

Application of the Trans-Theoretical Model (TTM) to Exercise Behavior among Female College Students

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(Received 19 Sep 2007; accepted 3 Nov 2007)

Abstract

Background: This study examined the applicability of trans-theoretical model (TTM) to understand exercise behavior among female college students in Hamadan University of Medical Sciences, Iran in 2007.

Methods: A cross-sectional descriptive study was conducted. The dependent variables analyzed were exercise efficacy expectation, decisional balance (pros and cons). The independent variable was stage of exercise behavior change. Five hundred and ninety female students representing various disciplines on campus completed a valid and reliable questionnaire ($r = 0.78$) during regularly scheduled classes. More than seventy-three percent of sample were sedentary (pre-contemplation, contemplation, or preparation) whereas 24.6% were in the action stage (regularly active < 6 months) and 2.2% were in the maintenance stage (regularly active > 6 months).

Results: All of the TTM constructs differed significantly across exercise stages. Students in pre-contemplation scored the lowest and those in maintenance stage scored highest on efficacy expectation and pros and reversed on cons.

Conclusion: Results supported the use of the entire TTM in examining exercise behavior among female college students.

Keywords: *Trans-theoretical model, Exercise behavior, Females, Students*

Introduction

Regular exercise contributes to an overall healthy lifestyle and is well documented in all age groups (1).

Sedentary lifestyles is established as major independent risk factor for coronary artery disease (2) and is associated with increase risk of colon cancer, hypertension, type 2 diabetes mellitus, osteoporosis and depression (3) and enhance ability to perform daily tasks throughout the lifespan (4). Despite the benefits associated with a regularly active lifestyle, only 15% of American adults engage in regular exercise and 25% are completely sedentary (5). Results from a National College Health Risk Behavior survey (6) indicated that 37.6% of students had participated in vigorous and

19.5% in moderate physical activity during the 7 d preceding the survey. It is well documented that physical activity participation decreases over the lifespan (7). By age 21 yr, 42% of males and 30% of females report participating in vigorous physical activity (8). No doubt initiate exercising in adolescence can have more benefits for overall healthy lifespan. Furthermore, studies have revealed that low levels of physical activity remain stables from adolescence in to adulthood especially in females (9). Therefore, adolescents seem to be an important group to promote the maintenance of adequate physical activity level or encourage inactive adolescents to become more active. So, colleges and universities are potentially crucial settings in which to implement interventions to help promote exercise through out lifespan. Numerous theoretical frameworks

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and models have been utilized to explain exercise behavior. The trans-theoretical model (TTM) of behavior change was developed by Prochaska and Diclement as a model of intentional behavior change (10). The TTM assumes that individuals vary in their motivation and readiness to change their behavior. Furthermore, the TTM recognizes that relapse is a normal occurrence for that undergoing significant behavior change. The TTM has shown promise as an effective framework for understanding exercise behavior among various populations (10-12). The TTM consists of five unique stages of behavior change and strategies hypothesized to influence behavior change i.e. efficacy expectation, decisional balance, and processes of change.

In applying the TTM to exercise, the majority of studies have solely utilized stage of exercise behavior change. The stages of exercise behavior change are defined as pre-contemplation (individuals are inactive and do not intend to begin exercising within the next 6 months); contemplation (individuals are inactive and are considering initiating exercise within the next 6 months); preparation (individuals exercise on an irregular basis but intend to become more active within the next month); action (individuals have engaged in regular exercise for less than six months); and maintenance (individuals have engaged in regular exercise for six months or more). Efficacy expectations are one's perceived confidence in the ability to carry out a specific behavior successfully. An individual's efficacy expectations are situation specific and may vary in relation to personal circumstances i.e., sickness, change in schedule. Marcus & Owen reported that efficacy expectation steadily increase across the stages of change for exercise (13).

Decisional balance relates to the pros (benefits) and cons (costs) of the behavior as it relates to oneself and significant others (14). For exercise, examples of pros include health benefits (stress relief, improved sleep patterns) and increase energy and stamina. Time constraints,

competing commitments and tasks (less time to spend with family and friends) and inclement weather are examples of cons.

For exercise behavior, the pros increase and the cons decrease across the stages of exercise behavior change. Prochaska et al. (15) examined the relationship of stage of change and decisional balance across 12 problem behaviors (e.g., high fat diet, radon exposure, mammography, screening, condom use) and concluded that there was evidence to support a crossover between pros and cons during the preparation stage for many health behaviors, including exercise.

The purpose of the present study was to test the applicability of the TTM to understanding exercise behavior among a sample of female college students in Hamadan University of Medical Sciences. The following hypotheses were tested: (i) exercise efficacy expectations were hypothesized to increase across the stages of exercise behavior change; (ii) pros were hypothesized to increase across the stages of exercise behavior change; (iii) Cons were hypothesized to decrease across the stages of exercise behavior change.

Materials and Methods

A descriptive cross-sectional survey was conducted. All under-graduates female students represented all academic disciplines (dentistry, public health, nursing, medicine,.....) in Hamadan University of Medical Sciences were asked to fill questionnaires. Students were instructed that their participation was voluntary and anonymity was assured. Five hundred and ninety usable questionnaires were obtained. Data were obtained with questionnaires.

Demographic characteristics

Six items about age, living situation, academic discipline, current year in college, marital status, parent education were collected to describe the demographic characteristics of subjects.

Stages of exercise behavior change questionnaire

Stage of exercise behavior change was assessed using a 5-item, dichotomous scale (yes/no) related to regular exercise.

Behavior and intentions

Regular exercise was defined as three times per week for 30 min or longer each session. Individuals were categorized in to one of five exercise behavior change. Marcus et al reported a Kappa index of 0.78 for the stages of change questionnaire. In this study, internal consistency was 0.71 (16).

Exercise efficacy expectations questionnaire

Exercise efficacy expectations were assessed using a 5- point Likert- type scale (ranging from 1, "not confident at all "to 5 "extremely confident") to measure confidence in one's ability to overcome barriers to exercise participation. The exercise efficacy expectations scale was scored by calculating a mean t-score for each individual. Marcus, et al reported an internal consistency of 0.82. In this study one week test-retest reliability was 0.94 for this instrument (16).

Decisional Balance Questionnaire

The 16-item decisional balance questionnaire (10 pros and 6 cons) developed by Marcus et al. was used in this study. Subjects were asked to indicate, on a 5-point Likert-type scale (ranging from 1 ,"not at all important " to 5, "extremely important"), how important each statement was in regard to their decision to exercise or not. Marcus, Rakowski, et al. (17) reported an internal consistency of 0.95 for the pro items and 0.79 for the cons items. In this study, internal consistency for the pro variable was 0.90 and 0.75 for cons variable.

Statistical Analysis

SPSS+ for Windows Version 10.0 was used for statistical analyses. Alpha was set at 0.05 a priori. Descriptive statistics (means, standard deviations, frequencies, and percentages) were computed. Chi-square analyses were calculated to identify differences in stage of exercise behavior change distribution as function of age, living situation, parent education, etc. Univariate analyses of variance (ANOVAs) were used

to identify TTM constructs that were significantly different as a function of exercise behavior.

Results

Stages of exercise behavior change distribution overall are represented in Table 1.

According to this table, pre-contemplation (n= 98, 16.6%), contemplation (n= 180, 30.5%), preparation (n= 154, 26.1%), action (n=145, 24.7%), maintenance (n=13, 2.2 %). Female students were more likely to be in the contemplation stage.

According to Table 2, the most frequency in maintenance phase belongs to bachelor students (n=16), and the least frequency in pre-contemplation belongs to postgraduate students (n=16). The most of students in each educational level, were in contemplation phase. Table 3, showed that significant differences in both pros and cons emerged across stages of exercise behavior change. Individuals in the pre-contemplation stage had significantly lower perceived pros associated with exercise in comparison with those in the other four stages. Cons generally decreased across the stages of exercise behavior change. Cons were the most in pre-contemplation stage for female students. According to Table 4, overall exercise efficacy expectations differentiated individuals at different stages of change ($P= 0.00$). Self-efficacy increased in stages and were the most in maintenance stage and very low in pre-contemplation stage.

Table 1: Distribution of female students according to TTM phases

Female students	Frequency	Percent	Cumulative percent
TTM phases			
Precontemplation	98	16.6	16.6
Contemplation	180	30.5	47.0
Preparation	154	26.1	73.1
Action	145	24.7	97.8
Maintenance	13	2.2	100.0
Total	590	100.0	

Table 2: Distribution of female students in phases of exercise behavior according to their educational level

TTM phase	Precontemplation	Contemplation	Preparation	Action	Maintenance	Total
Educational level						
Associate	36	55	46	43	5	185
Bachelor	46	85	83	81	8	303
Postgraduate	16	40	25	21	0	102
Total	98	180	154	145	13	590

Table 3: Comparison of Pros, Cons, Decisional Balance Scores Grouped by Stage of Exercise Change among all respondents (n=581)

Measure	Pre- contemplation (n=94) Mean±SD	Contemplation (n=178) Mean ±SD	Preparation (n = 152) Mean±SD	Action (n=144) Mean±SD	Maintenance (n=13) Mean±SD	Sig
Pros	3.76±70	4.16±.53	4.30±.51	4.14±.53	4.45± .41	0.00
Cons	2.69±. 71	2.33±.76	2.22±.69	2.25±.69	1.70±.96	0.00
Decisional Balance	1.06±1.15	1.84±1.04	2.08±1.04	1.88±1.01	2.75±1.27	0.00

Table 4: Comparison of Self-Efficacy scores, grouped by Stages of Exercise Change among all respondents (N=582).

Measure	Precontemplation (n=95) Mean±SD	Contemplation (n= 175) Mean± SD	Preparation (n=154) Mean± SD	Action (N=145) Mean± SD	Maintenance (n= 13) Mean±SD	Sig
Self-Efficacy	1.84± .66	2.30±.60	2.59± .98	2.42 ±.66	2.69± .71	0.00

Discussion

Exercising is very important for health in all ages and sexes. Female exercising is more important because very soon in menopause age osteoporosis and many other diseases are followed them certainly. Exercising should be started very soon from adolescence to adulthood. So, investigations about the female college students show us the exercise pattern in women adulthood and help us to plan for teach them according these results.

The purpose of this study was find exercise patterns of female college students according

to TTM change phases. Findings generally supported of the TTM in examining exercise behavior.

Seventy three percent (n=432) of female students in this sample were either sedentary (pre-contemplation or contemplation stages) or irregularly active (preparation stage). These findings can be compared with three other studies that classified college students as a function of stage of exercise behavior change. Calfas et al, found that approximately 33% (n=398) of upper-class students (junior and senior rank) and recent graduates at a large south-

western university, were inactive (pre-contemplation, contemplation or preparation stages) (18). In a random sample of under-graduate and graduate students at a small northeastern university 46% (n= 217), were inactive (pre-contemplation, contemplation or preparation stages) (19).

Wallace et al, conducted a random sample of under-graduate students at a large mid-western university and found that 52% (n= 937) were classified as being in the pre-contemplation, contemplation or preparation stages of exercise behavior change. There was approximately a 16% difference in the proportion of males and females in the maintenance stage (20).

The relationship between exercise efficacy expectation and participation in regular exercise has been well documented (21). As hypothesized, exercise efficacy expectations generally increased across the stages of exercise behavior change. These results are consistent with other studies documenting the relationship between exercise participation and efficacy expectations (22). Those in the maintenance stage reported the greatest level of efficacy expectations as compared with those in the lower stages of behavior change. Significant increases in efficacy expectations were not observed between females in the preparation and action stages. This finding may be attributed to the irregular nature of exercise behavior at this point in time. Efficacy expectation have been shown to increase the longer an individual continues to engage in the behavior, thus a greater difference may be present from action to maintenance rather than from preparation to action.

As hypothesized, pros associated with exercise behavior increased from pre-contemplation through maintenance. Those in contemplation perceived fewer benefits associated with exercise as compared with those in more advanced stages of exercise behavior change. Those in contemplation and preparation had lower perceived pros in comparison to those in maintenance. Finding supported hypothe-

sis 3, in that cons decreased across the stages of change.

In conclusion, evidence to support the utility of the TTM to exercise behavior among female college students was found. Based on the finding of this study, there is a need to developed intervention programs that foster increasing efficacy expectations and perceived benefits (i.e., pros), while decreasing the negative perceptions (cons) related to exercise behavior.

Acknowledgments

This project was financially supported by Dept. of Public Health, School of Health, Hamadan University of Medical Sciences. The authors would like to thank Dr. Hossein Mahjub for helping analyses more parts of results of research.

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