

ing their use of computers or surveys. Paper- and computer-based scoring was identical. Subjects using different input methods were not discriminable on the basis of time taken to complete paper-based materials. Speech recognition and trackball required greater training time than mouse, keyboard, and touchscreen (respective mean number of minutes  $\pm$  SD = 7.2  $\pm$  1.0, 5.8  $\pm$  1.8, 4.6  $\pm$  1.4, 3.9  $\pm$  2.0, 3.0  $\pm$  0.9;  $F_{1,11} = 6.9, p < .0001$ ). Trackball and mouse required greater completion time than speech recognition, keyboard, and touchscreen (respective mean number of minutes  $\pm$  SD = 15.2  $\pm$  5.9, 13.5  $\pm$  4.6, 10.3  $\pm$  3.4, 8.7  $\pm$  4.5, 7.4  $\pm$  1.8;  $F_{1,11} = 6.7, p < .0002$ ). Touchscreen had the shortest total (training plus questionnaire) time. The mean ratings of satisfaction with the computer ( $M = 8.7 \pm 1.9$  on a 10-point scale  $\pm$  SD) was comparable among groups. Touchscreen was rated as more useful than mouse or keyboard (respective Ms on a 10-point scale  $\pm$  SD = 8.6  $\pm$  1.3, 5.9  $\pm$  3.3, 6.5  $\pm$  3.3;  $F_{1,11} = 3.2, p < .05$ ).

Since score distributions for paper- and computer-based protocols were identical, the functional status of geriatric ambulatory patients as assessed via the Functional Status Questionnaire may appropriately be obtained via computer. The use of interactive computer-based systems offers the promise of increasing the efficiency, reliability, speed, and availability to health-care personnel of a wide range of information relevant to both patient management and quality assurance. Since interactive computer-based systems are increasingly prevalent in everyday life, this research has implications for increasing the autonomy, quality of medical care, and quality of life of elderly individuals.

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MOTIVATION TO PARTICIPATE, EXERCISE AFFECT, AND OUTCOME BEHAVIORS TOWARD PHYSICAL ACTIVITY

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*Summary.*—Recently researchers have focused attention on understanding the relationship between motivation to participate and affective states associated with adherence to exercise and psychological outcomes of participation. It was hypothesized that intrinsic motivation toward an activity will heighten the associated positive affect, thereby leading to increased participation and higher perceived competence and satisfaction. The presently devised models tested the above hypothesis with 130 college students enrolled in psychology classes. They were asked to complete the Motivation for Physical Activity Measure, the Sport Enjoyment Questionnaire, and general demographic questions assessing adherence to exercise and perceived competence and satisfaction. Partial support for these path models was shown as intrinsic motivation was a predictor of affect and perceived competence and satisfaction, while extrinsic motivation predicted adherence for men only. These results provide a model to enhance the understanding of exercise-related behavior in the general population and the study of the relationship of motivation with affect toward exercise.

The reasons why people exercise and the factors which temper participants' exercise patterns have always been of great interest to those who study fitness. Knowledge gained about participation is valuable because it can be used to encourage those who could benefit from greater amounts of exercise to increase their participation. Similarly, explanations of exercise participation can be used to reduce or modify exercise by those for whom exercise may become unhealthy. Before fitness experts can apply knowledge regarding participation, however, a thorough understanding of the factors involved in such participation must be developed. The present study was done to devise an integrative model of participation in exercise, which would include motivation, affect, and outcome behaviors and attitudes toward exercise.

Motivation and Exercise

A number of studies have examined motivation and exercise. The projects which have queried adult motivation have focused primarily on why men and women participate in marathons, fitness activities, college athletics, and individual sports.

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motivation in their adherence to and acceptance of society's norms for attractive appearance.

A cursory summary of this research on motivation indicates also that other reasons for participation in physical activities include challenge, satisfaction, fitness, and achievement.

#### *Affect and Exercise*

The relationship between affect and exercise has been examined in few studies, wherein affect concerned one's feelings in relation to various physical activities. Positive affect can be described as positive feelings about self, contentment, relaxation, feelings of invigoration, well being, and increased energy. Negative affect (depression, anxiety, guilt, tension, uneasiness) has usually been the most common focus of studies of affect in relation to participation in activity. This may be because negative affect is best illustrated in symptoms related to withdrawal of exercise.

Glasser (1976) reported severe withdrawal symptoms of pain and guilt in heavy exercisers when exercise was removed. He felt these examples of negative affect were strong because positive feelings were generated during activity. He termed this positive trance-like transcendent state as a feeling of "spinning free."

Manning and Morrison (1994) recorded affect and exercise addiction for a sample of 817 subjects using the Exercise Enjoyment Questionnaire which they developed to assess affect related to participation in exercise. These subjects were a random sample of 112 competitive triathletes who were members of Tri-Tel, 185 Ironman Triathlon World Championship triathletes, and 520 health club members from several places in the United States.

A factor analysis of intercorrelations of responses to the Exercise Enjoyment Questionnaire yielded five subscales which explained 58% of the variance of affective attitude toward exercise. These factors were exercise as fulfillment to the exerciser, psychological dependence, maintenance of physical status quo, physical drive to exercise, and relationship of physical appearance to training.

In the first of the factors, psychological dependence, exercise is seen as a means to reduce or alleviate anxiousness, guilt, depression, and uneasiness. The second factor, physical status quo, is essentially driven by the participants' fear of becoming fat. This emotion is a marshaling factor in relation to exercise. The third subscale, exercise fulfillment, is comprised of feelings of positive health and well-being associated with engagement in exercise. The fourth factor, relationship of physical appearance to training, measures one's feelings of physical success derived from participation, based on changes in physical appearance. Last, physical drive to exercise measures the

Summers, Machin, and Sargent (1983) and Summers, Levey, and Murray (1982) surveyed marathon runners to discover why they became interested in running marathons. Reasons given for starting a running program were fitness, weight loss, and improving health. Further, these athletes were asked why they continued to participate. Responses to this question showed these individuals enjoyed the personal challenge, sense of achievement, personal satisfaction, and the fitness garnered from marathoning. When gender differences were examined for continued participation in exercise, women indicated social factors and release of tension as major advantages, while men stated fitness and health benefits of most value.

Those engaged in a fitness class were assessed by Biddle and Bailey (1985) to elucidate their reasons for participation. The reasons for involvement differed for men and women. Men rated health and fitness as the top reasons for participation while women indicated release of tension and social aspects of exercise were most appealing. Further examination of the data by multivariate analysis showed men indicated more motivation for skill development while women expressed greater social orientation, combined with a feeling that exercise was valuable in releasing tension.

In 1985, Mathes and Battista surveyed college students who were in intercollegiate athletics and those who were not to find out why they engaged in physical activity. Motivation for participation emphases for the men and women differed as indicated in previous research. Women appeared to have a greater social orientation, while men appeared to be motivated more on skill aspects.

Relevant criticism of these studies is their lack of theoretical orientation in assessing and explaining motivation for participation. A more recent study by Frederick and Ryan (1993), who examined the participation motivation of 376 adults, was done to remedy this shortcoming using Self-determination theory (Deci & Ryan, 1985). The primary interest was to assess motivational differences of participants engaged in individual activities and fitness activities in relation to amount of participation and scores on psychological measures. General conclusions were that people who participated in individual sports were motivated more by interest and enjoyment while those involved in fitness activities were driven to participate for motives regarding body appearance and reported less competence and satisfaction with their participation. In the Self-determination framework, intrinsic motivation reflects a more internalized orientation, while extrinsic motivation reflects an underlying attitude of pressure and external control. Frederick and Ryan confirmed that individual sport participants showed a profile indicative of intrinsic motivation, reflected by high interest and enjoyment of their activity (Deci & Ryan, 1985), while participants in fitness activity reflected more extrinsic

Subjects were registered for classes in introductory psychology or personality theories and were given additional credit for their participation in the present study.

#### Measures

The Motivation for Physical Activity Measure-Revised (Frederick & Ryan, 1994) is a 32-item, self-report measure designed to assess motives for participation in sport, exercise, or physical activity. The measure reflects five motives for participation: interest/enjoyment motives, skill development motives, fitness motives, enhancement of body appearance, and social motives. Theoretically, motives of interest/enjoyment and skill development reflect aspects of intrinsic motivation toward participation, with interest/enjoyment representing self-determination and development of skill representing the challenge dimension, both proposed by Deci and Ryan (1985) as necessary conditions for intrinsic motivation to occur. The other three motive groups represent extrinsic aspects of motivation, characterized by lack of choice, pressure to participate from others, or lack of challenge. Previous work (Frederick, 1991; Frederick & Ryan, 1993) has shown high interitem reliability (range .69 to .90) and construct validity in relation to measures of anxiety, self-esteem, and vitality.

The Exercise Enjoyment Questionnaire (Manning & Morrison, 1994) is a 20-item, self-report rating designed to measure various components of exercise enjoyment and commitment. It has been shown to have five factors named Exercise as fulfillment, Psychological dependence upon exercise, Perception of weight as training motivation, Physical drive to exercise, and Psychological drive to exercise. Manning and Morrison reported the average test-retest reliability of this measure to be .68.

Four items of outcome attitude and adherence to exercise were used in the present study to measure adherence to exercise and psychological attitude toward exercise. The adherence items were self report, open-ended questions which asked subjects to report the number of days per week and hours per week in which they engaged in their primary physical activity. The psychological attitude questions asked subjects to report perceived competence in their activity in comparison to their peers and their satisfaction with the physical activity. The competence and satisfaction items used a 9-point rating scale anchored by (1) = much less competent/satisfied and (9) = much more competent/satisfied.

#### Procedure

Subjects were administered the questionnaire in a group setting. A trained researcher was present to clarify questions and to answer general questions. Subjects were required to complete a consent form for their informa-

participants' perceptions of physical changes which occur when deprived of the ability to exercise. Of the five factors, all but the last one, physical drive to exercise, reflect affective states related to participation in exercise.

Personality components have also been addressed as part of studies dealing with affect and addicted exercisers. Dependent runners were described as anxious, assertive, obsessed, and perfectionistic by Goldfarb and Plante (1984). Further, the authors compared these runners with anorexics. Yates, Leiby, and Shisslak (1983) indicated excessive exercisers ranked high on inhibition of anger, high self-expectations, and tolerance to physical discomfort. Excessive exercisers have also used exercise to increase their perceived physical effectiveness and body control and seem similar to people with eating disorders. Milman (1989) concluded women of the nineties may often try to build their self-esteem through exercise, whereas in the eighties they participated in binge-purge eating behavior.

#### The Present Study

Questions not examined by the above research are how affect relates to motivation for exercise and, in turn, how this translates into adherence to exercise and to perceived competence in and satisfaction with the chosen activity. Since a clear gender relationship has been established for motivation to exercise, the present purpose was to examine how affect mediates men's and women's exercise habits. More specifically, motivational orientation toward exercise was proposed as a direct predictor of affective attitude toward exercise. This affect in turn then predicts adherence to exercise, perceived competence, and perceived satisfaction. Support for this hypothetical model is provided in earlier work by Frederick (1991) and Frederick and Ryan (1993). In those studies, motivation was shown to relate directly to affective states such as self-esteem, depression, and anxiety as well as to adherence, competence, and satisfaction to a lesser extent. The present study attempts to remedy two shortcomings of these earlier works. The first limiting factor in those works was the use of general affective measures and not exercise-related affective measures. In the present study, affect was measured by an exercise-specific measure, namely, the Exercise Enjoyment Questionnaire (Manning & Morrison, 1994). Secondly, earlier results were correlational; the present study attempts to establish path models of the relationship between motivation, affect, adherence to exercise, and exercise attitudes using path analysis.

#### Method

##### Subjects

Subjects were 118 students (38 men and 80 women) of Southern Utah University, ranging in age from 17 to 52 years, with a mean age of 22 years.

tion to be used in the present study. All questionnaires were completed confidentially, and each subject was assigned a code number.

#### RESULTS AND DISCUSSION

##### *Correlations Between Variables*

Preliminary Pearson correlations between variables were run to establish the basis for path models predicting adherence and perceived competence and satisfaction. Path models were created for each gender by selecting the outcome variables (perceived competence, perceived satisfaction, days per week of exercise, and hours per week of exercise) and those affect and motivational variables which correlated significantly with the outcomes. These correlated variables were then subjected to two-stage path analyses in which (1) affect was hypothesized to be a direct predictor of outcome and (2) motivational orientation was hypothesized to be a direct predictor of affect but not of outcome. All correlations and related significances are presented in Tables 1 and 2.

TABLE 1

Motivation Variable	1	2	3	4	5	6	7	8	9	10
1. Interest/Enjoyment	.66*									
2. Skill Development	.05	.05								
3. Body-related Motivation	.54*	.47*	.10							
4. Exercise Fulfillment	-.05	.29*	.40*	.76*						
5. Exercise Dependence	.50*	.44*	-.06	.52*	.32*					
6. Psychological Drive for Exercise	.13	.55*	.25	.47*	.57*	.20				
7. Days Per Week of Exercise	.16	.07	.48*	.59*	.56*	.20	.29			
8. Hours Per Week of Exercise	.23	.20	.12	.44*	.29	.08	-.08	-.53*		
10. Perceived Competence	.57*	.22	-.14	.20	-.03	.20	.07	.09	.28	
11. Perceived Satisfaction	.43*	.04	-.18	.04	-.17	.16	-.18	.11	.03	.75*

\* $p < .05$ . † $p < .01$ .

##### *Models of Exercise Adherence and Psychological Attitude Toward Exercise for Men*

Based upon correlations presented in Table 1, three models of exercise adherence and attitude were tested for men. In the first model, psychological drive for exercise, exercise dependence, and body-related motivation were regressed onto days per week of exercise. The over-all model was significant ( $F_{3,8} = 5.87$ ,  $p = .01$ ,  $r^2 = .41$ ); however, the only significant predictor of days per week of exercise was body-related motivation ( $t_1 = 2.90$ ,  $p < .01$ ).

TABLE 2

Motivation Variable	1	2	3	4	5	6	7	8	9	10
1. Interest/Enjoyment	.67*									
2. Skill Development	.01	.12								
3. Body-related Motivation	.28*	.51*	.20							
4. Exercise Fulfillment	.10	.31*	.29*	.71*						
5. Exercise Dependence	.22*	.32*	.03	.48*	.45*					
6. Psychological Drive for Exercise	-.07	.16	.26*	.51*	.45*	.16				
7. Days Per Week of Exercise	.04	.12	.06	.01	.04	.28*	.08			
8. Hours Per Week of Exercise	.25*	.22*	.09	.08	.19*	.25*	.02	.53*		
10. Perceived Competence	.37*	.56*	.03	.52*	.30*	.31*	.26*	.18*	.29*	
11. Perceived Satisfaction	-.48*	.26*	-.11	.26*	.05	.25*	-.06	.04	.12	.52*

\* $p < .05$ . † $p < .01$ .

In the second model exercise fulfillment and interest/enjoyment motivation were regressed onto hours per week of exercise. The over all model was supported ( $F_{2,15} = 3.71$ ,  $p < .05$ ,  $r^2 = .18$ ). In this stage of the model, exercise fulfillment was a significant predictor of hours per week of exercise ( $t_1 = 2.5$ ,  $p < .05$ ). In a second regression done to test the path model completely, in interest/enjoyment motivation was regressed onto exercise fulfillment and significantly predicted fulfillment ( $F_{1,10} = 7.08$ ,  $p < .01$ ).

In the third model psychological drive for exercise, exercise fulfillment, motivation for skill development, and interest/enjoyment motivation were regressed onto perceived competence. In this regression, the over-all  $F$  was significant ( $F_{3,5} = 5.31$ ,  $p < .01$ ,  $r^2 = .41$ ); however, support for the total model was not shown. The only individual predictor of perceived competence in this model was interest/enjoyment motivation ( $t_1 = 3.81$ ,  $p < .01$ ).

All models for men are presented in Fig. 1.

##### *Models of Exercise Adherence and Psychological Attitude Toward Exercise for Women*

Based upon correlations between motivation, affect, and outcome variables, two models were tested for women. In the first step of the first model, exercise fulfillment, motivation for skill development, and interest/enjoyment motivation were regressed onto perceived competence. The over-all  $F$  was significant ( $F_{3,8} = 12.53$ ,  $p < .01$ ,  $r^2 = .40$ ). Individual predictors of perceived competence in this regression were motivation for skill development ( $t_1 = 2.68$ ,  $p < .01$ ) and exercise fulfillment ( $t_1 = 2.43$ ,  $p < .05$ ). In the second step of the model, motivation for skill development and interest/enjoyment

motivation were regressed onto exercise fulfillment. Motivation for skill development was also shown to be a direct predictor of exercise fulfillment ( $F_{1,38} = 15.58, p < .01, r^2 = .29$ ).

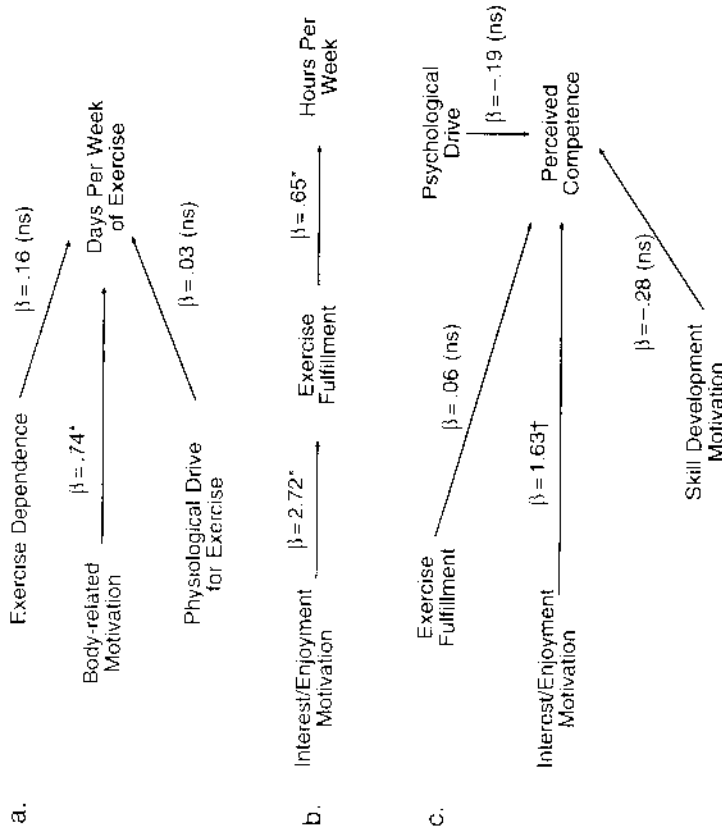


FIG. 1. Models of exercise adherence and psychological attitude toward exercise for 38 men ( $p < .05, *p < .01$ ).

In the second model tested, exercise fulfillment, psychological drive for exercise, interest/enjoyment, and motivation for skill development were regressed onto perceived satisfaction. The over-all model was significant ( $F_{4,38} = 9.71, p < .01, r^2 = .34$ ); however, only interest/enjoyment motivation was a significant, unique predictor of satisfaction ( $t = 4.74, p < .01$ ).

The models tested for women, with beta weights and significance levels, are presented in Fig. 2.

The results of this exploratory gender based study show different pictures for men and women. For men, exercise adherence can be driven via intrinsic or extrinsic motives. Among extrinsic motives are body-related motivation directly predicting days per week of exercise. Thus, if the focus is

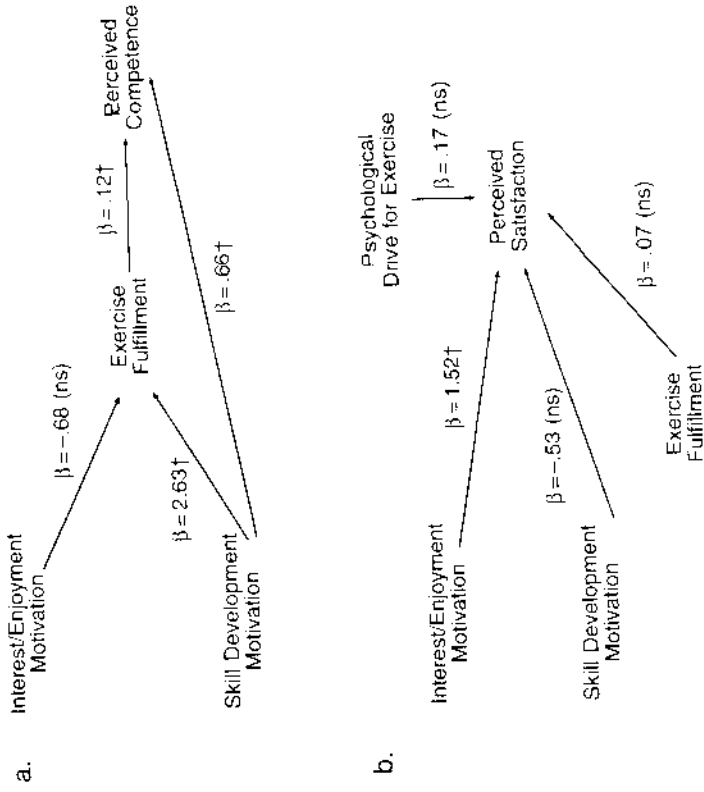


FIG. 2. Models of exercise adherence and psychological attitude toward exercise for 80 women ( $p < .05, *p < .01$ ).

on appearance related issues, the number of times one exercises per week increases; however, little inherent pleasure is derived for men following this model. Adherence as measured by hours per week of exercise may follow a more intrinsic model, wherein enjoyment drives feelings of fulfillment with regard to exercise. This increases the number of hours one is engaged in a primary activity. This model indicates more inherent pleasure toward activity as well as less emphasis on having to exercise a certain number of days per week. These results create something of a dilemma for the advisor or trainer. To maintain physical fitness, an individual must work out a specific number of times per week; however, individuals who can adhere to such a regimen may not find exercise enjoyable or meaningful. How long such individuals would adhere to a regimen not inherently satisfying is worthy of study.

For women, present results indicate better prediction of psychological attitude toward exercise than adherence. In both models, women showed an underlying intrinsic orientation toward exercise. This was reflected by interest/enjoyment and development of skill predicting positive affect toward ex-

exercise as well as increasing outcome variables of perceived competence and satisfaction. Unlike men, women do not seem to link motivational orientation to adherence in a linear fashion.

(Over-all, motivation may provide a foundation for exercise-related affect and outcomes, which are differentially based on type of motivation as well as gender. In a more intrinsic model of participation in exercise importance is placed upon the meaning of exercise for the participant (whether this activity is fulfilling and important to me, whether the exercise contributes to my skill development), with the outcome being an increase in perceived competence at or satisfaction with the activity. Thus, exercising gives the exerciser an enhanced sense of self in a pressure-free environment. On the other hand, extrinsic motives to conform to an ideal standard of appearance create an atmosphere within which the number of exercise sessions may increase. Rigid conformity to a training schedule becomes the norm. Although this model successfully predicts increased days per week of participation in physical activity, this adherence comes at the expense of personal freedom and choice. Feelings of self worth may then become contingent upon appearance and maintenance of a rigid schedule. It should also be noted that this pattern occurred only for the men. It appears that exercise advisors and trainers could help participants gain more from their activities by helping clients to develop an intrinsic motivational structure, thereby reducing the negative psychological aspects of exercise. It is important to realize the negative influence of extrinsic motivation on participation regardless of the value of adherence. These negative influences include feelings of pressure and anxiety and a lack of enjoyment of the exercise regimen, which could lead to abandoning exercise entirely. In the long term it is probably better to exercise twice a week and enjoy the experience than to exercise seven days a week and hate it. Results of the present study support previous work done by Frederick and Ryan (1993) and theoretical predictions of Deci and Ryan's (1985) Self-determination Theory.

The present research predicted adherence to exercise and perceived competence and satisfaction in a mediational model, incorporating motivation and enjoyment of exercise. Questions for study were presented as observed gender differences. Also, different models of adherence may be based on characteristics of the exerciser; for instance, an elite marathon runner may show a different adherence pattern than a noncompetitive jogger. These pattern differences based on ability may increase the sensitivity of this kind of approach to research.

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