and hypertension control programs (Morgan, 1977). The author's intent is that this model may be utilized not only to enhance activity adherence, but to enhance adherence to a variety of health related behavior changes as well.
METHODS

This paper utilized a review of reported research to identify and examine a number of factors potentially influencing activity adherence. In reviewing the studies, activity adherence variables were color coded and highlighted as they appeared in each study. Information reviewed in the articles studied was highlighted with the color that corresponded with the variable. Locus-of-control information was highlighted in blue, self-efficacy in green, individual needs in yellow, outcome expectancies in orange, and personal variables in red. The categorized activity adherence variables were then placed into an interactional model.

DEFINITIONS

Activity Adherence

For the purpose of this project exercise adherence will refer to one's compliance to an activity program or prescription.

Locus-of-Control

Individuals' acceptance of personal responsibility for what happens to them (Cox, 1990).

Self-Efficacy

Individuals' judgements of their capabilities to perform a behavior or task necessary to produce a particular outcome (Cox, 1990).
Individual Needs

Individual needs vary across the population, but for the purpose of this project will include Maslow's Hierarchy of Needs, social needs, and health needs.

Outcome Expectations

Individuals' estimates that given behaviors will produce certain outcomes. Related to activity, individuals associate definite outcomes with an active lifestyle (Brooks, 1992).

Personal Variables

For the purpose of this project personal variables will include personality type, previous and/or present lifestyle, and self-motivation.

Self-Motivation

Individuals' abilities to commit themselves to pursuit of a goal or goals (Cox, 1990).

Type A Personality

"Individuals aggressively involved in a chronic incessant struggle to achieve more and more in less and less time" (Friedman and Rosenmann, 1974).
REVIEW OF THE LITERATURE

INTRODUCTION OF VARIABLES

Sedentariness poses a large problem in America today. Investigative research conducted in an attempt to discover the causes of sedentariness has produced the following five major variable categories that seem to most significantly affect activity adherence: 1) Individual locus-of-control, 2) self-efficacy, 3) individual needs, 4) outcome expectation, and 5) personal variables. Numerous variables external to the individual may also affect adherence rates.

**Locus-of-Control**

Of the numerous variables affecting activity behavior patterns, locus-of-control appears to be a significant determinant of adherence. An internal-external reinforcement control has been developed that classifies people according to the degree they accept personal responsibility for what happens to them (Sonstroem & Walker, 1973). Extreme internal locus-of-control and extreme external locus-of-control should be viewed as two endpoints on a continuum. Most individuals lie somewhere between these two endpoints. Health behaviors of individuals who are primarily internal locus-of-control are distinctly different than the health behaviors of individuals who are more external locus-of-control (Sonstroem & Walker, 1973).
**Internal Locus-of-Control**

An individual with an internal locus-of-control assumes personal responsibility for his successes and failures. An internal locus-of-control individual believes that personal choice, ability, and effort interact to determine situation outcomes. Persons with an internal locus-of-control demonstrate an ability to easily forget failure, are action-oriented, and are likely to attempt personal improvements, even when faced with extremely difficult or threatening tasks (Sonstroem & Walker, 1973). When participating in an activity or health improvement program, it is inevitable that one will experience at least one perceived failure (missing an activity class, not meeting a short-term goal, or suffer a temporary smoking cessation relapse). The internal locus-of-control person tends to focus on attaining future successes in the program rather than focusing on the failure or relapse. Internals realize behavior change (i.e., activity adherence) is difficult. They are able, however, to formulate a plan of action to assist them in overcoming perceived barriers impeding personal improvement. Internal locus-of-control individuals are likely to seek and obtain health information and to self-monitor and maintain their personal health (Waller & Bates, 1991). Internals are also more likely to participate in health promotion programs than are externally controlled individuals. This statement is supported by research showing internals regularly using
contraception and successfully completing weight loss and smoking cessation programs at a higher rate than externals (Waller & Bates, 1991). Internal locus-of-control individuals are also more likely to participate in activities with higher metabolic costs, such as activity programs, than are external locus-of-control individuals (Waller & Bates, 1991). Internal health locus-of-control has a positive correlation with optimism, better health perception, more positive coping skills, positive self-concept, happiness, and contentment (Waller & Bates, 1991). These factors seem to encourage and help develop activity adherence.

External Locus-of-Control

External locus-of-control individuals do not possess the activity adherence facilitating characteristics common to internal-locus-of-control individuals. People with an external locus-of-control attribute their successes to luck and chance, while failures are attributed to fate and the influence of powerful others (Waller & Bates, 1991). Externally controlled individuals believe failure is inevitable. External locus-of-control is negatively correlated with good health and physical activity (Waller & Bates, 1991). Thus, locus-of-control may be a determining factor of a person's health and activity level. An external locus-of-control individual is less likely to engage in physical activity than is an internal locus-of-control
person. The externals believe they are doomed to fail from the outset of the program. For example, if the activity facility is not easily accessible, the external will not attend activity classes. External individuals believe they are not meant to be active. Fate has placed the activity center so far away as to render it inconvenient for utilization. Individuals beginning an activity class provide another example. If the individuals do not believe they can successfully complete the program, then the probability of the individuals completing the program or even completing more than one class is very low. External locus-of-control persons recall personally threatening negative information quite readily. When external locus-of-control individuals fail at a task they are likely to halt performance of that task. Sonstroem and Walker (1973) conducted a study showing externally controlled individuals exercising at amazingly lower rates than internals simply because they had failed at previous activity attempts. The external locus-of-control individual does not possess the personality characteristics necessary to overcome activity failures and continue the activity program. Waller and Bates (1991) cite studies showing patients with chronic diseases (cancer and diabetes) as having a high external health locus-of-control. This suggests that externals may be more susceptible to chronic diseases. Because of this, it is imperative to assist externals in making the
behavioral changes necessary to facilitate activity adherence and thus reduce their activity related disease risk.

**Self-Efficacy**

In relation to activity adherence, self-efficacy may be defined as one's confidence to adhere to an activity program or to activity continuously for a set time period. Waller and Bates (1991), Garcia and King (1991), Dishman (1987), and Dzwewaltowski (1989) have examined the relationship between self-efficacy and activity adherence have concluded the following: Self-efficacy is an important variable in maintaining health behavior changes, particularly activity adherence. If an individual engages in healthy behaviors (activity) self-efficacy perceptions improve (Waller & Bates, 1991). Efficacy beliefs influence behavior which, in turn, influences subsequent efficacy beliefs. Efficacy appears to be self-reinforcing. For example, if individuals do not complete an activity session they may believe they lack dedication. Negative self thoughts increase and cause self-efficacy to decrease. Alternatively, if individuals complete an activity program or even a phase of a program, positive self thoughts increase producing a higher self-efficacy. The resultant higher self-efficacy level helps individuals adhere to the program when other barriers are confronted. Garcia and King (1991) conducted a study which yielded results showing self-
efficacy as a significant determinant of activity adherence. Self-efficacy levels had a large affect on Garcia and King's subject's activity behaviors at both six months and one year. Individuals in a study by Dzwewaltowski (1989) who felt confident they could adhere to an activity program despite physical fatigue and time demands, were more likely to adhere despite perceived anguish. Generally, high self-efficacy is associated with increased activity involvement. High self-efficacy levels have also been associated with regular long-duration activity program attendance (Garcia & King, 1991).

**Individual Competence Level**

According to social learning theory, an individual's sense of competence affects that individual's self-efficacy level which in turn affects that individual's behaviors, more specifically that individual's activity behaviors (Waller & Bates, 1991). Perception of one's competence level is affected by perceived body image, perceived choice, past experience, and psychological state (Brooks, 1992). Research has also shown level of enjoyment affects one's competence level (Andrew, Oldridge, Parker, Cunningham, Rechnitzer, Jones, Buck, Kavanaugh, Shephard, & Sutton, 1981).

**Individual competence: body image and perceived choice**

Health club members are concerned about whether they would look stupid, whether they would be able to keep up
with the class and/or the instructor, and whether they would have to stop exercising in front of the entire class (Brooks, 1992). The individual's sense of competence is lowered when the individual suffers embarrassment. If the individual perceives an activity choice, however, one's sense of competence may increase and render social comparison and appearance concerns less significant. Perceived choice has been associated with increased activity session attendance (Dishman, 1987).

**Individual competence: past experience**

Past experience is a major determinant of activity program selection. Individuals with a low sense of competence will invariably choose familiar activities, believing they have a greater chance of completion. If these individuals are forced to choose an activity from a list of activities they are unfamiliar with, then the activity chosen is usually one that requires nominal skill to complete or is vaguely familiar to them (Brooks, 1992). Activities these individuals choose are typically stationary bicycling, walking programs, or utilizing activity machines such as stairclimbers or rowers.

Individuals with low self competence levels must be allowed to choose their activity or activity compliance will be greatly reduced (Brooks, 1992). Some individuals have chosen to perform no physical activity in lieu of participating in an activity in which they do not feel
If an activity professional places individuals in programs that they do not feel comfortable with, then the activity participants will likely experience a decrease in self-efficacy and drop out of the activity program altogether (Dishman, 1987). In order to increase competence, self-efficacy, and thus activity adherence, the individual must perceive a choice in activity selection. Development of a sense of competence is essential to maintain an active lifestyle.

**Individual competence: level of enjoyment**

The relationship between perceived level of enjoyment and sense of competence has been studied. In a study evaluating patients recovering from myocardial infarction, it was demonstrated that the subjects who were not enthusiastic about their prescribed activity sessions had higher dropout rates than those who enthusiastically approached activity (Andrew, et al. 1981). Level of enjoyment is directly related to sense of competence. Dishman (1987) suggests preferred exertion may be as important a determinant of adherence as perceived exertion. Dishman (1987) further states common sense dictates that activity should be an enjoyable activity. Most individuals, unless forced, do not participate in unenjoyable leisure time activities.

**Individual competence: attitudes and beliefs**
Sense of competency is also affected by attitudes and beliefs toward and about activity and the person's intention to engage in activity (Brooks, 1992). An individual's attitudes are developed in part by past experience. Attitudes have personal and impersonal components (Brooks, 1992). The personal component deals with the emotions an individual feels about specific activities. For example, some individuals love to run, while others hate running. The impersonal component deals with the way an individual characterizes the activity (Brooks, 1992). For example, certain individuals believe rock climbing is a dangerous activity, while others believe rock climbing to be a fun, safe, exhilarating sport. These attitudes determine the type of activity in which an individual chooses to participate.

Research has examined individuals' attitudes toward activity and subsequent activity adherence rates. While in the short run there appears to be a relationship between attitudes and activity adherence, Dishman (1987) has discovered almost no relationship between attitudes about health behaviors and long-term activity adherence. Surveys of activity program dropouts revealed dropouts held favorable views toward activity and the health benefits of activity (Dishman, 1987). Attitudes toward activity and beliefs about the health benefits of activity influence
initial activity program involvement, but not long-term adherence (Dishman, 1982). In summary, measurements of attitude cannot be used to successfully predict long-term habitual activity, but can be used to predict attraction to physical activity or to make evaluations about the individual's perceived worth of activity.

**Individual Needs**

Individual needs also affect activity adherence rates. Abraham Maslow originally established the theory of five levels of individual needs (Brooks, 1992). Individual needs range from being biological in nature, to the need for security, social interaction, self-esteem, and finally self-actualization. If specific needs are not satisfied, the importance of other needs are negated (Brooks, 1992). For example, if an individual is scared, which is often the case when beginning an activity program, it is extremely unlikely that the individual can in any way be motivated to participate in an activity program (Brooks, 1992).

**Commitment Level**

Individuals possess various commitments to participate in a healthy active lifestyle. The level of commitment is dependent upon one's level of need (Brooks, 1992). In general, the stronger the need, the greater the commitment. Dishman (1987) has stated that behavioral and psychometric studies indicate that level of commitment is one of the
stronger determinants of activity adherence. Three areas of individual need will be evaluated: social support and interaction, spouse or significant other support, and individual health needs.

Social Needs

The social needs of the individual seem to have significant influence on activity adherence. New activity participants prefer to exercise with others (Dubbert, et al. 1987). A majority of individuals participating in activity programs on their own, when ideally they desire to activity with others, fail (Dishman, 1987). Dependence upon social support during the initial phases of an activity program may later develop into use of intrinsic reinforcements that can enhance activity adherence (Dishman, 1987). The degree and type of social support and whether the activity is social or solitary both seem to affect adherence (Kirschchenbaum, 1987). Allen and Iwata (1980) examined group interaction and activity adherence rates. Allen and Iwata found the activity adherence rate is higher when individuals are working together toward a common goal rather than alone. In a 1981 study, perceived lack of encouragement from others (work colleagues and other program participants) seemed to cause individuals to dropout from the activity program (Andrew, et al. 1981). Garcia's and King's (1991) research has similarly concluded that social support is a major determinant of activity adherence.
Familial, Spouse, and Significant Other Support

Support from the spouse or significant other appears to be the most crucial individual need in attempting to promote activity adherence. A study involving coronary artery patients showed a three times higher dropout rate for those participants receiving no familial support compared to subjects with positive familial encouragement (Andrew, et al. 1981). On a questionnaire given to the subjects in the previous study, respondents three to one agreed that lack of spousal support was a significant factor in activity program adherence (Andrew, et al. 1981). Attitudes of husbands, wives, significant others, and other important family members were reported as critical to long-term activity participation.

Health Needs

A third area of individual need affecting activity adherence concerns the individual's health needs. Many inactive individuals begin exercising solely to improve their health. It is logical to assume that an individual with a high health risk status or an individual in a diseased state is more likely to begin and adhere to an activity program than an apparently healthy individual (Dishman, 1987).

Development of good activity habits may be the most difficult, however, for individuals who are not in good
health. These individuals must initiate the program at slower rates and will thus take longer to reach their personal fitness or health goals (Epstein, et al. 1980). Of the approximately 50% of individuals who quit their activity programs in the first six months, the individuals most likely to quit are those at the highest risk for cardiovascular disease: overweight, smokers, little health knowledge, blue collar workers, and individuals with inactive leisure time (Kirschenbaum, 1987). Research also supports the hypothesis that depressed people are less likely to become active and maintain activity (Dishman, 1987).

**Outcome Expectations**

In addition to the previously mentioned factors, research also indicates the individual's outcome expectations affect adherence rates. Outcome expectations are defined as individual's estimates that given behaviors will produce certain outcomes (Desharnais, Bouillon, & Godin, 1986). Dishman (1987) states individuals who expect health benefits usually have higher activity adherence rates than those who do not expect any health benefits.

**Health Belief Model**

The health belief model proposes that activity adherence is linked to: 1) an individual's perceived susceptibility to a health related disorder or disease, 2) the belief that non-adherence produces negative outcomes, 3)
an assessment of the potential benefits of healthy behavior (activity), 4) the personal and environmental barriers to adoption of healthy behaviors, and 5) symptoms or reminders that cue health advantageous behaviors (Dishman, 1987). However, the emphasis the health belief model places on illness avoidance fails to account for other possible activity outcomes that may serve to motivate the individual. The expected opportunities, anguish, rewards, and satisfaction associated with positive outcomes also affect activity adherence rates (Brooks, 1992).

Expected Opportunity

Individuals are more likely to participate in active lifestyles if they expect opportunity. Expected opportunity addresses the availability of the sport or activity in which the individual wishes to participate (Brooks, 1992). For example, if an individual desires to participate in an aerobics class, but the facility is not conveniently located or the class is not offered at a convenient time, the likelihood of this individual participating is slim. Similarly, if an individual wishes to join a health club but the fees are too high the individual will not be able to join. Lack of opportunity inhibits participation. Most individuals will choose activities matching their time, accessibility, and cost needs (Brooks, 1992).

Expected Anguish and Pain
The amount of anguish or pain the individual expects to experience due to engaging in physical activity will also affect adherence. In pursuit of a new activity, a certain amount of physical pain or intimidation is unavoidable (Brooks, 1992). During the initial phases of activity, the duration and the intensity of activity necessary to improve fitness levels may produce negative side effects (Epstein, et al. 1980). Further, certain activities are difficult to learn. For many individuals, learning the steps and sequences in an aerobics routine or learning the proper weight lifting techniques is extremely difficult. If an individual initially engages in an activity with reasonable expectations of how easy or difficult it will be to learn, then the chances of continued participation are high (Brooks, 1992).

As previously stated, most individuals do not like to engage in activities in which they perceive they look stupid, out of shape, or clumsy. For some people, physical and/or mental anguish is a challenge, or to others anguish is something to be avoided at all costs. Along the same line of thought, for some individuals, mastering a difficult task is enjoyable, for others the path to achieving mastery is wrought with misery. Most adults will try to foresee possible anguish and eliminate it from their activity (Brooks, 1992). In some instances, adults would not go to a fitness facility if they felt intimidated. They would not
engage in activity with others if they felt they were not in control of their exertion levels. Also, they would not attempt new activities if they believed the activity was difficult to learn (Brooks, 1992). Activity induced stress influences the individual's decision to dropout (Dishman, 1987). Some sedentary individuals perceive activity as physically demanding and have difficulty meeting the time demands of an activity program. For many individuals, the pain levels associated with personal change are intolerable and the end results are not worth the anguish.

**Expected Rewards**

The rewards an individual expects to receive also affect activity outcome. Dzewaltowski (1989) suggests all individuals may possibly value and expect some reward from activity. The likelihood of whether or not one is active may depend on what rewards the individual expects to attain from participation in an activity program. There are two types of expected rewards, extrinsic or intrinsic (Brooks, 1992). Extrinsic rewards can either be tangible (weight loss, body toning, and lower cholesterol) or intangible (respect, social approval, and affiliation). Many individuals weight train or body build to gain respect, social approval, and/or social affiliation. Intrinsic (intangible) rewards are extremely difficult to understand and measure. There are three categories of intrinsic rewards including, 1) the simple enjoyment of activity, 2)
the sense of potency derived from doing something physically challenging, and 3) the sense of mission associated with activity (Brooks, 1992). When individuals believe they are attaining a long-term goal, they may experience a feeling of "mission" accomplishment (Brooks, 1992). Maintaining good health in old age is an example of mission. The short-term goal (fitness) may not be immediately rewarding, but the possibility of long-term goal attainment (good health in old age) is motivating. Most people are active for a combination of internal and external rewards. Activity adherence increases when one achieves the expected outcome and receives the expected rewards.

**Satisfaction or Dissatisfaction**

The likelihood an individual has positive activity outcome expectations and will receive rewarding outcomes from participation in an active lifestyle determines that person's level of satisfaction or dissatisfaction (Brooks, 1992). Positive outcome expectancies include several components (Dzewaltowski, 1989). According to Dzewaltowski (1989) these components include rationales such as the expectation that participation in an activity program would be 1) healthy, 2) would relieve tension, 3) would help the individual reach ideal body weight, 4) would increase physical fitness, 5) would help the individual feel better, 6) would improve mental alertness, 7) would improve physical appearance, 8) would help the individual meet people, and 9)
would improve muscle tone. Negative outcome expectancies are that activity participation will be time consuming, physically injurious, boring, or too costly (Dzewaltowski, 1989). The sense of satisfaction or dissatisfaction associated with the types of rewards described in the previous section act to either strengthen or weaken the individual's activity commitment (Brooks, 1992). Individuals usually compare their performances against some perceived standard or goal and are either satisfied or dissatisfied. Activity adherence has been enhanced when individuals complete a rational decision-making process related to activity after analyzing the costs and benefits expected from participation (Dishman, 1987). Some individuals have successfully utilized balance sheets to compare positive and negative outcomes (Kirschenbaum, 1987). In the case of activity, performance is not the desired outcome for most individuals. Physical changes such as reduced body fat or increased muscle tone, social approval or respect, stress reduction, social affiliation, or reduced susceptibility to disease are but a few of the desired activity outcomes.

Occasional dissatisfaction appears to motivate individuals to continue the activity program or activity, attain the desired goal, and achieve satisfaction (Dzewaltowski, 1989). Continual dissatisfaction, however, tends to demotivate individuals and decrease activity
adherence. Dzewaltowski (1989) showed that satisfied individuals engage in activity more days per week than continually dissatisfied individuals.

Satisfaction is derived when the activity opportunity is readily available, the expected rewards (expected positive outcomes) match the rewards received, and when the anguish level is of a low enough intensity to render the activity enjoyable (Brooks, 1992). Once attained, satisfaction serves to reinforce the individual's commitment to activity (Kirschenbaum, 1987). Logically, the incentive to be active is higher if the individual believes in the positive outcomes of activity and is satisfied with the outcomes achieved. Common sense would then dictate that individuals who are more satisfied with the outcomes of activity are more likely to maintain adherence.

**Personal Variables**

The final area to evaluate in relation to individual internal factors affecting activity adherence is the area of personal variables. Personal variables include an individual's lifestyle or previous experiences, self-motivation level, and personality type. Additively, these factors have a notable impact on activity adherence.

**Personal Experiences and Lifestyle**

An individual's decision to be active may be based, in part, on current lifestyle, past lifestyle, and/or personal experiences. The culture individuals are born into will
affect their activity decisions (Brooks, 1992). Family, peers, teachers, and all personal contacts individuals make in life affect their beliefs. As previously reviewed, an individual's beliefs affect activity behaviors. Many activity specialists incorrectly assume if an individual was active earlier in their life (high school athlete) then adherence to an activity regimen will be relatively easy. However, research has supported the opposite view. Former athletes are less likely to engage in physical activity later in life than are individuals who were inactive in high school or college (Dishman, 1982). Findings of a study completed in the 1950's further support this theory (Montoye, Van Huss, Olson, Pierson, & Hudec, 1957). The results showed nonathletes becoming more active than athletes as the individuals approached middle age. Daily experiences and influences from others continually and multiplicatively affect previously formed beliefs about activity and physical activity. Several studies have shown a high negative correlation between activity adherence and individuals who work at blue collar jobs and individuals who are inactive during their leisure time. Both appear to negatively affect activity initiation and adherence (Dishman, 1982).

In many people, the aging process is associated with a decline in the amount of leisure time spent actively (Dishman, 1987). This suggests that activity adherence will
likely become increasingly difficult to maintain as one ages.

Dishman (1987) positively relates activity adherence to education level. College educated persons exercise more regularly than persons with high school or less education. However, as demonstrated by current attempts at health promotion via educational programs, education does not necessarily provide motivation to induce major, long-term, behavioral changes (Field & Steinhhardt, 1992).

Self-Motivation

The level of self-motivation an individual possesses is another personal variable hypothesized to affect activity adherence. Self-motivation is a general rather than a specific trait (Dishman, 1987). While self-motivated individuals have the ability to commit themselves to the pursuit of a goal, and goal commitment has been proven to increase activity adherence, the research on self-motivation and activity adherence is contradictory. Relatively few studies support a positive correlation between high self-motivation and high activity adherence. Self-motivation was not seen to be a factor affecting adherence to activity class attendance, participation in activity throughout the course of an activity study, or adherence to activity two months after participation in an activity study (Garcia & King, 1991). Dishman (1982) suggests that while self-
motivation may be a determinant of activity adherence early in the program, later in the program when obstacles are encountered, the individual drops out despite a high level of self-motivation.

Persons who continually and regularly engage in activity are high in self-motivation, but also have a high internal locus-of-control (Franseen, 1992). Individuals who are self-motivated and who voluntarily engage in self-reinforcing behaviors both inside and outside the activity setting seem to be more successful at adhering to activity (Dishman, 1982). In review of the literature, self-motivation may be an accurate determinant of activity adherence when combined with other adherence influencing factors. Caution must be implemented when interpreting and applying this information, however, as the self-motivated individual may drop out of a structured activity program but continue exercising alone in the home environment.

Personality Type

The final component in the category of personal variables affecting activity adherence is personality type. Extroversion, self-regulation and the Type A Personality, and Pargman's A-D/C-D Personality Continuum will be evaluated as they relate to and affect activity adherence.

Personality type: extroversion
Dishman (1987) addresses extroversion. There is a general tendency for habitually active adult males to exhibit more extrovert-related characteristics than inactive adult males (Dishman, 1987). Extroverted individuals adhere to activity programs better than introverted individuals (Dishman, 1987). While extroverted individuals exhibit higher adherence rates in the social activity setting, figures are not available to assess activity adherence rates of extroverts versus introverts in the home setting. As when assessing the activity behaviors of self-motivated individuals, one must use caution when attempting to draw conclusions regarding the activity habits of extroverts versus introverts. The introvert may engage in activity just as frequently as the extrovert, but not in a highly public social setting. The introvert is more likely to engage in solitary activities.

**Personality type: self-regulation and Type A**

Kirschenbaum (1987) suggests that self-regulated individuals adhere to activity programs at higher rates than those individuals who are not self-regulated. In order to successfully maintain self-regulation, however, Kirschenbaum states the individual must possess the ability to not let emotional stressors or negative thoughts detract attention from the constant self-monitoring necessary for goal attainment. According to Dishman (1984), Type A individuals probably do not possess the patience necessary
to wait for changes in fitness level, which results in a higher dropout rate. Dishman also theorizes Type A individuals may set other goals that conflict with and take precedence over the activity goals. Ironically, the factors that make the type A more prone to drop out of an activity program also place the type A individual at a higher risk for activity related diseases and disorders such as coronary artery disease (Dishman, 1984).

**Personality type: Pargman's personality continuum**

David Pargman has also related personality type to activity (running) adherence. Pargman has conducted research and developed a personality continuum that is based on the motivation of an individual to run. At the extreme left of the continuum is what Pargman (1980) refers to as the A-D (addicted-dependent) individual. This person is active for the sheer joy of the experience and will suffer withdrawal symptoms if unable to be active. This individual would define participation in an activity program by 1) the enjoyment experienced in anticipation preceding activity, during activity, and following the activity, 2) the relaxation achieved via activity, 3) the "high" experienced during and after the activity session, and 4) the withdrawal experienced if one or more activity sessions was missed (Pargman, 1980). At the extreme right of the continuum is what Pargman (1980) refers to as the C-D (committed-
dedicated) individual. This person would describe participation in an activity program in terms of 1) the health benefits gained through activity, 2) the amount of social approval and recognition received, 3) the grudging acceptance of recommended activity, and 4) guilt experienced when activity sessions were missed (Pargman, 1980).

When the characteristics of Pargman's A-D and C-D individuals are compared to the literature in the area of activity adherence, it is apparent the A-D individual is more likely to adhere to an activity program than the C-D individual. The A-D individual enjoys and values activity, derives satisfaction from activity, is self-motivated, is more internally than externally controlled, and has a positive outcome expectancy. The C-D individual does not enjoy activity, is more externally than internally controlled, relies on social approval for maintenance, and possesses negative outcome expectancies.

Pargman's model is a continuum and it is probable most individuals will not lie at the far extremes, but will have a tendency to lie in the more medial section. If this is the case, then the general population probably possesses both A-D and C-D characteristics. Their activity behaviors will accordingly reflect their tendency to one extreme or the other.
PROFESSIONAL CONTRIBUTION
SYNTHESIS OF CONCEPTS

After conducting a thorough literature review, it is questionable whether any one factor may account for more than a small percentage of difference in activity adherence rates. The concept of activity adherence is multi-faceted. An overwhelming number of theoretical activity adherence variables can be found in the literature. Categorization and comprehension of the interaction of the major variables is vitally necessary if activity specialists are to assist in altering the sedentary lifestyles exhibited by millions of Americans. The model set down in this paper meets this need by defining five major categories of variables hypothesized to notably affect activity adherence and by then illustrating variable interaction.

The five variables and their effects on adherence rates are as follows: 1) Locus-of-control. Individuals possessing an internal locus-of-control are more likely to successfully engage in long term activity programs than individuals with an external locus-of-control. 2) Self-efficacy. Similar to locus-of-control, individuals who maintain a high sense of self-efficacy are more likely to adhere to activity than are individuals who possess a low sense of self-efficacy. 3) Individual needs. If individual needs are not met via the activity program, the individual will probably not adhere to that program. 4) Outcome
expectations. If individuals do not begin the activity program with realistic outcome expectations, or are not guided and advised in how to develop attainable expectations, then the individuals will probably not be successful in their attempts to adhere to activity. 5)

Personal variables. Blue collar workers are less likely to engage in activity than are white collar workers. Pleasant past experiences associated with activity can, to a certain degree, predict that one will adhere to an activity program. Self-motivated individuals maintain initial activity adherence to an activity program better than individuals who are not self-motivated, but long-term there is not a significant difference. Lifestyle, personality type, and degree of self-motivation, three personal variables, do not readily lend themselves to manipulation, but can be shaped.

Presentation of the Interactional Model

The five major categories of activity adherence variables proffered in this paper have been reviewed and evaluated as independent factors. Each variable then has several sub-categories that also influence adherence. These sub-categories have also been independently reviewed and evaluated. However, the five major variables do not act independently. Rather, these variables act independently and interdependently, establishing a vast complex network of relationships affecting activity adherence. Figure 1. and the following analogy are presented to enhance the reader's
comprehension as to the reciprocal relationships existing among and between the five major variable categories of the interactional model.

If one could imagine the model of activity adherence depicted as a disk suspended in air, the following actions may occur in conjunction with fluctuations in the variables: 1) The disk (activity adherence) may spiral upward (increase) with positive interaction among and within the variable categories, 2) the position of the disk may remain unchanged indicating that the positive affects of one category are being counteracted by the negative affects of another category, and 3) the disk may spiral downward implicating a need to increase the positive interaction between and within the variables. The magnitude of change in the disk's position is related directly to the amount of change in any one variable and the combined effect of that change in and among all variables. As is made readily visible in Figure 1., a change in one variable carries over, and instigates changes in the other four variables. If the change is one which positively affects activity adherence, then this chain reaction is not a concern. Alternatively, if the change is one which negatively affects activity adherence, then this chain reaction is of legitimate concern as activity adherence rates will plummet.
Figure 1. Interaction among and between variables
RECOMMENDATIONS

Strategies to Improve Adherence

Activity specialists currently have at their disposal, several strategies to combat lack of activity adherence. These strategies, to a large degree, are currently not utilized. Whether practitioners are unaware of the existence of such strategies, or whether resource limitations preclude implementation is not clear. Following is a discussion of these strategies as they relate to the interactional model developed in this paper. The strategies discussed will impact one or more of the five variable categories. Interventions relate to and involve the five major variables as well as their sub-categories.

Exercise Verses Activity

Advice given to millions of Americans seeking to adopt an exercise program or active lifestyle does not vary substantially in regards to frequency, intensity, and duration of activity. This fact is amazing when one considers the multitude of differing individual characteristics across the population. While somewhat vigorous exercise programs are the standard recommendation, merely increasing activity level may be as effective a treatment modality as prescribed vigorous exercise in affecting sedentary lifestyle related health disorders (Ornstein & Sobel, 1989).
A lack of universal consensus on what constitutes exercise, however, obscures the degree to which exercise affects potential health outcomes (Dishman, 1987). If the proposed health benefits of exercise are not adversely affected by lack of exercise (as exercise is currently and routinely prescribed), but rather by lack of activity, then perhaps lack of exercise adherence does not pose the health threats activity specialists seem to believe it does. Perhaps activity specialists should halt this routine and mindless prescription of exercise altogether and study and adopt a new individualized approach such as the one developed in this paper. In consideration of the above statements exercise may well be on its way to becoming an outdated term, to possibly be replaced by the phrase physical activity. The phrase exercise prescription and the accompanying line of thinking should be modified also. Rather than rotely prescribing exercise, activity specialists need to assess clients against the interactional model described in this paper and help clients determine what activity type and level are most suited to them. One variable may dramatically affect one client, but negligibly affect another.

**Program Individualization**

Client's locus-of-control, self-efficacy, individual needs, outcome expectancies, and personal factors must be considered in planning and implementing the activity
program. The likelihood that one will engage in long-term activity is improved when the activity program is designed to compliment the individuality of the participant (Dishman, 1987). Addressing the variables on an individual basis has the potential to substantially impact long-term increased activity levels.

**Individual choice**

The intensity of the activity session or activity program affects perceived anguish or pain. Generally, the intensity of the activity appears to be inversely related to activity adherence (Dubbert, Rappaport, & Martin, 1987). Activity performed at the individual's preferred level of exertion may be used to reinforce the behavioral changes required to initiate participation in an activity program. Allowing individuals to choose activities with which they associate a high sense of competence and that are within their tolerance level for physical anguish may increase activity adherence (Allen & Iwata, 1980).

**Goal setting**

Goal setting is an approach that when used in conjunction with individualizing the activity program can significantly impact adherence rates. Correct utilization of a goal setting program facilitates behavioral change by helping the individual become more internally controlled and self-aware. Goal setting tactics that have been used with moderate success to increase internal locus-of-control and
Flexible goals set by the program participant are more successful in promoting adherence than inflexible goals established by the activity specialist. For example, cardiac rehabilitation patients have demonstrated a significantly higher rate of adherence to recommended activity programs when they are involved in setting the activity goals (Dishman, 1987). Individuals are best suited to determine the amount of behavioral change they can successfully accomplish and failure to reach preset fitness goals is a frequently reported cause of program drop out (Dishman, 1987). Allowing participants to set their own activity goals also helps teach them that they control specific personal behaviors and actions. This nurtures development of an internal locus-of-control and will thus increase adherence. Attendance is higher at health clubs where activity participants have perceived activity choices and are involved in personal goal setting (Dishman, 1987).

Implementation and utilization of a personal goal setting program for the activity participant may also aid in preventing or negating "abstainer's fallacy." Abstainer's fallacy results in decreased adherence to a behavioral change because the person equates a single or temporary relapse with total failure (Dishman, 1987). If extremely rigid and unrealistic goals are set, the activity program
participant is more likely to fail. Utilization of "milestones" or timeframes in conjunction with self-set goals, following the above goal setting guidelines, may increase a person's commitment to that goal (Dishman, 1973). Examples of useful milestones might include events such as important birthdays, anniversaries, or holidays.

The use of self-set long-term goals together with short-term goals further increases activity adherence (Dishman, 1987). Individualized activity goals and information conveyance on one's position related to goal attainment facilitates self-evaluation. Self-evaluation, in turn, promotes an internal locus-of-control (Dzewaltowski, 1989). Individuals evaluate the factors internal to themselves affecting activity behavior. External forces (luck, chance, fate, powerful others) are not considered. Self-monitoring, participant recording of participation in activity and completion of activity behaviors (number of miles run, time spent exercising, and subjective feelings before, during, and after the activity session), can be utilized to facilitate the self-evaluation process (Dishman, 1987).

Correct utilization of a goal setting program facilitates behavioral change by helping the individual become more internally controlled. Utilizing goal setting to increase internal locus-of-control necessitates that 1) there be a long-term goal with intermediate short-term
goals, 2) the goals be challenging, but attainable and realistic, 3) the goals be specific, 4) there be a defined strategy to meet the goal (a game plan), 5) the individual be rewarded upon meeting each goal, and 6) the goal setting program be constantly evaluated and progress assessed (Cox, 1985). In the initial stages of program implementation the client may require much interaction with the activity specialist in order to achieve success and maintain adherence. Clients will gradually realize an increased sense of internal-locus-of-control and thus self-efficacy also. Because of these internal changes, clients will eventually be capable of maintaining these goal setting procedures on their own. The period of time this change process will take is highly individual and cannot be predicted or limited.

**Cognitive Strategies**

Cognitive strategies may be successful in helping individuals adopt adherence promoting, activity-related, realistic, outcome expectations. Some individuals utilize cognitive strategies in an attempt to distract their attention from the perceived anguish experienced during activity (Dishman, 1987). Research has examined several distractive techniques designed to transfer the individual's attention from perceived exertion or anguish level to factors in the external environment or to internal factors. Both external and internal dissociation strategies seem to
be fairly successful in moving the individual's focus away from perceived discomfort during the activity session (Franseen, 1992). Internal dissociation involves attending closely to bodily sensations. Marathon runners, for example, may cue in to sensations of muscle fatigue or dehydration in order to better pace themselves and to prevent injury. Rather than concentrating on the pain or discomfort, the person engaging in activity focuses on what the bodily sensations mean in relation to completing the task at hand. External dissociation occurs when the discomforts associated with activity are tuned out and pleasant environmental stimuli are attended to. To assume that a reduced anguish level during activity will cause an individual to expect less anguish as a result of activity is both reasonable and logical. As the expectation of anguish associated with activity decreases adherence to an activity program becomes easier. Activity specialists should recommend and teach clients dissociation strategies.

Summary of Strategies

To most successfully facilitate adherence to long-term activity the activity specialist should concurrently apply the strategies described previously upon the client's initial indication of interest in beginning an activity program. First, differentiate between exercise and activity and explain the health related changes associated with initiation of a program with either focus. Second, empower
the client. The client chooses both the activity and the intensity of the program. Third, structure the program around personally set goals and rewards. Fourth, teach the client how to use dissociation strategies to combat physical and/or mental anguish and pain. Fifth, begin these treatments in the early phases of activity program adoption. Adopting the above guidelines will affect a change in each of the five major variable categories spurring increased adherence to activity programs substantially across the population.

Model Implementation Obstacles

If activity specialists truly desire to influence their clients' likelihood to sustain long-term activity, then problems regarding implementing the model must be resolved. First, in order to facilitate activity or health related behavior changes, the practitioner must possess a thorough understanding of both physiological processes and the underlying psychological principles. The curriculum for persons attending an institution of higher education with the intent of working in the health/activity field should include several mandatory classes in psychology. Further, students should be encouraged to take additional psychology courses to satisfy their out-of-department elective requirements. Second, the primary goal of activity specialists ought to be to assist their clients in achieving a higher quality of life via activity. Ideally, the time
and expense required to measure, interpret, and manipulate the variables identified in the interactional model should be of no consequence. Can a price tag be put on quality of life? Can only the wealthy afford to be healthy? Realistically, in America's capitalistic society, the impact and influence of money are pervasive and price tags are put on quality of life. Third, there is a necessity to develop an instrument to easily and accurately assess each of the five categories of variables. Several existing instruments could be combined and studied for reliability and validity, or a new instrument could be developed and studied. Finally, environmental factors which are largely out of the individual's control and which may override the effects on adherence of the five variables identified in the model need to be evaluated and compensated for. The activity specialist may utilize social engineering principles in an attempt to make the activity participants environment more conducive to activity program adherence. Unfortunately, at this point, activity specialists may find the model somewhat cumbersome to implement.

Future research

In order to lend credibility and generalizability to future studies several factors must be addressed. First, the studies must be at least one year in length, preferably five or more. Second, a determination must be made as to whether the individual is maintaining activity in some
setting other than that of the formal study. Maintenance of activity constitutes adherence regardless of setting. Third, placebo or control groups should be utilized to ensure the results are indeed due to the variable being studied. Fourth, exact standards need to be implemented in order to establish inter-study reliability. Specifically, standards related to measurements of activity behavior and a standard definition of adherence. What activities constitute exercise? What is the definition of adherence? Is adherence able to be measured objectively? If so, what are the criteria for adherence? Fifth, future studies should concentrate on interaction of several variables and their additive affect on adherence. The fact that individual variables can affect adherence is already well established. These independent factors, however, fail to significantly affect long-term adherence. Variable interaction may likely be the key to long-term adherence. Finally, randomly chosen samples must be utilized in studies in order for results to appropriately be generalized to the population. The easy access samples (i.e. college students enrolled in activity classes, monthly due paying health club members, or persons for whom activity has been recommended by a physician to treat a health disorder) of most of the studies evaluated in this paper do not accurately reflect the characteristics of the general population. If future researchers follow these research recommendations, then the
factors critical to maintaining long-term adherence to activity will at long last be evaluated in a reliable and valid manner with the results being generalizable to the population.

CONCLUSIONS

Individuals frequently report difficulty in maintaining adherence to even the simplest of health related behavior changes. Consequently, it is no surprise that activity adherence, an extremely complex health related behavioral change, presents such a challenge. The interaction model, however, identifies major barriers to adherence and provides a means to combat the lack of adherence to activity programs in contemporary America.
REFERENCES


