Exercise Hassles:
Toward Understanding Their Role in Exercise Continuance from a Relapse Prevention Perspective

by

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ABSTRACT

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The problem of exercise dropout with new exercisers continues at or above 50 percent in spite of the well-known importance of long term maintenance of exercise to sustain health benefits. While over 40 variables have been identified in the literature related to exercise continuance, no theoretical model exists that is comprehensive enough to account for the explanation of the known relationships and interaction of variables related to the process of exercise continuance. The present research focused on exercise continuance in non-athletic adults through the phase of exercise acquisition and early maintenance. These phases have been associated with the highest rate of discontinuance. The intent of the study was to provide a better understanding of the process of exercise continuance while contributing to development of a clinically relevant theory for use in a primary health care setting. Key factors in the model include: exercise self-efficacy, exercise outcome expectancy, exercise hassles, exercise hassle attributions, daily stress, exercise decision, exercise effects, and other effects.

A multiple case study design was used to explore the relationship between exercise hassles and exercise continuance. In addition, a descriptive and exploratory analysis of the cases was used to consider the potential fit of a lifestyle change model developed by the investigator. Five non-athletic participants, two long-term exercisers and three new exercisers, provided repeated measurements of physiological and psychological parameters. Historical, demographic, and weekly self-monitoring data were used to establish case study data bases. The study consisted of initial and final interviews, in addition to a 12-week period of weekly and daily monitoring and data collection. The data from each case were used for an in-depth individual analysis for descriptive and theoretical application.

The findings support the complex nature of lifestyle change associated with exercise continuance and offer tentative support for the Lifestyle Change Model for Exercise. Expected relationships between attributional dimensions of exercise hassles (stability and controllability) were not demonstrated across the cases. Explanations for the lack of predicted relationships are considered. Additional model development and use of a process-sensitive research strategy is recommended for future research.

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CHAPTER I

INTRODUCTION

The growing appreciation of the relationship between lifestyle and health status has heralded a new era in health care delivery, an era reflecting interest in behavioral health, health promotion, and health protection (Matarazzo, 1980, 1984b; Pender, 1987). Exercise has been repeatedly identified as an important facet of a lifestyle conducive to promoting health (Harris & Guten, 1979; Matarazzo, 1984b; Pender, 1987). The importance of lifestyle and exercise on health outcomes has been affirmed by others (Best & Cameron, 1986; Orleans, George, Houpt, & Brodie, 1985), including the US Government (Department of Health and Human Services, 1980).

Maintenance of a life-long habit of exercise is necessary to achieve maximum health benefits (Keefe & Blumenthal, 1980). This is underscored by the reversible nature of physiological and psychological changes underlying the health-promoting effects of exercise. Upon cessation of exercise, the effects of exercise begin to abate (Chi, et al., 1983). Thus, for exercise to have a long-term benefit, it must be an ongoing lifestyle.

The widespread discontinuation of exercise has emerged as a major problem that interferes with achieving the health-promoting benefits attributed to exercise. The extent of the problem is illustrated by dropout rates for exercise programs in excess of 50% (Dishman, 1986; Martin & Dubbert, 1982; Oldridge, 1984). The mean dropout rate reported in studies focusing on healthy adults is 44% (Franklin, 1988). Although behavioral techniques have been used to facilitate initial lifestyle change (Leventhal, Zimmerman, & Gutman, 1984), sustained behavior change has not been achieved. In spite of growing research interest in exercise continuance and related areas, knowledge about dropout and continuance remains at a relatively early stage of development (Best & Cameron, 1986; Dishman, 1988b).

The failure of exercise programs to help participants establish an exercise habit has been attributed to inadequate theory (Leventhal, et al., 1984). Although many factors with potential to contribute to the high dropout rate have been identified, most have not been integrated to theory. Two factors contributing to the lack of breadth of the theories that have been used are the failure to recognize the process nature of exercise continuance (Dishman, 1988b; Sonstroem, 1988) and acknowledgement of the complex nature of sustained behavior change.

The aim of the present study is to consider the complexity and the process nature of exercise continuance and to build toward a practice-relevant theory of lifestyle change. The proposed model for exercise-related lifestyle change addresses the complexities of the process of exercise continuance and offers potential for clinical intervention. The model includes multiple concepts, some of which are known to contribute to exercise continuance, and some which represent new approaches to the complex issue of exercise continuance. The express purpose of this model is to develop a relevant theory to guide primary health care clinicians in their attempts to foster positive lifestyle changes, including exercise continuance.

Unresolved Research Issues in the Study of Exercise as a Health Promotion Strategy

The complexity of the topic and the wide variety of research approaches applied to the study of exercise continuance have contributed to the fragmentation of theory and knowledge development. This is due in part to the different teleological interests of the researchers in their respective disciplines, which have influenced the type of questions addressed and research methods used. The basic problems identified are similar, but the ways in which they are explained reflects the bias of scientific disciplines seeking knowledge and theory to serve their respective fields. Studies differing in method, purpose, and scope have not resulted in an orderly progression of knowledge building or in making an integrated interpretation of research findings (Dishman, Sallis, & Orenstein, 1985). Yet, the broadness of multiple research perspectives presents the opportunity for a comprehensive understanding of exercise continuance and sustained lifestyle change. This section addresses conceptual and measurement issues, methodological approaches to the study of exercise continuance, and practice implications that have resulted in a slow progression of knowledge development regarding exercise continuance.

Conceptual and Measurement Issues

Lack of clarity in defining terms and underlying theoretical concepts has contributed to confusion over interpretation of research findings (Dishman, 1986). Terms particularly important to this study include: exercise adherence, compliance, maintenance, continuance, and dropout. Additional terms and concepts that impact the understanding of exercise research findings are: type of exercise, exercise outcomes, motivation for lifestyle change, and the process nature of lifestyle change.

Exercise compliance, adherence, and maintenance. The terms compliance, adherence, and maintenance have been included in a process model of treatment continuity that attempts to clarify the meaning of the terms (Kristeller & Rodin, 1984). The term compliance is often used interchangeably with adherence in the exercise literature. Compliance carries the connotation that someone has directed the individual to become involved with an exercise program. In contrast, adherence refers to the process of following through with an exercise plan, without regard as to whom established the plan. In Kristeller and Rodin's (1984) framework, compliance represents the initial following of a prescribed treatment by a patient. As the patient begins to take more ownership for following the treatment, adherence is said to occur. Finally as the treatment continues without the supervision of the prescriber, maintenance is said to operate.

As understood in this model, compliance and adherence have the connotation that the patient's behavior is under the direction of someone in authority whose influence will diminish as the patient moves toward maintenance. As maintenance is achieved, the patient has adopted the new behavior personally and no longer is dependent on another person for reinforcement of the behavior.

Exercise continuance. The term continuance does not share the connotation that exercise was directed by someone else. Continuance refers instead to the ongoing participation in exercise without reference to whether the action was self-initiated or other-initiated. The term continuance also refers to the ongoing performance of exercise, without regard to stage identification.

Exercise dropout. Exercise dropout refers to the discontinuation of regular exercise performance. Dishman (1986, 1988) has addressed the multiple possibilities that could be represented by the act of dropping out. Without further data regarding the nature of the discontinuation of exercise and some follow-up regarding continued activity, understanding of dropout is incomplete. Information regarding exercise participation outside an exercise program or regarding later resumption of exercise is not obtained in most studies. This is due to the common operational definition of compliance and adherence, which treats all participants who discontinue group participation as dropouts without regard to independent activity outside the study setting. Consistency between definitions and measurement of concepts such as exercise continuance and dropout is essential to maintain clarity in interpretation of research findings.

Type of exercise. The potential for multiple variations in exercise characteristics reinforces the importance of clear definitions regarding type of exercise. Exercise can be differentiated by frequency, intensity, and duration of exercise. In addition, the varied modes of exercise may have very different physiological outcomes depending on the nature of the exercise. For example, weight lifting high resistance with low repetitions foster bulk and strength development while walking, cycling and jogging favor endurance development (Åstrand & Rodahl, 1986).

Maintenance of or improvement in cardiorespiratory endurance has been identified as a major factor in classifying the health promotion effects of exercise. Dynamic exercise, characterized by repetitive movements of large muscle groups such as the legs, is recommended to produce such changes (ACSM, 1986; Pollock, Wilmore, & Fox, 1984).

Physiological and psychological changes derived from participation in exercise vary from person to person. Among the factors influencing change are the initial functional status of the individual and the exercise stimulus. Exercise stimulus is determined by the frequency of exercise sessions, and the type, intensity, and duration of exercise performed.

Exercise outcomes. An exercise outcome of interest is whether or to what degree a participant continues with exercise throughout the course of a study. Frequently exercise continuance has been dichotomized on the basis of whether the person drops out of exercise or continues. This differentiation of participants as dropouts or continuers may severely restrict the interpretation of research results. For example, dropouts have been described as representing several subsets of people, some of whom intend to and do resume exercise (Sonstroem, 1988). In addition, important aspects of differences between individuals may be missed by this classification scheme.

Another outcome that has been frequently included in exercise continuance studies is the measurement of physiological and psychological change. However, the amount of exercise stimulus (type, intensity, frequency, and duration) required to obtain various outcomes is not well understood and is likely different for different outcomes. For example, outcome measures that focus on changes in fitness level may be inadequate to assess other health changes such as improved sleep or improved self-esteem (Haskell, 1985).

Self-selection bias. Comparison of exercisers with non-exercisers has the potential for introducing bias by means of group self-selection. Epidemiological studies are especially plagued by self-selection bias due to limitations of retrospective analysis to differentiate potential confounding reasons for exercise performance (Laporte et al., 1984; Solomon, 1984). Paffenbarger (1987, 1988), has used statistical means to control for the effects on exercise behavior due to age, prior coronary artery disease, obesity, smoking, and high blood pressure. However, since the data used to assess current activity levels were compiled using mailed questionnaires, possible response bias remains an issue. For example,those who chose to respond may have more heavily represented individuals with a higher degree of fitness.

Motivation and lifestyle change. The concept of motivation is central to many of the theories addressing lifestyle change and has been widely used in the consideration of exercise behavior. Understanding the meaning of this term is crucial to understanding differences in the theories of lifestyle change.

Motivation has been defined as a purpose for action or something that prompts a person to act in a certain way (Barnhart & Stein, 1966). Thus, personal meaning or value associated with a behavior is part of the underlying basis of motivation. In many studies the precise definition of motivation has not been stated.

Motivation is an active process that is situation specific. Motivation is multifaceted since it occurs in reference to multiple behaviors and directions in the experience of life. When concurrent activity toward different aims causes conflict, the experience of ambivalence is common. The experience of motivational conflict and subsequent ambivalence likely represents a time of risk for discontinuation of new behaviors. The potential meanings and complexity for this term underscore the importance of clear definitions.

Process nature of lifestyle change. Although exercise continuance has been identified as a process (Dishman, 1988b), consideration of the process nature of lifestyle change with regard to exercise has been largely overlooked (Sonstroem, 1988). Most research has been cross-sectional using static measurement that emphasizes characteristics at the beginning or end of an exercise program. A major research objective has been to predict who will continue and who will discontinue exercise. By identifying characteristics that predict exercise continuance, additional interventions may be employed in order to facilitate continuance for those identified as more likely to discontinue exercise. However, this approach does not take into account that multiple characteristics and situations may influence continuance differently throughout the process and that the factors themselves are subject to change.

As people or their environment change they may be more susceptible to discontinuation of exercise. As various conflicts interfere with exercise, an increased attention or awareness to aspects of the process occurs (Kristeller & Rodin, 1984). It is precisely during times of increased awareness and conflict that the choice to continue or discontinue the behavior is entertained. For example, as a new behavior is adopted, an increased effort is required to attend to the details involved with the change. After a behavior has become integrated into one's lifestyle, less effort is required to the details of daily action. With each new conflict the individual again is confronted with an increased energy expenditure to attend to the details required by adjustments to the new situation. Thus, acknowledging the process nature is an important consideration to better understand exercise continuance.

Research Methodologies to Study Exercise Continuance

Traditional methods. Group analysis techniques with an emphasis on experimental design form the basis for research strategies in most areas of scientific inquiry. Research designs that incorporate experimental methods have revolutionized the ability of researchers to test data from large samples for statistically significant differences between groups. Aggregate analysis is based upon measurements of central tendency in evaluation of variance and covariance between and within groups (Kerlinger, 1986), and thus, systematically eliminates information about the uniqueness of individuals (Kazdin, 1982; Meier & Pugh, 1986; Metzger & Schultz, 1982). Although the use of these methods has become the standard of scientific inquiry, the study of process and individual difference is severely restricted with this type of approach.

Although the use of aggregate analysis has identified many factors related to exercise continuance, many studies have produced contradictory findings. This is because while a multitude of factors have the potential to impact each individual, only a few factors may be applicable in each case. Thus, the use of group means for analysis will result in non-statistically significant findings even though many individuals could be affected by several of the multiple factors. In addition, the identification of group differences between treatment and control groups says nothing about process.

Other limitations due to research methodology have relevance for the present study as well. For example, intersubject variability can be an important source of underestimation of clinical effectiveness when using group analysis techniques. In addition, aggregate analysis cannot explain why some within the group may change radically while others do not change at all. From a clinical perspective, these explanations may be critical for development of intervention strategies. Finally, in complex clinical situations, the conditions of homogenous groups and random assignment simply may not be feasible (Kazdin, 1982). Thus, research findings based upon group analysis techniques may have serious limitations for application to individual clients in complex clinical situations.

Repeated measures analysis of variance (ANOVA), which can evaluate change at an aggregate level, has been used extensively in nursing research. This analytical strategy is relatively robust when adequate consideration is given to the underlying theoretical assumptions. However, the rigid assumptions of ANOVA are often violated in nursing research, resulting in greater potential for false conclusions (Metzger & Schultz, 1982). Careful consideration must be given in any research strategy to match the question with the appropriate method, including underlying assumptions of both method and theory.

Case study research strategies. In contrast to aggregate analysis strategies, individual analysis has the capacity to reveal which of the factors related to exercise continuance are salient in each case. Although individual case studies are more tedious and costly, this approach may be the best way to identify the statistical and clinical significance that seems likely due to the multiple potential factors involved. No studies attempting to explore the multiple factors utilizing a case approach have been reported.

The concept of generalizability also differs in case study research. In case study approaches, generalizability refers to the ability to apply study results to theory rather than to apply study results to different populations. The ability to generalize to theory is thus enhanced with the accumulation of additional cases.

The use of case study research has grown over recent years and continues to be acceptable for research in several traditional disciplines including psychology, sociology, anthropology, history, economics and education (Yin, 1989). Dissertation research and evaluation research are additional areas in which the case study approach has been used. Case study can be a rigorous method of research that is particularly appropriate "when the focus of inquiry is on a contemporary phenomenon within a real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used" (Yin, 1989, p. 23). In addition, the case study approach may be especially appropriate when the investigator is concerned with patient-oriented clinical problems since the strategy focuses on intensive observation of a single subject as the unit of analysis (Meier & Pugh, 1986). Case studies can be exploratory, descriptive, or explanatory, depending on the specific research question addressed. Although the case study approach offers an excellent strategy to explore both individual characteristics and the process itself, great care in design of the case study is required to overcome criticisms of the method.

Case study has been characterized by some as a "weak sibling among social science methods" (Yin, 1989, p. 10), lacking in precision, objectivity and rigor. This negative stereotype of the case study is probably more associated with uncontrolled case studies and has lead to erroneous conclusions about the strengths and limitations of well designed case studies (Meier & Pugh, 1986).

Part of the misconception regarding case studies may be the idealization of the experimental method (Metzger & Schultz, 1982). Idealization of the experimental method is characterized by expectations that the experimental method is the only way to verify something as truth. As Campbell

(1984) has aptly stated, the core of the scientific method is not experimentation per se, but rather the strategy connotated by the phrase "plausible rival hypotheses." This strategy includes seeking out rival hypotheses and examining their plausibility as well as making explicit other implications of the hypotheses for other available data. Over time this ongoing process of exploration of rival hypotheses moves toward development of a consensus in the scientific community built upon the cumulative evidence. This process occurs without reaching foundational truth as was expected by the logical positivist tradition (Campbell, 1984). Careful consideration of threats to internal validity and care to provide reliability in the case study design can provide the basis for a rigorous research strategy (Kazdin, 1982).

Case studies are considered to be particularly appropriate for generalization to theory (analytic generalization) rather than to enumerate frequencies (statistical generalization) which are better served by aggregate analysis techniques (Yin, 1989). In addition, case study is a type of inquiry that facilitates bridging the gap between research and practice since it maintains the context of inquiry. This is in contrast to an experiment which deliberately divorces the phenomenon of interest from its context to allow careful control of specific variables.

The case study approach provides a strategy in which multiple types of data and analysis can be considered. The use of multiple methods, theories, or data types in the investigation of a common phenomena has been referred to as multiple triangulation (Duffy, 1987; Mitchell, 1986). The use of triangulation enhances a broad view of the phenomenon of interest. For example, the convergence of data from dissimilar methods, such as intensive interview and completion of a standardized assessment tool, adds an important degree of validation that research findings are not simply due to methodological artifact (Jick, 1979). The use of multiple triangulation is consistent with the concept of syncretism (Polkinghorne, 1983) that specifies combining the differences realized by different methods into a more complete yet unified understanding of the phenomenon of interest. Since the study of the human species presents a hard-to-specify stimulus in which the role of pattern and context are crucial (Campbell, 1984), use of a case study approach can provide the opportunity to study a process-oriented phenomenon within its normal context.

Contextual and Clinical Practice Issues

Inadequate Practice Models

Although primary health care providers may be in a unique position to influence decisions regarding lifestyle change (Dishman, 1986), common use of health promotion interventions in primary care has been slow to materialize. This reticence is likely due to several factors, including poor results primary care providers have experienced in their attempts to facilitate lifestyle change with their clients (Orleans, George, Houpt, & Brodie, 1985). Inadequate skills or lack of confidence to implement strategies designed to foster lifestyle change (Green, 1987) contributes to the problem as does lack of fully developed strategies with demonstrated effectiveness. Certain theoretical underpinnings of clinical practice also may inhibit the use of theory and techniques that could be more effective in assisting clients with positive lifestyle change.

Nurses are perceived as a significant resource for health promotion activities due to their excellent education and high level contact with healthy people (Matarazzo, 1984b). However, some settings have a functional philosophy of practice that limits a nurse's ability to effectively perform health promotion interventions. This may be at least partly due to the approach commonly used in which individuals seeking care are simply given information about what to do for their problem and expected to act on the basis of the information given alone. Although nurse practitioners have been taught to include education as part of their therapeutic plan, information-giving alone is not enough to facilitate lifestyle change (Crabtree, 1986; Siegel, Johnson, & Newhof, 1988).

In some settings clients may be given a great deal of information without consideration of their belief system or context of their life. Yet, an appreciation of the context of the individual has been identified as a major factor in facilitating lifestyle change (Baronowski & Nader, 1985; Jaffe & Jordan-Marsh, 1983; Stein & Pontious, 1985). The complexities of both intrapersonal factors and environmental factors related to lifestyle change must be better understood and accounted for in planning for long term change. To facilitate success in this endeavor both care provider and client must have an awareness of the multiple factors to be considered with regard to lifestyle change and be able to identify which factors are salient to the individual. Personal factors and expectations of others may conflict and interfere with desired lifestyle changes. A better appreciation of these conflicts appears essential to understand lifestyle change.

A general tenant of the traditional professional model is the belief that the professional possesses knowledge and skills that when applied will eliminate the problem for which professional help is being sought. This idea is based upon the general expectation that science and medicine can take care of any problems that may occur (Schön, 1983). Yet, in spite of advanced diagnostic and therapeutic services available for selected health problems, technology remains inadequate to address many of the basic human needs and dilemmas of the human experience. Health care that focuses on the available technology for diagnosis and treatment to the exclusion of psychosocial and interpersonal aspects of health care is unable to address the issues related to lifestyle change. The traditional practice model does not adequately address the contextual and personal aspects of the client in a way that can foster successful lifestyle change.

Individual Client Responsibility for Health Promotion

The importance of individual responsibility regarding health promotion and behavior change is underscored by the fact that behaviors related to health promotion are primarily under the domain of the individual (Matarazzo, 1980; Roberts & Krouse, 1988; Talkington, 1978). When individual needs are not addressed or an individual is not willing to participate in negotiating a change in lifestyle, the potential for change is negligible.

Self-regulation, as a practical model for lifestyle change, has been offered as an alternative theoretical perspective to both the medical and behavioral model (Leventhal et al., 1984). A key element of the self-regulation model is the shift of control and responsibility from the health care professional to the individual client. This perspective puts the health care provider more in the role of consultant rather than expert who will do something to or for the client to improve their health. Self-monitoring has been advocated as a way to facilitate client involvement in therapeutic interventions (Green, 1987; Meichenbaum & Turk, 1987). Often a new awareness that contributes to the success of a therapeutic intervention arises from the process of self-monitoring.

Although the concepts related to self-regulation are central to understanding the process of individual lifestyle change, particularly from a primary care standpoint, these approaches are only beginning to be appreciated in primary care settings. While a self-regulation approach is consistent with the general self-care philosophy accepted by many primary care nurse practitioners (Roberts & Krouse, 1988; Brykczynski, 1988), additional specific intervention strategies as well as a better understanding of the overall process will be necessary to effect sustained lifestyle change.

Nurse Practitioners and Health Promotion Intervention

Nurse practitioners in a primary care setting are particularly well suited for health promotion intervention. This is due to the breadth of their knowledge base as nurses, their view of clients as whollistic multidimensional beings, and their appreciation for environmental context. Nurse practitioners also have a focus on health promotion as a component of their educational preparation (Brykczynski, 1989). Thus, it is critically important that strategies to facilitate their success in helping clients make long term changes in lifestyle be developed and refined.

Practice implications

Although lifestyle change is important in primary care, research on exercise continuance with applicability to primary care intervention strategies represents a neglected area of knowledge development for nursing practice. Thus, research that contributes either directly or indirectly to primary care applications of exercise continuance has potential benefit. In addition, research that facilitates a clear link between practice and theory may contribute to narrowing the gap between practice and theory.

Clinical relevance. Identification of the inadequacy of available clinical practice strategies to foster long term participation in exercise has been observed over a number of years of clinical practice by this researcher. Interest and support expressed by nurse practitioner colleagues at a clinical research conference (Pittman, 1988) lent further validation for the clinical relevance of the present study.

As the process of exercise continuance is better understood, specific intervention strategies can be developed. Practice interventions that facilitate a more effective role for fostering self-care within a primary care setting will contribute toward extending the practice of health promotion.

Integration of theory, practice, and research. Exercise continuance research that fosters development of theory with clear practice relevance can contribute to bridging the gap between theory and practice that has been frequently identified in nursing practice (Firlit, 1985; Lindeman, 1987; Meleis, 1985). Most therapeutic interventions for complex clinical problems are based upon "trial-and-error" responses or procedures learned from respected authorities. In nursing, as in the practice of clinical psychology (Barlow, Hayes, & Nelson, 1984), even those with an appreciation for the importance of research identify clinical experience as being more helpful than research in making clinical practice decisions. One reason for this is that research findings frequently fall short of being readily applicable to individuals in clinical situations. Thus, interventions for complex clinical situations that systematically build in adjustments for the context of individuals seldom evolve. Consequently, systematic development of theory to guide practice is essential if the gap between research and practice is to be addressed.

Models that address the salient issues involved with exercise continuance in practice have not been developed (Sonstroem, 1988). This is likely due to the complex nature of the phenomenon of interest. Since theory for a practice discipline attempts to put ideas together to help understand and guide clinical practice (Dickoff & James, 1986; Dickoff, James, & Widenbach, 1968), further development of a theoretical base for intervention strategies that have relevance for the primary care clinician is essential. Integration of theory, research, and practice in development of a model that has clinical utility for long-term behavior change can be a vehicle to contribute to excellence in practice.

The use of a method that clearly relates to clinical practice also may help foster the acceptance of research findings. The use of a case design preserves the uniqueness of the individual and consequently allows exploration of complex issues that are typical of clinical practice (Mitchell, 1988). This also fosters bridging the gap between research and practice.

Summary

Although the influence of psychosocial factors on health status has been widely recognized, integration of health promotion interventions as part of primary care practice has been slow. Lack of fully developed strategies, inadequate understanding of the process of lifestyle change, and fragmented theory have inhibited nurse practitioners and other primary health care providers in promoting exercise continuance. Despite the recognition of primary care clinicians as having a strategic role in facilitating sustained behavior change, practice models that undermine a self-care approach have contributed to poor results.

Research-related issues contributing to the problem of studying sustained lifestyle include the use of diverse definitions and the use of research strategies that limit the study of lifestyle change as a process. Development of theory that has clear relevancy for clinical practice will foster bridging the gap between practice and theory. Understanding the process of exercise continuance more fully will provide the basis for development of intervention strategies for use in primary care settings.

Research that addresses the complexities of sustained behavior change from a clinical perspective is timely. Inadequate theory development, and a poor understanding of the overall process of behavior change remain important issues to be addressed. Thus, the use of a methodology designed to explore a process perspective of lifestyle change is essential to illuminate the dynamic nature of the exercise continuance in context of the complexities of real life. Chapter II addresses the literature base that reflects our current knowledge of these issues.

CHAPTER II

REVIEW OF LITERATURE

The purpose of this review of literature is to assess and critically analyze knowledge development salient to exercise continuance. This review and analysis of research and theoretical contributions provides a perspective on the current state of knowledge and provides a context for the present study. Controversies, gaps, and inconsistencies in the existing exercise literature are included in the discussion. An appreciation of the state of knowledge from the multiple disciplines interested in exercise continuance is essential to maximize theory development with the potential for clinical intervention in the primary care setting. The review of literature is organized into two major sections: (a) factors associated with exercise participation and dropout and (b) theoretical perspectives related to exercise continuance.

Factors Associated with Exercise Participation and Dropout

Many of the factors identified (over 40) have relevance for theory development. This discussion of factors associated with exercise participation and dropout has been organized into three main divisions: (a) person factors, (b) environment factors and (c) interactions between person and environment factors.

Person Factors

Person factors include physical characteristics, psychological characteristics, exercise effects, developmental status, and lifestyle patterns. While some of the person factors identified are amenable to change, such as physiological changes associated with exercise, others are not, such as body somatotype. The emphasis of this review is on factors amenable to change. While many of these characteristics have been identified as potentially relevant, for the most part, little systematic inquiry has been made specifically linking factors and theory with exercise participation or continuance.

Physical Characteristics

Body composition. Both higher percent body fat and higher body weight have been identified as having a negative association with exercise continuance (Dishman & Gettman, 1980; Massie & Shepherd, 1971). Although related, the use of percent body fat rather than body weight represents a more accurate reflection of obesity (Pollock, et al., 1984). Other body composition changes that may confound the measurement of body weight as an indicator of change include increased muscle mass related to exercise participation and carbohydrate depletion with subsequent water loss (Pollock, et al., 1984). Since these changes occur simultaneously when exercise is combined with dietary caloric restriction, the use of percent body fat is presumed to be a more accurate measure of changes in body composition.

Some differences between male and female exercisers were identified by Gale and colleagues (1984). These researchers found statistically significant differences for both percent body fat and body weight in differentiating non-adherent and adherent females in exercise behavior. The same study found statistical significance only for body weight differences between male adherers and non-adherers. No specific reasons were given to explain why body weight and not percent body fat was a predictor variable for men.

Although other researchers (Kriska, et al., 1986) have found body weight to have an inverse relationship with exercise continuance, the reasons for the relationship are unclear. One explanation is that percent body fat is related to fitness level. Higher percent body fat also may represent past patterns of higher caloric intake, patterns of less active lifestyles, or genetic predispositions.

Lean body mass, the portion of body mass excluding fat (muscle, bone, body fluids, cellular and connective tissue), also may impact exercise performance. Individuals with greater relative muscle mass will likely perform exercise with a greater proficiency than individuals with less muscle mass. Although muscle mass and percent body fat can be altered by physical training, the absolute changes in lean mass and body fat are limited in some degree by genotype. For example, a male with relative percent body fat of 22% might expect to decrease percent body fat to 18% but would be unlikely to decrease the percentage to 8%. However, definitive studies that explore this phenomenon have not been conducted.

Alteration of body composition by intensive physical training with or without anabolic steroids can also be accomplished. The absolute change in body composition is likely limited by genetic factors. The time required to achieve maximal changes in body composition depends upon the exercise stimulus but is lessened with the use of steroids. The fact that anabolic steroids continue to be used, despite notable increased health risks, reinforces the apparent importance that physical characteristics play with regard to performance and individual perception.

Physical fitness and health status. Although health status and physical fitness level have been identified as important factors relating to participation and maintenance of exercise behavior (Gale, et al., 1984; Mirotznik, et al., 1985), the definitions of health have varied greatly from study to study. The potential relationship between exercise and health has been difficult to interpret due to the lack of consensus on the definition of health. Definitions of health include uni-dimensional concepts such as absence of disease and functional role performance ability, as well as complex multidimensional concepts such as biopsychosocial wellness (Pender, 1986). Measurement of health has been equally diverse, resulting in research findings that make comparisons between studies difficult.

In spite of these definition and measurement difficulties, a few studies have attempted to explore possible relationships between health and exercise continuance. When active older adults were asked to force rank statements representing motives for participation in exercise, they consistently listed health as the highest motive for participation (Heitmann, 1986). The six categories included in the rank order format had been previously determined by open-ended questionnaires and included health, social interaction, coping, appearance, achievement, and aesthetics. Mirotznik et al. (1985) found that when given a choice after exercise testing, individuals who chose to join an exercise program had a greater tendency to be concerned about health and to see improved health as beneficial to other areas of their life. However, once in the exercise program, beliefs about health and exercise were not found to discriminate between continuers and dropouts.

In another study, an attempt to gain insight into a recreational verses a health outcome approach to exercise resulted in health goals consistently being rated as the most important for exercise continuers as well as dropouts (Wankel, et al., 1985). This finding is consistent with

Harris and Guten's (1979) research that found a high percentage of those surveyed rated exercise as important with regard to health, in spite of the fact that most respondents did not participate in regular exercise. Thus, to date, health or health related goals do not appear to discriminate between exercisers and non-exercisers or dropouts.

The concept of physical fitness level, which has been considered by some as an aspect of health, has also been somewhat easier to define and measure, although not entirely without difficulty. Although physical fitness level is generally thought to include muscular endurance, strength, and flexibility, in addition to cardiovascular endurance (Corbin & Lindsey, 1985; Lamb, 1985), measurement of cardiovascular endurance has received the majority of the attention of researchers and is commonly used interchangeably with fitness level. This is largely due to the major focus on endurance type activities which are considered to be protective against heart disease and the commonly accepted measurement of VO_2 max as representative of cardiovascular fitness (Pollock, et al., 1984). While all of the above mentioned factors of physical fitness may influence participation and continuance in exercise, the potential role of muscle endurance, strength, and flexibility has not been addressed with regard to exercise continuance.

Since cardiovascular endurance has received major attention in the study of exercise and exercise continuance, the remainder of the discussion will focus on cardiovascular endurance. This focus is particularly relevant since change in cardiovascular endurance is frequently the variable that represents physical evidence of exercise continuance.

Fitness level (determined by VO_2 max.) was found to be an important factor in consideration of exercise participation and adherence at a Coronary Detection and Intervention Center (CDIC) when comparing joiners and non-joiners and continuers and non-continuers in a cardiovascular fitness program (Mirotznik, et al., 1985). The CDIC program consisted of coronary heart disease (CHD) risk assessment, including maximal stress EKG and a structured exercise program designed to increase cardiovascular fitness. In this study, level of fitness correlated negatively with initial participation in the exercise program and positively with degree of adherence to the exercise program. These findings suggest that the individuals with better cardiovascular fitness in the testing phase chose not to participate in the exercise program, while those that did participate in the fitness program and continued were typically more fit initially than those who dropped out over the course of the program. The researchers (Mirotznik, et al., 1985) noted that the better fit non-joiners also were more involved in regular physical activity for recreation than joiners, which would indicate that they already were participating in some form of physical activity.

Another study that considered factors related to exercise continuance of healthy adults (Gale, et al., 1984) found that female participants with higher physical fitness levels tended to continue with participation while male participants who were more physically fit tended to drop out. While the meaning of this finding is unclear and contradicts previous research, Gale and colleagues (1984) suggest that their program may have started out too slowly without adequate challenge for the more fit male participants. Further analysis of dropout would have provided important information regarding this issue.

While physical fitness level and health status appear to have some impact on exercise continuance, the effect appears to differ from study to study and likely interacts with other variables as well. Other physiological factors including body type, structure, and function appear related to exercise continuance, yet additional exploratory research of these potential factors is needed to clarify potential relationships.

Illness/disease states. Exercise continuance is influenced by the presence of illness or injury (Kriska, et al., 1986). The impact of illness or injury symptoms depends on the nature and the meaning of the condition to the exerciser. Whether the nature of the condition is acute or chronic and whether the condition has direct impact on the performance of exercise are two important dimensions of illness/injury. For example, musculoskeletal injury that prevents performance of the usual exercise entirely is expected to have a major impact on performance of exercise, as is anginal pain (Dishman & Gettman, 1980). Illness states that alter energy level to the point that participation is not possible also have a direct impact on exercise continuance.

In a study of low intensity exercise of older women, illness was found to be the major factor that differentiated between compliers and non-compliers (Kriska, et al., 1986). In this longitudinal study of older females, walking was selected as the exercise activity of choice due to the low incidence of musculoskeletal injury, lack of specialized equipment or skills and general social acceptability of walking. Participants were randomly placed in exercise and control groups and studied over a 2 year duration. Exercise records were used to determine weekly mileage, using 7 miles per week average as the minimum level of activity to be included as a complier. Discriminant function analysis was used to differentiate factors contributing to compliance in these walkers. Illness, defined as being ill for a minimum of 4 days in a month during which no exercise was performed, was found to be the major determinant of non-compliance.

Illnesses reported included influenza, joint replacement surgery, and sciatica. Prior to randomization into the initial groups, individuals had been screened and excluded for conditions that might interfere with the walking protocol. Although illness or injury clearly have the potential to interrupt patterns of physical activity, the ability to adjust to alternate activities or to re-establish an exercise habit after recovery from a condition affecting exercise participation have only been superficially addressed in the research literature.

Psychological Characteristics

First, this section presents literature related to positive and negative perceptions and attitudes toward physical activity and exercise. Second, personality traits and preferences with potential to affect exercise continuance are discussed. Third, developmental status is considered.

Perceptions and attitudes toward exercise. Beliefs and knowledge about exercise, past exercise experiences, and the various specific meanings an individual attributes to exercise create expectations for exercise participation. Subjective assessments of past success or failure with exercise also may contribute to current attitudes and perceptions (Martin & Dubbert, 1982; Pemberton, 1986). Whether or not an individual perceives himself or herself as an exerciser likely depends on these factors.

Recreational and enjoyment factors have been associated with exercise continuance. Klint and Weiss (1986) examined reasons for participation and dropping out of youth gymnastics. They compared group differences between competitive gymnasts, recreational gymnasts, and former gymnasts (representing individuals who had either dropped out of sport participation or transferred to a different sport activity). Although all groups chose a variety of reasons for participation, fitness was cited as an important reason for those who continued in gymnastics (both competitive and recreational), while fun was listed as important only to the recreational and former gymnasts. Similarly, Siegel, Johnson, and Newhof (1988) reported identification of a recreational factor which included items related to fun, excitement, physical relaxation, and the instructor as the most potent discriminator between continuers and dropouts among college women.

A limitation of these findings is that the subjects have been relatively homogenous, making generalization difficult (Siegel, Johnson, & Newhof, 1988). However, positive experiences with exercise ranging from general enjoyment to addiction have been reported by other exercisers as well, especially runners (Glasser, 1976). In addition, improved psychological feelings associated with exercise was a contributing factor for continued exercise for overweight females (Gillett, 1988) and has been used to differentiate male continuers and dropouts (Wankel, 1985).

The most potent reinforcers of exercise tend to be associated with intrinsic motivation and direct exercise effects. These are thought to develop over a longer time period (Keefe & Blumenthal, 1980). Individuals who have experienced these positive effects in the past are likely to have positive recollections and expectations for exercise. Others, who have only previous short term experiences with exercise, are less likely to have experienced many of the long term effects. Thus, the type and characteristics of past exercise experience may differ greatly from person to person and have a variable effect on each individual exerciser.

Although the importance of positive exercise experience upon current exercise participation has been established (Godin et al., 1987), the role of negative past exercise experience has not been as carefully addressed. However, Sallis et al., (1986) have found that attitudes toward exercise barriers rather than attitudes toward the value of exercise is important to exercise adherence. They suggest that negative associations or barriers to exercise may outweigh perceived positive exercise effects for many.

Similarly, perceived task difficulty has been found to influence the adoption of health promoting behaviors. Sennott-Miller and Miller (1987) studied the likelihood of adopting health promoting behaviors, including exercise. Perceived effectiveness to promote health and perceived task difficulty were measured using magnitude estimation. The likelihood of behavior adoption was impacted more by task difficulty than task effectiveness. While this finding has potential clinical utility, further consideration of perceived difficulty with comparison of actual participation and continuance of the activity rather than a self estimate of likelihood of adoption would be helpful to further evaluate this concept.

Other negative factors such as perceived exertion or negative body sensations associated with exercise may influence participation and continuance as well. The type and intensity of exercise have a major impact on what bodily sensations a person might experience during exercise. The experience of chest pain associated with myocardial ischemia also can be precipitated during acute exercise. Because of the serious nature of negative cardiovascular exercise effects, fear of anginal pain has potential for negative impact on exercise continuance. However, the interpretation of what sensations mean to the individual varies from person to person and has not been studied with regard to exercise participation. Quite possibly the role of past exercise experience, including past sensations whether negative or positive, may be different for each individual and may change over time.

Personality traits and preferences. Interpretation of exercise related sensations and experiences also may depend on personality characteristics. Traits are individual personality characteristics that are relatively constant over time and occasion. Potentially, traits not directly related to exercise behavior may influence exercise continuance. The Type A personality (Friedman, 1974, cited in Shephard et al., 1987) is such a trait. Researchers predicted that the Type A individual would be too busy to fit exercise into a busy schedule, and thus, would be more likely to drop out of an exercise program. In their analysis of dropouts from a structured exercise program, Shephard et al. (1987) found a tendency toward the Type A personality factor among dropouts. However, this trend did not reach statistical significance.

Gavin (1988) has proposed trait psychology as a framework for sorting out the complexities of psychological issues related to exercise. If typical personality traits of participants of various sports can be identified, a clinician may be able to prescribe exercise based upon similar personality traits. Gavin's analysis of the literature on traits suggest that although certain traits may emerge as reflective of different sports, no clear link with regard to participation has been identified. Most of the research in this area has been on sport participation exclusively without consideration of non-athletic exercisers. Thus, no clear indication for recommendation for the like-trait sport or activity for an individual can be made.

The concept of self-motivation has been considered a trait-like characteristic by Dishman and his colleagues (Dishman & Gettman, 1980; Dishman & Ickes, 1981). In an attempt to identify factors related to exercise adherence, intrinsic motivation, percent body fat, and body weight were included as part of a psychobiological model intended to predict adherence to exercise. The self-motivation inventory (SMI) (Dishman & Gettman, 1980; Dishman & Ickes, 1981) was designed to measure the level of intrinsic motivation. While the initial studies related to the SMI appeared promising, later studies have been less favorable. Pemberton (1986) compared the psychobiological model of Dishman and Gettman (1980) to a goal orientation model of exercise adherence. She found that neither model was effective to predict attendance in exercise classes. Other researchers have also had conflicting and somewhat disappointing results using the SMI and psychobiological model as predictor variables for exercise continuance and dropout (Gale, Eckhoff, Mogel, & Rodnick, 1984; Sonstroem, 1988; Wankel, Yardley, & Graham, 1985).

Two explanations for the inconsistent performance of the SMI are noteworthy. First, a one-time trait measurement fails to explore interactions with other factors which may affect continuance over time. From this perspective, the process of change itself is important in considering the complexity of exercise adherence. Second, the rather limited conceptualization of motivation, as measured by the SMI, may reflect a restricted content domain and thus inadequately explain the role of motivation as it relates to exercise behavior.

Developmental status. Developmental status has physical and psychological components, both of which have potential for impact in relationship to exercise continuance. Few studies have attempted to consider the possible impact of life transitions or developmental status on exercise continuance. Although developmental perspectives such as competence motivation (Harter, 1982; Weiss et al., 1986) have received attention in youth sports, little consideration has been given to adult developmental perspectives.

One of the few studies to consider an adult developmental perspective was a phenomenological study designed to explore the meanings exercise might potentially have for adult males (Dixon, 1984). This methodological approach was taken due to the acknowledged complexity of factors related to individual meanings attributed to exercise. Although the findings were considered tentative, physical activity was found to be an important mediator of tension during transitional phases of several men's lives.

Further exploration of the process and relationship between adult development and coping was recommended. Developmental considerations may be a fruitful area for further research.

Exercise Effects

Although the physiological effects of exercise involve many body systems, the major areas of exercise related to health promotion are musculoskeletal and cardiovascular changes. There is also more recent literature that addresses a potential relationship between exercise and longevity. While the musculoskeletal and cardiovascular effects of exercise are well established in the research literature, the potential role of exercise in longevity remains controversial. Psychological effects of exercise have great potential for contribution to exercise continuance, but advances in understanding these effects have been slow.

Musculoskeletal effects. Both positive and negative effects on the musculoskeletal system are associated with exercise performance and can impact exercise continuance. In this section, negative effects or risks of exercise for continuance are considered first, followed by a discussion of positive exercise effects. The majority of research related to exercise injuries has focused on running. Risks associated with other types of exercise come mainly from clinical reports and generally lack quantification (Koplan, Siscovick, & Goldbaum, 1985).

Musculoskeletal injury has been identified as the major risk associated with running in a large survey of recreational runners (Koplan, Powell, Sikes, Shirley, & Campbell, 1982). The primary factors contributing to running injuries are the gradual accumulation of micro-trauma due to persistent high intensity and the "too much, too soon" syndrome associated with a sudden increase in mileage (Lehman, 1984; Subotnick, 1985). In addition, inadequate shoes and uneven running surfaces can alter the distribution of forces involved and contribute to musculoskeletal injuries (Lehman, 1984). The inclusion of high impact activities may predispose an individual to orthopedic injury from pre-existing conditions that might otherwise go unnoticed (Subotnick, 1985). Other musculoskeletal conditions such as strains, sprains, and myofascitis syndromes may be caused or aggravated by exercise, particularly when carried out without adequate preparation or equipment necessary to prevent injury. When injury or repeated injury does occur due to physical characteristics, such as these, the likelihood for discontinuation of exercise appears to increase.

The distinction between differences in rate of muscle and skeletal changes associated with endurance training has been identified as an important consideration in injury rate. Muscle changes in response to exercise occur more rapidly than do changes in ligament, tendon, and bone strength (Åstrand & Rodahl, 1986). Similarly, after injury, the healing of the various tissue types also occurs at different rates. Thus, while a stress fracture may have healed, the ability of the surrounding soft tissue to absorb the energy produced by the forces of running may be significantly longer in returning to normal (Zingg, 1975). Similar applications of the effects of forces on musculoskeletal injury may apply to other weight bearing activities, such as aerobic dance.

Although musculoskeletal injury has been identified as a major risk factor and likely contributes to exercise dropout, the positive musculoskeletal effects associated with exercise performance form the basis for many of the desirable and health promoting effects of exercise. Mechanical stress on bone, ligament, and tendons has been shown to be an important aspect of exercise resulting in the maintenance and improved strength of these structures (Haskell, 1985) which are critical in the normal process of mobility and daily functioning. Statistically significant improvement in joint and muscle function in elderly subjects demonstrates that moderate intensity exercise can be performed in a manner that minimizes risk of injury in a population traditionally considered to have greater risk for musculoskeletal injury (Stevenson, 1985).

A number of mitochondrial changes which appear to be critical in the ability to utilize fat as an energy substrate at a greater rate in trained exercisers than non-exercising controls is well known (Åstrand & Rodahl, 1986; Davies, Packer, & Brooks, 1981; Dudley, Abraham, & Terjung, 1982; Gollnick, 1985; Holloszy et al., 1986; Morgan et al., 1971; Saltin & Rowell, 1980). This effect contributes to and may be the primary factor leading to an increase in physical endurance during exercise as well as the basis for loss of body fat associated with exercise.

The ability to induce changes in skeletal muscle fiber types has been an important discovery in the understanding of how training can influence muscle metabolism and impact continued exercise. With chronic stimulation, fast twitch muscle fibers can be induced to develop the characteristics of slow twitch muscle fibers which are associated with increased endurance characteristics (Pette, 1986; Saltin & Gollnick, 1983). However, these muscle changes generally have been shown to be reversible when stimulation ceases (Chi, et al., 1983). The importance of specificity of exercise training is noted also as being important in determining what type of changes will be induced. That is, training that focuses on muscle strength will result in increased strength and mass of muscle fibers while endurance training induces the characteristic mitochondrial changes associated with endurance exercise ((Holloszy & Booth, 1976). These factors directly affect the type of exercise outcomes that will result from the performance of exercise.

Cardiovascular effects. A number of changes associated with the cardiovascular system have been associated with the performance of exercise, including changes in the heart and vascular system. Because of the role cholesterol and lipoproteins have in the degenerative changes linked to atherosclerosis which is a major contributor to cardiovascular disease (Pollock et al., 1984), changes in lipid metabolism are considered in the following discussion.

The most dramatic negative cardiovascular effect attributable to the performance of exercise is sudden death. Sudden death is associated primarily with overstimulation of the myocardium and subsequent fatal arrhythmia (Solomon, 1984). However, the overall death rate from coronary disease is less in exercisers than non-exercisers (Powell, 1988), and remains low even for vigorous activity (Oberman, 1985). This is in spite of a slight increased risk of death due to sudden strenuous exercise in the exercising population. Most deaths associated with vigorous exercise have been associated with advanced atherosclerotic heart disease (Oberman, 1985).

A number of important positive cardiovascular exercise effects have been documented. The major cardiovascular effects are increased cardiac stroke volume, increased peripheral capillary density and myoglobin in exercised skeletal muscle (Åstrand & Rodahl, 1986; Blomqvist & Saltin, 1983). These exercise-induced changes provide an increased capacity to deliver oxygen to active muscle. Control of mild hypertension (Dubbert et al., 1984) and vascular headache (Fitterling, Martin, Gramling, Cole, & Milan, 1988) are additional effects of exercise.

Although overall decrease in cholesterol, triglyceride, and low density lipoprotein (LDL) in addition to increased levels of high density lipoprotein (HDL) have been reported as a result of long term exercise (Wood & Haskell, 1979), the amount of stimulus required to obtain statistically significant changes may be greater than that required to produce changes in VO_2 max (Wood, Terry, & Haskell, 1985). However, a slight decrease in plasma lipids has been demonstrated in sedentary office workers who participate in greater leisure activity than their more sedentary counterparts (Quaal, 1981).

Exercise and longevity. The cardiovascular effects of exercise in combination with epidemiological evidence of improved longevity associated with higher activity levels have given rise to an area of controversy regarding whether or not exercise participation prolongs life. The basic argument for continued study of exercise compliance and strategies to enhance exercise compliance has been the reported therapeutic benefit of exercise in the rehabilitation of coronary artery disease (CAD)(Oldridge, 1988).

Paffenbarger and Hyde (1988) have reviewed the literature that particularly relates to the issue of exercise and longevity, asserting that many of the risk factors associated with CAD may be diminished by regular exercise. Paffenbarger (1988) further argues that the findings from the Harvard Alumni Study clearly support exercise, as well as smoking cessation, as contributing to lower CAD death rates.

Other researchers and experts remain less convinced of the presumed effect of exercise on longevity (LaPorte, Adams, Savage, Brenes, Dearwater, & Cook, 1984; Naughton, 1985; Oberman, 1985). Solomon (1984), also a critic of the exercise and longevity hypothesis, concludes that while evidence is lacking for cardioprotective or longevity benefits for exercisers, other beneficial effects of exercise can be accomplished by much less strenuous activities than usually recommended, such as swimming or walking. Such activities can be done without increasing the risk for cardiovascular events or musculoskeletal injury. Methodological issues in the interpretation of research findings related to longevity remains a formidable obstacle in arriving at a clear understanding of the topic.

Despite the notable changes that have been demonstrated for endurance exercise training and mental health effects, individual response remains highly variable depending on such factors as initial fitness level and genetic disposition (Åstrand & Rodahl, 1986; Pollock, Wilmore, & Fox, 1984). Generally, the less fit individuals will progress more rapidly and to a greater overall percentage of change. While longevity is commonly attributed to be a benefit of regular endurance type exercise, the evidence remains less than conclusive.

Psychological Effects. Although many claims for mental health benefits of exercise have been reported, Folkins and Sime (1981) assert that research studies in this area generally lack methodological soundness. However, in their extensive review, they did find adequate support for improved mood, self-concept, and work behavior related to exercise. Each of these factors offer potential incentive to continue with a regular exercise regimen.

King, Taylor, Haskell, and DeBusk (1989), recently studied the effects of exercise on psychological health. They found that measurement of psychological variables in non-clinical populations tended to have less sensitivety to change in comparison to subjects who were experiencing more severe psychological problems. Their approach included multiple repeated measures over time in an attempt to capture more of the process nature of change. This approach has previously been used to a limited extent. The findings of this study did not support the belief that exercise has a beneficial effect on psychological functioning in a non-clinical population of sedentary adults. The researchers do point out, however, that psychological variables and functions not measured may be affected by exercise. Other factors associated with exercise, such as social affiliation, also may have a role in positive psychological changes attributed to exercise.

Lifestyle patterns

In addition to physical and psychological characteristics that may influence exercise continuance, specific lifestyle patterns or habits may predispose an individual to exercise continuance or dropout. Previous ongoing participation in exercise has been reported as associated with exercise continuance. Cigarette smoking and the use of alcohol are the most commonly reported habits that appear to be associated with exercise dropout.

Previous exercise habit. The fact that an individual has participated or is participating in exercise appears to be an indicator of continued exercise participation. According to the causal modelling approach used by Godin et al. (1987), the role of exercise habit was strongly supported as a determinant of exercise behavior. In their study, exercise habit was determined by immediate past behavior, previous 4 month history of exercise, and pattern of exercise activity since becoming an adult. In a sense, this finding is circular in that exercise habit is said to be predictive of exercise habit. However, experience with an active lifestyle may make it easier to resume the habit for someone with previous experience. In a study of older women (Kriska et al., 1986) similar findings were reported. Older women who had been walking during a baseline study period prior to the initiation of scheduled exercise were found to have a higher compliance rate than those who were sedentary prior to the initiation of the exercise program.

In contrast to the positive findings regarding exercise habit as predictive of continuance, Gale et al. (1984) found that in healthy volunteers, previous exercise patterns did not affect rate of dropout from their program. However, in their study dropouts tended to have greater cardiovascular fitness than continuers. Without further analysis of dropout activity the non-significant finding of previous history of exercise patterns may be spurious. As noted in the discussion on perceptions of exercise, interpretations of meanings of past exercise experience may also affect whether past exercise experiences contribute to or inhibit exercise continuance. Habits which potentially may contribute a negative effect on exercise continuance are considered next.

Cigarette smoking. Oldridge (1979) found smoking to be related to dropout in the Ontario cardiac rehabilitation program from a post hoc analysis of over 750 individuals. While not the primary factor, smoking status was identified as an important factor and included in the discriminant function analysis in the research reported by Kriska, et al.

(1986) which differentiated 72% of exercise continuers from non-continuers. However, other researchers have found smoking to lack statistical significance related to exercise continuance (Gale et al., 1984; Mulder, 1981; Sallis et al., 1986). A number of reasons could be suggested as to why smoking may or may not be related to exercise continuance including the effect on pulmonary status and possible multicolinearity with other variables such as socioeconomic status. Having identified smoking as a possible factor in some studies however does little to enhance understanding of the process of sustained exercise behavior change.

Alcohol use. Another lifestyle habit that has been reported as possibly contributing to dropout of exercise is use or abuse of alcohol. Mulder (1981) found alcohol abuse to be an important predictor of exercise dropout along with a number of other factors. However, he did not report how alcohol abuse was defined or how the factors in the predictive equation were determined.

Consumption of more than two alcoholic drinks per day, as reported on the Cornell Medical Index, was found among irregular continuers in a study of elderly volunteers (Shephard et al., 1987). No similar report was found with early dropouts or exercise continuers. Other studies have not found an association between alcohol use and exercise continuance or dropout (Gale et al., 1984; Kriska et al., 1986). Undoubtedly the presence of alcoholism or alcohol abuse could affect exercise continuance. However, it appears more likely that the use of alcohol per se has little effect on exercise continuance for the majority of individuals.

Exercise and other health related behaviors. The idea that performance of exercise influences other health behaviors has been discussed by Blair, Jacobs, and Powell (1985). These investigators reviewed the literature to reassess the plausibility of association of exercise with smoking, weight control, chemical abuse, stress management, dental prophylaxis, and periodic health checkups. They found considerable difficulty in comparing many of the studies, due to the lack of precision and agreement in research definitions and a trend toward use of imprecise measures to assess physical activity or exercise. In spite of this difficulty, they identified over 40 research studies for complete review as well as re-analysis of survey data from the Center for Disease Control (CDC). They also noted a lack of precision in assessment of other health related behaviors such as diet and stress management, which further complicated their analysis. Overall, their findings tended to show small or statistically insignificant associations between exercise and the other health behaviors. They noted that some confounding of variables had likely occurred and that the behaviors under consideration probably were engaged in for more complex reasons than could be explained by examining the association of limited variables. For instance, in their analysis of the CDC data, habitual physical activity was clearly associated with better weight control as well as high caloric intake. They found an inverse association between physical activity and cigarette smoking, but inferred a confounding with socioeconomic status.

Although multiple lifestyle patterns, including exercise participation, are often addressed in context of health promotion, the impact of multiple concurrent behavioral changes is not well understood. However, an individual who is undergoing a health promoting lifestyle change in one area may be more likely to change other behaviors congruent with the general lifestyle the individual is seeking. Further research in this area is needed to begin to assess the multiple lifestyle factors with potential influence on exercise continuance.

Situation/Environment Factors

This section considers first the contextual factors at a macro level proceeding to the more specific micro level contextual factors. Socio-cultural factors including cultural expectations and norms as well as individual status within society with regard to potential influences on exercise continuance for the individual are discussed first. Next the role of interpersonal relationships, including family, friends and work environment as factors affecting exercise continuance are discussed. Finally, exercise specific factors including type of exercise and setting will conclude this section.

Socio-cultural factors

Cultural context has been cited by Allen and Allen (1986) as a major element that contributes to the overall failure of individuals to sustain efforts at positive lifestyle change. These authors suggest that health promoting changes recommended by the health care community are prone to failure due to societal values that endorse health risk behavior rather than health promoting behavior. As individuals adopt health behaviors that are in conflict with those around them, they are continually faced with the obvious discrepancy of their chosen behavior and cultural norms. This is the basis for community wide intervention trials such as the Stanford Three Community Study and Stanford Five City Project which attempt to foster supportive change in the environment as well as with individuals (Farquhar, in press; Flora, Maccoby, & Farquhar, 1989). For exercise continuance, a few studies have examined some of these possible conflicts. The factors related to cultural norms and individual status within society are considered respectively.

Cultural expectations and norms. Physical activity changes in our post-industrial society have contributed to a continual decrease in activity levels resulting in a sedentary lifestyle for a growing number of the U.S. population. Shephard (1984) reported findings from a study of Eskimo (Inuit) people who were rapidly progressing from a primitive hunting neolithic culture to a more technologically advanced culture. These people were experiencing a pronounced decrease in energy expenditure and fitness parameters. The implications are that as job energy expenditure requirements lessen, individuals within the society will have less energy expenditure unless other leisure time activity is adopted. Whether society is conducive to that endeavor or not is critical to the question of whether societal expectations influence participation and continuance of exercise.

A survey of U.S. beliefs about sport behavior and participation was conducted by the Miller Lite Beer Company in October, 1983 (Rudman, 1984). The findings of the survey provided evidence that age related differences and expectations for participation in sport do exist in our culture. As individuals age, group sport participation decreases dramatically while participation in all sport activities also declines. Marriage appeared to have a negative effect on participation although low cost family related sports activities increased in the 35 to 54-year-old age group. With increasing age, social-economic status emerged as a greater predictor of sport participation. While the findings of this survey are at best tentative, they suggest that societal factors may underlie participation in sport.

The cultural norm of participating in sports activities vicariously by means of spectator sports (television or attendance at athletic events) appears to outweigh the acceptability of personal participation. The emphasis on professional sports and elite athletes in the U.S. is evidenced by astronomical salaries of players and commercial enterprises associated with professional sports. This societal expectation further influences what meaning sport or exercise may have for the non-professional and non-athletic exerciser. This is especially true as individuals age. Notwithstanding, recent increases in the market for running attire and personal fitness equipment indicate a general societal shift toward increased acceptability of improving ones personal fitness by participation in exercise activity. The basis for these changes are likely complex and still not well understood, although fitness related companies have taken advantage of the trends for individuals to have the best in equipment which has become a status symbol in its own right.

Individual status within society. Depending upon the position of an individual within the social strata, exercise and sport participation may have very different meanings. As indicated by the phenomenological perspective of Dixon (1984), in some social settings the participation in exercise is an identity factor associated with upward mobility in the socioeconomic structure. For example, membership and involvement in exclusive athletic clubs has become associated with a certain degree of status. The potential social interactions in such a setting may have implications for important networking and associations that overlap with the work environment.

The perception of and maintenance of fitness in fulfilling an image of success has also been implicated (Rudman, 1984). Mirotznik et al. (1985) found that 41% of joiners compared to 19% of non-joiners had graduate level degrees. Socioeconomic factors may inhibit participation of some individuals as well, due to economic constraints such as the cost of membership in health/fitness clubs.

Blue-collar status was identified in the Ontario Collaborative Heart Study as a factor to predict discontinuation of an exercise program (Oldridge, 1979). Interpretation of this finding includes the possible perception that for blue-collar workers, job-related physical exertion provides adequate exercise. In addition, less work-time flexibility, or a general perceived lack of control over threats to health may contribute to greater dropout rates (Oldridge, 1984).

However, other researchers (Gale et al., 1984) reasoned that differences in sample representation may have resulted in spurious results. Noteworthy, was the number of blue-collar workers studied by Gale, and co-investigators (1984), approximately 10% compared to over 40% in the Ontario study (Oldridge, 1979). Thus effect size, sampling differences, and the number of other factors identified may have contributed to the divergent findings.

While the likely effect of social factors varies from situation to situation, the effect on individuals may be profound in some cases and less so in others. Little systematic inquiry has addressed this issue with regard to exercise continuation, yet the potential for interaction between societal factors and exercise continuance appears at least plausible and may contribute additional expectations to why an individual would participate in exercise or not.

Interpersonal relationship factors. An important part of the socio-cultural context of exercise behavior has to do with interpersonal relationships. This includes relationships in the work setting, friendships, family, and other relationships. Corporate programs for wellness have demonstrated effectiveness for improved productivity (Pender, 1987b). However, the dynamics of the impact of social reference groups on health strengthening behavior is not well understood (Pender, 1987b). The likelihood that interpersonal relationships influence exercise continuance in the work setting remains plausible, although not well studied.

Social support is a broad framework for consideration of interpersonal relationships with potential impact on exercise continuance. Social support has been considered in relation to a broad range of health care issues and to a limited degree with exercise. While a thorough review of the extensive literature on social support is beyond the focus of this chapter, some discussion of the potential relationship with exercise continuance is important. House (1981) has identified four content areas related to social support: (a) emotional support (liking, loving, empathy), (b) appraisal support (self-evaluative information), (c) informational support (about the environment), and (d) instrumental support (goods or services). He defines social support as the flow of these types of aid between people. A further review of the topic can be found in Dimond and Jones (1983).

In the exercise literature social support has been used vaguely. For example, the term was used to refer to what might better be described as group cohesiveness (King & Frederiksen, 1984). Both of these concepts affect the immediate environment of the individual. However, the concept of social support generally has a broader life perspective and a more robust character that influences many aspects of an individual's life (Gottlieb, 1981). Nevertheless, the supportive effects of building new relationships within an exercise group represents a type of interpersonal relationship that has demonstrated a positive effect on exercise continuance (Gillett, 1988; Massie & Shephard, 1971). Family support, most particularly spousal support, has also been identified as an important factor contributing to exercise continuance (Andrew & Parker, 1979).

As with the concept of social support which may have multifaceted relationships that have negative as well as positive components (Tilden & Galyen, 1987), Jaffe and Jordan-Marsh (1983) studied styles of couple interactions in context of a health behavior change program. They found that depending on the predominant couple interaction style some spousal support may be interpreted as negative. This pattern was particularly evident in an enmeshed-type style of couple interaction, where the support of the spouse was actually interpreted as a negative factor with regard to continued behavior change due to the dynamics of the relationship. Thus even when a spouse appears to have a positive or supportive attitude with regard to the targeted behavior change, the meaning of that support to the person who is engaging in the change may be interpreted in a variety of ways and thus have a varied influence on continuance.

Although the research specifically addressing exercise continuance and family context is limited and may be variable in its effects as discussed above, the family has been considered crucial with regard to the immediate context of an individual undergoing behavioral change (Baronowski & Nader, 1985; Barbarin & Tirado, 1984; Kingston, 1984; Litman, 1974; Patterson et al., 1988; Melito, 1985; Stein & Pontious, 1985). Thus, possible consequences and interaction effects within the family should be addressed.

Interpersonal relationships in all meaningful contexts, including work, friendship, and family, have the potential to influence exercise behavior both in positive and negative ways. The complexities of the many potential relationships in each person's life provide occasion to support or inhibit incorporation and continuation of exercise as a health promoting behavior differently for each individual. Thus, the limited approach taken to date to attempt to study spouse support or group cohesiveness while important, only touches the surface of what may be significant in individual cases.

As in the case of person factors, the level of diversity and complexity in relationship factors suggests that research methods need to be designed to focus on the individual in order to discern what is significant for the individual. In fact, the context of exercise may be one of the most important factors related to exercise continuance, judging from the concentration of research focused on the immediate context of exercise compared to other environmental factors.

Exercise-specific Factors

Both the characteristics and the setting in which exercise is performed are factors that have a bearing on exercise performance. Together these factors comprise the immediate context of exercise performance.

Exercise characteristics. Type, intensity, duration, frequency and progression of exercise are important characteristics of an exercise prescription (ACSM, 1986). The type of exercise recommended for cardiorespiratory effects are activities requiring the use of large muscles in a dynamic repetitive action such as walking, jogging, cycling, swimming, and cross-country skiing. Choices of various activities have potential for influencing exercise continuance due to differences in each of these activities. For example, certain activities may be easier to accomplish than others. Obvious differences in activities such as cross-country skiing and swimming will require varying degrees of preparation. Accessibility to facilities and necessary equipment also affect ability to engage in various activities. Inappropriate or unsafe equipment may predispose to injury and thus is a factor in exercise continuance. While these issues appeal to a common-sense perspective, little attention has been given to these factors in studies related to dropout.

Misconceptions about how to adjust frequency and progression of exercise may be a factor in early exercise dropout, particularly among sedentary individuals. This is particularly true for those who engage in self-prescribed unsupervised exercise. For example, the ACSM (1986) guidelines for maintaining fitness levels for moderately fit individuals are well known. However, application of these guidelines to sedentary individuals may not only be inappropriate, but may predispose them to early dropout from exercise due to negative body sensation and injury. Recommendations for adjustments in exercise performance depend upon the condition and outcome goals of the individual (ACSM, 1986). Exercise recommendations for sedentary individuals are of a lesser intensity than for healthy individuals who have been participating in exercise or have a higher functional capacity (ACSM, 1986). The recent publication of new exercise guidelines for fitness which have a greater focus on initial fitness level is an important step in rectifying this problem (ACSM, 1990).

Another aspect of inappropriate exercise prescription has been in studies using pre-determined exercise requirements without regard to initial fitness level. Pre-determined exercise prescriptions are likely to discriminate between those at the lowest and highest level of fitness. Unfit individuals may be at risk for injury and dropout, while very fit individuals may not be challenged as was suspected in the study by Gale et al. (1984).

Expectations for exercise outcomes depend upon the intended purpose of the exercise. The trend toward combining prescription of exercise for health and exercise for improved sport performance generally adds to the confusion for what is an appropriate exercise prescription. Gavin (1988) states that a confounding of critical issues has resulted from the lack of separation of exercise and sport participation and that the two should be considered separately. For example, the frequency, intensity and type of exercise prescribed for an individual may vary dramatically upon whether the exercise is designed to enhance performance in sport participation or whether the exercise is designed to improve one's health. Perception of exercise as work rather than recreation may be the defining characteristic for some individuals in differentiating sport from exercise. In such a definition, a possible negative perception of exercise may be embedded. This contributes to the idea that exercise must be difficult or require some degree of distastefulness in order to be beneficial. The old adage "no pain - no gain" is thus invoked, which predisposes to inappropriate intensity of exercise or avoidance of exercise altogether.

Most non-athletic adults interested in exercise for health are interested in how little per day they can participate in exercise and still have benefit. Svoboda (1986) found statistical significance in maximal oxygen uptake between exercisers and non-exercisers in exercise durations of as little as 7 minutes per day over a 3 month training interval. While Svoboda's study had methodological flaws in the measurement of functional capacity, due to cycle ergometry rather than treadmill testing, the direction of error in the measurement used would be expected to be in the direction of less effect than what was really obtained. Thus, the common expectation that an individual must exercise 20 to 30 minutes per day, 3 to 5 days per week in a moderate intensity range to have benefit, may not be true for individuals in the lower functional capacity fitness range. Since the unfit individual has the most to gain from regular exercise, this misconception may be a factor inhibiting the non-athletic adult from starting a low intensity exercise regimen that could not only be very tolerable, but could require less time than might be expected to have benefit.

Few studies have considered the absolute effect of exercise characteristics on the issue of exercise continuance. However, several studies have found that an exercise prescription of a low to moderate intensity has potential to contribute to sustained involvement (Gillett, 1988; Gossard et al., 1986; Juneau et al, 1987; King et al., 1988). The use of heart rate monitoring provides a method to relatively easily stay within an appropriate target range of exercise intensity. This minimizes the negative associations of greater intensity as well as lessens potential for orthopedic injury.

Fatigue is a negative factor associated with exercise dropout (Pollock, 1977) which is most likely an indicator of inappropriate intensity or duration of exercise. When an individual experiences fatigue or other negative effects during or after exercise, the likely result is a negative association or negative outcome expectancy for exercise. The specific characteristics of exercise are often dependent to some degree on the exercise setting.

Exercise setting. Quality of the exercise experience which is greatly influenced by the characteristics of the setting, has been identified as a major reason as to whether an individual continues with exercise or not (Siegel, Johnson, & Newhof, 1988). Convenience of exercise has also been suggested as a factor influencing the perception of the exercise experience (Andrew & Parker, 1979). These two factors are closely related to the setting in which exercise occurs.

A majority of studies relating to exercise continuance have focused on a group exercise setting. However, Gettman, Pollock, and Ward (1983) compared supervised to unsupervised exercise and found that unsupervised participants appeared to have a lower dropout rate than did supervised participants. In their study, both supervised and unsupervised groups had statistically significant improvement in cardiorespiratory fitness compared to non-exercising controls. The unsupervised subjects in their study underwent a 4-week training program and participated in one exercise session approximately every 2 weeks to allow monitoring of progress. Thus, the unsupervised group actually had supervision although less than in usual group programs while more individual flexibility was allowed. Support from the study personnel and self-monitoring procedures also may have contributed to the results. The researchers recommend use of a training period with ongoing periodic contact with participants to facilitate continuance in the unsupervised setting. Group support was the most obvious factor not present in the unsupervised group.

Other studies have found group support to be a major factor facilitating exercise continuance (Gillett, 1988; King & Frederiksen, 1984; Massie & Shephard, 1971). The expertise of the group leader and the composition of the group are important in fostering a positive experience as demonstrated in the work of Gillett (1988). In her study, close group identity and identification of the leader as a caring and important health resource were vital aspects of sustained exercise participation.

Greater individualization of the exercise experience has been repeatedly suggested as a way to improve the quality and adherence to exercise in a group setting (ACSM, 1986; Siegel, Johnson, & Newhof, 1988). This can be facilitated by a group leader who focuses on the exercise needs and performance of each participant. However, group size is restricted with this approach. Whether the context of exercise is a group setting or an individual setting, the ability to be flexible and adjust for individuals is important (Gale, Eckhoff, Mogel, & Rodnick, 1984; Siegel, Johnson, & Newhof, 1988).

Exercise in a private club setting has been growing in popularity in the U.S. over recent years. Many clubs offer exercise specialists to help design an exercise plan consistent with individual fitness levels, goals,and preferences. Although not significantly superior to self-monitoring alone, Weber and Wertheim (1989) found that special attention from staff was a positive factor in exercise continuance. A separate treatment condition of staff attention without self-monitoring was not incorporated into the research design.

While it is evident that differences in problems related to exercise varies from group to individual settings, access and cost are minimized by consideration of individual exercise in the home setting. With the increasing awareness that greater individualization of the exercise experience contributes to improved adherence and the awareness that flexibility of timing may be important as well, some researchers are beginning to focus on home exercise as an alternative that addresses both of these issues.

The plausibility that home exercise may decrease some hassles to exercise such as inconvenient location and inadequate time (Gettman, Pollock, & Ward, 1983) lends support for the use of the home setting as an important location in which to prescribe exercise. A number of studies that have focused on a home-based approach to exercise over recent years have demonstrated the effectiveness of home-based exercise both for cardiovascular benefit as well as higher levels of adherence for adults and adolescents (Juneau et al., 1987; King et al., 1988; Marrero, Fremion, & Golden, 1988). For clients in primary care settings, prescription of home exercise is particularly compatible (Mulder, 1981). In addition, many individuals do not have access to expensive health or athletic clubs that provide exercise classes or even community-based programs that are less expensive. Some communities, particularly in rural areas, do not have formal exercise facilities available. The choice involved in place and type of exercise is a consideration that is likely to be highly individualized based upon a number of factors including past exercise history, individual reasons for exercise, environment, and expectations of exercise involvement. Whatever the reasons for home exercise, the phenomena has only recently begun to be studied.

Lifestyle exercise has received some attention over recent years. Lifestyle exercise is defined as a generalized increase in physical activity such as walking instead of driving and including more exercise-oriented activities into leisure time. This approach has been seen as a way to foster a healthy lifestyle rather than a specific activity that should be performed. Lifestyle exercise has been used with some benefit, along with dietary regulation, in treating obese children (Epstein, Wing, Koeske, & Valoski, 1985). Lifestyle exercise represents another exercise setting and an alternative approach to the traditional group exercise program. However, because of the less clear identification of what is exercise and greater number of possible settings inherent in this type of approach, measurement and analysis of changes will be more difficult.

In summary, the consideration of factors related to exercise continuance must include some evaluation of the specific characteristics of exercise as well as the setting in which exercise occurs. The potential for individual differences in exercise, even when setting and exercise characteristics alone are considered, is profound. This complexity no doubt contributes to the difficulty in interpretation of the various studies that have attempted to explore factors related to exercise continuance. The sheer number of variables that can potentially impact the outcome is overwhelming. Consideration of potential interaction effects further enhances the complexity of the phenomenon of exercise continuance. Person-situation interactions is considered next as a broader perspective in which to consider these multiple factors.

Person - Situation Interactions

Simultaneous consideration of person factors and situation factors using an interactionist perspective has been suggested to enhance understanding of the complexities of exercise continuance (Gale, Eckhoff, Mogel, & Rodnick, 1984; Gavin, 1988). While person and situation factors are sometimes viewed as competing rather than complementary, the interaction between the two offers a broader perspective.

Most of the interactionist studies have been limited to measuring a few factors at a time. For example, Wankel and colleagues (1985) used the Self-Motivation Index (SMI) and a decision balance sheet to explore the broader capacity of an interactionist perspective over a situation or person perspective used alone to explain exercise continuance. They defined a situationist perspective as one that primarily focuses on environmental factors such as antecedent stimuli and reinforcement rather than interpersonal factors. The person perspective was defined as focusing on internal psychological processes such as attitude and personality traits. Their interactionist perspective combined the two above perspectives with the belief that both environmental and intra-personal attributes interact to explain behavior. They used the SMI (as representative of a person-type attribute) in combination with a decision balance sheet intervention (as representative of a situation factor) to represent an interactionist perspective. As previously noted, the decision balance sheet alone was found to have a statistically significant effect on exercise class attendance. The researchers interpreted this as supporting a situationist perspective rather than an interactionist perspective.

However, use of a decision balance sheet may indicate support for an interactionist perspective since several cognitive processes of an intra-personal nature are likely engaged in the completion of the form. For example, cognitive processes are used when an individual considers and lists possible benefits and negative factors as part of their decision making process. In doing so, early identification of potential difficulties and possible coping strategies may also emerge as part of the process. For a more detailed discussion of the cognitive aspects of the decision-making process see Janis (1984).

Limited attempts have been made to explore the relevance of an interactionist perspective. The sheer number of both intra-personal and environmental factors that appear to contribute to exercise continuance support the inclusion of both. Yet, the inclusion of both person and environment factors does not necessarily make an interactionist perspective unless the mutuality of the factors is considered as well. Conceptually, the idea of interaction or transaction is appealing when considering the multiple factors with potential to influence one another.

Summary of Factors Associated with Exercise Participation and Dropout

Exercise adherence appears to be the result of the interaction of many complex factors. Participant factors alone are thought to be poor predictors of exercise continuance (Gale et al., 1984). As evidenced in the literature reviewed, the multitude of both personal and situation factors, as well as their likely influence upon each other, serve as potential determinants of exercise continuance in a variety of people including non-athletic adults.

The need for a theoretical and methodological approach that allows exploration of the relationships between multiple factors is underscored by two points. First, any number of these factors may be relevant in any given situation. Second, each individual posesses a unique combination of factors, including his/her own interpretation of what the various factors mean and their importance. Although most of the factors identified in the previous discussion have largely been derived apart from formal theory, identification of these factors represents important groundwork and provides building blocks for further theory development. As additional work on theoretical models and instrument development occurs, the comprehensiveness of the complex interaction of variables important in exercise continuance research can be better understood. In addition, further development of a theoretical framework from which to consider exercise as a type of sustained behavior change will begin to fill in the gaps identified by Dishman (1986), Folkins and Sime (1981), and Martin and Dubbert (1982). The following section reviews theoretical perspectives related to the study of exercise continuance.

Theoretical Perspectives in Exercise Continuance

In spite of the absence of a robust theory for exercise continuance, many theoretical formulations have been applied to the study of exercise continuance. Yet, these theories explain only part of the complex phenomenon of exercise continuance. This section presents theoretical models and perspectives that have been utilized or hold promise for use in the study of exercise continuance. Behavior modification concepts will be considered first, followed by self-perception models, causality models, health belief models, stress, appraisal and coping models, and finally, stage models.

Behavior Modification Models

Principles of operant conditioning form the basis for most of the techniques commonly used in practice as health enhancement strategies (Chesney, 1984). This paradigm purports that behavior is influenced by stimuli which are designated as antecedents and consequents. As behaviors are reinforced by repeated occurrences, antecedents become cues for the behavior which elicit reinforcement. Consequents are contingent upon performance of the behavior in order to become a reinforcement of the behavior. In behavior modification intervention strategies, naturally occurring events are incorporated as cues (antecedents) for the performance of desired behaviors. Then, positive reinforcements (consequents) are used as rewards for performance of the desired behavior. For example, the ringing of an alarm clock in the morning could be a cue to get out of bed, get dressed in exercise clothes, and go outside to walk or jog. Upon completion of the planned exercise, the reinforcement may be taking a hot shower. As exercise becomes a habit, the feelings associated with the performance of the exercise may themselves become a reinforcement to continued participation.

Chesney (1984) discussed the importance of adequate criteria for reinforcement so that suitable positive reinforcement is achieved. The process of shaping or successive approximation is utilized to allow the new exerciser to apply reinforcement to reachable sub-goals. As the sub-goals are attained, the behavioral target is gradually increased until the desired overall goal is reached. In this situation, successive increases in exercise distance or time may be reinforced by the purchase of new running shoes. Chesney notes that the use of these techniques has been successful, but long-term maintenance of the desired behavior has been unsuccessful. She advocates the combined use of a self-regulation perspective to facilitate the maintenance phase of behavior change as does Leventhal and his colleagues (1984).

Stimulus control and reinforcement techniques. Keefe and Blumenthal (1980) utilized the Life Fitness Program, a behavioral intervention which included stimulus control and reinforcement techniques, in a clinical trial/single case design. Three middle-aged males with histories of difficulty maintaining exercise were evaluated using the Cooper 12-minute fitness test. The men kept daily baseline exercise records. In each case the subject scored in the "Very Poor" fitness category. The self-reinforcement strategy included development of an initial list of potential rewarding stimuli each participant could use as reinforcement for completion of weekly exercise goals. Self-administration of the reward was contingent upon meeting a pre-determined criterion. When possible, the reinforcement chosen was to be related to exercise in order to link the behaviors in a natural way. This facilitated shifting self-reinforcement to the positive rewards of exercise performance and exercise effects.

The stimulus control aspect of the study included: exercising at the same time and in a similar setting each day, engaging in a 10 minute warm-up, and setting an exercise goal not greater than 10% of the previous weeks goal. Each of the subjects had improved to the "Good" or "Excellent" fitness level by 9 months. All had advanced to the "Excellent" category by the 2-year follow-up assessment. All participants continued regular exercise at the 2-year follow-up and indicated they no longer relied upon the self-reinforcement strategy. Instead, they were experiencing the positive effects of exercise as a reinforcement of continued exercise.

This study demonstrates an approach that utilizes behavioral techniques in a self-regulation framework. Limitations include lack of identification and analysis of other potential variables capable of interacting with the intervention techniques that may have had an influence on the adoption and maintenance of the exercise habit. Also little discussion of the process is given other than the shift in reliance of the subjects on external reinforcement strategies to more intrinsic rewards of exercise itself. The researchers acknowledged that a limitation was the absence of exercise dropouts which precluded any analysis of variables associated with dropout or related problems.

Martin et al. (1984) completed a series of six studies designed to identify behavioral and cognitive interventions that would increase adherence to an exercise program for sedentary adults. The organized program was community-based and participants had a history of previous unsuccessful attempt(s) to begin or maintain a self-initiated or other structured exercise program. The most common reason given for initial participation was "improved physical health," followed by "weight loss." The most common reasons for previous failure to maintain an exercise program were loss of motivation and feelings of discouragement, and painful or unenjoyable exercise. Interestingly, 83% of the participants expressed a preference to exercise with someone else, while 63% noted that their previous exercise experience was done alone.

In each of the six studies, participants met twice weekly in groups with instructors and engaged in lecture sessions followed by individualized exercise plans based upon fitness levels and age adjusted target heart rates. In addition, a third exercise session each week was completed by the participant outside class and recorded in a self-report format. The participants provided a name of someone to contact to verify outside of class exercise. An evaluation of fitness was completed at the end of the course using a 12 minute walk/run test in studies 1 through 5. Study 6 utilized a 3-minute modified step test. Each study was designed to build upon the findings of the preceding studies.

The first study compared generalized group feedback given at the end of class with personalized feedback given during the exercise session. The other independent variable was specified distance for walking/jogging verses specified time without reference to distance. The results of the analysis showed a statistically significant interaction effect for participants who were given personal feedback, both for time and distance goals. Group feedback was effective only for those who had distance goals. Approximately 30% of the subjects dropped out of the 10-week study, the majority of which were in the "feedback-distance" group. Post-course follow up at 3 months by phone or letter revealed from 46% to 83% exercise dropout, with subjects in the personal feedback group having the lower dropout rate. Primary reasons given for non-continuance were inclement weather and loss of their exercise partner. Studies 2 through 4 considered aspects of goals setting.

<u>Goal setting</u>. Study 2 by Martin et al. (1984) attempted to replicate and extend the first study. Since personal feedback was found to be beneficial over group feedback, the remainder of the studies used personal feedback alone. Distance exercise goals were used rather than time goals since the follow-up evaluation of the first study revealed no difference in adherence between these two conditions. Two additional conditions were added to the experimental manipulations in the second study, namely: a weekly lottery for class attendance and flexible verses fixed exercise goals. No statistically significant differences were found with regard to either treatment condition. However, flexible goal setting approached statistical significance and had the lowest post-course and 3-month follow-up dropout rate as well as the most improvement in fitness among participants.

Study 3 (Martin et al., 1984) continued to focus on fixed verses flexible exercise goals, using a cross over design where the flexible goal group changed to a fixed goal approach during the second 6 weeks of the exercise class, and visa versa for the fixed goal group. The flexible-goals-first group had statistically significant better adherence than the other group, although both groups declined in attendance during the second 6 week period. No systematic follow-up was completed.

Study 4 (Martin et al., 1984) focused on proximal verses distal goal setting on exercise adherence. The proximal goal setting group wrote new mileage goals weekly, while the distal goal group wrote new mileage goals at 5 week intervals. No statistically significant difference between the two groups was found, although the trend favored the distant goals group.

The use of goal setting to facilitate stepwise challenge and provide specific feedback on performance to improve performance, self-efficacy, and greater persistence in sport and exercise also has been suggested by others (Locke & Latham, 1985). The use of specific short term goals can facilitate reaching long term goals if timely feedback is included, the goals are challenging, and the goals are accepted by the individual. The participation in goal setting and strategies for goal attainment by the individual can also reinforce commitment to goal achievement and motivation for persistence in sport or exercise. The use of goals as discussed by Locke and Latham may have important implications for planning an individual exercise program. This may be particularly true if short term reinforcement is desired to help keep an individual involved in exercise until the longer term benefits of exercise can be expected to reinforce the habit.

Cognitive-based strategies. Study 5 (Martin et al., 1984) attempted to explore the effect of cognitive based strategies comparing disassociative and associative techniques. One intervention was designed to distract the participants from internal negative cues while focusing on positive external cues. This approach essentially attempted to distract the exerciser from what he/she might be feeling as a result of exercise. The second condition had group participants attend to body sensations and internal cues to help avoid injury and appropriately pace themselves. Both groups used self-talk to utilize their individual strategies and recorded what they thought about during exercise as a means of evaluating their cognitive strategy. The analysis demonstrated superior adherence for the dissociative strategy condition. The 3-month follow-up adherence to exercise demonstrated continued superior adherence to exercise by the dissociative group. A 6-month follow-up assessment revealed a weakening of the superiority of adherence of dissociative group continuers.

Self-Perception Models

The idea that individuals' self-perception is important in whatever activities they engage in, is basic to many theories that have been advanced for the study of human behavior. Many of these self-structures overlap and may indeed reflect different facets of the same phenomenon. Three theoretical formulations that have been widely used in the study of exercise continuance, self-efficacy, competence motivation, and self-esteem, focus explicitly on self-concept and are considered in this section.

Self-efficacy. Bandura's (1977, 1986) social-cognitive perspective provides the necessary context in which to understand the specific nature of self-efficacy perceptions. It is the perception of how adequately an individual can act in a given situation that is most strongly correlated with the actual outcome of the behavior (Kaplan, Atkins, & Reinsch, 1984; Strecher, DeVellis, Becker, & Rosenstock, 1986). This mediation between knowledge or skills and action is accomplished by self-referent thought (Bandura, 1986; O'Leary, 1985). In addition, the theory embraces the notion of transaction between individual and environment, referred to as reciprocal determinism, as part of the process involved in behavior change (O'Leary, 1985; Schunk & Carbonari, 1984).

When studying clients with Diabetes Mellitus, Crabtree (1986) found that an individual's self-efficacy with regards to a specific behavior emerged as a potent predictor of whether or not a behavioral change would be continued or not. The concept of self-efficacy, an individual's sense of how well he or she can perform some specific behavior, has emerged as an important variable in other studies as well (Strecher et al., 1986), including exercise (Kaplan et al., 1984).

Competence motivation. Competence motivation, originally defined by White (1959), has been extended and further refined by Harter (1982) with application to understanding developmental perspectives of cognitive and physical skills of children. Harter's model includes the concepts of optimal challenge, perceived competence, and mastery attempts as well as others in an heuristic model that explores this complex phenomenon.

In this theory that offers explanation of motivation for various activities, the underlying assumption is that humans have the need to perceive themselves as competent, and thus engage in activities in which they can be successful. As individuals attempt activities such as exercise, whether or not they have success in mastery will affect how they perceive themselves in regard to the particular activity and may influence whether or not they will continue.

Harter (1982) further notes that changes occur in the self-concept over time making the developmental perspective important in understanding how self-regulation works in children. She notes also that focus on the process itself and the individual skills used in mastery attempts rather than the product or outcome can facilitate reinforcement of continued attempts toward mastery. In consideration of self-reward and self-evaluation, intrinsic motivation was found to have both a component of effectance motivation, as described by White (1959), as well as a "internalized" motivation which was reflective of external reinforcers which had been adopted or internalized by the individual. For further discussion of research and findings regarding self-regulation in children see Harter (1982).

Weiss (1987) discussed the components of Harter's model, including implications for practitioners. Weiss, Bredemeier, and Shewchuk (1986) found that the degree of understanding between one's behavior and the outcomes of that behavior is the most potent predictor of perceived competence, actual competence, and motivated behavior among children in sports. Consequently, the cognitive elements of understanding and attribution emerge as central to motivation in youth sports.

Bressan and Weiss (1982) have offered a theoretical formulation for teaching physical education that focuses on development of competence, self-confidence, and persistence. An extension of some of these theoretical considerations to adult exercise behavior may also be appropriate, especially in light of other exercise research, particularly the ideas of self-efficacy and attribution theory applied to exercise (Brawley, 1984; Desharnais, Boullon, & Godin, 1986; Duncan & McAuley, 1987; McAuley, 1985; Strecher, DeVellis, Becker, & Rosenstock, 1986).

Self-esteem. The concept of self-esteem, as it relates to exercise participation, has received considerable attention in the sport psychology literature. Sonstroem's (1978) Physical Estimation and Attraction Scales (PEAS) represent early attempts to explore the concept of self-esteem as it relates to sport and exercise. Physical estimation is said to represent the perception of the individual of his/her physical ability or sport skills. The instrument itself contains a variety of statements related to different activities and beliefs about personal ability to perform these activities. Meanwhile, the attraction scale is comprised of items that make the participant choose a preference between sport activities and non-sport activities or to affirm or deny personal attraction to exercise or sport. Interest or attraction is equated to the perceived reinforcement value of the activity. Attraction then, is thought to be a mediator between perceived estimation and participation in the sport or exercise activity. However, since the scale proposes to measure attitudes and some of the items measure interest in sport as a spectator, a direct link to action cannot be assumed.

The concepts of perceived individual ability and positive outcome expectation for the activity appear to be important factors in participation and maintenance of sport or exercise behavior whether identified as competence motivation, physical estimation or self-efficacy. The multiple perspectives on how to consider and even label these variables of interest in the sport and exercise literature may also represent one of the difficulties that researchers in this area face. To some degree this reflects the lack of maturity of theory development in considering the complex phenomena of exercise participation and continuance.

Sonstroem and Morgan (1989) have proposed a model to help clarify self-esteem and differentiate it from physical self-efficacy, physical competence, and physical acceptance. Each have been placed in a hierarchical structure with the specific concepts on the low end, progressing to the general concepts on the high end. Self-efficacy, as the most specific concept, is at the lowest end and self-esteem, the most global, at the highest end.

Self-esteem continues to be considered as an important variable in exercise participation theory development. Sonstroem (1988) has recommended the use of a less broad, more exercise-specific scale in order to better explore the mechanism of increased self-esteem and exercise performance. Even in his early work on the PEAS, Sonstroem recognized his model was incomplete. Yet, his continued work on theory development has made an important contribution to a broader understanding of self-esteem and exercise. He has demonstrated the importance of theory development in helping to understand complex phenomena regarding involvement in sport and exercise, as well as the importance of model building. In doing so, Sonstroem (Sonstroem & Morgan, 1989) has set an excellent example of how persistence with theory building can lead to a richer understanding of a complex phenomenon.

Causality Models

A number of important concepts used to explore relationships in behavior change and health promotion behavior have been derived from the overall framework of social learning theory (Rotter, 1966). These concepts include locus of control, self-efficacy, and causal attributions (Brown, Muhlenkamp, Fox, & Osborn, 1983; Strecher, DeVellis, Becker, & Rosenstock, 1986). Whether events or outcomes are influenced or controlled by the behavior of the individual or by external factors is central to locus of control theory and attribution theory.

Locus of Control. Locus of control (LOC) deals with individual interpretations of the causality of behavioral outcomes or reinforcements. Individuals who perceive themselves as primarily influencing what happens to them are identified as having an internal LOC. Meanwhile, those who perceive powerful others, luck, fate, or unpredictability due to the complexity of the situation as the primary cause of behavior are considered as having an external LOC (Rotter, 1966). In addition, the degree of expectancy that a behavior will receive reinforcement in the future is related to the perception of how much the reinforcement is contingent upon the person's behavior. The value placed on the reinforcement is essential to understanding behavior from this perspective as well.

Over the last 25 years an extension of LOC theory has resulted in a characterization of individuals as having an internal or external trait. Although the tendency to generalize the internal-external orientation to similar situations was specified in the original work on the theory, the application of a trait-like assignment that has occurred with frequency was never intended by the originator (Rotter, 1990). Rotter notes rather, that the internal/external dimension was to apply to the locus of the reinforcement or behavioral contingency. This alteration in meaning has resulted in a misunderstanding of LOC and added to the confusion of the concept.

Locus of control has been used in nursing to partially explain the phenomenon of non-compliance. Internalization training for individuals identified as generally more external has been used as a potential intervention to foster more active decision making (Arakelian, 1980). An internal orientation is associated with a higher degree of success at self-modification (Schallow, 1975). Thus, an awareness of an individual's LOC may be helpful in attempting to promote self-care (Balsmeyer, 1984).

Locus of control theory has had mixed success in explaining variance associated with exercise behavior (Dishman & Gettman, 1980; Laffrey & Isenburg, 1983; Sonstroem & Walker, 1973). This may be due in part to the inconsistent inclusion of a measure of value associated with the outcome of exercise (McCready & Long, 1985) or use of a restricted value scale such as the health oriented approach used by some (Carlson & Petti, 1989; Laffrey & Isenberg, 1983). The multiple potential reasons an individual may value exercise are likely to be highly independent and may not clearly relate to health aspects of exercise consistently. In addition, the use of a health value scale based on Rokeach's work (1973) using health items as terminal values (Brown, Muhlenkamp, Fox, & Osborn, 1983; Laffrey & Isenberg, 1983; Saltzer, 1981; Wallston, Wallston, Kaplan, & Maides, 1976) raises questions of validity for the revised measure. The concern is that health may not meet the requirements for a terminal value set forth by Rokeach (1973). Notwithstanding, the results of such studies have not demonstrated a high degree of relationship between the variables of interest.

Kaplan, Atkins, and Reinsch (1984) studied LOC and self-efficacy as alternative approaches to consider outcome expectancies as mediators of exercise compliance in clients with chronic pulmonary disease. They found self-efficacy to be more robust in predicting compliance with exercise than the LOC measure. This finding emphasizes the importance of situation specificity in approaching this topic which has been noted by Saltzer (1981) as well.

An exercise-specific LOC scale, developed by McCreedy (McCready & Long, 1985), was used to explore the relationship between LOC and exercise performance; a demonstrable relationship was not found. The scale consisted primarily of items relating the experience of exercise outcomes to internal causes, powerful others, or luck. In spite of the fact that the items related to exercise, a close scrutiny of the items reveals the general rather than specific nature of goals considered.

Finally, LOC, described as a moderator variable in the perception of stress (Lefcourt, 1983), may have utility in application to exercise continuance in that hassles associated with exercise may be characteristic of the daily stress that predisposes to exercise dropout. The general nature of the locus of control construct may have a greater applicability in explaining behaviors that are generally less complex than the multifaceted process involved in exercise continuance. In any case, the expectation that the reinforcement or behavioral objective is controllable or not controllable by the individual may have applicability in consideration of exercise continuance.

Attribution theory. Attribution theory (Weiner, 1985) considers perceived causal aspects of events on three dimensions: locus of causality, stability, and controllability. In the sport literature, achievement outcomes have been a major focus of attribution research, although other events in which causality may play a role have been identified (Brawley, 1984). For the most part attributions have been evaluated in the study of sport performance, particularly regarding winning/losing or success/failure (Duncan & McAuley, 1987; McAuley, 1985; Russell, McAuley, & Tarico, 1987). Recently, analysis of causal attributions in sport has been extended to the study of children's self-esteem and development of physical and social competence (Weiss, McAuley, Ebbeck, & Wiese, 1990).

Although attributional theory has been used in the study of sport, no corresponding development has occurred in the study of exercise continuance. However, attributional theory has relevance in the study of exercise continuance from several perspectives. Exercise hassles that conflict with exercise resulting in a failure to perform planned exercise could be evaluated with regard to attributional analysis to help determine appropriate intervention strategies. In addition, the interaction of activities performed by the individual that lead to success with exercise continuance may foster an increase in perceived self-efficacy inasmuch as they are perceived to be under the individual's control.

The interaction between efficacy expectations and perceptions of causality has recently been addressed in the sport domain (Duncan & McAuley, 1987) and holds promise for exercise applications as well. Attributions of perceived benefits from exercise participation may increase intrinsic motivation to continue exercise participation and thus have an effect on future exercise behavior. Thus, while causal attributions have not been studied to any great extent, the potential for interaction with other theories such as self-efficacy may contribute to development of a more robust theory of exercise continuance or general lifestyle change.

Health Belief Models

The Health Belief Model (HBM), although widely used, has had mixed success in explaining health promotion behavior (Brown, Muhlenkamp, Fox, & Osborn, 1983; Dishman, 1986; Langlie, 1977; Mikhail, 1981). The HBM has been used to explain the reluctance of individuals in seeking preventative health behaviors and includes a wide spectrum of variables. The central components of the model include perceived benefits of the behavior weighed against the perceived threat/vulnerability which is brought into awareness by various types of cues. Perception of what can be done, if anything, is a central variable thought to contribute to whether or not action is taken by an individual. The focus of the model is primarily oriented to prevention of disease and has had limited applicability in addressing health promotion activities.

Health promotion. Pender's (1986) Health Promotion Model has extended and adapted the basic notions of the HBM toward a more directed focus on health seeking behaviors. Instruments such as the Health Promoting Lifestyle Profile (Walker, Sechrist, & Pender, 1986) and the Exercise Benefits and Barriers Scale (Sechrist, Walker, & Pender, 1987) have come from research on the Health Promotion Model. Further theoretical work in this area holds promise for health promotion in general.

Health self-determinism. Cox (1985) proposed health self-determinism as an alternative to the HBM. The focus of the model is consistent with a self-monitoring approach previously presented. Health self-determinism is based on Deci's cognitive evaluation theory of intrinsic motivation, and represents a multi-dimensional perspective. This is seen by Cox as a more robust approach to motivation than the construct used in the Health Belief Model. Although her work on applying this theoretical perspective to health promotion behavior is an important first step, further work on the validity of the construct and psychometric testing of the instrument is necessary prior to its general use.

Stress, Appraisal and Coping Models

Many volumes could be written on theoretical perspectives that have utilized the concepts of stress and coping. While most stress and coping perspectives have not been applied to exercise behavior, Lazarus and Folkman's (1984) framework of stress, appraisal, and coping has been identified as being applicable to exercise (Folkins & Sime, 1981). This transactional/process model has the potential to consider motivation and lifestyle change from a stress and coping perspective. In this model, cognitive appraisal is the process of interpreting the meaning of events encountered in the change process. The choice of behavior is reflective of the individual's appraisal process and repertoire of coping strategies.

Appraisal is comprised of primary and secondary appraisals which focusses on environmental-individual transactions. Primary appraisal is the initial consideration of whether any given environmental stimulus has potential for threat (negative consequences) or challenge (positive consequences) for the individual. If either threat or challenge is perceived, the process of secondary appraisal or analysis of what is at stake and what can be done about it ensues. The perception that the relationship between person and environment may exceed or tax the resources of the individual is essentially the working definition of psychological stress (Lazarus & Folkman, 1984, p. 21).

The term transaction is used to reflect the mutuality of interchange between the individual and the environment (each affects the other). Motivation could be conceived in this model to be closely related to the appraisal process with the strength of motivation directly tied to the meaning of the change or threat as perceived by the individual.

This theory of stress, appraisal, and coping is highly individualized in that the actual perception of threat or challenge is totally dependent upon the perceptions of the individual. As such the theory represents a phenomenological cognitive perspective. The authors make a point that in this model both environment and person change as the relationship between them evolves. Thus, the process is referred to as transactional in nature rather than simply a person response to some environmental stimulus. Meanings for the individual are based on previous experiences and their own outcome expectancy.

Lazarus and Folkman (1984) discuss emotion-focused and problem-focused coping responses which are essentially determined by the primary and secondary appraisal process as well as the coping repertoire of the individual. The perception of options and personal resources form the basis for selection of coping processes. As time and the process evolve, new information and interpretations are re-appraised by the individual and coping may be adjusted depending upon the reassessment and the coping repertoire at hand.

Research to further knowledge development and clinical application of this model requires a focus on measurement of individual change in addition to evaluation of between-group change. Consideration of change using analysis of aggregate measures alone may obscure change within individuals. The authors recommend the use of an "ipsative-normative" approach in which concurrent analysis of intra-individual and inter-individual differences are sought to capture the essence of the person-environment transaction. This approach, which combines complimentary strategies, has been suggested by Lazarus and Folkman (1984) as a plausible method to evaluate complex clinical phenomena such as commonly encountered in stress research. Studies of how daily hassles relate to various health outcomes have used the ipsative-normative approach by study of inter- and intra-individual change (Bolger, DeLongis, Kessler, & Schilling, 1989; DeLongis, Folkman, & Lazarus, 1988).

Stage Models

Stage models share the belief that behavior change occurs over time as part of a process. As the process unfolds, the experiences and perspectives of an individual will vary depending on the stage of the process. This section focuses on the utility of stage models, including relapse prevention, for the study of exercise continuance.

Stages of behavior change. A 3-stage model of treatment continuity which describes compliance, adherence, and maintenance, as part of a process, has been developed by Kristeller and Rodin (1984). The stages are identified as: compliance, adherence, and maintenance. The health provider's recommendation for a client to adopt a health behavior and the client's decision to adopt the recommended health behavior occurs in the first stage. The second stage is represented by the continuation of the recommended health behavior by the client in a less structured situation. Potential adversity to continuing the behavior is associated with the second stage as well. The third stage addresses the integration of the recommended behavior into the lifestyle of the client, presumably in the absence of ongoing supervision of the health care professional.

This model offers a theoretical perspective that includes the notion of change occurring as a process and clarifies the dispute in terminology between compliance and adherence. Kristeller and Rodin's (1984) 3-stage model appears to fit generally into Leventhal et al.'s (1984) categorization of the medical model of health care. However, it incorporates a shift to self-responsibility as the adherence and maintenance processes progress. In this perspective, long term maintenance of behavior change is primarily under the control of the individual, although the health care provider can facilitate individual success depending upon the practice philosophy and strategies used to assist the individual.

Brownell, Marlatt, Lichtenstein, and Wilson (1986) discuss similar stages of behavior change in their consideration of the process of relapse. They identify at least 3 stages of the change process which include: motivation and commitment, initial change, and maintenance of behavior change. Marlatt and Gordon (1989) recently discussed the stage of pre-contemplation as part of the habit change model, signifying a stage in which a client may not only be uninterested, but may be resistant to behavior change.

The idea that behavior change occurs in a process through stages is also proposed by Best and Cameron (1986). They suggest that different people will be at different stages at any given time and that various objectives should be considered to account for these differences. With this perspective, interventions to assist individuals toward an eventual outcome of sustained behavior change would necessarily focus on the individual and the context of the change process.

A general model of change with a distinctive focus on self-change has been developed by Prochaska and DiClemente (1983). In their model, the stages include: pre-contemplation, contemplation, action, maintenance, and relapse. During each of these phases the individual is said to engage in a number of processes that facilitate their progress along the continuum of change.

Prochaska and DiClemente (1983) studied smokers in various stages of smoking cessation. They intended to develop a general theory of change with the capacity to make predictions regarding the use of stage-appropriate interventions. Their research findings supported their hypotheses, including the notion that different stages of the change process tend to require different strategies. They found that earlier phases tended to require more cognitive focused strategies in contrast to later stages in which behavioral focused strategies were employed. On the basis of these findings, they see implications for therapeutic interventions.

Stage identification is the basis for prescribing appropriate treatment interventions in Prochaska and DiClemente's model (1983). For example, the authors suggest that smokers in a contemplation stage are more open to and more likely to use consciousness-raising, while those in the maintenance phase are more attuned to counterconditioning and stimulus control strategies. The finding that counterconditioning and stimulus control strategies continue to be used in the maintenance phase are taken to support the view that the maintenance phase continues to be an active phase in the change process.

Concerns-Based Adoption Model. Jordan-Marsh (1985), has addressed the importance of stages of change in her research on exercise compliance. She developed an instrument designed to measure changes in an individual's concern about exercise as a way of enhancing compliance. Her instrument is based on the Concerns-Based Adoption Model which was originally developed to study diffusion of innovations in education. The general premiss is that at different stages an individual will have different concerns regarding the innovation that is being implemented. By attending to the specific concerns that are salient at the moment the process of accepting the innovation as part of the routine will be facilitated. Her extension of the model to exercise compliance offers another theoretical perspective from which to consider the process of lifestyle change and emphasizes that a dynamic process is integral to behavior change. The model appears to hold promise for future work.

Relapse prevention. The Relapse Prevention (RP) model of Marlatt and Gordon (1980, 1985) was developed to explain the process of relapse to addictive behaviors, which had been previously discontinued. The RP model was based upon research with alcoholics, smokers, and heroin addicts, but has eventually come to be used for other behavioral problems as well (Marlatt & Gordon, 1985).

The key variables in the RP model (see Figure 1) are (a) high risk situation (HRS), (b) whether or not the response to the HRS leads to coping (adequate resolution of HRS) or not, (c) self-efficacy (SE) of coping or not coping with the HRS, (d) outcome expectancies for substance effects, and (e) abstinence violation effect (AVE). The authors reasoned that if a coping strategy could be utilized that resulted in abstinence in the face of a high risk situation, self-efficacy regarding coping with the high risk situation would be enhanced and the individual would be less likely to relapse. Conversely, if the individual used a coping strategy that resulted in the initial use of the

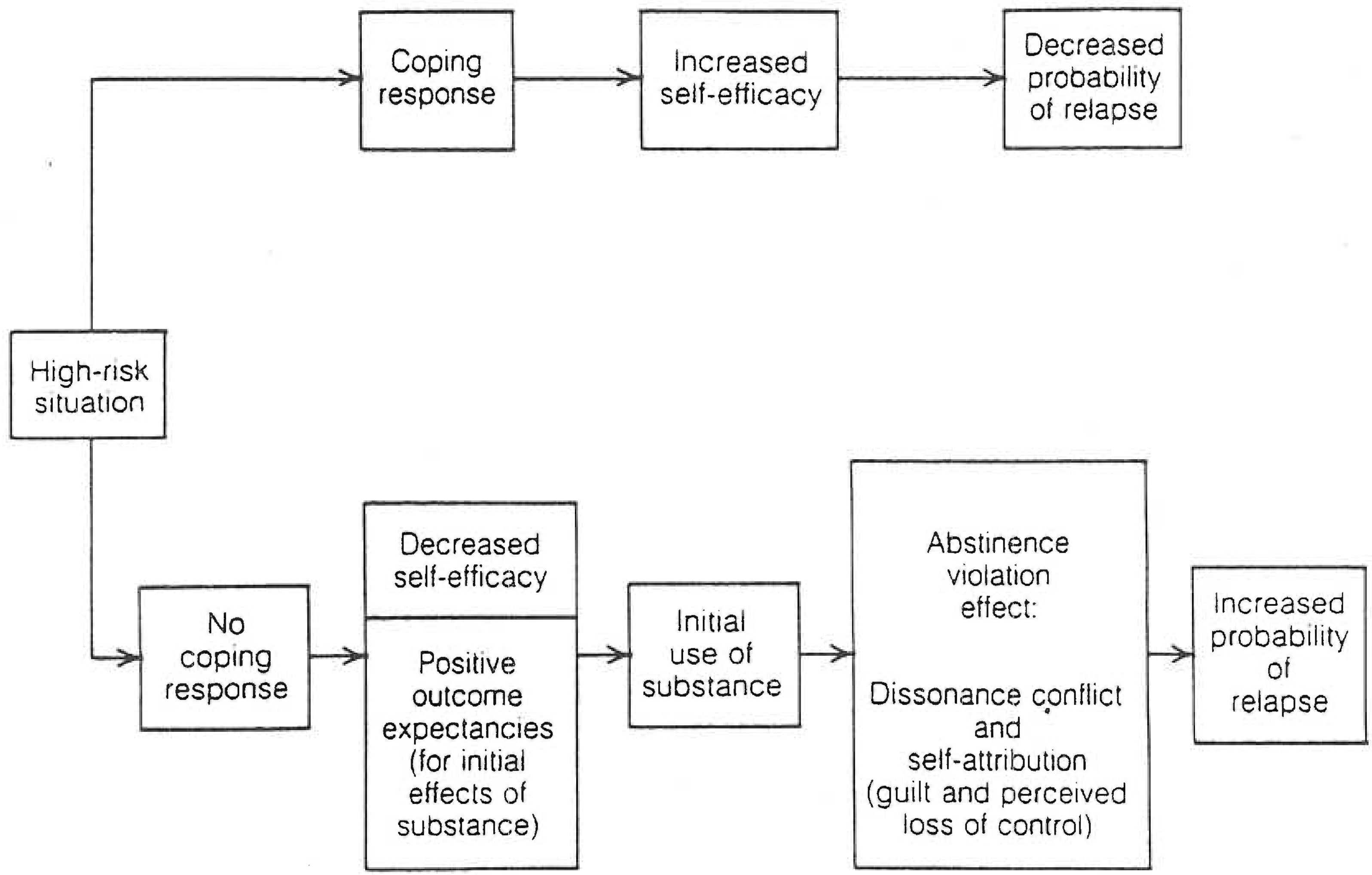

Figure 1: Relapse Prevention Model (Marlatt & Gordon, 1985).

prohibited substance, the sense of self-efficacy would be lessened, predisposing the individual to further use of the substance. Furthermore, the individual would experience a sense of cognitive dissonance between their new perception of themselves as a non-user and a lapse into the former addictive behavior. If the individual perceives the lapse into addictive behavior as a personal failure (personal attribution effect) the greater the tendency to go into a full relapse.

In contrast, if the process of behavior change is seen as a learned behavior, like learning to ride a bike, the expectation is that with practice, the individual will become better and better as time progresses. From the learned behavior perspective, a lapse (one-time use of negative substance) gives opportunity to learn what went wrong and to adjust strategies to prevent a negative recurrence. This perspective allows for less erosion of self-efficacy by inhibiting self-attributions of failure. Rather, the individual sees the coping strategy used as ineffective for that situation rather than interpreting the lapse as a personal failure.

An underlying assumption of the RP model is that when an individual encounters a HRS a certain degree of stress is involved. This is due to the fact that in a HRS the individual must make a decision to continue maintenance or to lapse into use of the forbidden substance. The source of stress in the HRS has to do with the conflict that occurs due to differing outcome expectancies, both positive and negative. The clinical use of the RP model depends on identification of high risk situations and development of a coping strategies for use with each HRS.

A few studies have attempted to evaluate the use of a relapse prevention model to explain exercise continuance. The final study (Study 6) reported by Martin et al. (1984), was designed to evaluate intervention strategies focusing on enhancement of exercise maintenance. A relapse prevention intervention was designed and compared to the use of disassociative cognitive strategies. The group class in the relapse prevention condition had focused discussions on: (a) likelihood of relapse (failure to exercise 3 days or more), (b) "apparently irrelevant decisions" that predispose relapse, (c) factors thought to increase the likelihood of relapse, and (d) "the abstinence violation effect" (cognitive dissonance associated with non-adherence). Toward the end of the exercise class, the group was instructed in a planned relapse (no exercise for 1 week) and encouraged to restart exercise on their own outside class. A third group also received the relapse prevention intervention, but had additional post-course contact with instructors by mailing completed exercise records every two weeks at which time the instructor would call and give verbal praise to the participant for continuing with exercise.

Although a statistically significant difference was not found between groups, several noteworthy methodological flaws were noted. An overall fall in adherence across groups occurred in this study and was partially attributed to "procedural drift" by the researchers. A change in exercise assistants who had less experience and who did not rotate between groups, as planned, was one of the differences. In addition, the exercise assistant of the basic program group continued to arrange group exercise meetings even after the completion of the course. Also, several members of the relapse prevention group without continued feedback continued to meet for exercise after completion of the course. Personal feedback, which was part of the basic program, was not implemented systematically in Study 6 due to a change from daylight savings to standard time. This occurred because most of the participants chose to arrive early and complete their exercise on their usual outside unlighted track rather than wait for their instructor and exercise on the inside track. Thus the instructor was not present as planned for the majority of the scheduled exercise. Finally, as previously noted, the method of evaluation for fitness improvement was changed during the 6th study.

Despite the confounding of variables and methodological flaws of Study 6, the researchers accepted the study as valid. Relapse prevention intervention was rejected while social support was sited as having possible relevance (although not specifically studied). Although Martin et al. (1984) have attempted to systematically evaluate strategies that have salience for exercise adherence, understanding of the process and identification of the key variables of behavior change remains unclear.

Summary of Theoretical Perspectives

Although several of the models presented offer potential for a better understanding of exercise continuance, none so far have been broad enough to encompass all the complexities regarding exercise continuance. Several elements are necessary to build a model with the capacity to address the complexities of exercise continuance. The elements include: a process capacity, a multidimensional formulation of motivation, an ability to consider individual meanings, and an ability to consider interactions of multiple person and situation variables.

The combining of theories to explain complex interactions offers potential for a way to advance theory. Several theories from the above discussion meet the above criteria and stand out as having potential for application to exercise continuance. Derivation of the theoretical framework of the present study is considered in chapter III.

CHAPTER III

THEORETICAL FRAMEWORK

The Lifestyle Change Model for Exercise (LCME), derived from multiple theoretical perspectives, was developed by this investigator to conceptualize the phenomenon of exercise continuance. The Relapse Prevention model of Marlatt and Gordon (1985) and the Stress, Appraisal, and Coping Theory of Lazarus and Folkman (1984) were particularly influential in the development of this model. The chapter is divided into three parts: underlying assumptions of the model, component parts of the model, and the purpose of the study.

Assumptions of the Lifestyle Change Model for Exercise

The primary assumptions of the LCME include: (a) longterm change occurs as part of a dynamic process that may occur in stages, (b) a person-environment transaction within the process of change occurs which affects and may change both the person and environment, (c) motivation is a multidimensional construct that is influenced by outcome expectancy, self-efficacy and the associated meanings an individual makes, and is susceptible to change depending upon ongoing appraisals of the individual, and (d) during the process of behavior change, decision making is associated with stress due to conflicts between opposing desired outcomes.

Lifestyle Change Model for Exercise

The Lifestyle Change Model for Exercise (LCME) depicts the transaction between an individual and the environment in the process of adoption and continuance of exercise (see Figure 2). Stress associated with conflicts within that transaction is an integral part of the model. The LCME has the flexibility to allow for individual perceptions and meanings related to the stress associated with conflicts. Individual meanings and perceptions are an important dimension of appraisal. Appraisal is the mental assessment that occurs with each person-environment transaction, during which the individual determines whether a conflict exists between exercise participation and salient factors within the person or the environment. The decision to participate, or to continue to participate in exercise, depends on the individual's self-perception and expectations regarding exercise as well as mediating processes that impact exercise performance.

As in the Lazarus and Folkman (1984) theory of stress and coping, the LCME can be characterized as having three major divisions: (1) antecedents to exercise (perceptions of self-as-an-exerciser, including exercise self-efficacy and exercise outcome expectancy), (2) mediating processes (the

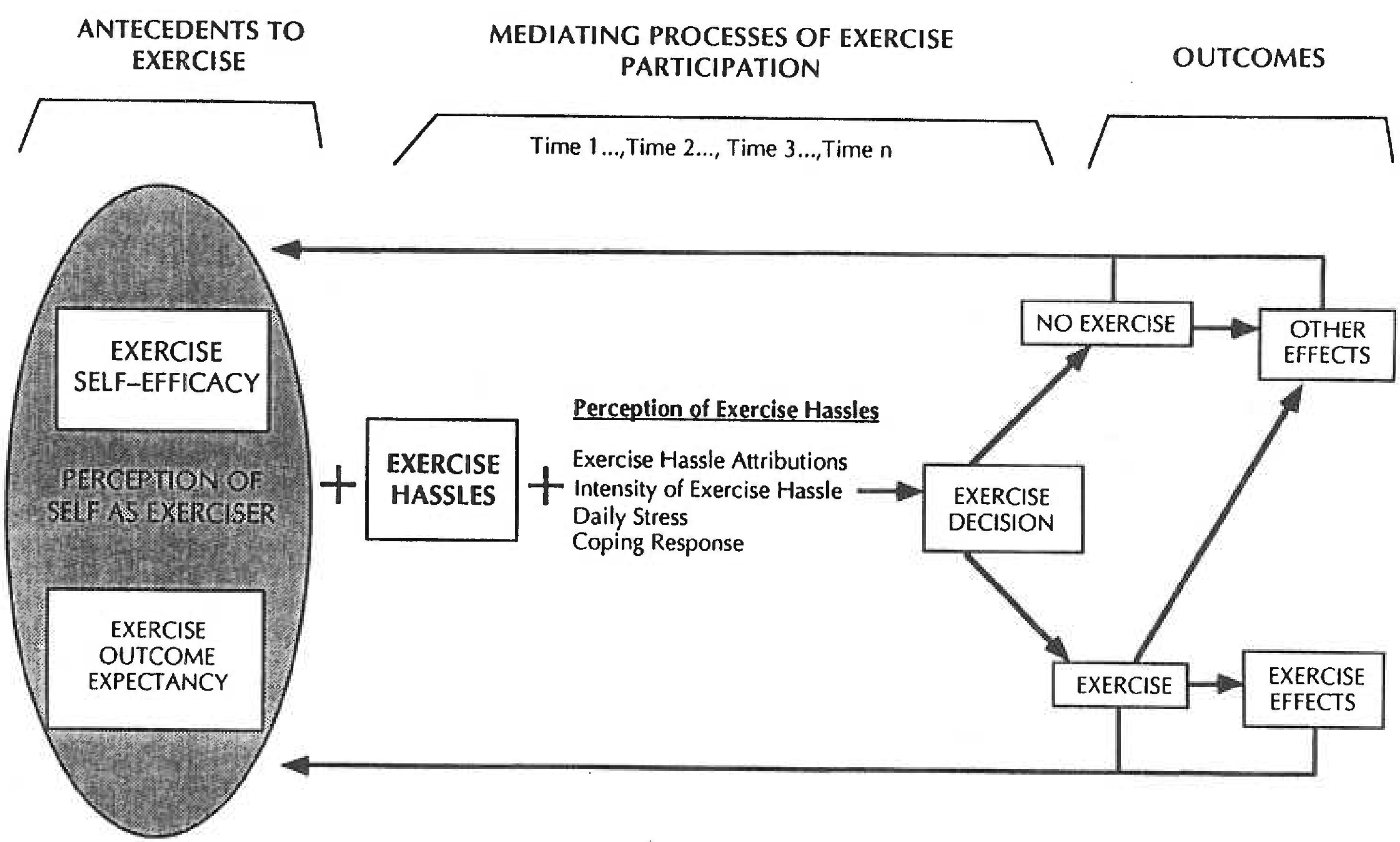

Figure 2. Lifestyle Change Model for Exercise.

repeated encounters of exercise hassles, perceptions of those hassles, and decision to exercise or not for each encounter), and (3) outcomes (exercise and other effects related to level of participation in exercise). Exercise self-efficacy has been well developed and has established salience to the study of exercise continuance. Other concepts, such as exercise hassles and exercise hassle characteristics, are much less developed, yet hold promise for building a prescriptive theory with relevance for health promotion research and clinical practice.

Antecedents to Exercise

Perception of Self-as-an-Exerciser

The degree to which individuals perceive themselves as exercisers depends on a variety of factors. Exercise self-efficacy and exercise outcome expectancy are important determinants of the perception of self-as-an-exerciser in the LCME. Exercise experience and socio-cultural factors, although not explicit in the model, provide context to the perception of self-as-an-exerciser. Exercise self-efficacy and outcome expectancy are also influenced by previous exercise behavior and cultural norms.

At the initiation of an exercise regimen some degree of identity as an exerciser is present. The strength of that identity depends on past experience and how an individual interprets that experience. As individuals successfully engage in exercise, they enhance their perception of themselves as exercisers. As exercise continues to be performed, the perception of self-as-an-exerciser continues to grow. Conversely, if exercise is not performed, the perception of self-as-an-exerciser will diminish.

Each time exercise is not performed as planned, cognitive dissonance is experienced. A conflict arises as individuals perceive the discrepancy between seeing themselves as exercisers, yet not performing exercise. This is similar to the abstinence violation effect associated with cognitive dissonance described in the Relapse Prevention model in relation to addictive behaviors (Marlatt & Gordon, 1985). This effect varies in intensity, but the dissonance increases with repeated episodes of missed exercise. Often the experience of this effect results finally in rationalization of reasons for non-continuance of exercise and could be analogous to the self-serving bias that has been described in relation to Weiner's (1985) attribution theory. This phenomenon has not been adequately addressed in the exercise-related literature.

Exercise self-efficacy. The perception of whether various exercises can be performed and the degree of certainty of that perception make up the concept of exercise self-efficacy. A high degree of exercise self-efficacy translates into confidence that a specific exercise activity can be accomplished. Conversely, if individuals believe they cannot perform a specific exercise task (low exercise self-efficacy), they are less likely to engage in exercise or do so with minimal effort. This may be the case even when a positive outcome is expected.

Exercise self-efficacy has been consistently identified as an important variable in exercise continuance (Crabtree, 1986; Desharnais, et al., 1986; Kaplan, et al., 1984). In the LCME an adequate level of exercise self-efficacy is necessary to initiate and continue with exercise. Strategies such as goal setting and individualized exercise prescriptions reinforce exercise self-efficacy.

Exercise outcome expectancy. Outcomes attributed to exercise performance make up exercise outcome expectancy. Exercise outcome expectancy includes a value assessment while appraising the desirability of the expected outcome. Over time, exercise outcome expectancy needs to be positive for an individual to continue with exercise. Even in the presence of adequate exercise self-efficacy, if exercise outcome expectancy is negative, exercise continuance will be undermined.

Exercise outcome expectancy is dependent upon current and past experience as well as attributions of causality. If a positive exercise effect is attributed to something other than exercise, the exercise outcome expectancy may be inappropriately low. Conversely, if a negative experience is associated with the performance of exercise, it may have a negative impact on the exercise outcome expectancy.

Hassles experienced in successive attempts at exercise also may contribute to negative outcome expectancies.

Exercise outcome expectancy is the interpretation and perception of effects the individual attributes to exercise. This is not the same as actual exercise effects. Accordingly, an individual with unrealistic expectations for exercise may gradually experience a decrease in positive exercise outcome expectancy as expected benefits are not experienced.

Although most outcome expectancies associated with exercise are positive in nature, negative exercise outcome expectancies can exist as well. For example, the expectation that to benefit from exercise one must also experience pain. If negative consequences occur that are attributed to exercise, such as musculoskeletal injury, the perception of a negative exercise outcome expectancy may occur. In the LCME, exercise outcome expectancy is expected to interact with exercise self-efficacy as a determinant of exercise continuance.

Mediating Processes of Exercise Participation

The decision to exercise is influenced by several potential factors identified in the LCME as mediating processes. These factors mediate the decision to exercise and include exercise hassles and perception of exercise hassles.

Perception of exercise hassles is based upon exercise hassle attributions, the intensity of exercise hassles, daily stress, and coping responses. The perceived intensity of exercise hassles may be mediated by the background stress level as well as by intensity and attributions of the hassle. In addition, the coping repertoire and specific use of coping skills may alter the intensity of the hassle. These mediating factors vary with each exercise session and culminate in the exercise decision.

Exercise Hassles

Exercise hassles are the product of person-environment transactions that present a conflict for the performance of exercise. The term "hassles" is used to reflect common experiences in daily living that are appraised by the individual as conflictual. When exercise hassles occur, the perceptions and assessments made regarding the nature of the hassles will influence the choice of coping strategy, if any, that will be used. This occurs with each hassle or situation that requires a decision regarding exercise continuance. Events or awarenesses perceived as exercise hassles can vary widely and persons may respond differently at different times.

Identification of relevant exercise hassles for each person is central to planning interventions in the LCME. By identification of expected hassles, interventions can be planned to assist the individual plan coping strategies to facilitate continued exercise. Development of the concept of exercise hassles is essential since exercise hassles are the focal point of the LCME. Reasons commonly cited for discontinuation of exercise are inconvenient time, inaccessible program location, lack of time, conflict with work or other activities, poor spouse support, failure to obtain expected results, boredom or lack of enjoyment, injuries, and other health reasons (Dishman, 1986; Kriska, et al., 1986; Landrum, 1985).

Exercise hassles and exercise outcome expectancy are essential parts of the motivational system of this model. As an individual encounters an exercise hassle, the degree of conflict regarding the decision to continue with exercise may vary depending on the nature of the hassle and expectations associated with resolution of the conflict.

The intensity of an exercise hassle may influence how and what type of coping response the individual will use to resolve the conflict involved. This is similar to the function of daily hassles (Kanner, Coyne, Schaefer, & Lazarus, 1981). The degree of sustained effort will be influenced by the strength of positive outcome expectancies for exercise and the intensity of exercise hassles. If exercise outcome expectancy is low, a moderate intensity of exercise hassle may undermine continuation of exercise. However, if exercise outcome expectancy and exercise self-efficacy continue to be high, a high degree of exercise hassle intensity may be accompanied by unrelenting effort to continue with exercise. Several mediating variables may influence the perception of exercise hassles and will be considered next.

Perceptions of Exercise Hassles

The ability to assess the nature of the hassles related to exercise is dependent on several factors. Foremost is the ability to make causal attributions regarding the nature of the exercise hassle.

Exercise hassle attributions. Exercise hassle attributions are comprised of the three causal dimensions described in Weiner's (1985) attribution theory: locus of causality, stability, and controllability. Locus of causality refers to whether the perceived cause of the hassle is internal or external to the person. Stability refers to the expected frequency of repetition of the hassle. Controllability refers to the perceived degree that anything can be done to change the hassle.

These characteristics represent important factors for making a cognitive appraisal regarding the meaning of the hassles related to exercise. For example, if a hassle is believed to be controllable, a coping strategy may be initiated. The causal dimensions of the exercise hassle will translate into a perception of whether anything can be done and the degree that doing something will affect the outcome. Thus, if an individual perceives the hassle as uncontrollable and stable, perception of self-as-an-exerciser may be inhibited. If the hassle completely inhibits performance of exercise, the non-participation may precipitate dropout altogether. However, participation in a different mode of exercise may eliminate the hassle.

Intensity of exercise hassle. The intensity of the exercise hassle relates to how an individual perceives and interprets an exercise hassle and the coping response. The perceived intensity of the hassle will have a greater effect on the performance of exercise where self-efficacy expectations, outcome expectations, and perception of self-as-an-exerciser are lower.

Daily stress. Another factor that influences the perception of an exercise hassle is daily stress. Although only indirectly related to exercise, daily stress provides the context in which exercise hassles are experienced and interpreted. As long as the level of daily stress remains relatively low, the stress associated with specific exercise hassles will likely have a greater impact on exercise continuance than does daily stress. However, as daily stress increases, an interaction between daily stress and exercise hassles is anticipated. When daily stress is extremely high it may directly interfere with exercise.

Coping response. Coping responses used in any given situation will be influenced by specific coping skills and the coping repertoire of the individual. If an individual has limited or ineffective coping strategies for a specific hassle, that hassle may be perceived as uncontrollable. Hassles perceived as uncontrollable may result in a lower intensity of attempting to overcome the hassle, non-performance of exercise, or use of emotion-focused rather than problem-focused strategies. On the other hand, a different individual with a broader coping repertoire may encounter the same hassle and utilize a coping strategy that results in elimination of the hassle. In the LCME, perception of exercise hassles is part of the appraisal process and as such is a mediating process of exercise performance.

Exercise Decision

The exercise decision is a recurring choice that is influenced by several factors. When an individual has no conflict with the choice to exercise, continuance will likely occur. However, the occurrence of hassles that conflict with the choice to exercise is one of the main reasons people discontinue exercise in this model.

In the LCME, the decision to exercise is the factor that most closely represents exercise continuance. That is, exercise continuance consists of regularly recurrent decisions to exercise over time. As long as the decision to exercise remains affirmative for the majority of planned exercise sessions, an individual may be said to be an exercise continuer. However, when a pattern of irregular exercise participation is present, appraisal of exercise continuance is less clear. Yet, even an irregular pattern of exercise over time represents some level of continuance.

Patterns of planned exercise vary from person to person and may change in response to various stimuli. Because of this variability, exercise continuance may be most appropriately represented in relative terms. For example, computation of the percentage of planned exercise that has been completed provides an opportunity to assess the degree of exercise continuance for an individual.

Outcomes of Exercise Continuance/Non-continuance

Most outcomes experienced as a result of exercise participation depend on the regularity of the choice to participate. Exercise and other effects may vary from person to person as a result of exercise type, intensity, duration and frequency. Depending on the frequency of the decision to exercise, both exercise-specific and other effects of exercise participation may occur.

Exercise Effects

Both physiological and psychological effects occur as a result of exercise. The individual's perception of these effects has a clear influence on exercise outcome expectancy including perceived effects, whether real or not. The many physiological and psychological changes attributed to exercise were previously discussed in Chapter 2. Most of the positive physiological effects of exercise occur over a long time and depend on sustained participation. Changes due to exercise also depend on the initial state of the individual at the outset of exercise and the frequency, intensity, duration, and type of exercise performed.

Psychological effects associated with exercise performance may occur more rapidly than physiological effects and can include a number of secondary effects. Secondary effects of exercise include group association, social contact, and the sense of mastery associated with successful participation. Feelings of wellness, increased energy, and a new awareness of body image also may precede notable physiological changes.

One type of physiological effects that may occur rapidly are those due to injury. Injuries associated with exercise may profoundly affect whether exercise is continued. Injuries can have a negative impact on exercise outcome expectancy or directly interfere with participation in exercise as in the case of severe musculoskeletal injury.

Body sensations also may have a significant impact on exercise continuance. Exercise performed at an inappropriate intensity level may result in discomfort from exertion or predispose the individual to overuse injury. The phenomenon of "positive addiction" (Glasser, 1984) represents bodily sensation associated with a positive response. The release of endorphins associated with "positive addiction" may result in continuation of exercise even when negative effects of exercise are being experienced (Rudy & Estok, 1986).

Other Effects

The final variable in the LCME has to do with outcomes indirectly related to exercise. These effects include positive or negative feelings, social effects (including group affiliation), and both psychological and physiological functioning (including deconditioning or increased risk for hypokinetic disease in the case that exercise is discontinued or decreased). For example, a social interaction at an exercise setting may be perceived as positive. These are effects that happen in association with exercise, but could as easily happen in non-exercise settings.

Purpose of the Study

The purpose of this study was twofold: (a) to explore the relationship between exercise hassles and subsequent performance of exercise and (b) to describe and explore concepts identified in the LCME in context of the process of establishing a habit of exercise participation. Although most of the concepts of the LCME were considered in the study, the intent was not to test the entire model. Rather, these concepts were addressed to represent the complex nature of the transactional model.

The parts of the model particularly of interest in this study were the potential relationships between exercise hassles, moderators of exercise hassles, and exercise continuance. Exercise self-efficacy was also considered since it has been repeatedly identified as contributing to ongoing exercise performance. Postulated relationships related to the LCME included:

(1) Exercise hassles will be inversely related to exercise performance (as hassles increase or decrease in intensity, a corresponding increase or decrease in percent of planned exercise will occur).

(2) The attributional dimension of exercise hassle controllability will be directly related to exercise performance (exercise hassles that are perceived as more controllable will be associated with a higher completion of planned exercise).

(3) The attributional dimension of exercise hassle stability will be inversely related to exercise performance (greater perceived hassle stability will be associated with a lower percent of exercise performance).

(4) Performance of exercise will be directly related to exercise self-efficacy (greater percent completion of

exercise will be associated with increased exercise self-efficacy).

CHAPTER IV

METHODS

Design

A multiple-case study design was used to describe and explore the relationship between exercise hassles and exercise continuance in non-athletic adults. This design allowed exploration of multiple person and situation factors during the process of acquiring and maintaining a lifestyle change of ongoing exercise participation. Historical and demographic data provided the context for each case, while multiple repeated measurements of physiological and psychological parameters allowed for in-depth individual analysis.

The case study approach offers a means to identify patterns and interactions of patterns likely to influence individual behavior. As such, the case study is an important method for focusing on individual behavior change in a real life context (Barlow, Hayes & Nelson, 1984; Yin, 1989). This method is particularly important in studying complex clinical situations and is compatible with the transactional process. In addition, the intensive within-subjects design included in the case study method has been advocated as a particularly effective strategy to study the unique patterns of individuals in relation to stress and coping (DeLongis, Folkman, & Lazarus, 1988).

Participant Selection

The logic of case selection was purposive and included recruitment of individuals with specific characteristics. To be included in the study, all case participants had to identify themselves as non-athletic adults and fulfil the following criteria:

(1) between 20 and 65 years of age.

(2) without physical or health conditions that would prevent participation in a mild to moderately intensive exercise regimen (release to participate from health care provider).

(3) taking no medication that interferes with heart rate monitoring (such as Beta-blockers).

(4) receiving routine health care services from a primary health care provider who had recommended or encouraged exercise participation as a health promotion strategy.

Other selection characteristics were chosen to represent various common life situations as well as simple and theoretical replication. These additional participant criteria are considered next.

Simple Replication

The first of the simple replication criteria was the stipulation that the individual had to have participated in regular exercise involving repetitive movements of large muscle groups from 2 weeks to 3 months immediately prior to entering the study. These criteria emphasized the early phase of exercise continuance which is associated with the greatest occurrence of dropout (Carmody et al., 1980). Exercise hassles are expected to have a major impact on exercise during this phase. In order to represent different life situations the participant selection included representation of at least one participant with the following criteria: (a) children present in the home, (b) currently married, (c) male and female, and (d) primary use of a non-structured setting for scheduled exercise (i.e., home-based).

Careful selection of multiple cases allowed for representation of a wide range of factors and settings. Home-based exercise was expected to be a common setting for non-athletic adults and was included in the selection criteria. Other exercise settings were included according to the preference of the participant. The inclusion of naturally occurring settings is congruous with the case study approach. Three participants were selected to represent simple case replication.

Theoretical Replication

In addition to meeting the general criteria, the two participants selected to represent theoretical replication had to have participated in regular exercise for a minimum of 1 year without a lapse in exercise greater than 2 weeks. Based on the LCME, the theoretical prediction was that these individuals would experience a low level of exercise hassle intensity. The reasoning behind this prediction was that the most common exercise hassles had been encountered previously and that enough time had elapsed to develop effective coping strategies. In the event that new hassles emerged during the study, a greater degree of intensity than for previously experienced hassles was expected.

Recruitment of Participants

Recruitment was accomplished through referrals from primary health care clinicians interested in exercise as a health promoting strategy. Primary health care clinicians were identified by their response to information disseminated by the researcher at the annual Oregon Nurse Practitioner Special Interest Group Continuing Education Conference in September, 1990. After clarifying the nature of the study, Nurse practitioners who indicated an interest in referring clients for participation were informed of the inclusion/selection criteria for study participants. The clinicians who made referrals identified themselves as using exercise as a health promoting strategy within their primary health care practice.

Upon receiving the name of a potential participant, the researcher contacted the person by phone to explain the nature of the project. This initial telephone contact also was used to establish eligibility for participation, to explain the requirements for awarding a compensation fee totaling $120.00, and to obtain an oral consent to participate.

Selection of participants was based upon the order of referral, meeting eligibility requirements, and agreement of the individual to enroll in the study. Five of the persons referred from primary health care providers met the eligibility criteria and agreed to participate. One individual met the criteria, but decided the measurement process would be too time consuming for him at that time. All but one of the individuals referred were initiated by nurse practitioners. The additional referral was made by an osteopathic physician who worked with a nurse practitioner. Recruitment was completed within 3 weeks after receiving approval to conduct the study by the Committee on Human Research.

Procedures and Measurement

Following approval by the Committee on Human Research of the Oregon Health Sciences University, a pilot study was conducted to evaluate the data collection procedure and format of the weekly measures. Two volunteers who identified themselves as non-athletic regular exercisers participated in completion of the weekly exercise packet for one week. Prior to completing the weekly measurement packet the pilot participants were interviewed. During the interview the researcher obtained an exercise history and reviewed each participant's current exercise plan. The participants were oriented to completion of the forms and asked to identify any aspect of the data collection procedure that could be simplified. After completion of the measurement packet, a second interview was conducted to discuss participants' impressions and recommendations. The forms and procedures for data collection were modified based upon the pilot study.

The Case Study Flow Sheet (Appendix A-1) displays and summarizes the sequencing of data collection units. A Case Study Protocol (Appendix A-2) was used as a guide for conducting the study. After the initial telephone contact, an initial interview was scheduled to take place at a mutually agreed upon convenient location (usually the participant's home or place of business). The participant was then mailed a general health and social history form to complete prior to the initial interview.

Data collection consisted of three basic parts: (a) an initial in-person interview, (b) completion of the weekly measurement packet over 12 consecutive weeks (both weekly and daily measures), and (c) a final in-person interview. The time frame of 12 weeks was decided based on the expectation that although data collection would be tedious, 3 months would be tolerable. In addition, the shift from adoption to maintenance is also thought to occur prior to 6 months of exercise participation so participants would at least be overlapping into maintenance if they did not drop out prior to completion of the study.

Initial Interview

The initial interview was conducted using an interview guide (Appendix B-1). The guide included a brief review of the study followed by specific directions for completing the remainder of the interview. The parts of the guide included: instructions and an opportunity for completion of the written consent form, review of the general health and social history form, instructions and format for obtaining the exercise history, orientation to data collection and obtaining of a blood specimen. The consent form (Appendix A-3) was completed and signed by the participant after having an opportunity to ask questions about the study.

General Health and Social History. The General Health and Social History form (Appendix B-2), was designed by the investigator to obtain information about health perceptions, health practices, and the social context of the participant pertaining to the present study. This form was modelled after similar forms used in clinical practice to obtain a basic health history.

The form was reviewed and clarified as needed with the participant. The information obtained from the form was for descriptive purposes, and to identify any problem areas that could potentially interfere with exercise or participation in the study.

Exercise history. The exercise history (Appendix B-1) included a review of past and current exercise participation. The interview guide included questions on participation in organized youth sports, school exercise activities, after-school activities, family activities, and adult activities (past and present).

Questions regarding previous effects of exercise as well as expectations for exercise (representative of exercise outcome expectancy) were also asked. Probing questions typical of an in-depth health interview were used to follow-up on areas relevant to past, present, or future exercise behavior. The exercise history provided information on the participant's view of him/herself as an exerciser.

Orientation to data collection. Data collection forms and expectations for data collection were explained while reviewing the actual forms with each participant. The measurement packet also contained written instructions for forms completion and a reminder for timely return of the packet.

Forms included in the weekly measurement packet were designed by the investigator after consulting with clinicians and other researchers interested in exercise as a health promotion strategy. Each form is individually discussed below. Content areas measured on the forms included weekly exercise plan, weekly exercise log, exercise effects and uplifts record, exercise hassles record, exercise hassle characteristic form, daily hassles and uplifts scale, and exercise self-efficacy scales.

Participants were reminded of researcher availability by phone and that completion of the monitoring, not the completion of exercise, was the focus of the study. All participants were asked to complete the study even if exercise was discontinued. This allowed for the possibility that exercise might be restarted spontaneously.

Laboratory testing. At the conclusion of the initial interview, a blood specimen (approximately 15 ml.) was obtained by the researcher and submitted to a clinical laboratory for analysis. Tests included a chemistry screen (SMAC), with lipids (triglycerides, cholesterol and lipoproteins), and complete blood count (CBC). Printed standards from the laboratory were used to interpret the results. Results of laboratory data were sent to the researcher and the primary health care provider. Data obtained from laboratory tests were used primarily to screen for factors that could potentially interfere with exercise participation and to provide additional information on health status.

Daily and Weekly Measurement

The weekly measurement packet included monitoring forms for daily exercise, exercise effects, exercise uplifts, exercise hassles and weekly forms for assessing characteristics of exercise hassles, overall stress, and exercise self-efficacy. At the completion of the initial interview, each participant was given 12 weekly measurement packets accompanied by 12 pre-addressed, stamped mailing envelopes. Data collection of daily and weekly measures occurred in the home or convenient alternate setting as determined by the participant.

At the conclusion of each week the completed packet was to be mailed. Weekly data forms were reviewed by the researcher upon receipt. Process notes related to the weekly measurement packets were included in the data base for each case.

The telephone was used throughout the study as a means of contact and follow-up. After receiving the first weekly measurement packet, the researcher contacted the participant by phone to ensure that all questions had been addressed and that data collection was proceeding smoothly. If the weekly measurement packet had not been received within five days of anticipated completion (Friday of each week), the researcher called to remind the participant to mail the packet or determine if a problem had occurred. In addition, each participant was contacted throughout the remainder of the study to clarify any aspects of data collection that were unclear. All telephone contacts were logged.

Exercise plan. The exercise plan (part of the exercise diary, Appendix C-1) lists each day of the week with space and directions for the participant to complete and document the plan of exercise before beginning exercise for the week. Type of exercise activity and duration of activity are included on the form. A question to assess the frequency with which the exerciser sought outside consultation or help in developing the weekly exercise plan was also included. The information obtained from this form was used with the exercise log to calculate the percentage of exercise completed.

Weekly exercise log. The exercise log, also part of the exercise diary (Appendix C-1), contains a list of the days of the week with instructions for the participant to record the following information: (a) type of activity, (b) duration (in minutes), (c) rating of perceived exertion (RPE) using a modified Borg scale on which the respondent indicated the degree of exertion with scores ranging from 1 (minimum exertion) to 10 (maximum exertion), and (d) heart rate obtained during active exercise by counting the radial or carotid pulse rate for 6 seconds. The modified Borg scale has been widely used in exercise stress testing and is considered to approximate the relative oxygen uptake corresponding to the exercise work load (Pollock, 1988; Pollock, Wilmore & Fox, 1984).

Participants were questioned regarding competency in checking their pulse. If any uncertainty was indicated by the participant, the researcher reviewed acceptable technique and checked the pulse with the participant. Intensity data were used to assess the level of exercise stimulus in light of reported exercise effects. The use of RPE was used to corroborate heart rate as a measure of exercise intensity. Each of these exercise characteristics were to be recorded after completion of each exercise session.

Exercise performance was measured by computing a percentage of planned exercise completed (the number of minutes spent in exercise participation, divided by the number of exercise minutes planned, multiplied by 100%). Inclusion of the day of exercise also allowed verification between dates on which exercise was performed and the occurrence of exercise hassles. The average of the weekly computed percentage was used as an indicator of exercise continuance.

Exercise effects and uplifts record. In order to monitor effects of exercise and exercise uplifts as they occurred, the exercise effects and uplifts record (Appendix C-2) listed the days of the week with space for observations corresponding to each day of exercise. Participants recorded perceived effects of exercise as they experienced them throughout the week. In addition, any factor that was identified or recognized as making exercise easier to perform was recorded as an exercise uplift. These data provided descriptive information and were a source for alternative explanations for exercise continuance.

Exercise hassles record. Hassles related to the performance of exercise and coping responses to the exercise hassles were recorded on a form developed by the researcher (Appendix C-3). Each participant was instructed to list all hassles related to the performance of exercise in the space provided on the form corresponding to each day in which exercise had been planned. At the end of the week the participant was to number each hassle.

For each exercise hassle listed, the participant recorded what was done in response to the hassle in the parallel column. While the nature of this open-ended question did not capture the full detail of coping strategies, it did allow for multiple types of coping responses to emerge. The combined information obtained on this form afforded a broad input of factors related to exercise hassles and performance of exercise.

Exercise hassle characteristics. Each exercise hassle previously recorded on the exercise hassle record, was transferred to the exercise hassle characteristic form by the participant (Appendix C-4) using the same number previously assigned. Rating for intensity of the hassle was accomplished using a scale of intensity ranging from 0 (none) to 3 (a great deal). The weekly exercise hassle intensity score was computed by summing the individual intensity ratings of all hassles listed for the week. In the present research, exercise hassle intensity was used to represent the concept of exercise hassles. This decision was made because exercise hassle intensity represents both the number and the intensity of hassles. This rating and scoring scheme is similar to the scoring procedure used on the Daily Hassles and Uplifts Scale (DeLongis, Folkman, & Lazarus, 1988).

Attributional aspects of exercise hassles were also included on the exercise hassle characteristics form. For each recorded exercise hassle, the participant was to answer four questions relating to perceived causal dimensions of each hassle. The scale used to rate these attributional perceptions was adapted from a causal attributions scale (Weiss et al., 1990) which included four items to tap the three attributional dimensions of controllability, stability and locus of causality (internal and external). The response options ranged from 0 (none) to 3 (a great deal).

Responses to each of the four attributional questions were averaged to obtain weekly scores for each of the four attributional dimensions. The information obtained from this scale was used to assess predicted patterns from the LCME and to consider alternative explanations.

Daily hassles and uplifts scale. A modified daily hassles and uplifts scale (DeLongis, Folkman, & Lazarus, 1988) based on the original scale of Kanner et al. (1981), was used to assess weekly experience and intensity of hassles and uplifts. The intensity of daily hassles represented daily stress. The original scale was reported to have a test-retest reliability coefficient of .79 for hassle frequency (Kanner et al., 1981). Studies relating to instrument validity have not been reported. Fifty-three items address areas of work, health, family, friends, environment, practical considerations, and chance occurrences. Hassles represent the degree of negative response to each of the content areas, while uplifts represent the degree of positive response. The instrument measures the number of hassles and uplifts experienced over the previous week, as well as the intensity of hassles and uplifts on a scale from 0 (none) to 3 (a great deal). Total scores can range from 0 to 159 with the higher number indicating a higher intensity of hassle or uplift.

The modified index was selected due to the nature of the research which used multiple repeated measures. The shorter form of the index was expected to be less taxing to the participant. Recommendation for limiting the length of frequently repeated measures has been made for case study approaches in order to diminish the potential of response bias (Yin, 1989; D. L. Taylor, personal communication, August 20, 1990).

Exercise self-efficacy scales. The exercise self-efficacy scales were modeled after those authored and used in previous exercise research. Previous research using a measure of exercise self-efficacy has been undertaken with cardiac rehabilitation patients (Ewart, Taylor, Reese, & DeBusk, 1983), chronic obstructive pulmonary disease patients (Kaplan, Atkins, & Reinsch, 1984) and diabetic patients (Crabtree, 1986). The four exercise self-efficacy scales included walking, jogging, running and stationary cycling with eight levels of increasing time for each activity. The participants were to assign a number from 0 to 100 corresponding to their level of confidence (percent) of being able to complete the specified level of activity.

The exercise self-efficacy scales were scored by summing all items and dividing by the total number of items. This resulted in a score of 0 to 100 with the higher value indicating a greater degree of exercise self-efficacy. An average of the four scales was also computed as an overall assessment of self-efficacy.

Since self-efficacy is situation-specific with each statement representing a unique activity, conventional methods of determining reliability for this instrument are not appropriate. For example, test-retest reliability and internal consistency reliability have been questioned due to potential for change in the self-efficacy over time and the use of individual items to measure each level of activity (Kaplan, Atkins, & Reinsch, 1984). However, construct validity has been assessed to some degree by the predictable performance of self-efficacy measures with other similar and dissimilar variables (Bandura, 1986; Strecher, DeVellis, Becker, & Rosenstock, 1986).

Final Interview

At the completion of the 12th week, each participant was interviewed using the final interview guide (Appendix B-3). The final interview included a review of the participant's perceptions of the study, an assessment of the impact of the weekly measurement packet upon participation in exercise, and a review of exercise effects and other outcomes. The researcher also presented his impressions of patterns that emerged over the 12 weeks. Final interviews were conducted in a mutually determined setting, the participant's home, office or public place such as a restaurant. After the final interview the $120.00 payment check was mailed to each participant who completed the study.

Analysis of Data

Data analysis is an ongoing process during and after completion of data collection in a multiple case design (Huberman & Miles, 1988; Yin, 1989). In this study, analysis began with a review of the initial interview and continued with weekly reviews of the completed exercise packets. In addition to weekly measurement data, interviews and logged theoretical and contact memos for each case were included in the case study data base.

Three modes of data analysis comprised the major analytic strategy for the present research: pattern-matching, explanation-building, and cross-case analysis. Data analysis began with a focus on individual cases and proceeded to cross-case comparison.

Pattern-matching

One of the predominant modes of analysis in evaluation of case study research is pattern-matching (Yin, 1989). In the pattern-matching approach a predicted pattern based upon theoretical expectations is compared to patterns emerging from collected data. Accumulated data from the weekly measurement packets were coded and transcribed to a one-page form designed by the researcher. This form allowed all measured raw data on a single page for ease of comparison of patterns between variables and an overview of each case study (see Appendix D). Graphic representation of the data also facilitated pattern identification by visual inspection. Narrative description was used to discuss the predicted and alternative patterns based on the research findings.

Explanation-building

Explanation-building is an analytic strategy that is particularly useful in a multiple case design (Yin, 1989). The goal of explanation-building is to examine the case study data and formulate a description of causal links consistent with the emergent data. This process uses inductive logic to formulate explanations. Using the explanation-building approach allows for analysis of case-study data in light of what is theoretically predicted. Comparison of rival explanations with theoretically predicted explanations is used to select the most logically sound presentation of the data. Consideration of rival explanations reduces the risk of building spurious explanations.

Although details of each case differ, the rationale of the explanation of the case should be consistent across cases. Thus the process of explanation-building extends ultimately beyond the individual case. For example, the rationale and explanations used in the analysis of the first case should be consistent with explanations in subsequent cases. If explanations in later cases diverge from previous cases, adjustment in the explanations must be made until congruency across cases is achieved. This iterative process provides the accumulation of evidence for theory modification.

In this study, multiple sources of evidence including interviews, daily and weekly logs,and physiological data, were used to develop a description and explanation of what occurred in each case. Evidence offered in support of explanations was clearly derived from the original data contained in the case study data base. Thus, a chain of evidence that connects the explanations to the data is constructed allowing for further analysis or analysis by other observers. This chain of evidence is analogous to "exhibits" presented in a criminal investigation that upon objective inspection by others must "hold up in court" (Yin, 1989).

Cross-case Comparison

After the analysis of each case study was completed using the above analytic strategies, further analysis between cases was done by comparing and contrasting the patterns and explanations from each case. Cross-case comparison allows for a summary of the cumulative findings from each individual case, as well as a synthesis of findings of the entire multiple case study. The cross-case comparison also provides the basis for generalizing findings from the present research to the Lifestyle Change Model for Exercise. Recommendations for additional theory building strategies and research approaches toward a fuller understanding of the process of health promoting lifestyle change emerged from this final analysis.

Reliability and Validity

Although issues of reliability and validity are viewed differently in a case study design (Field & Morse, 1986; Parse, Coyne & Smith, 1985), they are still an important aspect of the present study.

Reliability Issues

Reliability in a case study design can be primarily addressed in two ways: (a) by using a specific case study protocol and (b) by establishing a case study data base (Yin, 1989). Both approaches were used in the present study. A research protocol was carefully constructed specifying procedural issues, including data collection and management. This protocol was followed throughout the study. A case study data base was established by preservation of all original data, data coding forms, and graphic representation of data. Oral and written instructions for completing the weekly data collection forms also helped establish procedural consistency.

Validity issues

Validity has to do with the degree of accuracy obtained in the study of the process of exercise continuance. The description and exploration of human experiences related to the process of establishing and maintaining an exercise habit is by nature participant-oriented. Thus, inclusion of the participant's perspective is an important aspect of establishing credibility (Sandelowski, 1986; Yin, 1989). The researcher's impressions of the cumulative weekly measurement data were presented to the participant during the final interview. This allowed the participant to verify interpretations or clarify misunderstandings.

Purposive case selection is another credibility issue that impacts the integrity of the present study (Woods & Catanzaro, 1988). Each case was selected to serve a specific purpose in the overall scope of inquiry. The rationale for case selection was based on simple and theoretical replication. Simple replication was used to demonstrate common patterns with different individuals to provide evidence for generalizability. In this sense, simple replication is akin to literal replication in a multiple or cross experiment research design (Yin, 1989). In contrast, theoretical replication attempts to demonstrate predictable differences in patterns or outcomes based upon theoretical expectations.

The use of multiple cases enhances the external validity or generalizability of the case study approach (Kazdin, 1982; Kennedy, 1979; Meier & Pugh, 1989). The use of multiple cases is equally important in theory building (Yin, 1989). By careful case selection, person factors and contextual situations common to the clinical setting can be examined over time. The intricate details of factors and how they interact in each case can be explored, including meanings perceived by the individual that are essential to understanding the case. Thus, the credibility of clinical relevance can be established.

Finally, cross-case comparison of intact cases provides a technique to evaluate generalizability to theory. Using this approach, "each individual case study consists of a 'whole' study, in which convergent evidence is sought regarding the facts and conclusions for the case" (Yin, 1989, p. 57).

CHAPTER V

INDIVIDUAL CASE RESULTS

Results and discussion of individual case analyses are presented in this chapter. Both results and discussion are included in the case by case presentation to facilitate the integration of complex findings. Individual case reports include description of the participant, evaluation of predicted patterns, consideration of potential explanations, and a summary. Participants 1, 2 and 4 represent simple replications (new exercisers). Participants 3 and 5 represent theoretical replications (regular exercisers for at least 1 year).

Case # 1

Description of Participant

Participant 1 was a 35-year-old married white female who had begun an exercise program 3 1/2 weeks prior to participation in the current study. She was referred by a nurse practitioner and identified herself as non-athletic. Although having participated in exercise previously throughout her life, she had not done so regularly within the past year and considered herself as non-athletic.

Her primary roles were wife, mother, and nurse midwife. She was working as a midwife 26 hours per week, having achieved a Masters' degree in nursing. She had two children, a 3 1/2-year-old daughter, and an 8-month-old son. She reported equally sharing child care responsibilities with her husband.

Health status. Participant 1 identified her current health status as "good." She denied any current health problems other than hypothyroidism which was stable and controlled by taking daily oral synthetic thyroid hormone. She denied the use of other prescribed or over-the-counter medications. She had her last physical exam in November, 1990 with no abnormal findings.

Her past medical history was unremarkable for serious illnesses or hospitalizations other than for childbirth. She did have an occurrence of knee pain attributed to jogging, as a college student in 1985. She had no further problems with her knee since discontinuation of the activity.

She reported minimal participation in social habits with potential to negatively impact health status and exercise continuance. She acknowledged alcohol consumption of one glass of wine or one bottle of beer once per week on the average. She identified herself as a non-smoker.

She reported an ideal body weight of 125 pounds for herself with current weight of 145 pounds. She last weighed her ideal weight during summer of 1989 (before her last pregnancy).

Exercise history and plan. Participant 1 reported past exercise activities including recreational walking, jogging, aerobic dancing (classes), cross-country skiing, hiking, and playing softball (on a church team). She started recreational cycling which she also used for transportation within the month prior to entering the study.

As a child she was on a swim team, but dropped out when her parents became "too involved" with the pressure to be competitive. Since then, she tried swimming from time to time, but disliked her reaction to chlorinated pool water.

Overall she recalled a positive orientation to participation in exercise and sports as a child despite her negative experience associated with competitive swimming. She recalled achieving the President's Award for Physical Fitness in grade school which added to her positive perception of exercise.

At the beginning of the study, her exercise routine consisted of 3 to 4 exercise sessions per week. Each session lasted approximately 20 to 30 minutes and included a variety of exercise activities. Activities included a 15-minute aerobic exercise class 3 times per week, riding a stationary cycle in her home, and walking during her lunch break.

Participant 1 routinely monitored her exercise intensity. She did this by palpating her peripheral radial pulse for 10 seconds and multiplying by 6 to obtain her per minute heart rate. Her target heart rate for moderate intensity exercise was 132 beats per minute. Her heart rate determination was based upon printed information provided by the YMCA where she participated in an exercise class.

She identified potential for both positive and negative exercise effects. Her positive expectations for exercise participation included weight loss (so she could fit into her clothes again) and improved fitness level (so she could participate in the recreational activities she enjoys). She was aware of a potential for injury with exercise participation as well. However, she was hopeful that her previous elimination of jogging from her exercise plan would minimize her risk of injury.

Participant selection criteria. Participant 1 met the general criteria for participation in the present research (non-athletic adult with less than 3 months participation in exercise). Her participation allowed representation of the following additional criteria: (a) married, (b) with children, and (c) female. In addition, at least part of her exercise plan included home-based exercise.

Based upon her current life situation, several exercise hassles were anticipated. These included hassles related to child care, potential conflicts from her spouse, and conflicts with job expectations.

Predicted Patterns

Exercise hassles and exercise performance. An inverse relationship between exercise hassles and exercise performance was predicted. The percent of planned exercise completed was used to evaluate exercise performance and exercise hassle intensity was used to assess exercise hassles (see Table 1). A consistent pattern of relationship between these two variables was not demonstrated. However, when examining the exercise completed and exercise hassle intensity, the predicted pattern of relationship is evident on week 4 and between weeks 6 through 10, inclusive. On these weeks, lower exercise hassle intensity corresponded to higher percentage of completed exercise and visa versa.

Exercise was not scheduled for week 3 due to efforts to cope with a sick child. Consequently, no exercise and no exercise hassles occurred for week 3. This absence of exercise represents a lapse or discontinuation of exercise. The decision not to schedule exercise in anticipation of a sick child in itself was a coping response. However, if the usual routine of exercise for the participant had been scheduled for week 3 (no anticipation of a sick child), a high degree of exercise hassles would have emerged in conjunction with low or no exercise performance.

Stability of exercise hassles and exercise performance. An inverse relationship pattern between the attribution of stability and exercise performance was predicted. The

Table 1

Participant 1: Exercise Completed and Exercise Hassle Intensity by Week

Week	Exercise completed (% of planned exercise)	Exercise hassle Intensity (total)
1	69	23
2	66	10
3	--	--
4	32	16
5	60	16
6	34	16
7	100	10
8	36	13
9	58	11
10	47	12
11	66	16
12	70	19

expectation was that if an exercise hassle was perceived to have low stability over time (changeable with regard to frequency of occurrence), it would be associated with a higher percentage of performed exercise. Conversely, if the attribution was perceived as having high stability (unchangeable with regard to frequency of occurrence), a lower percentage of performed exercise would result. The mean for the attributional dimension of changeability for Participant 1 was 0.95 (0 representing high stability and 3 representing low stability, high changeability). The standard deviation across the 12 weeks was 0.39.

The mean of weekly stability attributions was compared to the percent of completed exercise to assess the predicted relationship pattern. The predicted pattern was not evident upon comparison of the data (see Table 2).

One possible explanation emerged during the final interview. The participant may have had a greater tolerance for the unchangeable nature of the exercise hassles due to a high value placed on the importance of her children, who had been identified as the primary source of hassles related to exercise.

Controllability of exercise hassles and exercise performance. A direct relationship between the attributional dimension of controllability and exercise performance was predicted. The mean score for

Table 2

Participant 1: Exercise Completed and Exercise Hassle Attributions of Stability and Controllability by Week

		Attributions	
Week	Exercise completed (% of plan)	Exercise hassle stability (mean)	Exercise hassle controllability (mean)
1	69	1.6	0.4
2	66	1	0.6
3	--	-	-
4	32	1.3	2
5	60	0.8	1
6	34	0.4	0.4
7	100	1.8	1.8
8	36	1.3	1.3
9	58	1	1.3
10	47	1.2	1.2
11	66	1.3	1.2
12	70	0.8	0.8

controllability of exercise hassles over the 12 weeks was 1.1 for Participant 1 (0 represented no controllability and 3 represented a great deal of controllability). Standard deviation across the 12 weeks was 0.52. Thus, exercise hassles attributed to have low controllability were predominant. A mean of exercise hassle controllability was calculated by week for comparison to the percent of exercise completed (see Table 2). According to the predicted pattern, hassles perceived as having lower controllability should be associated with a decrease in exercise performance. Comparison of the data for exercise hassle controllability did not reveal the predicted pattern. In addition, exercise hassle controllability does not appear to be related to hassle intensity or exercise self-efficacy over the course of this case study. The presence of exercise uplifts may potentially increase the degree of perceived controllability of exercise hassles, although the present study design does not allow this comparison since scaling of exercise uplifts was not attempted.

Exercise performance and exercise self-efficacy. A direct relationship pattern between exercise self-efficacy and exercise performance was predicted. The expected relationship was: as a high percentage of exercise is completed, exercise self-efficacy would increase as well. Conversely, a lower percentage of completed exercise would be associated with a decrease in exercise self-efficacy.

In this case, the percentage of completed exercise (see Table 3) ranged from 32% to 100% with a mean of 58% and standard deviation of 20 (week 3, which did not include scheduled exercise, was not included). In spite of the low completion of planned exercise, exercise self-efficacy for Participant 1 did rise gradually over the 12 weeks (from 46% initially to 67% by the 12th week). Although a direct relationship pattern between percent of performed exercise and exercise self-efficacy was not clearly demonstrated in the week to week measures, the gradual overall pattern was consistent with that predicted. If the percentage of exercise completed had been greater, a higher degree of exercise self-efficacy would have been expected according to the model. In addition, increases in exercise self-efficacy due to successful completion of exercise may require a period longer than 12 weeks.

A similarity in the pattern of exercise hassle controllability and exercise hassle changeability was found. In the present model, a higher degree of changeability means that the hassle is variable or not stable with regard to frequency or timing of occurrence. Thus, when hassles are perceived as both unstable and uncontrollable, hassle intensity would be expected to be high. In this case, changeability and controllability had similar patterns across the study and neither appeared to correspond to exercise hassle intensity.

Table 3

Participant 1: Exercise Completed and Exercise Self-efficacy by Week

Week	Exercise completed (% of plan)	Exercise self-efficacy (% confidence)
1	69	46
2	66	49
3	--	46
4	32	51
5	60	61
6	34	57
7	100	54
8	36	58
9	58	63
10	47	63
11	66	63
12	70	67

The wording used to describe the concept of stability may have contributed to a misunderstanding of the intended meaning. Although "changeability" was intended to refer to the perceived stability of the exercise hassle, an alternative meaning is the degree to which the hassle is amenable to change. If the alternative meaning were taken, little difference would be exhibited between the attribution of control and the attribution of stability. Although the meaning of "changeability" was explained during the initial interview, the potential for misunderstanding was greater than desired. Thus, the potential for misunderstanding of the terms remains a viable explanation for the close similarity in patterns between control and stability exhibited in this case.

Explanation Building

Participant 1 entered this study having begun an exercise routine 3 weeks prior to participation in the study. Although she had previously engaged in regular aerobic exercise, she had not done so for prolonged periods of sustained participation. As might be expected from her status in life as a young mother, her most frequent exercise hassles were due to conflicts between scheduled exercise and responsibilities for child care. To a lesser degree, conflicts with work responsibilities such as meetings and overbooking of clinic schedules were reported as a source of exercise hassles. Appendix E contains a table of all coded data for each Participant. The rows represent the variables for which data was coded with each column corresponding to each of the 12 weeks. Visual comparison of two variables at a time across the 12 weeks demonstrated some apparent covariability between data which is discussed in this section.

The first week had the highest reported exercise hassle intensity rating. Each night prior to scheduled exercise she was awakened multiple times by her baby's crying. She attributed low energy and a low level of tolerance for hassles during the day to her interrupted sleep. In spite of the intensity of hassles, she was able to complete 69% of her scheduled exercise for the week (see Table 1). However, the pattern of inadequate sleep over the week culminated with Participant 1 becoming sick with an upper respiratory infection.

The following 3 weeks continued to be full of exercise hassles related to children and work. The 2nd and 4th weeks were characterized by sick children and a busy work schedule. Week 3 was so difficult for this participant that she did not schedule any exercise during the week and stated that she was "barely coping." Her decision to not schedule exercise during week 3 was an effort to cope with the stress and time constraints due to sick children. In essence, Participant 1 had a lapse in exercise behavior during the 3rd week.

Week 4 had the lowest percentage of exercise performance (excluding week 3 which had no scheduled exercise). The participant reported that although she had discontinued exercise the previous week she was able to restart due to her commitment to complete the weekly measurement forms for this study. Had she not been engaged in a research project that was in itself an incentive to restart the weekly data collection process, she reportedly would have become an exercise dropout during the third week.

In this case, the overall level of daily stress could potentially explain the level of exercise hassle intensity since the hassles associated with child care were not strictly limited to participation in exercise. However, increased attention to details and management decisions about daily life are expected to increase during the process of behavior change. Thus, a pattern of covariation between daily hassles and exercise hassle intensity is not surprising.

Examination of the percent of planned exercise performed and daily hassles (see Appendix E, Participant 1) did not reveal a pattern of covariability between these two variables. As expected in the model, exercise hassles are more likely to be associated with performance of planned exercise than are daily hassles.

An alternative explanation for the covariability between exercise performance and the intensity of exercise hassles includes the potential moderating effect of daily uplifts or exercise uplifts. However, a comparison of patterns of daily uplifts and exercise hassle intensity (see Appendix E) fails to demonstrate a pattern of covariability. In addition, reported exercise uplifts were related predominantly to factors that removed or attenuated exercise hassles as indicated by the following examples: "getting organized the night before planned exercise," "mixing family time with exercise," "having child-care available either with spouse or at the YMCA." Other uplifts pertained to enjoyment of the exercise experience, included "making new friends" and a "sense of self accomplishment." Thus, exercise specific hassles and uplifts appear to have a greater degree of covariability with exercise performance than daily hassles and uplifts. This evidence is supportive of the lifestyle change model for exercise, suggesting that the focus of interventions should be directed to the exercise-related hassles and uplifts.

Outcome expectancies for Participant 1 included weight loss and increased fitness. Over the course of the study she experienced weight loss of 12 pounds which she directly attributed to her exercise participation. She also reported increased exercise endurance. Her improved endurance was evidenced by her increased amount of time and level of intensity while using the exercise equipment. Her improved physical condition also was associated with an increase in self-esteem.

Participant 1 expects that she will be a long-term exerciser. She cites the experience of restarting exercise after a difficult week as having a significant impact on her perception that she will be able to restart exercise even if she has to discontinue for a short time. Restarting a desired behavior after having discontinuing it demonstrates to the participant not only that it can be done, but that the individual is capable of doing it. The experience of exercise lapse with restarting of exercise is a recommended relapse prevention strategy (Marlatt & Gordon, 1985). The new awareness of increased confidence in her ability to restart exercise after a lapse also is consistent with self-efficacy theory (Bandura, 1986) in that behavior that one experiences as due to self is likely to be a strong source of efficacy expectations.

Case 1 Summary

Participant 1 engaged in exercise participation over the 12-week study at an overall level of completing 58% of planned exercise. She demonstrated a lapse in exercise during the 3rd week of the study, but was able to resume exercise the following week. The major exercise hassles experienced by Participant 1 were related to child care and stresses associated with her job. The data provided by Participant 1 partially demonstrated two of the four predicted patterns specified by the LCME, including: (1) an inverse relationship between exercise hassle intensity and exercise performance and (2) a gradual increase in exercise self-efficacy associated with performance of regularly scheduled exercise.

Predicted patterns related to the attributional dimensions of exercise hassle controllability and stability on exercise performance were not demonstrated. This apparent lack of covariability may be due to the presence of unmeasured meanings related to exercise hassles or may reflect an indirect relationship between the variables of interest that have not been adequately assessed in this study design. For example, meanings related to the interpretation of exercise hassles such as Participant 1's high valuing of her children may mitigate the impact of her decision-making related to exercise hassles. In other words, while her children were a primary source of exercise hassles, her children were also a source of joy and importance to her. Thus, measurement of attributions of exercise hassles related to her children may be altered or concealed by the meaning attached to her children.

As a result of completing the study, Participant 1 reported an increased awareness of hassles that interfered with her scheduled routine of exercise participation. She also had become aware of the importance of scheduling her weekly exercise plan to help her realistically adjust her schedule. In addition, she identified and recorded as exercise uplifts activities that decreased the influence of anticipated exercise hassles. These anticipatory interventions also appeared to have an impact on exercise continuance by avoiding exercise hassles before they occurred.

Active problem-solving regarding exercise hassles toward the end of the study was more common and she identified this as a skill to enhance her continued participation in exercise. Overall, the data from case # 1 are consonant with the LCME, but do not provide consistent persuasive evidence in support of the predicted patterns.

In this case study, exercise hassles and uplifts appear to have a greater association with exercise performance than daily hassles and uplifts. This is consistent with the LCME, in that stress associated with performance of exercise appears to covary with performance of exercise more than does daily stress. Daily stress, as measured by daily hassles, is thought to play a background role rather than directly impacting the performance of exercise. Although not apparent in this case, high degrees of daily stress may be expected to increase exercise hassle intensity.

Case # 2

Description of Participant

Participant 2 was a 41-year-old divorced white female, referred for participation in the study by a nurse practitioner. She identified herself as non-athletic in spite of multiple episodes of short term recreational exercise. She was currently active in a routine of exercise initiated 6 weeks prior to entering the study. She had one child and one grandchild, who lived in the local area. She had visits with her daughter and granddaughter an average of twice per month. At the beginning of the study she shared an apartment with a woman in her 20's, previously unknown to her.

Participant 2 worked part-time as a receptionist and as a paid convention coordinator. In addition, she was attending school in the evenings to become a massage therapist.

Health status. Participant 2 identified her current health status as "good" with no current health problems other than an occasional upper respiratory infection and hypertension, which had been controlled with daily medication. She denied use of cigarettes or alcohol. She routinely used a multivitamin supplement with periodic use of over-the-counter cold remedies for symptom control of minor illnesses (3 to 4 times per year as needed). Her family history included Diabetes Mellitus and hypertension, both from her maternal family. The results of her physical exam, which was completed within the past calendar year, were reported as normal.

Exercise history and plan. Participant 2 reported numerous past exercise activities including: walking, jogging, water aerobics, swimming, weight lifting, cycling, and calisthenics. In each instance, activities were performed on a semi-regular basis and discontinued due to injuries or inconveniences. As a child, she engaged in softball, volleyball, and swimming in grade school, and golf as a teenager. She reported participation in numerous sports activities for recreation including golf, tennis, volleyball, water, and snow skiing. None of these recreational activities had been engaged in over the past 30 months. In addition, she had joined a health club exercise facility which she used only sporadically over a 2-month period 5 years ago.

The exercise plan for Participant 2 at the initiation of the study included use of a stationary cycle, rowing machine, and walking. The planned frequency of exercise was 3 to 5 times per week with a planned duration of 30 to 60 minutes. Exercise equipment was available at a centrally located exercise room within the apartment complex where she was living. Her expectations for exercise were to help manage her stress and improve her overall sense of well-being, which would make it easier for her to study.

Participant selection criteria. Participant 2 met the general criteria for participation in the present research and represented the following additional criteria: (a) nonmarried, (b) no children (at home), and (c) female. Due to her life situation, anticipated exercise hassles included time conflicts with job and school work, and potential problems with access to exercise equipment.

Predicted Patterns

Several non-exercise related stressful events occurred during the 12 weeks that had a profound impact on the normal life routine for Participant 2. These unexpected life events included the death of a close relative, the heart attack and near death of her father, and a conflict with her roommate which resulted in the break up of her living situation.

In spite of the profound disruption of normal life patterns, the participant wished to and did continue to complete weekly monitoring activities. The patterns that resulted from this study period represent a real life situation, but are more likely representative of an unusual circumstance.

Although the analysis of this case was more complex because of the presence of major life stressors, careful consideration of the patterns that emerged allowed for an opportunity to study the effects of major life stress on exercise continuance. Consideration of the potential fit of the LCME to this situation also was facilitated by this case. Thus, the patterns that emerged from Participant 2's data should be interpreted from the standpoint that this case represents a special rather than typical situation. For example, patterns which may have emerged under more routine conditions could be obscured by the extraordinary conditions described in this case. Data for Participant 2 can be found in Appendix E.

Exercise hassles and exercise performance. An inverse relationship between exercise hassles and exercise performance was predicted. Examination of the data reveals an inconsistent pattern of relationship between percent of planned exercise completed and exercise hassle intensity (see Table 4). The predicted relationship does hold for weeks 3, 4, 5, 7, 9, and 10. Noteworthy is the change in pattern of scheduled sessions and minutes per week of exercise during weeks 5, 9, 11 and 12. The amount of time scheduled per exercise session was reduced from her previous routine. Thus, while the percentage of planned exercise completed was the same (100%), the minutes of exercise for week 4 and 5 differ by threefold (see Table 5).

During the 8th week of the study the participant did not plan exercise due to ongoing concerns regarding the health of her father. When her father experienced cardiac asystole during an angiographic procedure and was re-hospitalized, Participant 2 walked for 30 minutes in an effort to reduce stress. Thus, the performance of planned exercise as a stress reduction strategy may mitigate the

Table 4

Participant 2: Exercise Completed and Exercise Hassle Intensity by Week

Week	Exercise completed (% of planned exercise)	Exercise hassle Intensity (total)
1	100	5
2	45	3
3	100	0
4	33	7
5	100	2
6	100	6
7	33	9
8	--	-
9	100	6
10	100	1
11	100	3
12	100	5

Table 5

Participant 2: Percent of Planned Exercise Completed, Total Minutes Exercise Completed, and Number of Exercise Sessions by Week

Week	Exercise completed (% of plan)	Exercise completed (minutes)	Exercise sessions planned/completed (number of sessions)
1	100	210	4/4
2	45	95	3/2
3	100	120	2/2
4	33	60	3/1
5	100	60	1/1
6	100	180	3/3
7	33	60	3/1
8	--	30	0/1
9	100	80	2/2
10	100	140	3/3
11	100	90	1/1
12	100	90	1/1

effects of exercise hassle intensity to the degree that overall stress is contributing to exercise hassle intensity.

Stability of exercise hassles and exercise performance. An inverse relationship pattern between the attribution of exercise hassle stability and exercise performance was predicted. Examination of the data does not reveal the predicted pattern (see Table 6). As discussed regarding the attributional dimension of controllability, stability may not be adequately represented in this case due to the nature of interpretation of exercise hassles.

Controllability of exercise hassles and exercise performance. A direct relationship between the attributional dimension of controllability and exercise performance was predicted. The mean of the controllability data over the 12 weeks was 1.4 with a standard deviation of 1.3. Although a moderate degree of controllability is suggested by the overall mean, the wide range of values over the 12 weeks reflects the varied perceived attributional dimension of exercise hassle controllability. The weekly data (see Table 6) does not reflect the predicted pattern between the exercise hassle controllability and exercise performance.

However, an interpretive problem related to the term hassles may have contributed to inconsistent data. Participant 2 perceived that hassles represented more serious problems and not minor annoyances that interfere

Table 6

Participant 2: Exercise Completed and Exercise Hassle Attributions of Stability and Controllability by Week

		Attributions	
Week	Exercise completed (% of plan)	Exercise hassle stability (mean)	Exercise hassle controllability (mean)
1	100	0	0.5
2	45	1.5	1.5
3	100	0	0
4	33	2.3	2.3
5	100	3	3
6	100	0.3	0.5
7	33	0	0
8	--	-	-
9	100	0	0
10	100	2	3
11	100	3	3
12	100	1.5	0.5

with scheduled exercise. Consequently, the type and dimensions of hassles that were recorded reflect a perspective of exercise hassles divergent to the LCME. As previously noted, the recording of events she encountered throughout the study related to the serious illness of her father also diverge from the typical hassles expected for this participant.

Exercise performance and exercise self-efficacy. A direct pattern of relationship between exercise self-efficacy and exercise performance was predicted. Examination of the data do not reveal such a pattern (see Table 7). The average exercise self-efficacy slightly increased over the 12 weeks. However, weekly comparisons between percent of exercise completed and exercise self-efficacy should be done cautiously, since the actual time spent at exercise was reduced as the weeks progressed, as previously discussed.

By adjusting her exercise schedule, Participant 2 maintained her percent of completed exercise at 100% while the actual minutes of exercise performed decreased toward the end of the study. In spite of the high percentage of exercise completed, exercise self-efficacy might be expected to decrease since she was doing less actual exercise. However, rather than decreasing, exercise self-efficacy increased during the period in which scheduled exercise was adjusted downward. Participant 2 may have maintained her

Table 7

Participant 2: Exercise Completed and Exercise Self-efficacy by Week

Week	Exercise completed (% of plan)	Exercise self-efficacy (% confidence)
1	100	51
2	45	51
3	100	51
4	33	48
5	100	47
6	100	51
7	33	51
8	--	46
9	100	42
10	100	54
11	100	61
12	100	57

exercise self-efficacy by adjusting her expectations for completion of exercise. In a sense, Participant 2 may have manipulated her planned exercise in a way to help maintain her perception of self-efficacy. Thus, her view of self-as-an-exerciser could be maintained. Eventually, self-efficacy would be expected to decrease if exercise was performed less, assuming the participant perceives the discrepancy between the decreasing amount of exercise performed and the high percentage of planned exercise completed. This would also be influenced by the degree she attributed the success or failure of exercise completion to self (Bandura & Schunk, 1981).

Other observed patterns. Exercise hassle intensity and daily hassles were examined for potential relationship patterns, given the possibility that overall stress appeared to be influencing exercise performance in this case study (see Appendix E). An erratic pattern of relationship where daily hassles appear to co-vary with exercise hassle intensity for weeks 1 through 4, weeks 6, 7, 10 and 12 was noted. However, since Participant 2 recorded her father's illness as an exercise hassle on several weeks, some confounding between daily hassles and exercise hassles is possible. The potential for confounding exercise-specific hassles and more general daily hassles is thus emphasized.

The potential relationship between percent of planned exercise completed and daily hassles was also examined to consider a possible relationship between daily stress and exercise performance as an alternative explanation for the apparent relationship between exercise hassles and performance. No clear pattern was discerned.

Explanation Building

Participant 2 began this study as a relatively new exerciser. Although she had a history of previous exercise and recreational sports participation, no prolonged periods of sustained participation in regular aerobic exercise had previously occurred.

Her pattern of participation over the early weeks of the study showed a gradual decrease in time spent at exercise (see Table 5). During the first week of the study Participant 2 performed well in spite of exercise hassles related to school pressure and heavy work load. During week 2, the death of a close aunt, and being called in to work early, interfered with exercise participation. By week 3 she was anticipating an overall decrease in available time for exercise. Consequently, she adjusted the amount of scheduled exercise for the week (2 days of planned exercise rather than 3 or 4 as previously planned). She noted that the availability of the exercise setting at her living complex was not very compatible with her schedule. However, by decreasing her planned number of exercise sessions she was able to complete 100% of her planned exercise.

Other major life events also played a role in this case study. During week 4 this participant was notified that her father had experienced a serious cardiac condition and was not expected to live. The combination of her father's serious illness and an already difficult time schedule resulted in a major emotional trauma for this participant. She discontinued attending classes and performed only one of her planned exercise sessions for the week.

By week 5 she officially withdrew from school and was spending the majority of her time with relatives who had come to see her ailing father. Several relatives stayed with her which added yet another dimension to her stress. She spent time each day at the hospital and took several walks with family and friends which she did not record as part of her exercise for the wek. She planned only one exercise session for week 5 in anticipation of the continuing crisis with her father. Thus, her reported exercise for the week was again 100% completion of planned exercise.

By week 6 she expressed a sense of "exhaustion" and "burden." She attributed this largely to taking care of her "out of town" family. In addition, her roommate expressed that she was bothered by having extra guests in the home. The reaction of her roommate to the extra guests exacerbated Participant 2's feelings of conflict. She noted that during week 6 she was feeling sorry for herself, but she pushed herself to exercise and felt better. She later reported that her participation in exercise over week 6 was entirely based upon her belief that exercise would help with her stress management. The fact that she had previously set a schedule had no impact upon her exercise performance for that week.

During week 7 and 8 deterioration of her father's health again became a major inhibition to performance of her usual routines. Her father experienced asystole during admission to the hospital, and underwent angiography with angioplasty. During week 8 she did not plan to exercise, yet performed one session. Although the major life event associated with the ongoing health crisis of her father was a major source of stress in her life and contributed many additional hassles, she specifically noted a high degree of uplifts from being able to be supportive to her family. She stated on more than one occasion that although the weeks surrounding her father's hospitalization had been stressful she "wouldn't have wanted it any other way." When questioned further about what she meant by that statement, she explained that she was grateful to have a family and was appreciative of her relationship with her father. Consequently, she considered the care she was able to provide to her extended family as daily uplifts. By week 9 her father was discharged from the hospital and her extended family left town.

During week 9 she actively restarted her participation in scheduled exercise. However, she continued to schedule fewer sessions per week than she had at the beginning of the study. She also started using an aerobics tape for exercise due to difficulty in getting to the exercise facility at her living complex when it was open.

By week 10 her father was re-hospitalized with pneumonia. Since her family had previously left town she sensed a greater degree of responsibility to be there with him. In addition, her second job as a convention coordinator was requiring a high time commitment.

During week 11, Participant 2's roommate disconnected the telephone and moved out of the apartment without notice. The former roommate also took Participant 2's aerobics tape which she had been using as an alternative to using the exercise room at her apartment complex. Her coping response was to schedule fewer exercise sessions for the remaining 2 weeks of the study.

Although the percentage of scheduled exercise she completed was at 100% for weeks 9 through 12, she scheduled only 2, 3, 1, and 1 sessions per week respectively. Thus, while a pattern of high completion of planned exercise is apparent, scrutiny of the data reveals an artifactually high completion rate of exercise. In other words, she completed what she scheduled, but scheduled less than she previously had scheduled (see Table 5).

The experience of having self-control of her exercise schedule was seen as an important experience for this participant as reported during the final interview. She identified her sense of flexibility with scheduling as having a positive influence on her for future participation in exercise. For this participant, an apparent strategy to cope with an erratic and low degree of exercise participation was to schedule fewer exercise sessions per week. This finding is consistent with previous research that sites flexibility in exercise planning as contributing favorably toward exercise continuance (Gettman et al., 1983).

Inconsistent mailing of completed weekly exercise packets further complicated the analysis and posed a threat to the reliability of the data obtained in this case. Several times during the study Participant 2 was asked if she wished to continue as a participant given the major stressful life events that occurred. At each telephone contact she assured the researcher that she wished to continue. However, exercise packets were returned sporadically which significantly impaired the researcher's ability to assess week to week patterns and problems. When later packets failed to arrive, a search by the postal service was initiated. The search failed to retrieve the lost packets. Since the participant had begun to keep an additional diary of her life events, including exercise, she was able to reconstruct the forms for the final 4 weeks of the study. Despite her confidence in the reconstructed forms, the reliability of the measures, especially daily hassles and exercise self-efficacy, has to be questioned and interpreted cautiously.

Despite the unusual circumstances of this case study, Participant 2 reported a sense of increased endurance (easier to do her routine on rowing machine and cycle). She also noted an increase in self-confidence and a "total mental awareness of the necessity of exercise." By the final interview she identified herself as a long-term exerciser and anticipated that her new living situation would facilitate less hassles related to her performance of exercise. She identified use of the exercise diary and self-monitoring as positively affecting her exercise continuance. In fact, by the end of the 12 weeks she anticipated continuing keeping a daily diary of exercise and other factors that impacted her life.

At the final interview Participant 2 suggested as a recommendation for improving the study: " don't choose someone as unstable as me, but, I guess, how would you know?" She also stated that the term "hassles" was too strong for what she preferred to call "adjustments" in her schedule or plans. Thus, she was reluctant to write down the conflicts that needed adjustment, but were not truly hassles in her estimation.

Case 2 Summary

Although the context of this case study reflects a special situation, patterns that emerged throughout the case may none-the-less contribute to understanding exercise continuance. Participant 2 engaged in exercise participation over the 12 weeks at an overall level of completing 82% of her planned exercise. The relatively high percentage level of exercise completion is partly due to the participant lowering exercise goals during the study in response to major life stressors. On the other hand, the adjusting of her planned exercise allowed her to continue to meet a high percentage of exercise goals although she was actually exercising at a lower frequency and duration of exercise. Had she not adjusted her schedule, her perception of self-as-an-exerciser may have been adversely impacted.

In addition to using exercise to manage stressful events, Participant 2 reinterpreted the meanings she held for certain events. For example, while caring for her father and "out of town" family members during her father's hospitalization, Participant 2 noted that she considered the experience as an uplift because it gave her the opportunity to "be there for her family."

Participant 2 also reported predictable hassles consistent with job, student role, and access to the exercise facility. Predictable exercise hassles included tiredness, being called to work early, and difficult access to exercise equipment due to crowding and the facility being closed at times she wished to participate. However, due to the degree of unusual circumstances in this case, the relationship between the more routine exercise hassles and exercise performance was difficult to discern.

In spite of the major life events and adjustments to her exercise routine, Participant 2 reported several outcomes she attributed to exercise including increased self-confidence, improved subjective endurance (on rowing machine and stationary cycle), and a mental awareness of her need to continue with exercise. She also sees herself as a long term exerciser. In addition, she continued and extended the self-monitoring begun in the study by keeping a daily journal.

Case # 3

Description of Participant

Participant 3 was a 44-year-old married white female who worked as a receptionist and had been a regular participant in exercise for approximately 3 years. She identified herself as non-athletic and as such her participation in the study represented a theoretical replication. She had one male teen-aged child at home for whom she identified herself as the primary child-care provider. She was referred by a nurse practitioner as a possible study participant.

Health status. Participant 3 identified her current health status as "excellent" with no current health problems other than an occasional stiff neck that she associated with a four-wheel drive accident several years ago. Her past health history was unremarkable except for ovarian surgery over 10 years ago. She also had a one-time episode of irregular heart rate several years ago after participation in a race. She denied the use of cigarettes and limited use of alcohol to wine with meals on the average of once to twice per month. Her over-the-counter medication use included only acetaminophen for occasional head or neck aches. Her last physical exam was 3 years ago without abnormal findings.

Exercise history and plan. Participant 3 reported a current exercise plan that included brisk walking for approximately 45 minutes three to four times per week. This regimen was initiated 3 years prior to participating in the study. She also took part in dance aerobics three times per week over the last year, but was not currently doing so. She occasionally participated in hiking on the weekends and played softball on church outings.

As a child she was physically active, but exercise and sport participation decreased as she grew older. She participated in play activities including bike riding and swimming. She was also on a swim team before entering high school. Her high school and college exercise experiences were limited. Group showers in high school physical education classes were a horrible experience for her. She describes her high school physical education experience as "hell." She took an archery class in college that she considered as a positive experience, but did not continue the activity.

After college her exercise activities were limited. She remained inactive until her son was assaulted in 1975. As a result of that event she enrolled in a karate class with him which she continued for approximately 3 years. She identified the karate exercise experience as a reintroduction to exercise as an adult. Around the same time she became active with some women in her neighborhood who regularly jogged approximately one mile per day. This activity continued over 2 to 3 years. The group gradually broke up as individuals began to have greater work and other time commitments away from home.

Participant 3's expectations for exercise included keeping herself in good physical condition and helping her manage stress (help keep her "mental health"). She also anticipated limitations for her to socialize during lunch unless she had company on her walk.

Participant selection criteria. Participant 3 met the general criteria for participation in the present research representing theoretical replication (non-athletic adult with more than 1 year participation in exercise). Her participation allowed representation of the following additional criteria: (a) married, (b) with children, and (c) female. Based upon her current life situation and her usual plan of exercise (walking during her lunch break at her place of employment), predictions for likely exercise hassles were anticipated. These included hassles related to interference from work conflicts (not getting away on time, possible meetings), conflicts from others to have lunch together (socializing), and potential conflicts with inclement weather. However, because she was a regular exerciser, adjustment to most commonly occurring conflicts or exercise hassles was expected. In contrast, new or conflicts not previously experienced would be expected to have a greater capacity to interfere with exercise participation.

Predicted Patterns

Exercise hassles and exercise performance. A tendency toward an inverse relationship between exercise hassles intensity and exercise performance (percent of planned exercise completed) was demonstrated (see Table 8). Exceptions in the relationship pattern between hassles and performance occurred during week 8 and week 10. During the 8th week Participant 3 was on vacation from work. She was able to complete planned exercise early in the week while at the beach with her husband, but later in the week she missed 2 planned sessions while doing errands at home (her regular

Table 8

Participant 3: Exercise Completed and Exercise Hassle Intensity by Week

Week	Exercise completed (% of planned exercise)	Exercise hassle Intensity (total)
1	95	3
2	117	3
3	58	4
4	50	11
5	81	3
6	127	0
7	61	1
8	92	4
9	69	7
10	30	3
11	73	3
12	100	1

partner and setting were not available). Although the hassle was labelled as a motivational problem, her planned exercise setting for that week was different as well.

During week 10 Participant 3 reported an awareness that she was gaining weight. She shifted her attitude from exercise as an enjoyment to exercise as a necessity to help lose the weight. She recorded decreased or missed exercise for 3 days due to inclement weather and 1 day due to being asked out to lunch. She did not include her awareness of weight and change in attitude as an exercise hassle. Had she included the change in perception of exercise for that week, the exhibited pattern would have depicted a greater degree of exercise hassle and thus been consonant with the predicted pattern.

Stability of exercise hassles and exercise performance. The predicted inverse relationship pattern between the attribution of stability and exercise performance was not found upon examination of the weekly data. The mean for the attributional dimension of stability was 1.9 with a standard deviation of 0.67, which suggests a slightly higher than middle degree of stability (not susceptible to change).

Controllability of exercise hassles and exercise performance. A direct relationship between the attributional dimension of controllability and exercise performance was predicted. The mean value for controllability of exercise hassles was 1.6, with a standard deviation of 0.76. This suggests that exercise hassles were perceived to have moderate controllability. A pattern of relationship between the controllability of exercise hassles and exercise performance was not demonstrated.

Exercise performance and exercise self-efficacy. A direct relationship pattern between exercise self-efficacy and exercise performance was predicted. The range of percent of planned exercise completed was from a high of 127% on week 6 to a low of 30% on week 10 (see Table 9). Although exercise performance varied widely over the 12 weeks, exercise self-efficacy remained relatively stable from week to week. Over the course of the study exercise self-efficacy gradually increased.

The actual completion of planned exercise may have less direct influence on the perception of self-as-an-exerciser when the individual has a high degree of exercise self-efficacy as in the case of a long term exerciser. This is consistent with self-efficacy theory in that, a high degree of self-efficacy translates into a high degree of persistence in the activity even in the face of obstacles (Bandura, 1986). For a long-term exerciser, the changes in day to day performance of exercise are less influential on exercise continuance than might be expected in a new exerciser.

Other observed patterns. Exploration of alternative explanations for relationships includes consideration of the

Table 9

Participant 3: Exercise Completed and Exercise Self-efficacy by Week

Week	Exercise completed (% of plan)	Exercise self-efficacy (% confidence)
1	95	39
2	117	51
3	58	45
4	50	46
5	81	49
6	127	61
7	61	51
8	92	52
9	69	53
10	30	54
11	73	57
12	100	54

potential relationship between daily hassles and percent of planned exercise completed. Examination of the data did not reveal such a pattern. Although the impact of daily hassles could be mitigated by daily uplifts, such a pattern was not demonstrated. In addition, no distinct relationship between exercise hassle intensity and daily hassles was apparent.

Explanation Building

Participant 3 entered this study having been a regular exerciser for approximately 3 years prior to participation in the study. The most common exercise hassles for this participant were related to weather conditions, conflict with other activities scheduled at the same time as exercise, and having an exercise partner. Although she had one child at home, he was not a major source of conflict for her exercise participation. This is understandable since her scheduled time of exercise was generally while she was at work and as an older teenager he took quite a bit of responsibility for himself. However, on several occasions Participant 3 anecdotally reported that her concerns about her son influenced her perceived stress level. See Appendix E for a summary of data recorded by Participant 3.

Participant 3 completed scheduled exercise at an overall percentage of 79.4%. During the first 2 weeks completed exercise was close to or exceeded the duration of planned exercise. Although inclement weather occurred during the first week, Participant 3 persisted with her scheduled exercise. She identified the presence of a walking partner and discussing her children while walking as contributing factors to completion of her planned exercise for that week. Although she did not record any hassles related to her children that week, she noted a new awareness related to exercise and her children. She recorded "when bad things happen to the kids, I must take a few minutes to exercise to handle the bad stuff."

The second week she exceeded her planned exercise for the week and reported receiving flowers from her son as an exercise uplift. She noted that she "could have walked 50 miles that day."

In contrast, low completion rates for planned exercise were experienced in the 3rd and 4th week with 50% and 58% of planned exercise completed respectively. Week 3 included hassles related to cancellation of her walking partner and poor weather coupled with an offer for lunch with her son. Both of these instances resulted in skipping exercise.

Hassles reported on week 4 included being out of town in an unusual situation. She adjusted her exercise schedule for the week by not scheduling exercise in anticipation of her trip. Poor weather and having to work overtime at lunch conflicted with scheduled exercise time. In addition, spending a large part of the day at the airport related to her son leaving town also was a reported exercise hassle that week.

Exercise participation was high in the interim between week 4 and week 10. However, week 10 had the lowest percentage of completed exercise over the course of the study. Similar to other weeks in which exercise had been missed or decreased, weather was identified as a predominant factor during the 10th week. Unlike previous weeks, the exercise plan for week 10 included tree planting resulting in an unusually long duration of planned exercise. Abandonment of tree planting due to poor weather conditions resulted in an unusually low percentage of completed exercise for the week.

The issue of whether work activities that have aerobic potential should be included as a part of exercise was raised by this participant's inclusion of tree planting as part of her scheduled exercise for the week. On one hand, the activity meets the broad definitional criteria for repetitive large muscle group activity and is consistent with lifestyle exercise (Epstein et al., 1985). On the other hand, inclusion of work activities tends to confound measurement and may represent a different type of exercise altogether. The fact that tree planting occurs infrequently in this person's exercise repertoire and was done primarily for non-exercise reasons supports not including it as an exercise activity. In fact, the level of physical conditioning required to complete the tree planting job was likely made possible by her ongoing participation in exercise.

A summary of the hassles encountered over the 12 weeks produced both typical hassles and atypical hassles. As anticipated due to the usual time of scheduled exercise (lunch) and usual location (outside), time impingements and weather played a crucial role in exercise hassles. In the final interview, Participant 3 acknowledged the impact of weather on her exercise participation. She further explained that when the weather is especially bad and she exercises anyway, her clothes are often wet or muddy when she returns to work.

The additional factor of having a walking partner was the basis for many of the benefits associated with exercise identified and recorded by Participant 3. Talking with her partner was an important way to help her think about concerns in her life rather than thinking about exercise specifically. She also reported a consistent improved state of physical well-being associated with performance of exercise.

Case 3 Summary

Participant 3 engaged in exercise participation over the 12-week study at an overall completion of planned exercise of 79.4%. The moderately high percentage level of exercise completion was influenced by weeks 2 and 6 during which she exceeded her planned exercise duration. Her status as a long term exerciser undoubtedly influenced her rate of completed exercise. Her primary exercise hassles, as predicted, were related to inclement weather, work conflicts and dependence on the presence of a co-participant. In this case the data supports the LCME with the exception that a relationship between exercise hassle attributions and exercise performance was not demonstrated. However, the combined effects of attributions and other meanings associated with exercise hassles may together mediate the relationship between exercise hassles and exercise performance.

Case # 4

Description of Participant

Participant 4 was a 33-year-old married white male who had recently begun an exercise routine 3 weeks prior to the initial interview. He identified himself as non-athletic, thus representing a simple replication. He was referred as a potential participant by a physician who worked with a nurse practitioner.

His primary roles included working as a travelling salesman, being a spouse, and a father of two children (an 8-year-old son and a 6-year-old daughter). He reported sharing child care responsibilities with his wife, although he worked away from the home approximately 65 hours per week.

Health status. Participant 4 identified his current health status as "good," identifying dep problem for which he was currently unde been taking antidepressant medications ongoing medication side effects of dry which he tolerated. Exercise also had him as an adjunct to his treatment for

add comma after "alcohol"

His past medical and social histor areas of concern regarding his potentia the exception of Rheumatoid Arthritis w remission. He denied the use of cigarettes, alcohol, and over-the-counter medications. His last physical exam was 3 years ago without abnormal findings other than those mentioned above.

Laboratory data for participant 4 revealed evidence of a mild hyperlipoproteinemia which had not been previously identified. This finding reinforced the potential benefit from exercise participation, either as an adjunct to treatment or as a primary treatment itself.

Exercise history and plan. Participant 4 reported a current exercise plan that included brisk walking for approximately 45 minutes three times per week with the expectation to add swimming 1 to 2 days per week in the near future. The walking regimen was initiated 3 weeks before entering the study. He had previously participated in brisk walking for a short time 6 months before restarting his current exercise. His previous walking regimen had been discontinued after approximately 2 months duration. He cited increased job pressures as the major reason for previous exercise discontinuation.

In recent years he had occasionally participated in swimming at a local pool in the early morning prior to work. He identified a sense of mood elevation during his work day when he participated in the walking or swimming activity.

As a child he was active with recreational sports activities including bike riding, water skiing, ice hockey, and baseball. After he was diagnosed with Rheumatoid Arthritis at age 14 his recreational sports participation was discontinued. During high school he had minimal participation in physical education classes.

As an adult he resumed limited participation in recreational sports activities. He played softball on a church league for 2 years in 1985-1986. He described the experience as fun and denied injuries or problems with his joints during that time. He also reported infrequent golfing and bowling as exercise-related activities in which he participated for recreation and relaxation.

Participant 4's expectations for exercise included getting in good physical condition and losing weight. He identified a 40 pound weight gain over the 2 months preceding enrollment in the study. He did not anticipate negative outcomes from exercise, unless he "overdid it."

Participant selection criteria. Participant 4 met the general criteria for participation in the present research representing simple replication (non-athletic adult with less than 3 months and more than 2 weeks participation in exercise). His participation provided for representation of the following additional criteria: (a) married, (b) with children, and (c) male. Based upon his current life situation and his usual plan of exercise, predictions for likely exercise hassles were anticipated. Anticipated hassles included conflicts with work, family time, and possible conflicts with inclement weather.

Explanation Building

Other than completion of the initial interview, Participant 4 was non-compliant with the case study protocol. Only after not receiving several weeks of weekly data did the researcher realize that the weekly packets were not being completed. Multiple telephone contacts were made by the researcher to reinforce the importance of data collection despite the irregularity with which exercise was being performed. Although the participant reaffirmed his willingness to participate in the study with each telephone contact, he did not complete or mail any of the weekly measurement packets. Four weeks after initiating the study he met with the researcher to explore the feasibility of continuing in the study.

At the mid-study interview, Participant 4 stated that he had experienced increased difficulties with his job and had been unable to complete the weekly packets. He further disclosed that he had discontinued his exercise regimen during the week he was to have begun self-monitoring with the weekly exercise packet. Additional business trips out of town further interfered with self-monitoring and weekly study packet completion. He discussed his intense job situation which was requiring him to work 15 to 16 hours per day and had increased his travel time over previous months. He also indicated he had decided to seek a different employment situation since the impact of his job was also affecting his family and overall life satisfaction. He expressed an apology for not having started the data collection process and insisted on continuing in the study. He felt certain he could complete the weekly packets based upon his calendar notes over the previous weeks of the study and continue with the current weeks. Since the situation appeared to represent an opportunity to study exercise non-continuance in process, the researcher agreed to allow Participant 4 to remain in the study.

Further efforts by the researcher to facilitate communication and encourage participation in the study were made with little success. A follow-up letter was sent to the participant 10 days after the interview, having still not received any weekly measurement packets. After multiple messages and attempts to contact Participant 4, contact was finally made. He reported that he had not completed any of the exercise packets and had only rarely walked during the 12 week period. He cited increasing job stress as primarily contributing to his inability to engage in exercise or complete the weekly measurement packets. In addition, he reported a further weight gain over the 12 weeks. He said he was still hopeful that he would be able to start exercise in the future. His reflection on non-participation in the study and exercise had given him some insight into priorities in his life and contributed to making a decision to change jobs. During the final telephone contact he disclosed that he had quit his job and was looking for another that would require less time demands.

Although Participant 4 did not complete the forms provided to collect research data, his situation is likely representative of other non-athletic men of similar age and socioeconomic status. The impression of the researcher from the telephone contacts and the two interviews was that Participant 4 had intentions to engage in exercise, but did not have adequate stress management skills necessary to alter his life in a way that allowed him to do so. Thus, in spite of the lack of weekly exercise data, Participant 4's experience contributes information that exemplifies a common experience among non-athletic adults that drop out of exercise early in the course of lifestyle change. This phenomenon reinforces that desire, intention, or commitment to exercise is not enough to facilitate actual participation in exercise. In this case, stress related to job demands exceeded Participant 4's capacity to manage planned lifestyle change. In fact, his inability to follow through with plans he had made likely represented a lifestyle pattern that had developed over previous months or years.

Some of the life patterns that influenced this phenomenon of non-compliance were revealed during the course of data collection. Participant 4 expressed concern that he wanted to do a good job with participation in this research. He was hoping that participation in the study would help him establish exercise as a long term part of his life. His desire to perform well conflicted with an apparent tendency toward over-commitment and limited stress management skills. The resultant pattern was potentially contributing to his long term depression. In addition, the depression may have contributed to his lack of follow through.

In this case, as seen through the LCME, Participant 4 appeared to have a limited perception of himself as an exerciser. This, coupled with high stress and limited stress management skills, resulted in inability to follow through with exercise and complete the study protocol. Had the participant completed his weekly exercise plans, an expected pattern of high stress and no or low exercise participation would have emerged. However, since the measures of these variables were not completed in written format, as specified in the research protocol, only supposition based upon interpretations of verbal information can be offered in support of the model.

Self-monitoring has been identified as an important strategy in lifestyle change (Leventhal et al., 1984). The lack of completion of the weekly measurement packet resulted in less self-monitoring by Participant 4 than other cases in this study. Had self-monitoring occurred, Participant 4 may have gained additional insight into the nature of his inability to continue with exercise. Since this case exemplifies the central issue of interest, dropout of exercise, it is unfortunate that better written documentation was not obtained. However, it is likely that an exercise dropout in any study would present similar difficulties. This is due to the common perception that the act of dropping out is an admission of failure. The act of completing the weekly forms in this case may have had a negative connotation to the participant from the standpoint that by completing the forms he was confronted with his failure to follow through with his goal of exercise participation. Thus, in spite of reinforcement from the researcher that non-completion of exercise was acceptable for the goals of the study, the proposition of having to face the incongruence between his behavior and his intended behavior was not acceptable to him. In addition, his apparent failure in exercise performance may be a pattern of the same mechanism that prevented him from completing the written documents.

The discrepancy between promises to complete the weekly exercise packets and the failure to do so, was a major problem for Participant 4. The depression, for which he had been undergoing treatment for some time, may have had an effect on his inability to follow-through. In addition, coping strategies that avoid confronting discrepancies between his behavior and his perception of himself may have also added to the problem. If this is the case, Participant 4 may continue to effectively undermine his participation in exercise or other lifestyle changes until other coping strategies are initiated or until his perception of stress lessens. As with the decision making model of Janis and Mann (Janis, 1984), the attempt to move forward with behavior change without contingency planning or attention to the details of the problems to be encountered will result in continued ineffective attempts at change.

Case 4 Summary

Although Participant 4's lack of data collection resulted in an incomplete case, the data that were obtained typifies the dilemma that occurs with the study of exercise dropout. The description of factors related to exercise dropout obtained from this case suggest that factors related to exercise dropout for this participant also related broadly to other aspects of his life.

Participant 4 did not engage in exercise over the course of the study and did not complete the weekly evaluation measures. However, information provided during the initial interview, a subsequent mid-study interview, and telephone contacts provided some evidence about the exercise dropout experienced by this participant. Since exercise dropout and continuance are centrally important to this study, the information obtained from this case was evaluated for consistency with the LCME. Case # 4 did not meet the case study protocol requirements, yet provides descriptive information toward understanding exercise dropout.

Case # 5

Description of Participant

Participant 5 was a 55-year-old married white male who had begun an exercise program 4 years prior to participation in the current study. He identified himself as non-athletic and was referred by a nurse practitioner.

The primary roles identified by Participant 5 included his clinical practice as a dentist, and his role in his family as a spouse and father. He had a 16-year-old son at home and identified his wife as the primary child care provider. He reported spending 40+ hours per week away from home in the practice of his profession.

Health status. Participant 5 identified his health status as "excellent" with no current health problems other than occasional seasonal allergies. He denied the use of prescribed or over-the-counter medications and identified himself as a non-smoker. He reported alcohol consumption of one mixed drink or one bottle of beer once or twice per month on the average.

His health history was benign, citing only a few conditions with the potential to influence participation in exercise. He denied any serious illnesses or hospitalizations, but mentioned episodes of bursitis in his shoulder as well as a minor back injury. Each of these conditions occurred before beginning his current exercise regimen and have not been a recurrent problem. He reported an ideal body weight of 168 pounds with a current weight of 174 pounds.

Exercise history and plan. Other than his current regimen, Participant 5 reported limited past exercise activities. His previous exercise included downhill skiing and jogging. He began the downhill skiing in early middle-age and continued the activity for approximately 10 years. His jogging experience began in 1987 after an awareness of being overweight, middle-aged, and stressed. He discontinued the jogging after a short time due to a back injury from running on an uneven surface.

After his back healed he again became aware of the high stress level in his life. After an emergency situation in his office he decided to call an athletic club and immediately get started in an exercise program. His prime motivation in starting exercise was to alleviate everyday stress.

Shortly after beginning exercise at the athletic club he met a trainer at the facility who helped personalize an exercise regimen to meet his goals. As he continued with the help of the trainer he gradually became aware that he could exercise without injuring himself. His confidence level increased as a result of his continued participation in exercise without sustaining any injuries.

As a child, Participant 5 reported minimal participation in sports due to poor neuromuscular coordination. He stated he never perceived himself as athletic although he always had the sense that exercise was probably beneficial. He cites his severe nearsightedness as contributing to his perception of inadequate physical prowess. He added: "I was always the last to be selected" when choosing teams for sport participation.

At the beginning of the study, his exercise routine consisted of approximately 1 hour of exercise per day, 5 days per week. Activities included a walk-jog on the treadmill, occasional use of the Stairmaster, and use of the Nautilus weights in a manner consistent with aerobic activity. He knew how to take his own pulse and calculate his heart rate. He had participated in aqua-aerobics in the past but discontinued this as part of his regular routine when the instructor left. He has recently begun to include aqua-aerobics as an occasional part of his regimen for added variety.

His expectations for exercise participation included maintaining an improved fitness level for health. He identified exercise as a coping strategy for helping him manage his busy and stressful practice. He sensed some resentment from his wife due to the additional time away from home to perform exercise, but sees exercise as an essential part of taking care of himself. He did not anticipate any negative effects from exercise although he has experienced a few negative exercise effects that have altered his exercise regimen. Approximately 1 year ago he was ill with influenza and discontinued his exercise routine for over a week. Upon restarting exercise, he experienced irregular heart beats and muscle soreness that he attributed to resuming exercise too soon.

Participant selection criteria. Participant 5 met the general criteria for participation in the present research representing theoretical replication (non-athletic adult with more than 1 year participation in exercise). His participation allowed representation of the following additional criteria: (a) married, (b) with children, and (c) male.

Based upon his current life situation and his usual plan of exercise, predictions for likely exercise hassles were related to interference from work and family. Because of his status as a long term exerciser, he was expected to have previously adjusted his exercise routine to account for common conflicts. When new or different conflicts arise, a greater intensity of perceived exercise hassle intensity would be anticipated.

Predicted Patterns

Exercise hassles and exercise performance. As predicted, an inverse relationship between exercise hassles and exercise performance was demonstrated (see Table 10). However, Participant 5 adjusted his planned exercise schedule on weeks 10 and 11 eliminating exercise sessions on several days that he usually performed exercise. Thus, anticipated exercise hassles were avoided by not scheduling exercise the day of the anticipated conflict. If these anticipatory adjustments had not been made, patterns of exercise hassles would have been demonstrated for those weeks as well. The ability to anticipate conflicts or hassles with scheduled exercise in advance appears to have been an important overall strategy in Participant 5's ability to manage his exercise continuance.

Table 10

Participant 5: Exercise Completed and Exercise Hassle Intensity by Week

Week	Exercise completed (% of planned exercise)	Exercise hassle Intensity (total)
1	100	2
2	100	3
3	92	2
4	0	12
5	100	2
6	100	2
7	92	1
8	100	1
9	100	2
10	100	3
11	100	2
12	98	1

An alternative explanation for the pattern described above is the possibility that daily hassles may have impacted exercise hassle intensity. Potential patterns between exercise hassle intensity and daily hassles or daily hassles and the percent of planned exercise completed was not apparent in the data (see Appendix E).

The predominant experience of exercise uplifts for this participant were feelings of invigoration associated with exercise and a sense of motivation when he persisted with exercise even though he did not feel like it. The anticipated effects of exercise were a positive reinforcement for Participant 5. This finding is consistent with the experience of long term exercisers reported by Keefe and Blumenthal (1980). Indeed, a desired outcome of long term exercise is to have the performance of exercise be self-reinforcing. In this case the self-reinforcing nature of the exercise experience is evident.

Stability of exercise hassles and exercise performance. The predicted inverse relationship pattern between the attribution of stability and exercise performance was not evident upon inspection of the weekly data with the exception of week 3 (see Table 11). During week 3 an illness was identified as an exercise hassle and characterized as having high stability.

Discrepancies that became evident during analysis of stability data reflect possible misunderstandings. The

Table 11

Participant 5: Exercise Completed and Exercise Hassle Attributions of Stability and Controllability by Week

		Attributions (weekly mean)	
Week	Exercise completed (% of plan)	Exercise hassle stability	Exercise hassle controllability
1	100	3	3
2	100	2.5	2.5
3	92	3	3
4	0	0	0
5	100	3	3
6	100	1	1
7	92	3	3
8	100	3	2
9	100	3	3
10	100	0	0
11	100	0	0
12	98	0	0

expected meaning of high stability is that an exercise hassle with high stability would be expected to recur over time (low changeability). Participant 5 apparently understood the meaning to be that the consequences of illness are not changeable and that although this specific illness may not be present very frequently, when it is present it will have a high stability on its relationship with exercise. Thus, although this illness was perceived as having high stability, this concept may have been confused with changeability. This possible discrepancy was not identified until after the final interview and was not clarified with the participant.

This understanding illuminates another possible dimension of exercise hassles, that is, the frequency of exercise hassle occurrence. The frequency of occurrence may mediate exercise hassle intensity and exercise performance.

The mean value for exercise hassle stability was 1.8 with a standard deviation of 1.4. The middle range of the mean and the wide variation reflected in the standard deviation suggests that this attributional data may not be adequately represented by these statistics. A better approach would be directly considering attributional dimensions of hassles with each individual exercise hassle. This approach would be more consistent with the process orientation of the study.

Controllability of exercise hassles and exercise performance. As predicted, a pattern of covariability between the attributional dimension of controllability and exercise performance was found (see Table 11). This pattern would have been more pronounced had the exercise schedule not been adjusted for anticipated hassles on weeks 10 and 11. The perception of a low degree of controllability was associated with less exercise sessions completed on weeks 10 through 12 and thus reflects the expected pattern as well. The mean for controllability was 1.7 with a standard deviation of 1.4, indicating a wide range of controllability attributions.

Exercise performance and exercise self-efficacy. A direct relationship pattern between exercise self-efficacy and exercise performance was predicted. However, in this case, exercise self-efficacy did not change meaningfully throughout the course of the study (see Table 12). The range of average exercise self-efficacy was from a high of 70% confidence on weeks 5 and 7 to a low of 45% confidence on week 4 (the week no exercise was completed). For exercise self-efficacy specific to walking, the percent confidence remained at 100% except the week in which no exercise was completed. The participant noted that he thought the measure of exercise self-efficacy was difficult for him to understand. He suspected that self-efficacy

Table 12

Participant 5: Exercise Completed and Exercise Self-efficacy by Week

Week	Exercise completed (% of plan)	Exercise self-efficacy (% confidence)
1	100	55
2	100	63
3	92	62
4	0	45
5	100	70
6	100	58
7	92	70
8	100	64
9	100	49
10	100	56
11	100	64
12	98	58

might increase when reflecting a successful week of exercise completion.

Explanation Building

As a long-term exerciser, Participant 5 was expected to have the ability to manage the stress associated with exercise hassles conflicting with his planned exercise. The overall pattern of exercise demonstrated that Participant 5 performed as predicted. His exercise completion rate of 89% of planned exercise is consistent with his status as a long term exerciser. The major hassles reported were tiredness and decreased time for exercise due to being behind schedule, either oversleeping or working later than expected. However, he was able to exercise anyway in each instance of being behind schedule. Usually his experience of tiredness was near the end of the week. He noted that he has become aware that even if he feels tired during an exercise session he always feels a greater degree of energy if he goes ahead and completes the planned session. See Appendix E for a summary of data recorded by Participant 5.

The first several weeks of the study proceeded as per his usual routine, until week 4. On week 4 he experienced an illness that impacted his exercise for the week. Due to the illness and lack of energy recovering from the illness, he did not complete any exercise for the 4th week of the study. In spite of this lapse of exercise for week 4, the following week he was able to restart his routine without difficulty. His apparent lack of difficulty in restarting exercise was likely due to his long term habit of exercise participation.

During week 10 Participant 5 experienced a frustrating week of less exercise than usual due to his wife having a planned surgery. Accompanying his wife's surgery was a major disruption in his home routine and home responsibilities. Noteworthy is the increase in daily hassles associated with the change in his home routine for week 10 (see Appendix E). However, in anticipation of his wife's surgery he adjusted his exercise plan for the week. By doing so he was able to complete 100% of his planned exercise for the week. However, he exercised only 60 minutes for the week compared to his usual 300 minutes.

On week 11 Participant 5 again adjusted his exercise schedule in anticipation of time conflicts. In order to take his son to school, only 3 sessions for the week instead of his usual 5 sessions were included in his plan. This anticipatory adjustment in his plan for the week allowed him to complete 100% of his planned exercise. Had he not adjusted the schedule, he would have performed a lower percentage of exercise for the week.

Finally, on week 12 he had to cut short his exercise session to complete an exercise stress test. His performance during the stress test resulted in achieving a high level of fitness for his age. He cited this experience as a strong reinforcement that his exercise regimen was paying off in improved cardiovascular fitness.

During the final interview Participant 5 stated that his participation in the study did not impact his performance of exercise to any degree. He would be doing it anyway. He clearly identified his participation in exercise as a major key to his overall stress management. He also noted that he feels less frustration when he can adjust his schedule in advance of conflicts with his exercise plan. He applies this principle in other areas of his life as well.

Participant 5 reported several outcomes related to exercise, including stress management, ability to have greater flexibility in his diet (occasional increased calories), increased energy, and less sleep problems (not previously mentioned as a problem). He notes that he had previously adjusted his exercise routine to eliminate as many exercise hassles as possible.

Case 5 Summary

Participant 5 completed exercise at an overall rate of 89%. Excluding the week he did not exercise due to illness, he completed 100% of planned exercise on 7 weeks and 88% or 92% on the remaining weeks. As expected, the exercise hassles he reported were primarily due to job or family conflict. He demonstrated the ability to anticipate hassles for the most part and adapt his exercise plan accordingly, except during the week he was ill.

Participant 5's episode of illness appeared to catch him off guard and was clearly the only exercise hassle that substantially interrupted his exercise completion. Since the illness was not predictable and perceived as not controllable, he experienced a high degree of hassle intensity. Yet, his choice to not exercise was appropriate and did not seem to impair his restarting exercise by the following week. These findings are consistent with the LCME for an exercise continuer.

Predicted patterns were demonstrated with the exception of exercise hassle stability. A misunderstanding of the intended meaning of the exercise hassle stability may have caused erroneous data to be entered regarding that attributional dimension. However, his apparent misunderstanding of the term helped identify frequency of occurrence as a possible mediator of exercise hassles and intensity.

CHAPTER VI

CROSS-CASE COMPARISON AND DISCUSSION

The central tenant of cross-case comparison is the ability to generalize to theory from the findings of multiple cases. Each case is considered a complete study within itself, while the findings of the accumulated cases contribute collectively toward application to theory. In this chapter the collective findings from this research are considered in relation to the Lifestyle Change Model for Exercise (LCME). Four postulated relationships based upon the LCME were specified as a focus of this research. Each of the specified relationship patterns are considered, followed by a broader discussion of the application of the case findings to the model.

Exercise Hassles and Exercise Performance

According to the LCME, the more exercise hassles experienced by an individual, the lower the percentage of exercise completed. The four cases for which data were available reflected the expected patterns to varying degrees. Theoretical replication cases (Participants 3 and 5) provided the most consistent support for expected patterns. Data from Participant 5 reflected the predicted pattern across the 12 weeks while data from Participant 3 demonstrated the expected pattern all but 2 weeks. However, descriptive data obtained from Participant 3 revealed that during both weeks exercise hassles were experienced but not recorded as such.

Simple replication cases (Participants 1 and 2) less clearly demonstrated the expected pattern. In both of these cases the expected relationship patten was represented in 6 of the 12 weeks. This inconsistency in pattern could be due to a measurement artifact because of the flexible nature of exercise plan alterations from week to week. Thus, across all cases, a moderate level of support for the proposed relationship between exercise hassles and performance of exercise was demonstrated.

In addition to the data related to the specified relationship, two additional major findings were observed from the cumulative data on exercise hassles and performance of exercise. First, although the flexible nature of the exercise plan contributed to measurement difficulties, the ability to adapt the exercise plan was cited as a positive aspect of the study by the participants. Adaptation of exercise plans in anticipation of expected exercise hassles demonstrated the overall appropriateness of the model for exercise. This evidence of self-regulation demonstrates a logical application of the model. In essence, each of the participants demonstrated self-regulation of hassles and anticipated hassles in the context of exercise continuance.

The ability by study participants to anticipate and modify hassles and exercise plans to facilitate exercise continuance provides fundamental support for the LCME. Other studies also have noted the positive aspects of allowing individual choices in establishing and altering exercise plans (Gettman, et al., 1983; Siegel, et al., 1988). The process of self-monitoring which was integral to completion of the weekly measurement packet also may have contributed to the apparent improved ability to adjust exercise plans in anticipation of exercise hassles as the study progressed.

The interaction and mediating effect of factors not specifically included in the LCME on exercise hassles is a second important finding. The explanation building analysis of each case identified additional factors that appeared to mediate the expected relationship between exercise hassles and performance of exercise. These factors were individual meanings and values unique to each participant that mediated their understanding and responses to exercise hassles. These seemed to be closely related to the process of secondary appraisal described by Lazarus and Folkman (1984).

Further exploration of the process of appraisal and assignment of meaning offers a level of consideration that is rich in providing insights into an individual's decision to exercise. Attention to the appraisal process also allows consideration of a broad range of other potential conflicts with exercise. For example, Participant 3 recorded exercise hassles related to her son which clearly were more important than her commitment to exercise. Similarly, Participant 1 experienced hassles related to her children which superseded her commitment to exercise. The discovery of these factors is supportive to the underlying stress, appraisal, and coping perspective of the LCME in that appraisal appears to be central to understanding the mediators of exercise participation.

In spite of the life changes and other meanings that influenced the appraisal process and eventual relationship between hassles and exercise performance, the data from the cases collectively support the idea that hassles impact performance of exercise. The additional findings that participants naturally anticipated exercise hassles and used various coping strategies to attend to them also provide tentative support for the LCME.

Unexpected events that occur in life, whether hassles or major life events, may contribute to greater hassle intensity depending upon the context and priorities in ones life and the timing of hassle occurrence. These factors were not specifically addressed in the present study, but may be an area of rich information regarding the nature of prioritization with which an individual makes decisions regarding lifestyle change, such as exercise.

Stability of Exercise Hassles and Exercise Performance

A consistent pattern of relationship between the perceived stability of exercise hassles and performance of exercise was not found. In case 5, one week alone exhibited the predicted pattern although further analysis raised the question of a potential misunderstanding of terms by the participant. Data from other cases clearly did not demonstrate the predicted pattern.

As with the dimension of controllability, stability may have been obscured by other mediators of hassle intensity not included in the model. As demonstrated in case 1, the unchangeable nature of exercise hassles was tolerated as they related to the care of this participant's children to whom she was highly committed. Although Participant 1 had a high degree of hassles related to her children, she was willing to accept the conflict of providing good parenting as well as engaging in exercise.

Controllability of Exercise Hassles and Exercise Performance

The predicted pattern of relationship between exercise hassle controllability and exercise performance was not demonstrated by the accumulative cases (with the exception of Participant 5). Two alternative relationship patterns between hassle controllability and other factors were examined. The first explored the potential relationship between exercise hassle controllability and exercise self-efficacy. The second considered the potential pattern between exercise hassle controllability and exercise hassle intensity. No evidence in support of the alternative relationship patterns was found across cases.

The most prominent explanation for the lack of apparent relationship between exercise hassle controllability and performance of exercise is the occurrence of mediators not included in the model. Other factors, related to meanings determined in the context of each hassle, appear to have been more potent mediators of intensity than the attribution of controllability. In addition, operationalization of the concept of controllability or participant understanding of the concept, as reflected in the instrument, pose a potential explanation for the lack of the predicted relationship.

Case 5, which demonstrated the expected pattern of relationships, was a theoretical replication case in which the participant was a long term exerciser who had a relatively stable pattern of exercise performance. The presence of the expected pattern may be due to the apparent minimal influence of mediators of hassle intensity not included in the model. Case 5 appeared to have less occurrence of mediators not specified in the model, thus maximizing the potential relationship due to the attribution of exercise hassle controllability.

Exercise Performance and Exercise Self-efficacy

Self-efficacy was predicted to show a relationship pattern with exercise performance. While evidence for a week to week pattern was limited (only demonstrated by case 2), gradual increases in exercise self-efficacy were found among all cases over the 12 weeks. In the theoretical replication cases (3 and 5), self-efficacy was expected to be relatively constant due to the long term nature of exercise participation. Although major disruptions in exercise performance would be expected to undermine exercise self-efficacy, none occurred for the theoretical replication cases. Thus, the constant pattern of stable exercise self-efficacy for cases 3 and 5 upholds the prediction based upon the model.

Case 2 also demonstrated a relationship pattern between exercise performance and exercise self-efficacy. The possible delay in week to week performance data was consistent with theoretical predictions. Participant 2 was able to complete 100% of planned exercise although actual amounts of exercise completed were less than her initial stated pattern of exercise. Explanations of exercise plan revisions by Participant 2 demonstrated an effective strategy to minimize the effect of lower exercise performance on exercise self-efficacy. The continued completion of planned exercise allowed her to maintain her perception of self-as-an-exerciser even though her amount of exercise had diminished.

Case 2 illustrates a coping strategy of how cognitive re-appraisal of potentially negative information can be reinterpreted as positive. The possibility that any cognitive manipulation of information that allows a positive self-efficacy to be maintained may in itself be a conscious or unconscious strategy to maintain a desired view of oneself. Such a manipulation of information at a cognitive level represents less energy expenditure than would the corresponding behavior change required to maintain consistency with one's perceived self. Thus, cognitive dissonance associated with sporadic performance of exercise may be managed by altering the perception that the low level of exercise performance is attributable to self verses outside forces. As long as plausible alternative explanations exist, the integrity of high self-efficacy may be maintained. However, if performance of exercise remains at a low level, eventually self-efficacy may be undermined. When self-efficacy is undermined, the perception of self-as-an-exerciser will likely come into conflict.

Applicability of Current Research Findings to the LCME

Several factors that contribute to theory development have evolved over the course of the present research. Although the present study did not find support for the predicted relationships between exercise performance and attributional aspects of exercise hassles, the broader awareness of additional factors that influence meaning and intensity of exercise hassles is itself an important contribution to theory development. The ability to have a model with the flexibility and breadth to include various meanings is consonant with the stress, appraisal, and coping (Lazarus & Folkman, 1984) aspects of the LCME.

The importance of individual differences has been highlighted in the present research. The methodological approach taken allowed exploration of a real life process in which many factors interact. Consideration of the different contextual and personal situations of each of the participants was part of the overall research strategy. The intent was that each case would be representative of common situations in which the LCME should function. Thus, the rational for case selection was purposive to include a variety of personal and contextual situations in which to evaluate the appropriateness of the LCME. In each case exercise hassles were anticipated based upon participant characteristics and situations. In each case the expected hassles were experienced.

Self-regulation was demonstrated in both simple and theoretical cases. Both simple replication cases experienced lapses in exercise performance, but were able to resume their exercise plan. In contrast, the two theoretical replications had few disruptions in exercise and were able to anticipate hassles and adjust their exercise plan to facilitate successful completion of planned exercise. In both types of replications the participants became more adept at anticipating exercise hassles as the study progressed. The self-regulation that occurred spontaneously reinforced the expectation that such planning could mitigate the effects of exercise hassles. Although this was not intended as an intervention study, the self-regulation that occurred demonstrated the potential utility of this model for clinical practice.

Uplifts for exercise performance (things that made it easier to perform scheduled exercise) characteristically were associated with elimination or decreasing exercise hassles. The concept of exercise uplifts was explored as a potential alternative explanation for exercise performance. Although exercise uplifts were included as subjective data only, their presence reinforces the notion that exercise hassles have a disruptive effect on exercise performance. Exercise uplifts were frequently related to the elimination of an exercise hassle.

The major life changes that were identified and recorded by Participant 2 provided yet another instance of contributory factors that mediate the decision to exercise. Although the study was not designed to evaluate the impact of major life events on the model, their natural occurrence afforded this possibility. The abrupt illness of Participant 2's father profoundly changed the character of her daily life routine. In a sense, the acute illness of her father superseded the previous routine of her life.

From a broad life perspective, the events and expectations of daily life for Participant 2 changed dramatically in response to her father's illness and ensuing family crisis. Participant 2 recorded her father's illness as an exercise hassle of high intensity. She did not specify other hassles such as conflicts with caring for family members on the hassles record of the weekly data. However, in all likelihood, the many details of attending to other family members as well as the energy she was directing toward concern for her father also were exercise hassles.

The literature on hassles suggests that the accumulation of details that must be attended to with the occurrence of major life events is a greater source of stress than the event itself (Kanner, et al., 1981). Participant 2 affirmed this perspective during the final interview. The delayed return of weekly measurement data precluded identification of this response pattern until the end of the study. Consequently, clarification that might have resulted in more detailed weekly reporting of hassles did not occur.

The LCME would predict a lapse in exercise given the emergent situation. Such a lapse did occur. However, the potential relationship between exercise hassles and exercise performance was obscured by identification of the major life event as an exercise hassle. The myriad of new details the participant had to attend to due to her father's illness would have more closely represented the hassles related to exercise. Clearly the presence of a major change due to the near death and ongoing sickness of a parent caused a disruption in most of the life routines of the participant. Participant 2's reluctance to use the term hassles as simple everyday inconveniences in conflict with exercise also may have resulted in under-reporting of exercise hassles. This case illustrates the importance of contextual aspects of the appraisal process. The overall outcome of the study in which a major life event occurred was consonant with the LCME.

In spite of the lapse, the Participant 2 was able to restart exercise and adjust her exercise plan. This allowed her to maintain a high percentage of exercise completion and high exercise self-efficacy. Her outcome expectations for the value of exercise likely contributed to her restarting exercise. This was reflected in her use of unscheduled exercise as a stress management strategy during the time of highest stress.

In each of the cases considered in the present study, family relationships contributed to supportive aspects of exercise continuance and/or hassles with exercise performance. Examples of exercise hassles due to family included caring for sick children and parents, making adjustments in schedules due to sick spouses, and spending time with spouses. This finding is consistent with previous research that has implicated the importance of families in lifestyle change (Barbarin & Tirado, 1974; Baronowski & Nader, 1985; Jaffe & Jordan-Marsh, 1983).

Summary

One of the primary considerations in the present series of cases was to evaluate the potential relationship between exercise hassles and exercise continuance. The concept of exercise hassles along with the intensity factor of exercise hassles in relationship to performance of exercise has been demonstrated. Predicted patterns of other mediating factors included in the LCME, including exercise hassle attributions and daily stress, did not emerge in this research. Evidence for additional mediating factors not included in the model, but consistent with the underlying theory of stress, appraisal, and coping also was found.

The intensity aspect of exercise hassles was found to reflect a wide array of possible meanings. Yet, the intensity factor gives little or no specific insight into the details of the multiple potential interactions. The factors and meanings that contribute to exercise hassle intensity appear to be related to individual meanings and values and immediate contextual variables. If this possibility is born out in future research, attributional characteristics could be eliminated from the model and replaced by a broad factor that could represent numerous potential meanings specific to each person. Such a factor would allow a clinician to assess numerous potential areas of concern depending on the individual's relevant personal and situational characteristics and immediate exercise goals and plans.

The consideration of exercise continuance in degrees of achievement rather than as a dichotomy between continuance and non-continuance allowed consideration of individual differences of exercisers. This allowed a more thorough exploration of the different exercise goals and hassles experienced by each participant. Both simple and theoretical replications demonstrated the relevance of self-regulation in adapting to or coping with exercise hassles.

The preliminary support indicated by these cases establishes the need for further research on the concepts in the LCME. In addition, further research with process sensitivity will likely contribute to practice relevant theory. Suggestions for future research as well as limitations of this study are presented in the following chapter.

CHAPTER VII

SUMMARY

This study has provided beginning work for the development of a model that explains the process of exercise continuance. The importance of ongoing participation in exercise as part of a healthy lifestyle has been documented. Yet, facilitating lifestyle change continues to be a complex and tenacious problem. The breadth of opportunity for primary health care nurse practitioners to address positive life changes with clients underlies the selection of the present problem as a research topic.

Although many behavioral interventions have been used in the past, little success with sustained behavior change has been accomplished. The limited success of interventions and theoretical approaches to this problem has been attributed to the complexity of the problem as well as the inadequacy of theory development. The present research represents an important contribution toward development of a theoretical model that integrates the complex array of individual differences with a process-sensitive approach. In spite of the acknowledgement of the importance of process in the study of exercise continuance, for the most part, process has not been reflected in the design of studies investigating exercise continuance. The current study used a process-sensitive approach in an effort to explore the potential relationships between exercise continuance and exercise hassles, which are two central concepts in the theoretical framework.

The review of literature presented the range of factors with potential to influence exercise continuance. Over 30 factors, both internal and external to the individual, were discussed. Although several of the models devised by exercise researchers offer potential for a better understanding of exercise continuance, they are not broad enough to encompass all the complexities of the current state of knowledge regarding exercise continuance.

The elements identified by this researcher as essential to build a model with the capacity to address the complexities of exercise continuance included: (a) a process capacity, (b) ability to consider multiple person and situation variables, (c) consideration of individual meanings, and (d) a multidimensional formulation of motivation. The theoretical framework for this research, the Lifestyle Change Model for Exercise (LCME), has been offered to meet these standards. The LCME was derived using the stress, appraisal, and coping framework of Lazarus and Folkman (1984), along with the Relapse Prevention approach of Marlatt and Gordon (1985). This model has process-sensitivity, and has the broad capacity to consider the range of factors identified to date. The motivational nature of the LCME is based upon self-efficacy theory (Bandura, 1979, 1986), attributional theory (Weiner, 1985), and decision-making theory (Janis, 1984). These contributory frameworks include value components as well as appraisal of capabilities, resources, and competing values that are considered in a robust understanding of motivation. The motivational aspects of the LCME allow for this complexity and are consistent with the transactional process nature of the model.

Of the factors in the LCME, the primary focus of this research has been on exercise hassles and their potential relationship with exercise continuance. A multiple case design was used to consider exercise continuance in context of the ongoing process of both new exercisers and long term exercisers. All participants were non-athletic adults who compiled weekly data related to exercise continuance over the 12-week study. Patterns of relationships between several key variables of the LCME were predicted to correlate with exercise performance. The predicted variables included exercise hassles, exercise hassle attributions, and exercise self-efficacy. Patterns between exercise hassles and exercise performance clearly emerged. A relationship pattern between attributional aspects of exercise hassles and performance of exercise was not demonstrated. Exercise self-efficacy performed as expected over the course of the study, but did not demonstrate a weekly pattern of relationship with exercise performance.

The present research demonstrated varied patterns of exercise plans. Thus, exercise continuance may best be represented in relative terms such as percent of planned exercise completed. The amount and consistency of exercise completion compared to the person and situation variables pertinent to the individual adds depth to the interpretation of exercise continuance in contrast to the common practice of dichotomizing exercisers as dropouts or continuers.

The exercise hassle intensity factor reflected the rich interaction of events and meanings that contribute to perceptions of exercise hassles. The concept of exercise hassle intensity adds an important dimension toward understanding the influence of hassles on the performance of exercise. This assumes that all hassles do not have the same intensity and that the intensity of any given hassle may change at different times or in different contexts. The inclusion of the intensity dimension of each hassle allowed a more fluid estimate of the influence of hassles on performance of exercise.

The opportunity to study the early phase of exercise continuance in context of a process-oriented approach allowed consideration of several important concepts. Mediators of exercise participation not explicitly included in the model emerged as potentially impacting the decision to exercise. These factors included meanings and values related to exercise hassles which conflicted with the performance of exercise. In addition, anticipation of exercise hassles and self-initiated interventions to remove/modify the hassle and/or the plan of exercise appeared in several cases. This strategy demonstrated the implied utility of the LCME. The self-regulation that occurred spontaneously during the course of the study is the basis for development of such a model and supports further development and refinement of the model.

Practice Implications

The intent of the present research was to advance understanding of sustained lifestyle change with a focus on exercise continuance as a desired health promoting behavior. Primary health care clinicians have the opportunity to interface with individuals in need of the benefits attributed to sustained aerobic exercise. However, the skills and theory necessary to promote exercise continuance have not been developed sufficiently to be effective over the long term. Thus, the contribution of this research toward theory development that has clear practice relevance is timely.

The importance of theory development that has clinical relevance to the problem of sustained behavior change regarding exercise continuance has been reinforced throughout this paper. In addition, the use of a process-oriented research strategy is reinforced by the widespread acknowledgement that the phenomenon of interest is indeed a process and to date has not been studied as such.

Further, the discovery of the use of self-monitoring and self-regulation that occurred spontaneously in the present research strongly supports the clinical relevance of the LCME. Self-monitoring and self-regulation are important aspects of self-care in general which is central to practice theory and a desired outcome of nursing research (Dickoff, James, & Wiedenbach, 1969; Lindeman, 1987).

Limitations of the Study

Although the flexible nature of the weekly exercise plan was identified as an important aspect of the study by several participants, the adaptations in exercise plans that occurred in the study made identification of hassles more difficult. For example, when exercise plans were altered in a way that resulted in a different exercise pattern, hassles that would have emerged with the original plan were eliminated. Thus the effect of exercise hassles on exercise performance may have been weakened.

This study failed to demonstrate the predicted pattern of relationship between exercise performance and the attributional dimensions of exercise hassles. While this does not in itself indicate a limitation of the study, it raises the possibility that exercise hassle attributions may have been measured inadequately. Another possibility is that the attributional dimensions of exercise hassles are weak in comparison to other moderating variables. Two moderating factors identified in this study not previously included in the model are dependent on individual perceptions: personal meanings of exercise hassles and the ability to tolerate exercise hassles. Both of these dimensions are connected to the person's values, priorities, and expectations for personal behavior.

The measurement difficulties discussed above lead to a discussion of the reliability of all quantitative measures used in this study. Since each case was a study in itself, no reliability data could be generated with regard to the measures in the current context of use. The best case would be to use measures with established reliability in other studies. However, a concept such as exercise self-efficacy is not amenable to traditional reliability studies due to its nature of expected change and uniqueness of each scale. Thus, as with other aspects of this study the researcher and reader must depend upon non-statistical reasoning to build a case for reliability.

While on one hand the case study design allows a broad consideration of complex variables in a natural setting, the flexibility left open the possibility that factors outside of the researchers awareness were operating. Of course, the explanation building aspect of the analytic strategy is designed to consider alternative explanations. However, unknown factors cannot be considered until they are at least partly known.

Limitations due to the occurrence of major life events with one of the participants resulted in a special case rather than routine case of adoption and maintenance of exercise as was intended. However, the occurrence of the non-routine condition was representative of a real-life situation. The expected routine exercise hassles were supplanted by family-related hassles due to a major life event.

The case participant who chose not to complete any of the weekly data packets represents a limitation. By failing to comply with the case study protocol, this case did not meet the criteria for inclusion as one of the multiple cases. However, consideration of the data that were obtained provided some potentially relevant descriptive information regarding exercise continuance. In spite of the loss of this case as part of the study, the remaining cases were representative of the desired participant selection criteria for both simple and theoretical replications.

The amount of data generated in a case study design provides a rich potential for insights into individual perspectives related to the process of exercise continuance. Although the analysis is tedious and difficult, one of the strengths in the multiple case approach is the ability to consider complex phenomenon in context of a naturalistic setting with the ability to replicate findings. The cross-case analysis allowed consideration of accumulated findings from the cases. While this study was not intended to provide causal relationships, evidence presented allowed consideration of plausible relationships between concepts in the LCME. This represents a first step in model building that has potential for clinical use by nurse practitioners and others interested in facilitating long-term exercise participation among non-athletic adults.

Future Study Recommendations

Many questions have been left unanswered by the present research. As additional research is done to evaluate and further develop the LCME, use of a process-sensitive research strategy will ensure that the complex transactions between variables will be appreciated.

Additional aspects of the LCME need to be considered for applicability to the overall model. The nature of the cognitive dissonance that occurs as an exerciser experiences a lapse in exercise may be a critical phase that leads to complete relapse from ongoing exercise participation. The relationship between self-as-exerciser and exercise self-efficacy and exercise outcome expectancy need to be further explored as well.

The apparent relationship between exercise hassles and performance of exercise needs further delineation. In addition, additional development of an exercise hassle inventory may prove helpful as both a clinical and research tool. Identification of exercise hassles apriori may be an important strategy in assisting clients to problem solve and avoid the hassle, or adjust exercise plans and expectations in a way that facilitate long term continuance. The basis for this assertion was an unexpected finding. Additional effort in identifying and understanding the use of coping strategies and coping repertoire are also logical extensions of the present study.

Measurement aspects of the variables included in the LCME should be carefully considered with instrument development for variables showing promise. As noted earlier, one trade off of the case study design is the limited or non-existent reliability testing that is afforded. Clearly, the ipsative-normative approach encouraged by Lazarus and Folkman (1984) that includes both intra-subject and inter-subject analyses offers a triangulation approach that will move forward the effort at model development. The LCME is promising, but adaptations and refinements are clearly in order. As this model moves toward a situation-producing theory (Dickoff, James & Wiedenbach, 1968), clinical application in the primary care setting will be an important contribution to nursing and social science.

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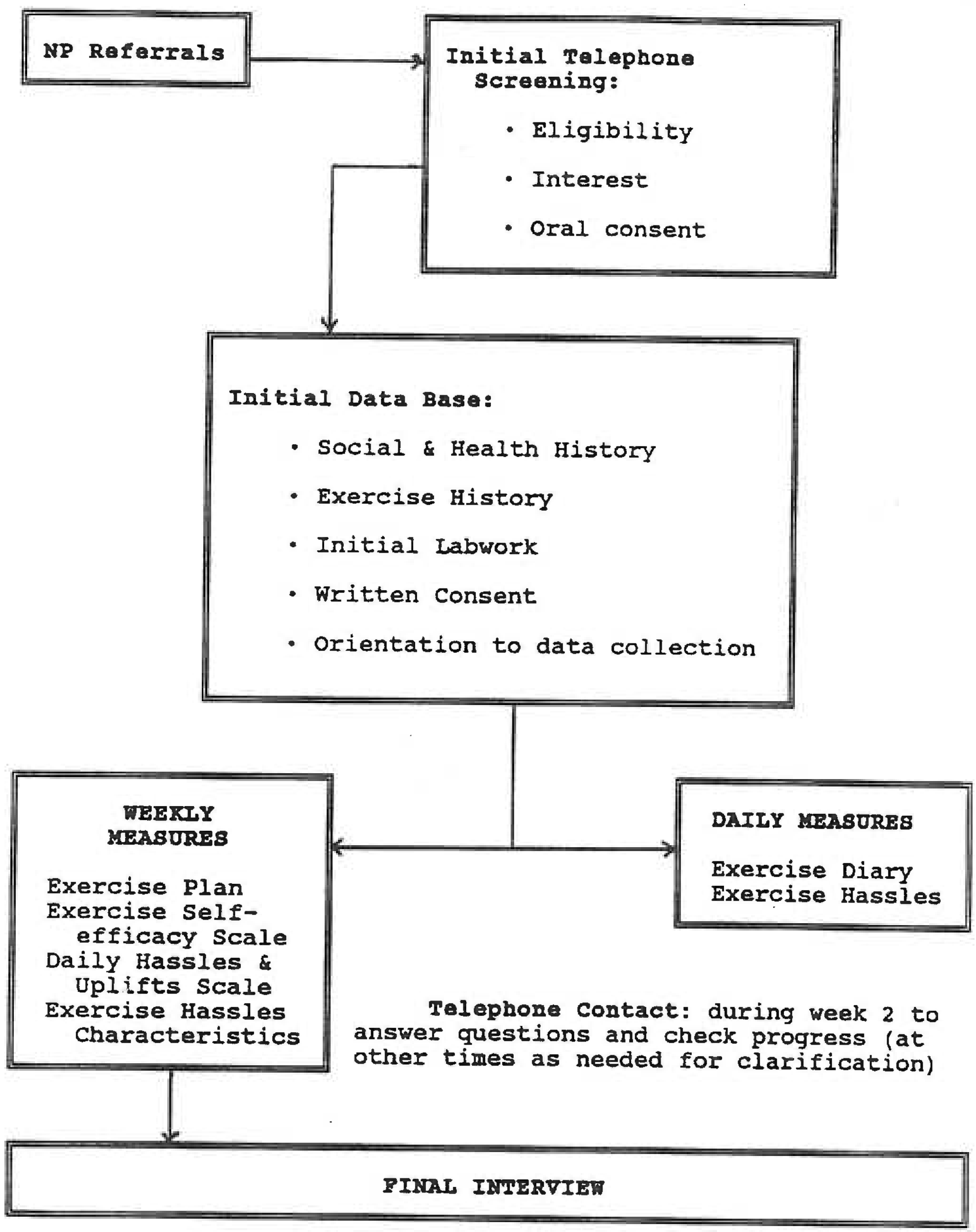
Appendix A - 1

CASE STUDY FLOW SHEET

CASE STUDY FLOW SHEET



Appendix A - 2

CASE STUDY PROTOCOL

Appendix A-2
Case Study Protocol

I. Initial contact/participant referral
  A. Sources
    1. NP referrals
    2. Other primary health care provider referrals
  B. Initial telephone screening
    1. Identify source of referral
    2. Establish eligibility
      a. non-athletic status
      b. age 21-65
      c. no current use of Beta-blockers
      d. < 2 months or > 1 year current exercise
      e. difference characteristics (gender, employment, children, home exercise)
    3. Brief explanation of study
    4. Establish interest in participation
    5. Oral consent to participate
    6. Schedule initial interview
  C. Mail history form (for completion prior to interview)

II. Initial interview/data base
  A. Overview of study & data collection procedures
  B. Written consent
  C. Social & health history form review
  D. Exercise history (focused interview)
  E. Exercise plan
  F. Review data collection forms & give measurement packets
  G. Questions? (availability of investigator throughout study)
  H. Lab work (copies of results to investigator & referral clinician)
    1. SMAC with lipids
    2. CBC

III. Daily & weekly data collection (begin week following 1st interview)
  A. Exercise Diary
    1. Exercise plan
    2. Exercise log
  B. Exercise Effects & Uplifts
  C. Exercise Hassles
  D. Exercise Hassles Characteristics
  E. Daily Hassles & Uplifts Scale
  F. Exercise Self-efficacy Scale
  G. Mail completed forms in self-addressed stamped envelopes upon completion

IV. Telephone contact

A. During 2nd week of study to answer any questions & make arrangements for final interview

B. To clarify hassles or questions identified on daily forms

C. Telephone contact if Weekly Measurement Packet not received by 5 days after anticipated completion

V. Final interview

A. Schedule final interview per telephone contact between 10th and 12th week of study

B. Focused interview regarding exercise study experience, including description of experience, perceived exercise effects, hassles, strategies used, and plans for continued exercise.

C. Offer final report of findings to be mailed after completion of multiple case analysis.

D. Payment for forms completion to be mailed following completion of data collection & final interview.

Appendix A - 3

PARTICIPANT CONSENT FORM

The OREGON HEALTH SCIENCES UNIVERSITY
Consent Form

TITLE: Sustained Lifestyle Change: Exercise Continuance

PRINCIPAL INVESTIGATOR: James F. Pittman, R.N.,C., M.S., Doctoral Student, [Telephone Contact: 543-3615 (home), 494-7796 (OHSU School of Nursing)]

PURPOSE: The primary objective of this study is to gain a better understanding of the process of exercise continuance. That is, the process of moving from the status of a new exerciser to a person who regularly engages in exercise as a habit. The focus of this study is on the factors that inhibit or contribute to helping a person make this transition to long term exercise. The study will continue over a 12 week period of time during which the participants will gather and record information related to their experience with exercise.

PROCEDURES: Each participant in the study will complete a weekly series of questionnaires over the 12 week study period. At the conclusion of each week the forms will be placed in a self-addressed stamped envelope and mailed to the investigator. In addition, each participant will be interviewed twice, once before and once after the completion of the 12 weeks. At the initial interview each participant will have blood drawn which will be submitted to the Oregon Health Sciences University laboratory for testing. Two tubes of blood will be drawn from each individual consisting of approximately 15 ml. of blood total (equivalent to 3 teaspoonfuls).

RISKS AND DISCOMFORTS: The primary discomforts in this study will be the potential inconvenience due to completion of the weekly forms and participation in the interviews. Completion of the weekly forms are expected to take approximately 15 to 20 minutes per week. The time involved in the two interviews will be approximately one and a half hours each for a total of three hours. Blood drawing may also cause some discomfort or pain and a slight risk of bleeding or bruising at the puncture site. Blood drawing will be done by the investigator who is a licensed Registered Nurse in the State of Oregon and has considersable experience in drawing blood.

BENEFITS: As a participant in this study, I will be compensated for completion of weekly forms and interviews by payment of $120.00 total at the conclusion of the final interview. Participation in this study may also contribute to new information which will have benefit to others in the future who are in the process of lifestyle change with exercise.

CONFIDENTIALITY: All information submitted or obtained from participants in this study will be kept strictly confidential with the sole exception of the blood test results, a copy of which will be sent to my primary health care provider. Neither my name nor my identity will be used for publication or publicity purposes.

COSTS: Weekly postage costs and fees for lab work will be prepaid by the investigator. The only potential costs for the participants will be for transportation to the site of the initial and final interviews.

LIABILITY: It is not the policy of the U. S. Department of Health and Human Services or any agency funding the research project in which I am participating to compensate or provide medical treatment for human subjects in the event the research resulting in physical injury. The Oregon Health Sciences University, as an agency of the state, is covered by the State Liability Fund. If I suffer any injury from the research project, compensation would be available to me only if I establish that the injury occurred through the fault of the University, its officers or employees. If I have further questions regarding liability issues I have been informed that I may call Dr. Michael Baird at (503) 494-8014.

Mr. **James F. Pittman** has offered to answer any questions I have regarding participation in this study [**(503)543-3615** or **(503)494-7796**]. I understand that participation in this research project is voluntary and I have the right to refuse to participate or withdraw from the study at any time without affecting my relationship with or potential for treatment at the Oregon Health Sciences University. I also understand that the condition for receiving monetary compensation is the completion and return of 12 weekly study packets and participation in the initial and final interviews.

My signature below indicates I have read the foregoing and agree to participate in this study (I will also receive a copy of this consent form).

Participant________________________________
Date_______________

Witness____________________________________
Date_______________

Appendix B - 1

INITIAL INTERVIEW GUIDE

INITIAL INTERVIEW GUIDE

Introduction: First I'd like to briefly tell you about what you can expect by participating in the study. The study is 12 weeks long and divided into three parts: (1) initial history and labwork, (2) daily & weekly monitoring and forms completion, and (3) final interview (at the conclusion of the 12 weeks). Today I will be reviewing your health history form and asking you some questions about your past and current experience with exercise. I will review the forms to be used during the course of the study and answer any questions you may have about the completion of the forms or procedures involved. At the conclusion of this meeting I will give you a packet containing the forms with instructions and a telephone number where you can contact me if you have additional questions. After completion of this interview I will draw your lab work and ask you to complete your initial exercise plan for the coming week. After completing the exercise plan you may begin the monitoring and forms completion part of the study with your next scheduled exercise session. You will be reimbursed a total of $120 at the conclusion of the study to help offset the time taken for weekly completion of forms and monitoring records. Is their any reason you are aware of that would be a problems for you to participate in this study? If yes, what?

Do you have any questions at this time?

(Give written consent form to sign)

Social & health history form review: (Review form for completion of all items and clarify any positive findings with use of routine probing questions) In addition ask for current use of medications, including over the counter medicines, vitamins and nutritional supplements.

Exercise history: Have you been involved in any of the following exercise activities? If so, please describe (dates, characteristics, time frame, exercise effects including injuries and benefits).

Walking
Jogging
Running
Aerobic dance
Weight lifting
Calisthenics
Swimming
Cycling (stationary or cross country)
Sports (golf, basketball, volleyball, tennis, racquetball, baseball, softball, soccer, football, track, wrestling, bowling, skiing,

cross country skiing,
other(list)________________________

Think back to your childhood and recall any exercise experiences you had while growing up. Start with any memories of activities with your family.

Tell me about what kinds of exercise experiences you had in grade school. High school. College.

Do you recall any particularly positive experiences with exercise? Negative?

What do you see as an outcome from your current involvement with exercise? (If answers positive, ask about negative, if negative ask about positive)

Is there any other information you would like to tell me about yourself with regards to your past experience with exercise?

Forms review: At this time I'd like to review the forms you will be completing throughout the course of this study (review forms, ask participant to think about their exercise plan and how they will fill out forms - ask for questions). If additional questions arise please feel free to call me. In addition, as you mail you completed forms back to me I will call you from time to time to clarify any additional details I may need to help me understand the information gathering.

Thank you very much for your willingness to participate in this study. I will conclude by drawing your labwork. Copies of your labwork will be sent to your health care provider. At the final interview I will review your exercise experience and give you an opportunity to receive a copy of the final case reports from the study.

Appendix B - 2

GENERAL HEALTH & SOCIAL HISTORY FORM

EXERCISE CONTINUANCE STUDY
General Health & Social History Form

General Information

NAME: ____________________
ADDRESS: ____________________
CITY: ____________ **STATE:** _____ **ZIP CODE:** ________
TELEPHONE NUMBER: (___) ________
TIME OF DAY BEST REACHED: ____________________
ALTERNATE PHONE NUMBER: (___) ________

HEALTH CARE PROVIDER: ____________________
HEALTH CARE PROVIDERS OFFICE/CLINIC ADDRESS:
____
CITY: ____________ **STATE:** ___ **ZIP CODE:** ________

MARITAL STATUS: Single____ Married____ Divorced____ Separated____
Widowed____ Living with partner____

PRESENT AGE: ____
BIRTHDATE (MONTH/DAY/YEAR): __________

EDUCATION COMPLETED: Grade School____ Junior High School____
High School____ 2-year college____ College____
Masters degree____ Doctoral degree____

OCCUPATION: ____________________

HOURS SPENT PER WEEK WORKING AWAY FROM HOME: __________

NUMBER OF CHILDREN AT HOME: ________
PLEASE LIST AGE & GENDER OF CHILDREN AT HOME:
____
____
____
____

PERSON WHO USUALLY TAKES CARE OF CHILDREN: __________

Personal Health History

DATE OF YOUR LAST PHYSICAL EXAM: ____________________

WHAT IS YOUR CURRENT GENERAL STATE OF HEALTH:
Poor____ Fair____ Good____ Excellent____

LIST ANY SERIOUS ILLNESSES, INJURIES OR HOSPITALIZATIONS:

____
____
____
____
____

LIST ANY CURRENT HEALTH PROBLEMS YOU ARE BEING TREATED FOR:

____
____
____
____

DO YOU NOW HAVE OR HAVE YOU HAD ANY OF THE FOLLOWING:

High blood pressure	yes___	no___
Stroke	yes___	no___
Heart disease	yes___	no___
Diabetes	yes___	no___
Allergies/hayfever	yes___	no___
Lung disease (bronchitis, pneumonia, TB)	yes___	no___
Asthma	yes___	no___
Thyroid problems	yes___	no___
Seizures (epilepsy)	yes___	no___
Bone or joint problems/injuries	yes___	no___
Back or neck pain/injury	yes___	no___
Severe depression or other mental problems	yes___	no___

IF YOU CURRENTLY SMOKE OR USE ANY TOBACCO PRODUCTS PLEASE LIST TYPE, AMOUNT & FREQUENCY OF USE:

____
____

IF YOU CURRENTLY DRINK ALCOHOLIC BEVERAGES PLEASE LIST TYPE, AMOUNT & FREQUENCY OF USE:

____
____
____

PLEASE LIST ANY CURRENT MEDICATIONS YOU ARE USING OR GENERALLY USE (INCLUDING OVER-THE-COUNTER MEDICATIONS):

____
____
____
____
____

Appendix B - 3

FINAL INTERVIEW GUIDE

FINAL INTERVIEW GUIDE

Introduction: I'd like to tell you the general format of this final interview. First I'd like you tell me your overall impressions of this study and in what way, if at all, the study impacted your participation in exercise. Next, I will review a summary of your weekly exercise packets and tell you what my impressions of the study are. My intent is that I will have an appreciation of what your experience during the course of this study has been. If I say something you don't think is accurate please let me know so I can have the best understanding possible. I will be asking you some other questions throughout the interview. Please answer as honestly as possible. The time to complete this interview will be approximately 30 to 60 minutes. Do you have any questions at this time?

Overall perceptions of study: Please tell me your impressions of being a participant in this study.

Did your completion of the weekly measures impact your participation in exercise? If so, in what way.

Were any parts of the weekly measurement packet particularly meaningful to you. Did any parts seem like they weren't providing helpful information?

Have you become aware of any additional information that might be added to help understand the issue of continuing with exercise?

Review of weekly measures & comments: (Use data collection form to review weeks. Discuss any patterns or deviations from patterns.)

Do any of the weeks stand out as being different to you? If so please discuss.

Did you find yourself reporting more fully on some weeks than others? If recording was different on some weeks can you identify any issues related to why recording differed? Please discuss.

Exercise outcomes: Are you aware of any specific outcomes related to exercise that you experienced over the course of this study? (Note exercise effects listed on weekly packet. Also note those listed during the initial interview.)

Is there any other information you would like me to be aware of regarding your participation in this study?

Is there anything you would have liked to be done differently or any suggestions for changes if this study was to be repeated?

Appendix C - 1

EXERCISE DIARY

EXERCISE DIARY

EXERCISE TYPE: W=WALK   WJ=WALK/JOG   SC=STATIONARY CYCLE   O=OTHER

HEART RATE: At the most active part of your exercise session, count your heart rate for 6 seconds and record the number of beats.

RPE (INTENSITY): Record the average Rate of Perceived Exertion for your exercise session:

1	2	3	4	5	6	7	8	9	10
minimum	very very light	very light	fairly light	moderate	somewhat hard	hard	very hard	very very hard	maximum

DURATION: Record the number of minutes you spent or plan to spend doing your exercise activity.

WEEKLY EXERCISE PLAN

Date Completed________

	Exercise Type	Duration
Sunday		
Monday		
Tuesday		
Wednesday		
Thursday		
Friday		
Saturday		

Number of sessions planned for this week ______________

Total minutes of exercise planned ______________

Did you consult with anyone or have assistance in planning this week's exercise *(circle response)*?   0 No   1 Yes

If YES, please indicate who (i.e., exercise specialist, health care provider, friend, spouse, etc.) ______________________

WEEKLY EXERCISE LOG (exercise performed)

	ExerciseType	Duration	RPE	HR
Sunday				
Monday				
Tuesday				
Wednesday				
Thursday				
Friday				
Saturday				

Total sessions completed ___________

Total duration of exercise (in minutes) __________

Appendix C - 2

EXERCISE EFFECTS & UPLIFTS RECORD

EXERCISE EFFECTS AND UPLIFTS RECORD

Instructions: Please record any positive or negative effects of exercise that you experience on the following form. In the Exercise Uplifts column, record anything that makes performing your exercise easier.

	Exercise Effects	Exercise Uplifts
Sunday		
Monday		
Tuesday		
Wednesday		
Thursday		
Friday		
Saturday		

Appendix C - 3

EXERCISE HASSLES RECORD

Participant # _____ We ___

EXERCISE HASSLES RECORD

INSTRUCTIONS: Please record any problems or difficulties you experience with regard to performance of exercise (including anything that makes it impossible or more difficult for you to perform your scheduled exercise). Please record anything you do in response to identified hassles.

	Exercise Hassles	Response to Hassles
Sunday		
Monday		
Tuesday		
Wednesday		
Thursday		
Friday		
Saturday		

Appendix C - 4

EXERCISE HASSLE CHARACTERISTICS

Participant # _____ Week # ____

EXERCISE HASSLE CHARACTERISTICS

After listing exercise hassles from the preceeding page, rate each hassle on each of the characteristics listed in the five columns below. Using the following scale, please indicate your choice by circling the number that most closely indicates your perception.

0 = None; 1 = Slight; 2 = Moderate; 3 = A great deal

HASSLE	Overall intensity of the hassle	The extent to which this hassle is caused by others	The extent to which this hassle is caused by me	The extent to which this hassle can be changed	The extent to which I am able to control this hassle
1.____________	0 1 2 3	0 1 2 3	0 1 2 3	0 1 2 3	0 1 2 3
2.____________	0 1 2 3	0 1 2 3	0 1 2 3	0 1 2 3	0 1 2 3
3.____________	0 1 2 3	0 1 2 3	0 1 2 3	0 1 2 3	0 1 2 3
4.____________	0 1 2 3	0 1 2 3	0 1 2 3	0 1 2 3	0 1 2 3
5.____________	0 1 2 3	0 1 2 3	0 1 2 3	0 1 2 3	0 1 2 3
6.____________	0 1 2 3	0 1 2 3	0 1 2 3	0 1 2 3	0 1 2 3
7.____________	0 1 2 3	0 1 2 3	0 1 2 3	0 1 2 3	0 1 2 3
8.____________	0 1 2 3	0 1 2 3	0 1 2 3	0 1 2 3	0 1 2 3
9.____________	0 1 2 3	0 1 2 3	0 1 2 3	0 1 2 3	0 1 2 3
10.____________	0 1 2 3	0 1 2 3	0 1 2 3	0 1 2 3	0 1 2 3

Appendix C - 5

HASSLES & UPLIFTS SCALE

THE HASSLES AND UPLIFTS SCALE

HASSLES are irritants—things that annoy or bother you; they can make you upset or angry. *UPLIFTS* are events that make you feel good; they can make you joyful, glad or satisfied. Some hassles and uplifts occur on a fairly regular basis and others are relatively rare. Some have only a slight effect, others have a strong effect.

This questionnaire lists things that can be hassles and uplifts in day–to–day life. You will find that during the course of a day some of these things will have been only a hassle for you and some will have been only an uplift. *Others will have been both a hassle and an uplift.*

DIRECTIONS: Please think about how much of a hassle and how much of an uplift each item was for you over the past week. Please indicate on the left–hand side of the page (under "HASSLES") how much of a hassle the item was by circling the appropriate number. Then indicate on the right–hand side of the page (under "UPLIFTS") how much of an uplift it was for you by circling the appropriate number.

Remember, CIRCLE one number on the left–hand side of the page *and* one number on the right–hand side of the page for *each* item.

HASSLES AND UPLIFTS SCALE

Example:

How much of a hassle was this item for you today?

HASSLES

0=None or not applicable
1=Somewhat
2=Quite a bit
3=A great deal

How much of an uplift was this item for you today?

UPLIFTS

0=None or not applicable
1=Somewhat
2=Quite a bit
3=A great deal

DIRECTIONS: Please CIRCLE one number on the left–hand side and one number on the right–hand side for each item.

0	1	2	3	1. Your child(ren)	0	1	2	3
0	1	2	3	2. Your parents or parents–in–law	0	1	2	3

☛ PLEASE FILL OUT THE QUESTIONNAIRE ON THE NEXT PAGE AT THE CONCLUSION OF THE WEEK.

HASSLES AND UPLIFTS SCALE

How much of a hassle was this item for you this week? How much of an uplift was this item for you this week?

HASSLES | UPLIFTS

DIRECTIONS: Please CIRCLE one number on the left–hand side *and* one number on the right–hand side for each item.

None /NA	Some-what	Quite a bit	A great deal	HASSLES / UPLIFTS	None /NA	Some-what	Quite a bit	A great deal
0	1	2	3	1. Your child(ren)	0	1	2	3
0	1	2	3	2. Your parents or parents–in–law	0	1	2	3
0	1	2	3	3. Other relative(s)	0	1	2	3
0	1	2	3	4. Your spouse	0	1	2	3
0	1	2	3	5. Time spent with family	0	1	2	3
0	1	2	3	6. Health or well-being of a family member	0	1	2	3
0	1	2	3	7. Sex	0	1	2	3
0	1	2	3	8. Intimacy	0	1	2	3
0	1	2	3	9. Family-related obligations	0	1	2	3
0	1	2	3	10. Your friend(s)	0	1	2	3
0	1	2	3	11. Fellow Workers	0	1	2	3
0	1	2	3	12. Clients, customers, patients, etc.	0	1	2	3
0	1	2	3	13. Your supervisor or employer	0	1	2	3
0	1	2	3	14. The nature of your work	0	1	2	3
0	1	2	3	15. Your work load	0	1	2	3
0	1	2	3	16. Your job security	0	1	2	3
0	1	2	3	17. Meeting deadlines or goals on the job	0	1	2	3
0	1	2	3	18. Enough money for necessities *(food, clothing, housing)*	0	1	2	3
0	1	2	3	19. Enough money for education	0	1	2	3
0	1	2	3	20. Enough money for emergencies	0	1	2	3
0	1	2	3	21. Enough money for extras *(entertainment, vacations)*	0	1	2	3
0	1	2	3	22. Financial care for someone who doesn't live with you	0	1	2	3
0	1	2	3	23. Investments	0	1	2	3
0	1	2	3	24. Your smoking	0	1	2	3
0	1	2	3	25. Your drinking	0	1	2	3
0	1	2	3	26. Mood–altering drugs	0	1	2	3
0	1	2	3	27. Your physical appearance	0	1	2	3
0	1	2	3	28. Contraception	0	1	2	3
0	1	2	3	29. Exercise(s)	0	1	2	3
0	1	2	3	30. Your medical care	0	1	2	3
0	1	2	3	31. Your health	0	1	2	3
0	1	2	3	32. Your physical abilities	0	1	2	3
0	1	2	3	33. The weather	0	1	2	3
0	1	2	3	34. News events	0	1	2	3
0	1	2	3	35. Your environment *(quality of air, noise level, greenery)*	0	1	2	3
0	1	2	3	36. Political or social issues	0	1	2	3
0	1	2	3	37. Your neighborhood *(neighbors, setting)*	0	1	2	3
0	1	2	3	38. Conserving *(gas, electricity, water, gasoline)*	0	1	2	3
0	1	2	3	39. Pets	0	1	2	3
0	1	2	3	40. Cooking	0	1	2	3
0	1	2	3	41. Housework	0	1	2	3
0	1	2	3	42. Home repairs	0	1	2	3
0	1	2	3	43. Yardwork	0	1	2	3
0	1	2	3	44. Car maintenance	0	1	2	3
0	1	2	3	45. Taking care of paperwork *(paying bills, filling out forms)*	0	1	2	3
0	1	2	3	46. Home entertainment *(T.V., music, reading)*	0	1	2	3
0	1	2	3	47. Amount of free time	0	1	2	3
0	1	2	3	48. Recreation & entertainment outside the home	0	1	2	3
0	1	2	3	49. Eating *(at home)*	0	1	2	3
0	1	2	3	50. Church or community organizations	0	1	2	3
0	1	2	3	51. Legal matters	0	1	2	3
0	1	2	3	52. Being organized	0	1	2	3

Appendix C - 6

EXERCISE SELF-EFFICACY SCALE

EXERCISE SELF-EFFICACY SCALE

Participant # ____ Week #____ (1 - 12) Date form completed____________

Instructions: This form asks you how much physical activity you think you can handle right now. Complete the following form by recording how **confident** you are that you can do each of the activities listed. Please use the following scale to indicate how confident you are to perform the activities listed:

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Definitely Cannot Do		Probably Cannot Do			Maybe (50-50)		Probably Can Do		Definitely Can Do	

Example:

Lifting objects:	Confidence (0-100%)
Lift a 20 pound object	100%
Lift a 40 pound object	100%
Lift a 60 pound object	100%
Lift a 80 pound object	90%
Lift a 100 pound object	50%
Lift a 120 pound object	10%
Lift a 140 pound object	0%

In the above example, this person has indicated they are definitely (100%) confident they can lift a 20, 40, and 60 pound weight. They think they probably (80% confident) they can lift a 80 pound weight, with moderate confidence (about a 50/50 likelihood) they can lift a 100 pound weight. They are only slightly confident they can lift a 120 pound weight and have no confidence (0%) they can lift a 140 pound weight.

Please rate your confidence level for each of the following activities using increments of 10 from 0% confidence to 100% confidence.

Riding a bike:	Confidence	Walking: (steady pace at 3 miles per hour)	Confidence
ride a bike 2 blocks	______	walk 1 block (2 min.)	______
ride a bike 4 blocks	______	walk 2 blocks (4 min.)	______
ride a bike 1 mile	______	walk 4 blocks (8 min.)	______
ride a bike 1/2 mile	______	walk 1/2 mile (10 min.)	______
ride a bike 3 miles	______	walk 3/4 mile (15 min.)	______
ride a bike 5 miles	______	walk 1 mile (20 min.)	______
ride a bike 10 miles	______	walk 2 miles (40 min.)	______
ride a bike 20 miles	______	walk 4 miles (80 min.)	______

Jogging: (steady pace at 6 miles per hour)	Confidence	Riding an exercise cycle: (80 rpm at light intensity)	Confidence
jog 1/2 mile (5 min.)	_______	10 minutes	_______
jog 3/4 mile (7 1/2 min.)	_______	15 minutes	_______
jog 1 mile (10 min.)	_______	20 minutes	_______
jog 2 miles (20 min.)	_______	30 minutes	_______
jog 3 miles (30 min.)	_______	45 minutes	_______
jog 5 miles (50 min.)	_______	60 minutes	_______
jog 6 miles (60 min.)	_______	90 minutes	_______
jog 10 miles (110 min.)	_______	120 minutes	_______

Appendix D

CODING FORM I
(WEEKLY MEASUREMENT PACKET)

Participant No. _____

Weekly Measurement Packet Coding Form 1

WEEKS OF STUDY

VARIABLE	1	2	3	4	5	6	7	8	9	10	11	12
1-XSESPL												
2-XPLAN												
3-ASSIST												
4-XSESPR												
5-XPERF												
6-XPERCNT												
7-XHASS												
8-HASINT												
9-HASOTH												
10-HASELF												
11-HCHAN												
12-HCONT												
13-DHAS												
14-DUPL												
15-ESEW												
16-ESEJ												
17-ESER												
18-ESEC												
19-ESEAV												

COMMENTS/NOTES (by weeks):

1

2

3

4

5

6

7

8

9

10

11

12

Appendix E

WEEKLY MEASUREMENT DATA
PARTICIPANTS 1,2,3,5
(CODED DATA)

VARIABLE NAMES AND DEFINITIONS
for
WEEKLY MEASUREMENT DATA

Variable Name	**Variable Definition**
1-XSESPL	Number of exercise sessions planned.
2-XPLAN	Minutes of exercise planned.
3-ASSIST	Outside assistance with exercise plan. (0=No, 1=Yes)
4-XSESPR	Number of exercise sessions performed.
5-XPERF	Minutes of exercise performed.
6-XPERCENT	Percentage of completed exercise (XPERF divided by XPLAN multiplied by 100).
7-XHASS	Number of exercise hassles listed.
8-HASINT	Exercise hassle intensity (sum of all exercise hassle intensity ratings for the week).
9-HASOTH	Average rating of exercise hassles attributed to locus other than self.
10-HASELF	Average rating of exercise hassles attributed to self.
11-HCHAN	Average rating of exercise hassle stability (low stability = high changeability).
12-HCONT	Average rating of exercise hassle controlability.
13-DHAS	Rating of perceived daily hassles for week.
14-DUPL	Rating of perceived daily uplifts for week.
15-ESEW	Exercise self-efficacy for walking.
16-ESEJ	Exercise self-efficacy for jogging.
17-ESER	Exercise self-efficacy for running.
18-ESEC	Exercise self-efficacy for stationary cycling.
19-ESEAV	Average exercise self-efficacy for walking, jogging, running, and cycling.

Weekly Measurement - Participant 1

WEEKS OF STUDY

VARIABLE	1	2	3	4	5	6	7	8	9	10	11	12
1-XSESPL	6	6	0	3	6	7	3	3	6	4	4	3
2-XPLAN	200	160	0	85	160	235	100	110	260	170	180	150
3-ASSIST	0	0	0	0	0	0	0	0	0	0	0	0
4-XSESPR	5	3	0	1	5	2	3	2	4	2	3	3
5-XPERF	138	105	0	27	96	80	100	40	150	80	120	105
6-XPERCNT	69	66	-	32	60	34	100	36	58	47	66	70
7-XHASS	11	5	-	6	6	1	4	7	4	5	6	8
8-HASINT	23	10	-	16	16	16	10	13	11	12	16	19
9-HASOTH	2.6	0.8	-	1	2	2	1.8	2	1.3	0.8	2	2
10-HASELF	1	1	-	1	1.2	1	1.5	1	1.3	1.6	1.2	1.1
11-HCHAN	1.6	1	-	1.3	0.8	0.4	1.8	1.3	1	1.2	1.3	0.8
12-HCONT	0.4	0.6	-	2	1	0.4	1.8	1.3	1.3	1.2	1.2	0.8
13-DHAS	34	44	29	29	29	32	33	20	21	23	36	35
14-DUPL	38	41	26	46	46	55	63	62	63	55	75	72
15-ESEW	91	89	91	85	98	98	98	98	100	100	100	100
16-ESEJ	36	35	34	31	41	39	36	28	39	41	29	40
17-ESER	5	13	10	19	23	20	16	16	19	16	23	29
18-ESEC	51	58	48	69	83	70	66	89	95	95	100	100
19-ESEAV	46	49	46	51	61	57	54	58	63	63	63	67

Weekly Measurement - Participant 2

WEEKS OF STUDY

VARIABLE	1	2	3	4	5	6	7	8	9	10	11	12
1-XSESPL	4	3	2	3	1	3	3	0	2	3	1	1
2-XPLAN	210	210	120	180	60	180	180	0	80	140	90	90
3-ASSIST	0	0	0	1	0	0	0	0	0	0	0	0
4-XSESPR	4	2	2	1	1	3	1	1	2	3	1	1
5-XPERF	210	95	120	60	60	180	60	30	80	140	90	90
6-XPERCNT	100	45	100	33	100	100	33	-	100	100	100	100
7-XHASS	2	2	0	3	1	4	3	-	2	1	1	2
8-HASINT	5	3	0	7	2	6	9	-	6	1	3	5
9-HASOTH	0.5	2	0	3	1	1.5	3	-	2.5	3	3	1.5
10-HASELF	2.5	0	0	0	2	1.3	0	-	0	3	0	0
11-HCHAN	0	1.5	0	2.3	3	0.3	0	-	0	2	3	1.5
12-HCONT	0.5	1.5	0	2.3	3	0.5	0	-	0	3	3	0.5
13-DHAS	22	18	8	13	20	19	26	25	37	26	17	37
14-DUPL	54	43	32	32	37	30	21	39	33	38	40	53
15-ESEW	63	63	63	58	69	63	64	44	56	54	83	78
16-ESEJ	40	39	39	36	35	40	36	43	18	56	48	49
17-ESER	34	35	34	33	26	31	31	36	34	45	50	44
18-ESEC	66	65	66	64	58	68	71	59	61	59	61	58
19-ESEAV	51	51	51	48	47	51	51	46	42	54	61	57

Weekly Measurement - Participant 3

WEEKS OF STUDY

VARIABLE	1	2	3	4	5	6	7	8	9	10	11	12
1-XSESPL	4	5	5	4	6	4	5	5	4	5	5	4
2-XPLAN	180	225	225	180	270	180	240	195	180	435	420	195
3-ASSIST	0	0	0	0	0	0	0	0	0	0	0	0
4-XSESPR	4	6	3	2	5	5	4	3	3	3	6	4
5-XPERF	171	265	130	90	220	230	147	180	125	130	305	195
6-XPERCNT	95	117	58	50	81	127	61	92	69	30	73	100
7-XHASS	3	3	3	5	2	0	2	2	3	4	1	1
8-HASINT	3	3	4	11	3	0	1	4	7	3	3	1
9-HASOTH	0.67	0	.33	1.2	0	-	.5	0	.3	.25	0	0
10-HASELF	0.67	0.67	.67	1.2	1.5	-	.5	3	.67	1	3	3
11-HCHAN	2.33	1.67	2.33	2.2	2	-	.5	2	1	2	2	3
12-HCONT	2.33	1	2	2.2	1.5	-	.5	1	1	1	2	3
13-DHAS	33	25	20	21	20	16	18	12	15	15	10	8
14-DUPL	16	16	8	10	14	12	21	13	9	14	10	12
15-ESEW	99	99	100	94	98	98	98	98	100	100	100	98
16-ESEJ	13	27	25	19	29	29	29	33	23	29	44	29
17-ESER	0	16	6	19	0	0	10	10	16	19	19	16
18-ESEC	43	63	50	54	66	66	66	66	70	68	63	73
19-ESEAV	39	51	45	46	49	61	51	52	53	54	57	54

Weekly Measurement - Participant 5

WEEKS OF STUDY

VARIABLE	1	2	3	4	5	6	7	8	9	10	11	12
1-XSESPL	5	5	5	5	5	5	5	5	5	1	3	4
2-XPLAN	300	300	300	300	300	300	300	300	300	60	180	240
3-ASSIST	0	0	0	0	0	0	0	0	0	0	0	0
4-XSESPR	5	5	5	0	5	5	5	5	5	1	3	4
5-XPERF	300	300	275	0	300	300	275	300	300	60	180	210
6-XPERCNT	100	100	92	0	100	100	92	100	100	100	100	88
7-XHASS	1	2	1	5	1	1	1	1	1	1	2	1
8-HASINT	2	3	2	12	2	2	1	1	2	3	2	1
9-HASOTH	0	1	0	0	0	0	0	0	0	3	3	0
10-HASELF	3	2.5	3	3	3	3	3	3	3	0	0	3
11-HCHAN	3	2.5	3	0	3	1	3	3	3	0	0	0
12-HCONT	3	2.5	3	0	3	1	3	2	3	0	0	0
13-DHAS	17	17	14	15	8	21	16	14	18	30	15	11
14-DUPL	22	11	6	3	16	10	8	11	17	4	21	20
15-ESEW	100	100	100	91	100	100	100	100	100	100	100	100
16-ESEJ	55	54	60	35	74	63	71	54	65	38	63	66
17-ESER	28	30	43	19	25	26	40	38	31	30	38	18
18-ESEC	38	69	46	35	79	43	68	64	45	54	56	48
19-ESEAV	55	63	62	45	70	58	70	64	49	56	64	58