
TRANSTHEORETICAL MODEL: IS TERMINATION APPLICABLE TO EXERCISE?

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Abstract: This study uses the Transtheoretical Model constructs (i.e., processes of change, decisional balance, barriers-efficacy, and temptation) to examine the validity of Prochaska's definition of the termination stage for exercise behavior. Participants (N = 269) were classified into maintenance (n = 129), 5-10 year termination (n = 58), and > 10 year termination (n = 63) stages. The 5-10 year terminators and > 10-year terminators reported greater self-efficacy, lower affect temptation, and fewer experiential and behavioral processes of change compared to those in the maintenance stage. The utility of the termination stage for exercise behavior and future directions for research will be discussed.

Regular physical activity contributes positively to physical and psychological health (United States Department of Health and Human Services [USDHHS], 1996, 1999, 2000). Despite the efforts of government, public, and private organizations to increase physical activity levels, over 40% of Americans are sedentary (National Center for Health Statistics [NCHS], 1995; USDHHS). This has led health-care professionals and researchers to develop exercise interventions based on theoretical models of behavior change in an attempt to increase physical activity levels (e.g., Marcus, Banspach, et al., 1992). One theory that has received increased attention from health and mental health practitioners is the Transtheoretical Model (TTM; Prochaska et al., 1982, 1983). Although this model was developed for the cessation of negative behaviors such as smoking and alcohol and drug abuse, the TTM has also been applied to the acquisition of and adherence to positive behaviors such as exercise (e.g., Marcus, Banspach, et al., 1992; Marcus, Eaton, Rossi, & Harlow, 1994; Marcus, Rossi, Selby, Niauri, & Abrams, 1992; Nigg & Courneya, 1998).

Although the TTM consists of the following five constructs: stages of change, self-efficacy, temptation, decisional balance, and processes of change, it is the stages of change construct that has received the most research attention (Reed et al., 1997). The stages of change hypothesize that individuals move cyclically through the following six stages with periods of progression and relapse: precontemplation, contemplation,

preparation, action, maintenance, and termination. The *Precontemplation* stage is when an individual does not intend to change the unhealthy behavior within the upcoming six months. *Contemplation* is the stage in which an individual is thinking of changing the behavior within the upcoming 6 months, but has not begun practicing the desired behavior. When individuals seriously consider changing their behavior within the next month, they are in the *preparation* stage. The *action* stage is characterized by overt, measurable changes in behavior that have consistently occurred during the past six months. When these changes in behavior continue for six consecutive months, a person is classified into the *maintenance* stage. Finally, individuals are classified into the *termination* stage when they have maintained their behavior for more than five years, have 0% temptation to engage in the undesired behavior, and 100% self-efficacy to engage in the desired behavior. (Prochaska & Velicer, 1997).

Self-efficacy is the situation-specific confidence to overcome a high-risk circumstance without relapse into an unhealthy habit (Bandura, 1977, 1986, 1992). Temptation is the intensity of urges to engage in a specific habit in the midst of a difficult situation (Prochaska & Velicer, 1997). Temptation varies inversely with self-efficacy across the stages of change, such that temptation is highest in the earlier stages and lowest in the later stages with equal levels of temptation and self-efficacy in the action stage (Hausenblas et al., 2001; Prochaska & Velicer, 1997). Decisional

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balance reflects the weighing of the pros and the cons of engaging in a healthy behavior (Marcus, Rakowski, & Rossi, 1992; Prochaska & Velicer, 1997). More specifically, the cons are associated with the earlier stages of change, while the pros are associated with the later stages of change (Nigg, Courneya, & Estabrooks, 1997). Finally, the processes of change consist of five experiential and five behavioral processes that people use to progress through the stages of change. The experiential processes, consisting of consciousness raising, dramatic relief, environmental reevaluation, self-reevaluation, and social liberation, are primarily used in the early stages (i.e., precontemplation, contemplation); while the behavioral processes of reinforcement management, self-liberation, helping relationships, stimulus control, and counter conditioning are primarily used to move through the later stages of change (i.e., action, maintenance) (Nigg & Courneya, 1998).

While extensive research has examined the first five stages of change for the acquisition and adherence to exercise behavior (e.g., Cardinal, 1997; Marcus et al, 1992; Nigg & Courneya, 1998), research investigating the validity of the termination stage for exercise is limited and equivocal (Cardinal, 1999; Cardinal & Levy, 2000; Courneya & Bobick, 2000). For example, Courneya and Bobick operationalized termination as 100% perceived behavioral control and 100% positive attitude for exercise, and they found that only 4% of the undergraduate students surveyed were in the termination stage. Therefore, they refuted the existence of the termination stage for exercise because the number of students in the termination stage was fewer than the 15-17% reported for problem drinkers and smokers (Prochaska & Marcus, 1994; Prochaska & Velicer, 1997). Additionally, Courneya and Bobick concluded that exercisers are likely to dwell in a constant state of maintenance. It is important to note, however, that the undergraduate students were asked to recall their exercise behavior that began between the ages of 13 and 17. It is likely that these students were not exercising, but rather were physically active through involvement in sport activities and physical education classes (Gauvin & Spence, 1995). Additionally, the definition used to operationalize the termination stage was not adapted from Prochaska and Velicer. That is, Courneya and Bobick operationalized termination as 100% perceived behavioral control and 100% positive attitude, while Prochaska and Velicer define termination as 100% self-efficacy, 0% temptation, and five years of adherence to the desired behavior.

Cardinal (1999) and Cardinal & Levy (2000) also investigated the termination stage for exercise by measuring participants' self-perceived physical activ-

ity, self-perceived physical fitness, and exercise attitudes and behaviors. They found that approximately 16% of the participants were classified into the termination stage of exercise behavior. This is similar to the 15-17% of participants reporting termination for smoking cessation (Prochaska & Marcus, 1994; Prochaska & Velicer, 1997), and therefore, the authors concluded that the termination stage exists for exercise behavior. While the results from this study seem to support the validity of the termination stage for exercise behavior, the definition of the termination stage used in this study was not the definition originally established by research investigating problem drinkers and smokers (Prochaska and Velicer, 1997). Furthermore, the items used to assess physical activity and exercise attitudes were not tested adequately for validity and reliability.

Therefore, Fallon and Hausenblas (2001) extended the research investigating the existence of the termination stage for exercise by applying the definition for termination proposed by Prochaska and Velicer (1997). Specifically, they assessed barriers-efficacy and temptation to not exercise of exercisers in the maintenance (i.e., exercise less than five years) and termination stages (i.e., exercise more than five years). Although few individuals reported 100% self-efficacy and 0% temptation, the results indicated that terminators reported significantly greater barriers-efficacy and less temptation to not exercise compared to maintainers. While the study did not fully support the definition provided by Prochaska and Velicer, the results supported previous research by Cardinal (1999) and Cardinal and Levy (2000) by indicating the presence of a termination stage for exercise behavior.

Furthermore, research examining the TTM for exercise has been criticized because the majority of researchers have not investigated all five of the TTM constructs simultaneously (Culos-Reed, Gyurcsik, & Brawley, 2001). Consistent with this criticism, no studies examining the termination stage have used all five of the TTM constructs. As a result, it is difficult for researchers to develop accurate and consistent knowledge of how the psychosocial constructs of the TTM effect exercise behavior. Thus, research examining the relationship between all the TTM constructs with the termination stage is warranted. Finally, the majority of the research has not investigated gender differences among the TTM constructs. Because men report more exercise behavior than women (USDHHS, 1996), research investigating gender differences among the TTM constructs is needed.

Therefore, the purpose of this study was to examine the validity of the five-year time requirement of the termination stage by comparing men and women

in the maintenance and termination stages on all five of the TTM constructs (i.e., processes of change, decisional balance, stages of change, barriers-efficacy, and temptation). Based on previous research, the terminators were expected to report greater amounts of mild, moderate, and strenuous exercise (Fallon & Hausenblas, 2001; Powers & Howley, 2001), greater barriers-efficacy (Fallon & Hausenblas, 2001; McAuley, Mihalko, & Bane, 1997), lower temptation to not exercise (Fallon & Hausenblas, 2001), and have lower body mass index (BMI; Fallon & Hausenblas, 2001, Powers & Howley, 2001) compared to the maintainers. Because the TTM does not propose psychosocial changes when advancing from the maintenance stage to the termination stage for the processes of change and decisional balance, no differences for sex or stage were expected for these measures (Prochaska & Velicer, 1997). Likewise, because the TTM does not propose psychosocial differences for men and women within the same stage of change, no sex differences were expected for temptation to not exercise, barriers-efficacy, decisional balance, or processes of change within each stage. Finally, the men were expected to report higher amounts of mild, moderate, and strenuous exercise (USDHHS, 2000), and have higher BMI compared to the women (American College of Sports Medicine [ACSM], 2000).

METHOD

PARTICIPANTS

Participants ($N = 269$) were undergraduate students and community adults (age range = 18 to 70 years; $M = 30.16$, $SD = 11.59$). On average, the men ($n = 142$) were 2.01 m tall, weighed 80.93 kg, and had a BMI of 25.08 ($SD = 3.11$). In comparison, the women ($n = 127$) were 1.66 m tall, weighed 60.81 kg, and had a BMI of 22.27 ($SD = 2.54$).

MEASURES

Stages of Exercise Change Questionnaire. The SOC for exercise behavior was assessed using a modified version of the Stages of Exercise Change Questionnaire (Reed et al., 1997). The original staging algorithm consists of five items that represent the first five SOC (i.e., precontemplation, contemplation, preparation, action, and maintenance). However, for the purposes of this study, two items were added to this staging algorithm. The item "Yes, I have been exercising for more than five years" was added to represent the termination stage; and the question "If you have been exercising consistently for more than five years, how many years have you been exercising?" was added for participants to indicate the length of time they had adhered to regular exercise. The original version of the

exercise-staging algorithm is a valid and reliable staging method for adults (Reed et al., 1997). To establish content validity for the staging algorithm used in this study, five exercise science professionals reviewed the staging algorithm for readability and clarity.

Leisure-Time Exercise Questionnaire (LTEQ). The LTEQ (Godin, Jobin, & Bouillon, 1986) is a self-report instrument that assesses the frequency of mild, moderate, and strenuous exercise done for 20 minutes or longer during a typical week. The weekly frequency of mild, moderate, and strenuous exercise are converted into a measure of energy expenditure called metabolic equivalents (METs) using the following formula: $3(\text{mild}) + 5(\text{moderate}) + 9(\text{strenuous})$. This measure has adequate validity and test-retest reliability (Jacobs, Ainsworth, Hartman, & Leon, 1993).

Barriers-efficacy Scale. Barriers-efficacy was measured with the 12-item Barriers-efficacy Scale (McAuley & Mihalko, 1998), which assesses participant's perceived ability to exercise five times per week in the face of barriers (e.g., bad weather, lack of interest/boredom, pain and discomfort, exercising alone). On a 0%-100% scale, participants rated their degree of confidence that they could exercise in the event that barrier circumstances were to occur (0% = no confidence at all, 50% = somewhat confident, 100% = completely confident). This scale has excellent psychometric properties (McAuley & Mihalko, 1998), and in this study, the internal consistency was good ($\alpha = .85$).

Temptation to Not Exercise Questionnaire. The Temptation to Not Exercise Questionnaire (Hausenblas et al., 2001) consists of 10 items that measure the intensity of temptations to not exercise, and it contains the following two subscales: Competing Demands (e.g., lack of time, too busy) and Affect (e.g., anger, stress, satisfaction). Participants rate their temptation to not exercise for a variety of situations on a 0%-100% scale (0% = not tempted at all, 50% = somewhat tempted, 100% = extremely tempted). Greater amounts of temptation to not exercise are indicated by a higher score. This questionnaire has adequate psychometric properties (Hausenblas et al., 2001). In this study, the internal consistency values were .89 and .81 for the affect and competing demands subscales, respectively.

Decisional Balance Questionnaire. The 16-item Decisional Balance Questionnaire (Marcus, Rakowski, & Rossi, 1992) uses a 5-point Likert scale, ranging from not at all important (1) to extremely important (5), to assess an individual's attitudes towards exercise. More specifically, the questionnaire contains 10 pro items and 6 con items, and it is scored by subtracting the sum of the pro items from the sum of the con items. An example of a pro item is "Regular exercise

would help me relieve tension or stress." An example of a con item is "I would have less time for my family and friends if I exercised regularly." For each subscale, higher scores indicate greater beliefs for the pros and cons associated with exercise. This measure has adequate psychometric properties, and the internal consistency values for this study for the pros ($\alpha = .93$) and the cons ($\alpha = .77$) were adequate.

Processes of Change Questionnaire. The Processes of Change Questionnaire (Nigg et al., 1999) is a 30-item measure that uses a 5-point Likert scale (1 = never and 5 = repeatedly) to assess the five experiential and five behavioral activities individuals use to modify their exercise behavior. Higher scores on this questionnaire indicate greater use of the processes of change. Experiential processes include the following activities: conscious raising, dramatic relief, environmental reevaluation, self-reevaluation, and social liberation. Behavioral processes include the following activities: reinforcement management, getting social support, helping relationships, stimulus control, and counter conditioning. This measure has adequate psychometric properties (Nigg et al., 1999). Internal consistency values for the experiential processes ($\alpha = .85$) and behavioral processes ($\alpha = .79$) were adequate for this study.

Body composition. Self-reported height and weight measurements were used to compute BMI [weight(kg)/(height(m)²)]. Although BMI has a $\pm 5\%$ error rate in estimating body composition (ACSM, 2000), it has a moderately high correlation with body composition ($r^3 .69$; Morrow, Jackson, Disch, & Mood, 1995), and it is an adequate estimate of body composition in epidemiological studies (Kuczmarski, Carroll, Flegal, & Troiano, 1997).

PROCEDURE

Participants were undergraduate students enrolled in sport and fitness courses, members of local fitness centers, participants at local road races, and spectators of local athletic events. All participants signed the informed consent before completing the questionnaires. About 15 minutes were needed for participants to complete the packet. Participants enrolled in the university were provided extra course credit for completing the questionnaires. Individuals not enrolled in the university received no compensation for their participation.

DATA ANALYSIS

The ACSM and Center for Disease Control recommend that "every U.S. adult should accumulate 30 minutes or more of moderate-intensity physical activity on most, preferably all, days of the week" (Pate et al., 1995, p. 404). Therefore, for this study, only those

individuals reporting a minimum of five bouts of moderate or strenuous exercise on the LTEQ were selected. Additionally, because the purpose of this study was to examine the termination stage of exercise behavior, only those participants who reported being in either the maintenance or the termination stage were analyzed. To ensure that exercise behavior began voluntarily during the adult years, and exercise was not the result of mandatory physical training for youth sport or high school competition, participants who reported beginning exercise before 18 years of age were excluded from analyses (Gauvin & Spence, 1995).

Because no research has studied when the termination stage occurs for exercise behavior, and because exercise is a positive health behavior that potentially takes a longer time to establish as a permanent behavior than the cessation of negative behaviors (e.g., quitting smoking), the participants were separated into the following three stages: (a) *maintenance* - exercise more than six months and less than five years; (b) *5-10 year terminators* - exercise between 5 and 10 years; and (c) *> 10 year terminators* - exercise longer than 10 years. Frequency counts were used to determine the distribution of individuals on the Stages of Exercise Change Questionnaire. Separate 2 (Sex: male, female) X 3 (Stage: maintenance, 5-10 year terminators, > 10 year terminators) analysis of variance (ANOVA) were conducted for the dependant variables of Barriers-efficacy Scale, BMI, and the mild, moderate, and strenuous subscales of the LTEQ. Separate 2 (Sex) X 3 (Stage) multiple analysis of variance (MANOVA) were conducted for the dependant variables of decisional balance, processes of change, and temptation to not exercise. Follow-up Tukey's HSD were conducted when appropriate. An alpha level of .05 was used for all statistical analyses. Finally, omega squared was calculated to determine the meaningfulness of the significant results (w^2 ; Tolson, 1980).

RESULTS

Two hundred seventy participants (52.6% male) were divided into the following stages: maintenance ($n = 129$, 47.8%), 5-10 year terminators ($n = 58$, 21.5%), and > 10 year terminators ($n = 63$, 23.3%). Table 1 displays the means and standard deviations for the study variables for the men, and Table 2 displays the means and standard deviations for the study variables for the women.

A 2 (Sex) X 3 (Stage) ANOVA was conducted for mild, moderate and strenuous exercise behavior. For mild exercise, no main effect for sex [$F(1, 264) = .01$, $p = .90$], or stage [$F(2, 264) = 2.705$, $p = .07$], and no sex by stage interaction [$F(2, 264) = 2.37$, $p = .10$] were evidenced. For moderate exercise, there was a

Table 1. Mean (M) and Standard Deviation (SD) Values for the Men by Stage for the Dependent Variables.

Dependant Variable	Stage					
	Maintenance		5 -10 years		> 10 years	
	(n = 68)		(n = 34)		(n = 41)	
	M	(SD)	M	(SD)	M	(SD)
Barriers-efficacy Scale	56.07	(15.55)	71.28	(15.10)	72.57	(14.50)
Temptation Scale						
Affect	26.83	(24.16)	28.82	(31.92)	18.37	(25.82)
Competing Demands	38.60	(29.72)	21.89	(23.90)	16.97	(23.07)
Decisional Balance						
Pros	36.26	(10.06)	39.65	(9.14)	37.66	(11.40)
Cons	12.35	(5.54)	12.68	(5.26)	10.43	(4.50)
Processes of Change						
Experiential	3.31	(.67)	3.86	(.55)	3.83	(.61)
Behavioral	3.24	(.66)	3.54	(.57)	3.60	(.87)
LTEQ (METs)						
Mild	10.63	(11.86)	7.41	(7.82)	4.68	(6.91)
Moderate	14.23	(10.99)	14.26	(10.16)	9.70	(13.07)
Strenuous	32.23	(14.64)	41.03	(18.92)	52.90	(30.00)
Body Mass Index	24.92	(3.07)	24.30	(2.56)	25.97	(3.39)

Note: LTEQ = Leisure-Time Exercise Questionnaire; METs = Metabolic Equivalents

significant main effect of stage [$F(2, 264) = 3.26, p = .04, \eta^2 = .02$; see Figure 1]; however, no main effect for sex [$F(2, 264) = .12, p = .73$] or sex by stage interaction [$F(2, 264) = .08, p = .92$] was evidenced. Follow

up Tukey's post hoc revealed that individuals exercising more than 10 years engaged in significantly less moderate exercise compared to individuals in the maintenance stage (i.e., six months to five years; $p = .04$).

Table 2. Mean (M) and Standard Deviation (SD) Values for the Women by Stage for the Dependent Variables.

Dependant Variable	Stage					
	Maintenance		5 -10 years		> 10 years	
	(n = 68)		(n = 34)		(n = 41)	
	M	(SD)	M	(SD)	M	(SD)
Barriers-efficacy Scale	58.71	(18.01)	65.43	(13.82)	70.18	(14.99)
Temptation						
Affect	38.60	(29.72)	21.89	(23.90)	16.97	(23.07)
Competing Demands	48.50	(21.92)	45.70	(24.96)	44.41	(24.27)
Decisional Balance						
Pros	40.96	(9.88)	44.52	(4.31)	42.67	(8.60)
Cons	12.76	(4.44)	11.19	(4.44)	12.19	(4.36)
Processes of Change						
Experiential	3.78	(.48)	4.10	(.51)	3.96	(.49)
Behavioral	3.66	(.54)	3.90	(.47)	3.97	(.60)
LTEQ (METs)						
Mild	7.65	(8.56)	8.20	(8.33)	7.29	(8.48)
Moderate	14.07	(9.56)	14.73	(13.75)	10.86	(10.18)
Strenuous	32.34	(14.56)	40.34	(15.12)	41.28	(24.00)
Body Mass Index	22.39	(2.59)	22.63	(2.62)	21.66	(2.31)

Note: LTEQ = Leisure-Time Exercise Questionnaire; METs = Metabolic Equivalents

For strenuous exercise, there was a significant main effect for stage [$F(2, 264) = 14.08, p < .001, \eta^2 = .09$], but no significant main effect of sex [$F(1, 264) = 2.60, p = .11$] or sex by stage interaction [$F(2, 264) = 2.24, p = .11$] was evidenced. Tukey's post hoc analysis revealed that participants in the maintenance stage reported significantly less strenuous exercise compared to those in the 5-10 year ($p = .01$) and the greater than 10 year termination stages ($p < .001$).

For BMI, a 2 (Sex) X 3 (Stage) ANOVA revealed a main effect for sex [$F(1, 261) = 58.40, p < .001, \eta^2 = .04$], no significant main effect for stage [$F(2, 261) = .24, p = .78$], and a significant sex by stage interaction [$F(2, 261) = 3.73, p = .03, \eta^2 = 1.00$]. Tukey's post hoc analysis for the interaction was nonsignificant. The main effect for sex revealed that the men had higher BMI compared to the women.

For barriers-efficacy, a 2 (Sex) X 3 (Stage) ANOVA showed a significant main effect for stage [$F(2, 254) = 20.79, p < .001, \eta^2 = .13$]. No significant main effect for sex [$F(1, 254) = .80, p = .37$] or sex by stage interaction [$F(2, 254) = 1.62, p = .20$] was evidenced. Tukey's post hoc analysis revealed that participants in the maintenance stage reported significantly less self-efficacy to overcome barriers to exercise compared to the 5-10 year terminators ($p < .001$), and the > 10 year terminators ($p < .001$).

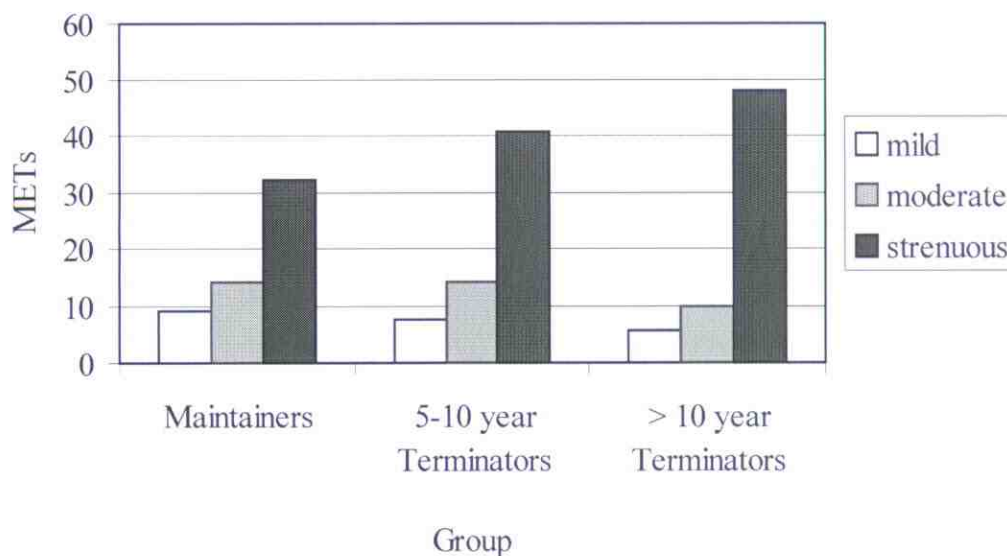
A 2 (Sex) X 3 (Stage) MANOVA for the Temptation to Not Exercise Questionnaire indicated a significant main effect for stage [Wilks' Lambda = .94, $F(4, 520) = 4.14, p = .003$]. No significant main effect for sex [Wilks' Lambda = 1.00, $F(2, 260) = .32, p = .73$],

or significant sex by stage interaction [Wilks' Lambda = .97, $F(4, 520) = 2.17, p = .05$] were evidenced. Follow-up univariate analysis for the Affect subscale indicated a significant main effect for stage [$F(2, 261) = 7.27, p = .001, \eta^2 = .04$], and Tukey's post revealed that the > 10 year terminators reported less affect temptation to not exercise compared to the maintainers ($p < .001$). For the Competing Demands subscale, the follow-up univariate analysis showed no main effect for stage [$F(2, 261) = 2.82, p = .06$].

For the Decisional Balance Questionnaire, a 2 (Sex) X 3 (Stage) MANOVA revealed a significant main effect for sex [Wilks' Lambda = .95, $F(2, 246) = 7.10, p < .001$]. No significant main effect for stage [Wilks' Lambda = .96, $F(4, 492) = 2.75, p = .06$], and no sex by stage interaction [Wilks' Lambda = .99, $F(4, 492) = .85, p = .50$] were evidenced. Follow-up univariate analysis for the pros indicated a significant main effect for sex [$F(1, 247) = 14.24, p < .001, \eta^2 = .05$], such that the women reported more pros for exercise compared to the men. For the cons, there was no significant main effect for sex [$F(1, 247) = .12, p = .73$].

A 2 (Sex) X 3 (Stage) MANOVA for the processes of change revealed a significant main effect for sex [Wilks' Lambda = .92, $F(1, 244) = 12.84, p < .001$], and a significant main effect for stage [Wilks' Lambda = .88, $F(2, 244) = 14.85, p < .001$]. No significant sex by stage interaction [Wilks' Lambda = .98, $F(2, 244) = 2.19, p = .11$] was evidenced. Follow-up univariate analyses indicated that the women reported greater use of experiential processes [$F(1, 244) = 12.84, p < .001, \eta^2 = .04$] and behavioral processes [$F(1,$

Figure 1. Exercise Behavior for the Maintenance and Termination Stages



244) = 19.88, $p < .001$, $\eta^2 = .07$] than the men. Follow-up univariate analyses for stage showed a significant main effect for both the experiential [$F(2, 244) = 14.85$, $p < .001$, $\eta^2 = .09$] and the behavioral processes [$F(2, 244) = 7.205$, $p < .001$, $\eta^2 = .04$]. Tukey's post hoc analysis revealed that those participants in maintenance reported significantly less use of experiential process of change compared to participants in the 5-10 ($p < .001$) and > 10 years termination stages ($p < .001$). Additionally, participants in the maintenance stage reported significantly less use of the behavioral processes compared to the 5-10 ($p = .03$) and > 10 years termination stages ($p = .005$).

DISCUSSION

The termination stage is operationally defined as five years of exercise adherence, 100% self-efficacy, and 0% temptation to not exercise (Prochaska & Velicer, 1997). The purpose of this study was to extend the research examining the validity of the termination stage by comparing people in the maintenance and termination stages for all of the TTM constructs. Consistent with previous research indicating the presence of the termination stage for exercise behavior (Cardinal 1999; Cardinal & Levy, 2000; Fallon & Hausenblas, 2001), participants in the maintenance stage reported less self-efficacy to exercise in the face of barriers and greater temptation to not exercise compared to participants in the termination stage. While these results support the existence of the termination stage, it is also important to note that only one participant in this study reported 100% self-efficacy and 0% temptation to not exercise. Therefore, the operational definition of termination developed for the cessation of negative behaviors (e.g., smoking, drug abuse) may need to be modified when applied to the acquisition of a positive behavior such as exercise. That is, the stringent criterion of 100% self-efficacy and 0% temptation may not be reasonable for exercise because it requires higher levels of preparation (i.e., scheduling, purchasing memberships and equipment) and motivation throughout the lifespan compared to the cessation of negative behaviors.

In regard to exercise behavior, it was hypothesized that individuals in the termination stage would report greater amounts of mild, moderate, and strenuous exercise behavior than those in the maintenance stage. Results indicated no stage differences for mild exercise. For moderate exercise, the > 10 year terminators engaged in less moderate exercise compared to the maintenance and 5-10 year terminators. And finally, those in the termination stage reported greater amounts of strenuous exercise compared to those in the maintenance stage. In general, these results suggest that most

people have a fixed amount of time available for exercise, and as the number of years of consistent exercise increases, more time is spent in strenuous exercise and less time is allotted for moderate and mild exercise.

In accordance with previous research (Fallon & Hausenblas, 2001), BMI was expected to be lower for participants in the termination stage compared to those in the maintenance stage. Contrary to the hypothesis, however, there were no stage differences for BMI. This finding may be a result of the sample chosen for this study. More specifically, only individuals reporting five or more days per week of moderate to strenuous exercise were included for data analysis. It may be that the amount of exercise behavior required for inclusion in this study is the same amount of exercise needed to maintain a healthy weight, and therefore, no stage differences in BMI were evidenced.

To extend our knowledge regarding the validity of the termination stage for exercise, we examined if the maintainers and terminators differed on the processes of change and decisional balance constructs. Because the TTM does not assume any psychosocial changes during the transition from the maintenance to the termination stage (Prochaska & Marcus, 1994; Prochaska & Velicer, 1997), no stage differences were expected for decisional balance. Likewise, because the TTM does not postulate sex differences, no differences between the men and the women were expected. Concurrent with the hypothesis, no stage differences were yielded for the pros and the cons subscales of decisional balance. In regard to sex differences, however, the women reported significantly more pros for exercise compared to the men.

Like decisional balance, no stage differences were expected between the maintenance and termination stages for the processes of change. Contrary to the hypothesis, however, those in the maintenance stage reported less use of the experiential and behavioral processes of change compared to the terminators. This result indicates that psychosocial changes are still occurring during the maintenance stage. In regard to sex differences, the women reported greater use of the experiential and behavioral processes compared to the men.

The TTM does not provide an explanation for why the women reported more pros and greater use of the processes of change compared to the men. Therefore, to provide a greater understanding of why sex differences were found for the processes of change and decisional balance, future research is needed to study gender differences in the perception of the benefits of exercise. It may be that the gender roles imposed on men and women by western society allow women to perceive their exercise behavior as a liberating, positive

experience, while men view exercise as a behavior that they are expected to do. Understanding these gender differences may aid in the development of better intervention programs for exercise.

With regard to the five-year time limit of the termination stage defined by smoking cessation research (Prochaska & Velicer, 1997), this study is the first to quantitatively validate this time requirement for exercise behavior. More specifically, there were stage differences when comparing the maintenance stage (i.e., six months to five years) and both the termination stage (i.e., 5-10 year and > 10 years stages) for affect temptation, barriers-efficacy, and the processes of change. However, there were no stage differences for these constructs between the two termination stages. This suggests that psychosocial factors for exercise behavior plateau after the five-year time mark. As a result, the five-year time requirement may be an appropriate estimation of when an individual's transition from the maintenance stage to the termination stage has occurred.

While this study provided evidence for the presence of the termination stage as well as quantitatively confirmed the five-year time requirement proposed by Prochaska and Velicer (1997), there are several limitations that warrant discussion. First, this study only examined long-time exercisers (i.e., maintainers and terminators), and therefore, no comparisons could be made among those in the lower stages of change. To expand our knowledge of how the TTM applies to exercise behavior, future researchers should use all five TTM constructs to examine the six stages of change simultaneously.

Second, measurement errors often result from self-reported exercise (Sallis & Owen, 1998). For example, participants may unintentionally misreport retrospective information such as number of years of exercise, exercise frequency, duration, and intensity. Furthermore, because people who are physically active are of-

ten attributed with positive social characteristics, such as being more popular and outgoing (Langlios et al., 2000; Martin, Sinden, & Fleming, 2000), participants' responses for barriers-efficacy, temptation, and exercise behavior are subject to self-presentation bias. Therefore, prospective and longitudinal studies are needed that verify self-report data by using multiple administrations of the TTM measures and objective physiological measures of health such as body composition (i.e., caliper measurements, hydrostatic weighing) and physical fitness testing (i.e., maximal oxygen uptake, 1 repetition maximum).

Third, because the TTM was developed to explain the cessation of negative behaviors, there may be conceptual differences when applying the TTM to the acquisition and adherence to a positive behavior such as exercise. As previously stated, only one exerciser reported 100% self-efficacy and 0% temptation after five years of adhering to an exercise program. Therefore, it may be beneficial for future research to modify the operational definition of the termination stage when using the TTM to examine exercise behavior.

In conclusion, this study provides support for the existence of the termination stage for exercise, and it shows that people may move from the maintenance stage to the termination stage at the five-year mark. While the change from maintenance to termination is evidenced by higher barriers-efficacy and lower temptation to not exercise, the definition provided by Prochaska and Velicer (1997) was not confirmed. It appears that for exercise behavior – or the acquisition of a healthy behavior – 100% self-efficacy and 0% temptation may not be a viable operational definition for the termination stage, and therefore, high barriers-efficacy and low temptation in combination with five years of consistent exercise may be that is required to move from maintenance to termination.

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HEALTH EDUCATION RESPONSIBILITY AND COMPETENCY ADDRESSED

Responsibility II – Planning Effective Health Education Programs

Competency B – Develop a logical scope and sequence plan for a health education program

Sub-competency 5 – Develop a theory-based framework for health education programs

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