

# Process of Change, Decisional Balance, Self-efficacy and Depression across the Stages of Change for Exercise among Middle Aged Women in Korea

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**Purpose.** The purpose of this study was to differentiate the change in exercise behavior into different stages and to investigate differences in the process of change, self efficacy, decisional balances and depression according to the stages of exercise behavior change among middle aged women in Korea by using the transtheoretical Model.

**Methods.** A convenience sample of 434 middle aged women (40-64 years) completed measures of all transtheoretical model constructs involved in exercise behaviors (stages and processes of exercise behaviors change, self efficacy and decisional balance) and depression. The data were analyzed by using the SPSS 10.0 program including descriptive statistics, and one-way ANOVA.

**Results.** The subjects were distributed in each stage of change in exercise behaviors: pre-contemplation (n = 106; 24.4%), contemplation (n = 126; 29%), preparation (n = 88; 20.3%), action (n = 51; 11.8%), and maintenance (n = 63; 14.5%). The processes of change, pros(advantages of behaviors), self-efficacy and depression were significantly differentiated across the stages of exercise behavior change. Cons(disadvantage of behaviors) was not significantly differentiated across the stages of exercise behavior change.

**Conclusions.** Results of this study suggested that discriminating of processes of change, self-efficacy, decisional balance, and depression could provide positive information to people about the stages of change in exercise behavior. Therefore, in designing interventions, the stage of a client's exercise behaviors change needs to be assessed prior to application of intervention programs in order to increase and maintain exercise behavior in middle aged women.

**Key Words :** Middle aged women, Depression, Exercise behavior, Stage of change

## INTRODUCTION

Strong link exists between physical inactivity and adverse health condition (U.S. Department of Health and Human Services, 1996) and recent studies indicated that a physically active lifestyle offers numerous benefits for

physical and psychological health(U.S. Department of Health and Human Services, 1996). Exercising on a regular basis could help to prevent and treat various diseases and conditions including coronary heart disease, hypertension, colon cancer, non-insulin-dependent diabetes mellitus, anxiety, and obesity, as well as aiding normal skeletal development during childhood and ado-

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lescence (U.S. Department of Health and Human Services, 1996).

Middle-aged women, especially, tend to experience the myriad of significant physiological and psychological transitions that is associating with increased stress and limited personal time. Approximately 30–50% of middle-aged women are being affected by symptoms associated with menopause. Regular physical activity program could be a beneficial alternative therapy for relieving symptoms as hot flashes, night sweats, vaginal dryness, depression, irritability, headache, and/or sleep disturbances (Li, Holm, Gulanik, Lanusa, & Penckofer, 1999). Despite the increasing evidence of the benefits from regular physical activity, 60% of middle ages women are not engaged in the recommended 30 minutes moderate physical activity for 3–4 days per week in U.S. (Centers for Disease Control, 1999). According to an analysis of available surveys on physical activity in Korea, only 38% of women are regularly active in sufficient degree to achieve health benefits (Park, 1999). Thus, increasing the proportion of individuals interested in initiating or increasing exercise behavior would be public health challenge for middle aged women in Korea.

Likewise, Dishman (1988) reported that 50% of individuals who are engaged in exercise programs get dropped out during the first 3–6 months. Robinson and Rogers (1994) also observed similar results from children, youth, middle-aged people, and the elderly. Thus, exercise programs were not effective in long run, only temporarily due to the assumption that the motive for physical activity is always the same, although the most effective approach to physical activity is to apply self voluntary motive. To solve this problem, it was suggested that exercise behavior change is a multi-stage model, which may have implications for the type of intervention applied to each stage of behavior change (Dishman, 1991).

The Transtheoretical Model (TTM) by Prochaska and DiClemente (1983), which was initially applied to smoking behavior change and other negative addictive habits, was used to understand how people change their health behavior. Subsequently, the application has been generalized to exercise behavior (Marcus & Simkin, 1993). The model consists of five stages of readiness for change, the 10 processes of change, the pros and cons of changing, and self-efficacy. Propositions of the model suggests that individuals who are attempting to change their health behavior experience the series of stages of readi-

ness for change; “precontemplation” (not intending to make changes or denying the need of change), “contemplation” (seriously considering making a change), “preparation” (making small changes), “action” (actively engaging in exercise but for less than six months), and “maintenance” (exercising regularly for at least six months). Movement through these stages often occurs in a cyclic, rather than linear, pattern because it is necessary for many individuals to make several attempts to change behavior before they meet their goal (Marcus, Simkin, Rossi, & Pinto, 1996). In the movement through the stages, people could use different strategies and techniques depending on the stage they are in.

The TTM’s main goal is to explain how health behavior change occurs and to this end, 10 processes of change identified the strategies and techniques that people use to change their behavior (Prochaska, Velicer, DiClemente, & Fava, 1988). These processes include overt and covert activities that individuals use to modify their experiences and environments in order to modify their behavior (Prochaska & Velicer, 1997). The 10 processes of change could be divided into two higher factors in order labeled cognitive/experiential (i.e. consciousness raising, dramatic relief, environmental reevaluation, self-reevaluation, and social liberation) and behavioral/environmental (i.e. counter conditioning, helping relationships, contingency management, self-liberation, and stimulus control).

Self-efficacy and decisional balance (i.e. pros and cons) are also key elements of the TTM (Prochaska & DiClemente, 1983) and these elements are appeared to be helping explain why health behavior changes occur. Self-efficacy was taken from Bandura’s (1986) social cognitive theory and reflects confidence that individuals have in performing the health behavior change. Meta-analyses have shown that self-efficacy for exercise increase with each stage of change, but dosed so in nonlinear pattern (Marshall & Biddle, 2001). More specifically, moderate effects were observed from precontemplation to contemplation, small to moderate effects from contemplation to preparation, moderate from preparation to action, and moderate to large effects from action to maintenance.

Decisional balance is involved in the perceived “pros” (advantages) and “cons” (disadvantages) of continuing current behaviors or adapting new behaviors. Decisional balance reflects the weighing of the pros and the cons of engaging in a healthy behaviors and is im-

portant for early stage progression (Nigg & Courneya, 1998; Prochaska & Velicer, 1997). These pros and cons are relevant for understanding and predicting transitions across the stages of change. The processes of change, self-efficacy, and pros and cons have received strong empirical support in the exercise domain in terms of discriminating among the stages of change.

In addition, depression is a major health problem for women (Hauenstein, 1996); the prevalence of depression in American women is 20–30% (Blehar, 1997), and is 33.1% for Korean middle aged women (Shin, 2001). Depression in Korean women has an influence on various aspects of their life. Moreover, a cross-sectional study reported negative correlation between depression and exercise behaviors (Kim & Chun, 2003). Fukukawa et al. (2004) suggested that increased physical activity is associated with lower level of depressive symptoms.

There are insufficient amount of studies in Korea on exercise to verify the changes of behavior in middle aged women and relatively little empirical research has been conducted on the relations of depression and stages of change for exercise behavior. Therefore, present study was conducted to identify the major composing factors of Transtheoretical Model such as stages of change, processes of change, self-efficacy and decisional balances, as well as to examine the differences in processes of change, self-efficacy, decisional balances and depression in each stage of change.

### Objectives

The objectives of this study were;

- 1) To identify the stages of change for exercise among middle aged women in Korea
- 2) To identify the differences in processes of change, self-efficacy, decisional balance and depression in each stage of change for exercise among middle aged women in Korea

## METHODS

### Research design

This study was a descriptive research to investigate differences in process of change, self efficacy, decisional balances and depression according to the stages of exercise behavior change based on the Transtheoretical Model among middle aged women in Korea.

### Sample

For the subject for the study, convenience sampling was used to select 434 women (40–64 years old) from 2 areas (Gu) in B city. The research team explained the research purposes and procedures to the heads in the community health center of B city, from whom permission to collect data was obtained. 980 women were contacted by telephone. Four hundred and fifty women attended the community health center where health education for middle aged women was held. Four hundred and fifty women were willing to answer to questionnaire. Data collection took place in the community health centers. After reading and signing informed consent forms questionnaires were self-administered under supervision of research assistant. Subjects were also informed that individual results would be strictly confidential and anonymous. Sixteen did not completely fill out the questionnaire or quit during the data collection were excluded, leaving 434 women as the study sample. Completion of the questionnaires took 20–25 minutes.

### Instrumentation

The order of the instruments stayed same for all participants. Each questionnaire packet contained an assessment of general characteristics, transtheoretical model constructs related to exercise behaviors (stages and processes of change, self efficacy and decisional balance) and the Center for Epidemiologic Studies Depression Scale. In this study, physical exercise for participants was defined as “any activity performed on a repeated basis over an extended period of time with the intention of improving physical fitness and health”, and the term “regular physical exercise” was also defined for participants as “any planned physical activity performed three to five times per week for a minimum 20 minutes per session to increase physical fitness at a level that causes increasing in breathing rate and sweating”. Participants were instructed to answer all questions based on this definition of “regular physical exercise”. The information of general characteristics included age, BMI, marital status, level of education, economic status, job, menopausal status, religion, and subjective health state of participant.

### Stage of Exercise Behavior Change

Stage of Change was measured by using statements adapted from Marcus, Shelby, Niaura & Rossi (1992) after its translation followed by back translation by Lee et al. (1999). The specific statements were: “I am currently

not participating in regular physical exercise and not thinking about starting in the near future" (precontemplation), "I am currently not participating in regular physical exercise but thinking about starting in the near future" (Contemplation), "I am currently not participating in regular physical exercise but I do at least some physical exercise once or twice per week" (Preparation), "I am currently participating in regular physical exercise but have done so for less than six consecutive months since starting" (Action), and "I am currently participating in regular physical exercise and have done so for longer than six consecutive months" (Maintenance). Participants were required to select only one stage that described their current exercise pattern best.

### Processes of Change

Processes of change were assessed by using the Processes of Change Questionnaire (PCQ) developed and validated specifically for the exercise domain by Nigg, Norman, Rossi & Benisovich (1999) after its translation followed by back translation by Kim (2002). PCQ contains 30 items to measure the 10 processes of change. Each subject was asked to recall the past month and rate the frequency of occurrence for each item on 5-point scale from 1 (never) to 5 (repeatedly). Higher scores on the questions indicate subject's more experiences on the factor. Processes of change consist of two dimensions; Experiential process (consciousness raising, dramatic relief, environmental reevaluation, self reevaluation and social liberation), behavioral process (counter conditioning, helping relationships, reinforcement management, self liberation, and stimulus control). Previous study by Nigg et al. (1999) reported the Cronbach's alpha values ranged from 0.62 to 0.85 and the study by Kim (2002) reported the Cronbach's alpha values ranged from 0.80 to 0.93. Cronbach's alpha for the present study ranged from 0.76 to 0.89.

### Self-efficacy

Self-efficacy developed by Marcus et al. (1992a) was used after translation and back translation by Lee and Chang (2001) in this study. Exercise self-efficacy was assessed by using 5 item, 5 point Likert-type scale (1 - "not at all confident" to 5 - "extremely confident") to measure confidence in one's ability to overcome obstacles for exercising. The self-efficacy scale addresses the following barriers: negative affect, resisting relapse, and taking time for exercising. Higher scores on the ques-

tions indicate higher self-efficacy of subjects. Cronbach's Alpha for this tool was 0.82 as developed, 0.89 in study by Lee and Chang (2001) and 0.90 in this investigation, respectively.

### Decisional Balance

The 5-point scale that was developed by Nigg et al. (1999) and including 10 questions and 2 subordinate factors was used after being translated to Korean and back translated by Park and Kang (2001). This 10-item questionnaire is made up of items that reflect positive (pro) and negative (con) aspects of exercise adoption. Higher points in these factors indicate factors' more important role in making a decision on exercise. Cronbach's Alpha for this tool was 0.87 and 0.90 for the pro and con scales when developed, 0.86, 0.70 in study by Park and Kang (2001), and 0.86, 0.70 in this study, respectively.

### Depression

The level of depression was measured by using the 20 item - Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) which was translated to Korean and back-translated by Shin (2001). CES-D consists of four dimensions; depressive affect, positive affect, somatic symptoms, and interpersonal relationships. Subjects were asked how often they experienced each symptom in past month and the scale items were; rarely (0), some of the time (1), occasionally (2), or most of the time (3). Responses were summed with items that measured positive, and the affected reverses were scored before summing. Scores range from 0 to 60 and the higher the score meant, the higher the occurrence of depressive symptoms. Respondents with scores of 16 or higher were considered as probable cases of depression (Radloff, 1977). Cronbach's alpha was 0.87 in the study by Shin (2001) and was 0.86 in this study, respectively.

### Data analysis

Data were analyzed by the SPSS Win 10.0 program and other specific methods used as follows;

- 1) The general characteristics of subjects were analyzed by frequency and percentage.
- 2) The stages of exercise behavior change of subjects were analyzed by frequency and percentage
- 3) One-way ANOVA was used to analyze the differences in processes of change, self-efficacy, decisional balance and depression that were involved with the stages

of exercise behavior change of subjects. Post hoc test was used for Tukey comparison.

## RESULTS

### General characteristics of subjects

The general characteristics of subjects are displayed in Table 1. The average age of the subjects was 46.6 years and the average BMI (Body Mass Index) was 21.8 (16.6-28.3). 94.7% of subjects were married and 3.7% of them were never been married. 16.1% of them were university graduates, and 62.7% of them were in moderate economic state and 87.8% of them were in premenopause state. 44.7% of total subjects were in healthy state, and 45.4% of them had religion of Buddhism as rated highest. 59.4% of subjects had a job.

**Table 1.** General Characteristics of Subjects (N = 434)

Characteristics	Categories	Frequency (%)
Age	40-49 years	358 (82.5)
	50-59 years	68 (15.7)
	60-64 years	8 (1.9)
BMI	19.9 and below	43 (9.9)
	20.0-24.9	299 (68.9)
	25.0 and above	92 (21.2)
Marital status	Married	411 (94.7)
	Single	16 (3.7)
	Separate/divorce	2 (0.5)
	Widow	5 (1.2)
Education	Elementary	18 (4.6)
	Middle school	18 (4.7)
	High school	280 (64.5)
	College and above	70 (16.1)
Economic state	Very difficult	4 (0.9)
	Difficult	45 (10.4)
	Moderate	272 (62.7)
	Comfortable	101 (23.3)
	Very comfortable	12 (2.8)
Job	Yes	258 (59.4)
	No	176 (40.6)
Menopausal status	Premenopause	381 (87.8)
	Menopause	53 (12.2)
Health state	Very unhealthy	2 (0.5)
	Unhealthy	42 (9.7)
	Moderate	165 (38.8)
	Healthy	194 (44.7)
	Very healthy	31 (7.1)
Religion	Buddhism	197 (45.4)
	Protestant	78 (18.0)
	Catholic	32 (7.4)
	None	123 (28.3)
	Others	4 (0.9)

### Distribution of subject associated with stage of exercise behavior change

In this study, the stage distribution for sample was as follows: precontemplation (n = 106; 24.4%), contemplation (n = 126; 29.0%), preparation (n = 88; 20.3%), action (n = 51; 11.8%), and maintenance (n = 63; 14.5%) <Table 2>.

**Table 2.** Stage of Exercise Behavior Change (N = 434)

Stage	Frequency (N)	Percentile (%)
Precontemplation	106	24.4
Contemplation	126	29.0
Preparation	88	20.3
Action	51	11.8
Maintenance	63	14.5

### Differences in processes of change, self-efficacy, decisional balances, and depression according to the stages of exercise behavior change

As the analysis on the difference in process of change, significant difference was indicated in consciousness raising ( $F = 43.69, p = .000$ ), and Post-hoc follow-up testing showed significant differences between the precontemplation and other groups (contemplation, preparation, action, maintenance). There was also a significant difference in dramatic relief ( $F = 25.79, p = .000$ ), and Post-hoc follow-up testing showed significant increases in exercise self-efficacy from the precontemplation to maintenance stages. In addition, significant differences were resulted in self-reevaluation ( $F = 30.54, p = .000$ ), social liberation ( $F = 6.98, p = .000$ ), environmental reevaluation ( $F = 11.26, p = .000$ ), helping relationship ( $F = 24.23, p = .000$ ), counter conditioning ( $F = 43.83, p = .000$ ), reinforcement management ( $F = 36.20, p = .000$ ), stimulus control ( $F = 82.03, p = .000$ ), and self liberation ( $F = 45.03, p = .000$ ).

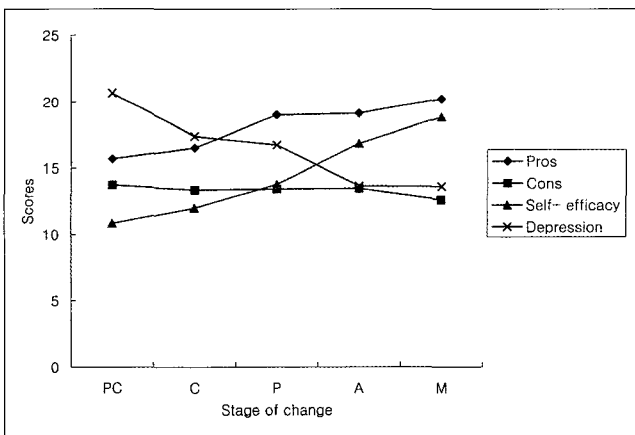
There was a significant difference ( $F = 65.39, p = .000$ ) in self-efficacy. Tukey's post-hoc test resulted in significant differences in between the preparation and action stage. Self-efficacy also increased as stage of change progressed from precontemplation to maintenance. In decisional balance, while the mean score of maintenance was the highest in the positive attitude differences toward exercise (pros) showing statistically significant difference ( $F = 22.02, p = .000$ ), there was no statistical significance in negative attitude against exercise (cons). Post-hoc follow-up test showed significant differences in between the precontemplation and other groups (prepa-

**Table 3.** Difference in Processes of Changes, Self-Efficacy, Decisional Balance and Depression by Stage of Change in Exercise Behavior (N = 434)

Characteristics	Stage of change					F	Tukey' HSD
	PC(N= 106)	C(N = 126)	PR(N = 88)	A(N = 51)	M(N= 63)		
<i>Processes of changes</i>							
<i>Experiential process</i>							
Consciousness raising	5.75(2.47)	7.54(2.76)	8.44(2.63)	9.12(2.64)	10.84(2.13)	43.69**	PC < C, PR, A < M
Dramatic relief	8.67(2.83)	9.62(2.86)	10.39(2.35)	10.82(2.22)	12.60(1.78)	25.79**	PC < C, PR, A < M
Self-reevaluation	9.36(2.59)	10.73(2.81)	11.88(2.37)	12.31(2.22)	13.21(1.57)	30.54**	PC < C < PR, A, M
Social liberation	9.39(2.93)	10.17(2.86)	10.73(2.41)	11.08(2.34)	11.29(0.72)	6.98**	PC < PR, A, M
Environmental reevaluation	8.92(2.60)	10.02(2.85)	10.70(2.91)	11.12(2.25)	11.44(2.87)	11.26**	PC < C, PR, A, M C < M
<i>Behavioral process</i>							
Helping relationship	7.74(3.19)	7.94(2.44)	9.52(2.63)	9.88(2.84)	11.57(3.32)	24.23**	PC, C < PR, A < M
Counter conditioning	6.60(2.55)	7.30(2.37)	8.58(2.52)	9.94(2.40)	11.08(2.45)	43.83**	PC, C < PR < A, M
Reinforcement management	8.75(2.84)	10.04(2.72)	11.33(2.76)	11.96(2.02)	13.38(2.52)	36.20**	PC < C < PR, A < M
Stimulus control	5.38(2.34)	6.56(2.27)	8.02(2.51)	9.80(2.41)	11.44(2.41)	82.03**	PC < C < PR < A < M
Self-liberation	8.23(2.39)	9.49(2.81)	10.39(2.32)	11.45(2.36)	13.17(2.24)	45.03**	PC < C, PR, A, M C < A < M; PR < M
<i>Self-efficacy</i>	10.83(3.78)	11.99(3.95)	13.77(3.57)	16.84(3.26)	18.83(2.80)	65.39**	PC, C < PR < A < M
<i>Decisional balance</i>							
Pros	15.68(4.21)	16.51(4.29)	18.98(3.28)	19.12(2.86)	20.19(3.05)	22.02**	PC, C < PR, A, M
Cons	13.72(3.41)	13.35(3.16)	13.41(2.83)	13.45(3.69)	12.60(3.92)	1.12	N/A
<i>Depression</i>	20.67(6.50)	17.40(7.54)	16.73(7.96)	13.63(9.56)	13.60(8.29)	10.62**	PC < C, PR, A, M

\*\* p < .001

PC= Precontemplation; C= Contemplation; PR= Preparation; A= Action; M= Maintenance



**Figure 1.** Pros, cons, self efficacy and depression according to stage of exercise change

ration, action, maintenance group). In depression, there was a significant difference (F = 10.62, p = .000) and Post-hoc follow-up test also showed significant differences in between the precontemplation and maintenance groups.

In decisional balance, it was indicated in <Figure 1> that pros and cons were not intersected at any stages of change in association with the stages of exercise behaviors change. From precontemplation to maintenance,

while pros of exercise behaviors showed increase and cons of exercise behaviors showed decrease. While self-efficacy increased from precontemplation to maintenance, depression decreased from precontemplation to maintenance.

## DISCUSSION

This study was to examine the differences in process of change, self-efficacy, decisional balances and depression according to the stages of exercise behavior change among middle aged women in Korea by using the Transtheoretical Model. This study provides much needed information about Korean middle aged women in terms of their exercise behavior and TTM constructs that are related directly to exercise behavior change.

Throughout all the stages of change, the sample was composed of 24.4% in precontemplation stage, 29.0% in contemplation stage, 20.3% in preparation stage, 11.8% in action stage, and 14.5% in maintenance stage. This result was rather different from the results of the study by Nigg and Courneya (1998) with subjects of adolescents: precontemplation stage (2.1%), contemplation stage (4.2%), preparation stage (28.7%), action

stage (15.7%), and maintenance stage (49.3%). In comparison with the studies of the elderly (Chang et al., 2002) and adolescents (Kim, 2002) in Korea, the current sample showed less activeness in exercise. The stage distribution of the current sample included a larger percentage in precontemplation and contemplation. This result indicates 73.7% middle aged women exercises irregularly or do not exercise at all and explains their lack of exercise. Therefore, it was necessary to encourage physical activity to each individual through the individually adjusted exercise behavior change program based on their readiness for change.

All processes of change (experiential and behavioral) had significant differences in each stage, and this result replicates previous research on the processes of change in the exercise domain (Marcus et al., 1992a; Nigg & Courneya, 1998). The result showed that social liberation was used mostly in precontemplation by subject and self-revaluation was mostly used in the contemplation. While self-reevaluation was mostly used in both preparation and action, reinforcement management was mostly used in maintenance. In the study by Prochaska and Velicer (1997), it reported that experiential process was used in the early stages of change (e.g., precontemplation) and behavioral process was used in the late stages (e.g., maintenance). In this study, experiential process was used more than behavioral process in the first stage, and in the latter stages, however, both were used. Our results were consistent with the results of the study by Fallon et al. (2005) that women reported greater use of experiential and behavioral processes of change. These results point out the importance of experiential strategy for middle aged women who are ready to start exercise and also need for both processes for continuous exercise in action and maintenance stages.

Self-efficacy is a belief in a person's own capabilities (Bandura, 1986) and it significantly increased as it progressed from precontemplation through the stages; contemplation, preparation, action, and maintenance. This result is consistent with the result from previous research using self-efficacy and the stages of change in the exercise domain (Chang et al, 2002; Gorely & Gordon, 1995; Kim, 2002; Marcus et al, 1992a; Marcus & Owen, 1992; Nigg & Courneya, 1998). Women who feel confident about physical activity and view exercise more positively, showed more active participation than those who do not, and it suggested that self-efficacy could be a factor in increasing participation in physical activity

(Caserta & Gillett, 1998). As the result of regulation of exercise activity, which could make continuous exercise, self-efficacy especially showed the highest point in maintenance stage. Therefore, it is believed that self-efficacy could work more positive way in mental state with regular exercise. In addition, self-efficacy enhancement for exercise behaviors could be considered to be the most important variable in designing the intervention programs for middle aged women.

For decisional balance, subjects in the precontemplation stage had significantly lower perceived benefits involved in exercise compare to those in preparation, action and maintenance stages. Although the mean score of cons was the highest at precontemplation and the lowest at maintenance, no significant differences were found across the stages of change and it was similar to the result reported by Jordan et al. (2002). Research showed strong link between resulted decisional balance measure and the stage of physical activity adoption in a variety of samples (Gorely & Gordon, 1995; Kim, 2002; Marcus & Owen, 1992; Nigg & Courneya, 1998). Hellman (1997) reported that pros and cons are important predictors for continuous exercise and these factors have about 50% explanation power to explain stages of exercise. According to the report by Prochaska and Velicer (1997), a positive decisional balance is associated with more advanced motivational readiness for exercise.

The decisional balance point (intersection of the pros and cons) was found at the action stage in the study by Nigg and Courneya (1998) and in between the preparation and action stage in the study by Gorely and Gordon (1995). Marcus and Owen (1992) found the decisional balance point to be at the contemplation stage for their Australian sample and at the preparation stage for their American sample. On the other hand, in current findings, the decisional balance point was not found at any stages of change. This result was rather different from previous research on decisional balance in the exercise domain (Gorely & Gordon, 1995; Jordon et al., 2002; Nigg & Courneya, 1998). According to the indication by Marcus et al. (1992b), it might be the type of measure used or more likely, the population specific that affected the decisional balance point. It is also considered that this result can be caused by the differences of measurement tools and population. Thus, research on middle aged women need to be replicated for further explanation of this finding.

Depression is serious health problem for middle aged

women and it was reported that 33.1% middle aged women, who are from 40 to 65 years old, feel depression (Shin, 2001). Also in cases of this study, mean score were 20.67 in precontemplation stage, 17.40 in contemplation stage, and 16.73 in preparation stage, respectively, by CES-D and resulted cut point of 16 indicated the existence of depression in subjects. However, the mean score was 13.63 in action stage and 13.60 in maintenance stage, respectively and it showed that those depressed were less ready to exercise. Although causality between depression and exercise cannot be determined in this study, the result presented here report that people with lower stages of exercise readiness tend to have higher levels of depression scores. Depression was reported to be reduced through exercise (Gannon, 1988) and many other illnesses along with depression could be prevented through exercise according to Klein et al. (1984). Brown et al. (2005) suggested that there is a clear relationship between increasing physical activity and decreasing depressive symptoms in middle aged women. Therefore, promoting low to high stages of exercise behaviors change could be an important strategy for the prevention of depression among middle aged women.

Although meaningful findings were reported by this study, there are limitations that need to be taken into consideration before interpreting the results and planning future research. Due to the lack of representativeness in demographics of convenience sample used in this study, generalizability in this study could be limited. It is suggested that further replication, longitudinal and experimental research would be needed to determine the key variables involved in the stage of exercise behavior change in this population.

From all of these results, it could be concluded that identification of processes of change, self-efficacy, decisional balance, and depression provide valuable information about the stages of exercise behavior change. Pender (1999) emphasized development and performance of tailored intervention for future nursing intervention that respect characteristics of patients. Therefore, in designing interventions to increase and maintain exercise behavior in middle aged women, one's stage of exercise behaviors change needs be assessed prior to application of intervention programs. In addition, for change of exercise behavior of middle aged women, intervention, which can intensify process of change by motive level and emphasize the pros of exercise and en-

hance self-efficacy, would be needed.

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