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**IS THERE A RELATIONSHIP BETWEEN STAGES OF
CHANGE AND PERCEIVED SELF-EFFICACY
RELATED TO EXERISE AMONG LOW RISK
PREGNANT WOMEN?**

BY

REBECCA WEINER

A THESIS

**Submitted to Grand Valley State University
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for the degree of**

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ABSTRACT

IS THERE A RELATIONSHIP BETWEEN STAGES OF CHANGE AND PERCEIVED SELF-EFFICACY REGARDING EXERCISE AMONG THE LOW-RISK PREGNANT WOMAN?

By

Rebecca S. Weiner

The theoretical framework used for this study was based on Prochaska and DiClemente's (1983) Transtheoretical Model. The purpose of the study was to determine if there is a relationship between stage of change (precontemplation, contemplation, preparation, action, maintenance) and perceived self-efficacy regarding exercise among low risk pregnant women. Data was obtained through a survey of 140 low risk pregnant women from two private obstetricians' offices. Participants were between 18 and 43 years old and primarily Caucasian (75%) and high school educated (85%). Each participant was successfully categorized into a stages of change based on their reported exercise behavior. The levels of self-efficacy for each of the five situations within each of the self-efficacy groups were determined. One-way ANOVA showed self-efficacy was significantly related to stage of change $F(3, 127) = 10.55, p < .001$, but post Hoc Scheffe' test revealed that the action stage was the only stage significantly different from subjects in all other stages. Study findings partially supported the notion that self-efficacy may be an important indicator of current and future exercise behavior during pregnancy.

Dedication

Special gratitude is due to my family, Philip, Jolene and Michael, Jenell and Rob, and Jennifer whose love, patience, support and understanding persisted through out this endeavor. A special thanks is extended to my friends for their enthusiastic support of this project.

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CHAPTER 1

INTRODUCTION

Exercise has become a key entity in health promotion and risk reduction. It is receiving wide spread multidisciplinary attention in research and lifestyle. With this trend, Advanced Practice Nurses (APN) are becoming increasingly involved in providing assessment and interventions to facilitate exercise adoption and maintenance. In women's health, APNs provide prenatal care with emphasis on health promotion as well as risk reduction utilizing such interventions as exercise.

In 1994, the American College of Obstetrics and Gynecology (ACOG) provided guidelines stating that pregnant women without obstetric or medical complications can exercise at moderate intensity (not to exhaustion) for 20-30 minutes at a minimum of three times per week to maintain cardiorespiratory and muscular fitness throughout pregnancy and the postpartum period. They further recommended regular exercise to enhance feelings of well being, lessen some of the discomforts of pregnancy, and improve mood and body image.

Data from three national surveys for adults (National Health Interview Survey, National Health and Nutrition Examination Survey, and the Behavioral Risk Factor Surveillance System) reported that 27.8% of all women ages 18 through 44 perform regular exercise. It remains unknown how many of these women continue to exercise during pregnancy (Zhang & Savitz, 1996), but earlier data suggested that only 5-10% of all women continue to exercise on a regular basis during pregnancy (Maeder, 1985). Zhang & Savitz (1996) reported on the prevalence of

exercise during pregnancy based on 9,953 women residing in the U.S., who gave birth to infants in 1988 and participated in the National Maternal and Infant Health Survey. They reported that 45% of these women did not perform regular exercise prior to or during pregnancy, and 13% exercised before pregnancy but stopped after they found out they were pregnant. It is unknown if the intensity and duration of exercise remained the same during pregnancy because these factors were not reported in this study.

The high attrition and low adoption rates for prenatal exercise represents a major challenge to health professionals. Advanced practice nurses may be in one of the most optimum positions to meet the demands of this challenge. Research has demonstrated that patients respect APNs advice and may potentially change their exercise behaviors as a result (Lewis & Lynch, 1993). The increasing number of APNs in women's healthcare settings and the frequency with which pregnant women visit them suggest that even moderately effective interventions would have a substantial impact towards promoting exercise.

The ACOG guidelines (1994) provided APNs latitude in recommending prenatal exercise, but effective strategies to accomplish this have not been established. Currently, APNs in women's health are expert clinicians for women, yet they have limited knowledge about how to promote health behaviors such as exercise into the overall care of women (Kemp & Hatmaker, 1992; Peipert & Ruggiero, 1999). Traditionally, APNs have relied on offering advice and providing a "generalized exercise prescription" to promote exercise. This has been done without assessing the pregnant woman's intentions about health behavior change (Kost, Landry, & Darroch, 1998). The traditional approach may be suitable for women ready to adopt exercise, but may not be for those who do not exhibit comparable readiness.

The mismatch between current interventions (action-oriented programs) and the condition of the population (majority not adopting or maintaining exercising) indicates that successful interventions must be tailored to the specific needs of the population of interest. According to Dishman (1994), the best way to tailor interventions is to recognize the complexity of personal influences and relationships for exercise determinants through the application of multidimensional theoretical models. This approach provides the way to more effective interventions directed at the specialized needs of individuals or groups.

One multidimensional model that has met with success in exercise in the general population is the Transtheoretical Model (TTM) (Prochaska & DiClemente, 1983). The TTM has four major components: 1) stages of change, 2) self-efficacy, 3) decisional balance (pros and cons), and 4) processes of change. This research studied the two constructs of stages of change and self-efficacy.

The application of a sound theory using the stages of change and self-efficacy could aid APNs in the designing of more effective interventions to promote adoption and maintenance. Although research has provided some support for a relationship between stage of change and self-efficacy in the general population, attention to the application of stage of change to self-efficacy in the pregnant population is needed. Stages of change and self-efficacy have never before been measured in pregnant women, therefore, the purpose of this study was to determine if there is a relationship between stage of change and perceived self-efficacy regarding exercise among low risk pregnant women.

CHAPTER 2

CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

The Conceptual Framework

The theoretical framework used for this study is based on Prochaska and DiClemente's (1983) Transtheoretical Model (TTM). The model's origin is in psychotherapy and related research into the cessation of addictive behaviors, such as smoking. The TTM is a model of intentional behavior change. The model focuses on the dynamic nature of health behavior change and proposes that any behavior change is likely to occur through a series of five interrelated stages: precontemplation (not intending to make changes), contemplation (considering change), preparation (making small changes), action (actively engaging in the new behavior), and maintenance (sustaining the change over time). Movement through these stages is not linear, but in a "spiral pattern" which represents how most people change health behaviors over time. This type of spiral pattern recognizes that it may take more than one attempt to change a behavior. The amount of progress that an individual makes can be a result of an intervention and tends to be a function of their stage at the start of treatment.

The TTM consists of the five stages of change, and three other major constructs which are: ten processes of change, the pros and cons of changing, and self-efficacy. As people change, the processes, self-efficacy, and pros and cons are employed uniquely at each stage (DiClemente, et al., 1991). For the purpose of this study, only the constructs of stages of change, and self-efficacy were discussed.

Understanding the concept of a stage is critical to understanding the TTM. The TTM stages of change fall somewhere between traits and states. Traits are seen as stable while states are readily changed and lack stability. Stages can be both stable and dynamic in nature allowing for change. That is, an individual can remain in a stage for a considerable amount of time but still remain open to change. A stage of change involves both behavior and behavioral intention, thus providing a framework for understanding such health behaviors as exercise.

When relating stages to exercise behavior, the individual in the Precontemplation stage does not currently exercise and has no intention to change his or her behavior in the foreseeable future. Those in the Contemplation stage are seriously thinking about beginning to exercise, but are not currently exercising. It has been suggested that on the average, individuals stay in this relatively stable stage for at least two years, although they have the best intentions to start exercising (Prochaska et al., 1994). Those in the Preparation stage intend to exercise regularly and have a plan of action. Usually they have started some form of exercise, but not on a regular basis. Action stage individuals have started to exercise regularly (a minimum of three sessions of at least 20 minutes per week) but for less than six months (American College of Sports Medicine, 1993). This is the most unstable stage where one is the most vulnerable to regress to earlier stages. The final stage is Maintenance and represents the individual who has exercised regularly and has done so for longer than six months.

Self-efficacy has become a central concept of social learning theory and believed to be critical to behavior change (Bandura, 1977; Bandura, Adams, Hardy, & Howells, 1988). Self-efficacy represents an individual's degree of confidence that he or she can engage in a positive behavior across a broad range of specific, salient situations. This study examined the data to see

if there was a relationship between stage of change and perceived self-efficacy regarding exercise among low-risk pregnant women.

Literature Review

In order to be effective in helping women change health behaviors, clinicians need to be knowledgeable about the state-of-the science behavior change models and interventions according to Peipert & Ruggiero (1998). Although most APNs have expert clinical skills, they generally receive limited training in behavior change. Furthermore, topics related to behavior change during pregnancy are scant (Peipert & Ruggiero, 1998). Throughout history, society has been inclined to view the pregnant woman essentially as a carrier whose duty is to provide a safe haven for the growing fetus (Yeo, 1996). This attitude prevails as most research studies regarding the pregnant population have restricted their primary focus to the impact of maternal physical exertion on the developing fetus, with little or no attention to exercise promotion for women's own well being. Exercise is described by some researchers as something that the pregnant woman can do rather than something she should do (Sternfeld, 1997; Wang & Apgar, 1998).

An accumulating body of evidence in the domain of exercise is supporting the application of process oriented models to study exercise behavior (Buxton, Wyse, & Mercer, 1996; Dishman, 1994; Hellman, 1997; Herrick, Stone, & Mettler, 1997; Marcus, Rossi, Selby, Niaura, & Abrams, 1992). One of the leading process models for exercise cited in the literature is Prochaska and DiClemente's Transtheoretical Model (1983), commonly referred to as the Stage of Change Model. According to Dr. J. Prochaska (personal conversation, June 1999), "It is unfortunate that there are no published studies regarding the application of the TTM to exercise

promotion in pregnancy, especially when you consider the numerous studies supporting its application for exercise promotion in other populations”.

The concept of stages is important for understanding how individuals change health behaviors, because they represent a temporal dimension in which change unfolds. The major assets of the TTM stages of change model (Precontemplation, Contemplation, Preparation, Action, and Maintenance) are that it recognizes the dynamic nature of behavior change and also the consideration of an individual’s intentions regarding future action. It suggests that individuals do not follow a linear pattern of behavior, but rather a “spiral” pattern, where one may progress and then regress to an earlier stage until they eventually reach a maintenance stage.

Self-efficacy has been found to be the strongest correlate (Armstrong, Sallis, Hovell, & Hofsetter, 1993) and predictor (Sallis, et al., 1986; Sallis, Hovell, & Hofsetter, 1992) of both present and future exercise behavior. Studies examining the stages of exercise behavior change and exercise self-efficacy reported self-efficacy scores significantly differentiated in individuals at different stages of exercise behavior (Buxton, et al., 1996). A clear pattern emerged, with those in the Precontemplation stage reporting the lowest rating for exercise self-efficacy (confidence in their ability), and individuals in Maintenance reporting the highest. Also, several exercise studies have reported similar findings in a variety of population sub-groups, including adolescents (Nigg & Courneya, 1998) and older adults (Gorley & Gordon, 1995; Lee, 1993).

Marcus and colleagues (Marcus, Rossi, Selby, Niaura, & Abrams, 1992; Marcus, Selby, Niaura, & Rossi, 1992) have reported several studies examining exercise self-efficacy in relation to the stages of change in exercise. They developed scales to measure self-efficacy and the stages of change specially for exercise. For nearly the past decade, this group has completed extensive work on measurement development and model testing which has provided support that the TTM

can be successfully applied to the study of exercise behavior (Marcus, Banspach, Lefebvre, Rossi, Carleton, & Abrams, 1992; Marcus, Rakowski, & Rossi, 1992; Marcus & Simkin, 1994).

Marcus and colleagues (Marcus, Selby, Niaura, & Rossi, 1992) reported two of the earliest studies regarding the TTMs application to exercise using stages of change and self-efficacy. This single article described both studies and concluded with a discussion comparing results from both studies. The purpose of both studies was to examine the application of stage of change and self-efficacy to exercise behavior. The aims of the two cross sectional studies were to (a) develop a scale to measure stages of change for exercise behavior, (b) obtain prevalence information regarding where individuals were distributed along the stages of change scale and (c) test the ability of a self-efficacy measure to differentiate individuals according to stage of readiness to change.

Study I, included 1,063 government employees in Rhode Island. Seventy-seven percent were males and the average age in years was 41.1 (SD = 10.8). Subjects completed questionnaires on exercise and demographic information as well as newly designed stage-of-change and self-efficacy questionnaires. The stage of change scale consisted of four items, which represented four stages. The self-efficacy scale included five items, which ranged from one (minimally confident) to eleven (extremely confident). Data analysis included frequency counts, one-way ANOVA, and Tukey post hoc procedures. Results revealed that employees fell into the following four stages of change: 8.0% in Precontemplation stage, 21.1% in Contemplation, 36.9% in Action, and 34.0% in Maintenance (n = 991). Seventy-two subjects (7%) could not be placed into a stage. Total scores on the self-efficacy items differentiated employees at different stages $F(3,3861) = 85.93, p < .001$. "Proportion of variance accounted for was .23, which exceeds the amount needed for a large effect size" (Cohen, 1977 p.62).

Study II included 429 employees of a medical center in Rhode Island. Eighty-five percent were females and the average age in years was 40.5 (SD = 11.0). The same procedure from Study I was used, except the two measures for stage of change for exercise behavior and self-efficacy for exercise were modified. The stage of change measure was expanded to a five-item measure with the addition of a new stage labeled Preparation. Preparation was defined as the person not only thinking about becoming physically active, but also performing some exercise behavior although not regularly. Preparation was considered the third stage along the continuum of exercise stages of change. The self-efficacy instrument was modified to include a scale range from one-to-seven instead of one-to-eleven, to provide more clarity as a result of feedback from the subjects in Study I. The same sequence of data analysis used in Study I was repeated in Study II. Results revealed that 7.3% of employees were in the Precontemplation stage, 23.1% in Contemplation, 30.4% in Preparation, 16.6% in Action and 22.6% in Maintenance (n = 398). Seven percent of the subjects could not be placed into a stage. The self-efficacy measure reliably differentiated employees at different stages, $F(4, 369) = 36.57, p < .001$. Internal consistency for the self-efficacy measure in Study II was .76 (n = 388). "Proportion of variance was .28" (Cohen, 1977 p.63). There were no significant relationships between demographic variables and stage of change or self-efficacy.

Results from Study I and II were later compared for further analysis. More information about the subjects' activity level was available in Study II because of the addition of the Preparation stage item. Addition of this stage assisted in further dividing those that would have been considered in the Action stage in Study I. Approximately two thirds of the subjects who reported that they were in the Action stage in Study I were actually in the Preparation stage. Those in the Preparation stage may only have participated in weekly or monthly physical activity

and therefore were determined different from those who exercise at least three times per week (Action stage). Further results revealed that, in both Study I and Study II, scores on the self-efficacy measure were significantly related to stage of change. Results from both studies demonstrated that individuals at various stages of change have different degrees of exercise-specific self-efficacy. This clearly points to the need to recognize the fact that individuals at different stages of change benefit from interventions to increase their self-efficacy.

Marcus and Owen (1992) used a cross sectional design to examine the relationship of the different stages of change to exercise self-efficacy and to perceived costs and benefits of exercising within two separate groups. The same instruments and data analysis procedures were used for both groups. The first group included 1,093 employees from four work sites in Rhode Island. Fifty-two percent were female. The mean age of the group was 41 years. Subjects were recruited from a larger study group (N = 2,581) on health promotion where they were informed that their names would be entered in a drawing for a \$100 prize in return for participation. Stages of change were measured using a 0-10 point Likert-type scale in the shape of a ladder where 0 meant they did not currently exercise and did not intend to start (Precontemplation stage) to 10 meaning they have exercised regularly (three or more times per week for 20 or more minutes) for six months or more (Maintenance stage). The five-item self-efficacy measure (Marcus, Selby, et al., 1992) described previously on page nine, was used to measure self-efficacy. A six-item instrument was used to measure the exercise decisional balance (three items = pros, and three items = cons). Data analysis included frequency counts, one-way ANOVA, and Tukey procedure. Results revealed that 8.0% of the participants were in the Precontemplation stage, 30.8% in Contemplation, 28.8% in Preparation, 13.2% in Action, and 19.2% in Maintenance. Total scores on the self-efficacy items differentiated employees at different stages, $F(4,970) =$

115.84, $p < .001$. Similar findings were demonstrated for total scores on the pro-scale, $F(4,1034) = 36.04$, $p < .001$, the con-scale $F(4,1039) = 35.86$, $p < .001$; and the overall decisional balance index $F(4,1034) = 61.59$, $p < .001$. The study results revealed that those in the Precontemplation stage scored the lowest and those in the Maintenance stage scored the highest on exercise self-efficacy. These results demonstrate that self-efficacy scores significantly differentiate individuals at different stages of exercise behavior. Thus, in order to move an individual from a lower stage of exercise behavior to a higher stage, self-efficacy must be considered.

Marcus and Owens (1992) second group included 801 employees from a health promotion project in Australia. Eighty-eight percent of the sample were males. The mean age was 42 years. Questionnaires were completed as part of a survey of a health practices planning phase for a proposed company-wide health promotion program. The results reported from the stages of change were 7.2% of the sample in Precontemplation; 35.9% in Contemplation; 25.4% in Preparation; 6.8% in Action; and 24% in Maintenance. Total scores on the self-efficacy items reliably differentiated employees at different stages, $F(4,757) = 40.38$, $p < .001$. Similar findings were demonstrated for the scores on the pro scale, $F(4,754) = 22.19$, $p < .001$, and the con scale, $F(4,747) = 30.80$, $p < .001$. Similar to the findings of the first group, Precontemplators were significantly different from subjects in all other stages.

Although the two groups in the studies were from different countries, the results revealed a consistent pattern. In Study Group 1, 39% of the employees had not yet begun to take action (Precontemplators and Contemplators) and 61 % were at some phase of action (Preparation, Action, or Maintenance). Study Group 2 showed a similar pattern with 43% not yet beginning to take Action (Precontemplators and Contemplators) and 57% at some phase of Action (Preparation, action, or Maintenance). In both Group 1 and Group 2, the scores on the self-

efficacy measure were significantly related to stage of change. This finding is consistent with that of TTM studies in the area of smoking cessation (DiClemente, Prochaska, & Gibertini, 1985).

Due to the well-documented health benefits associated with regular “vigorous” exercise, Armstrong and colleagues (1993) prospectively examined the relationship between stage of change, self-efficacy, and the adoption of vigorous exercise in only two of the stages (Precontemplators and Contemplators). From a San Diego, California area, a random sample was studied of 2,053 residents, 188 were classified as Precontemplators and 213 as Contemplators, dependent on whether they reported no interest or some interest in vigorous exercise during a usual week at baseline. Baseline and post-baseline exercise self-efficacy was assessed using a three-item questionnaire with a five point-Likert scale with one = I’m sure I cannot, and five = I’m sure I can. Participation in vigorous exercise and stage of change during the 24 month post-baseline period were assessed by a questionnaire where the respondent marked boxes to indicate which specific months they exercised vigorously nine or more times. Data analysis was accomplished with a multivariate procedure. Results showed that stage of change was a significant predictor of future adoption of exercise. Contemplators had higher baseline self-efficacy scores than did the precontemplators ($F(3,99) = 5.09, p < .001, r^2 = .07$). A major finding was that baseline stage of change was not only a significant predictor of future exercise behavior but was a predictor of approximately equal magnitude with self-efficacy. These analyses provide evidence supporting the use of the TTM for understanding the adoption of exercise. One implication of this study is that it can be counterproductive to view individuals who do not exercise as being the same. According to this study, these individuals are not homogeneous, but

are very different with distinct stage specific levels of self-efficacy. Dependent on their stage, interventions would require different strategies to promote action.

A three step model building approach was taken to examine the application of three components of the TTM; stages of change, pros and cons, and self-efficacy, to exercise behavior in a two work site samples (N = 698) located in Rhode Island (Marcus, Eaton, Rossi, & Harlow, 1994). Step I consisted of an exploratory principle components analysis which examined the component structure of the three independent constructs. This analysis was conducted on participants from each work site (N1 = 349). Step II involved an examination of the same three constructs, but used confirmatory structural equation modeling procedures. This analysis included the second half of the sample (N2 = 349). Step III examined the confirmatory structural equation model with longitudinal data. This analysis was based on a second six month assessment and included 433 (62%) of the original 698 participants. Self-efficacy and the mediating construct of stages of change at the first assessment were examined for prediction of exercise at the later second assessment. Overall, the results showed that individual's level of exercise could be predicted by knowing their stage of change and their perceptions of self-efficacy for exercise. Exploratory analysis revealed that self-efficacy was an independent component. Confirmatory analysis revealed that there was an excellent fit between the hypothesized model and the data, that much of the variance in the stage of change construct was explained by self-efficacy and that much of the variance in exercise was explained by stage of change. Longitudinal analysis demonstrated that the model did predict exercise behavior six months later.

Marcus, et al., (1994) showed that individuals who place great importance on engaging in exercise even when they were experiencing negative conditions suggested by the self-efficacy

questionnaire (tired, bad mood, or little time) can be seen as having a high self-efficacy for exercise. They are expected to feel much higher readiness for exercise and will engage in a higher amount of exercise than those with low self-efficacy. These assumptions are consistent with the hypothesis of Bandura's (1977) theory that an individual's level of confidence to engage in a specific behavior is significantly related to actual behavior. Even with a six-month period between assessments of self-efficacy and subsequent exercise, results demonstrated a strong support for this prediction.

In one of the first studies to apply all four TTM constructs, Gorley & Gordon (1995) examined the structure of the TTM in exercise behavior change among 1,028 adults aged 50-65 years in Western Australia. The purpose of Gordon's study was to examine the relationship between stage of change and the constructs of processes of change, self-efficacy, and decisional balance. The sample consisted of staff from an educational institution (n = 380), volunteers from service groups such as Rotary International (n = 65), people from the general community through "over 55 clubs," and parents/friends of students (n = 583). A multivariate design was used in order to examine the relationships between the constructs. Instruments used to collect data were the Stage of Change Questionnaire (Marcus, Selby, et al., 1992), Processes of Change Questionnaire (Marcus, Rossi, et al., 1992), Self-efficacy Questionnaire (Marcus, Selby, et al., 1992), and the Decisional Balance Questionnaire (Marcus, Rakowski, et al., 1992). The reliability and validity of all instruments had been established in earlier studies (Marcus et al., 1992a; Marcus, Rossi, Selby, Niaura, & Abrams, 1992b; Marcus, Selby, Niaura, & Rossi, 1992c).

Consistent with the TTM model's previous research (Marcus, Rossi, et al., 1992; Marcus & Simkin, 1994), individuals in the Preparation, Action, and Maintenance stage reported

significantly different levels of exercise frequency, $F(2,454) = 163.14, p < .001$. A Tukey post hoc comparison test showed that individuals in Preparation exercised less frequently than individuals in Action and Maintenance. Although the Maintenance group reported the highest frequency of exercise, it was not significantly different from the Action group. A MANOVA was conducted in which stage of change served as the independent variable and the self-efficacy, pros and cons, and the ten processes of change served as the dependent variables. The main effect for stage of change was significant (Wilks' $\lambda = .422$), $f(48, 1890) = 9.88, p < .001$. The self-efficacy results showed a steady and significant increase from Precontemplators to Maintenance in self-reported confidence to exercise, that is, self-efficacy for exercise increased as individuals increased the amount of exercise they participated in. This study provides additional support for the relevance of the TTM to stage of change. A limitation is that this study included a population of adults 50-65 years of age, therefore it cannot be generalized to the pregnant population.

In one of the most recent studies, the efficacy of two self-help interventions were compared (Marcus, et al., 1998). The sample consisted of employees randomly selected from 11 work sites that had participated in the "Working Healthy Project" at the Miriam Hospital/Brown University School of Medicine. A prospective evaluative comparison was conducted on individuals ($n = 1559$) who received a self-help intervention "tailored" to their stage of motivational readiness for exercise adoption and individuals ($n = 1225$) who received a "standard condition" (p. 250) self-help intervention. It was hypothesized that there would be significantly more positive change in motivational readiness for exercise among those receiving the motivational stage "tailored intervention" compared to the "standard condition" self-help intervention. Assessments were conducted at baseline and three months following baseline. Data analysis included Chi Square analysis, one-way ANOVA, and repeated measures MANOVA.

In this study (Marcus et al., 1998) exercise was measured by the self-report stage of change questionnaire regarding exercise and a self-report Seven-Day Physical Activity Recall questionnaire (Blair, 1985). The test-retest reliability data for the Seven Day Physical Activity recall questionnaire has been fairly stable for light ($r = .65$), hard ($r = .31$), and very hard ($r = .61$) forms of exercise. The motivational stage of change intervention consisted of five motivational tailored self-help manuals that were based upon the TTM's stage of change for exercise, self-efficacy motivation, pros and cons for exercise change, and certain processes to be used at different stages. The second intervention consisted of five manuals on exercise developed by the American Heart Association (AHA) (AHA, 1989; 1984a; 1984b; 1984c; 1984d). These manuals were selected to represent the type of "action oriented" self help material that is currently available for the public, which are "typically no intervention" (p. 249).

Results revealed that more subjects in the motivation stage tailored condition demonstrated stage progression (37% vs 27%, respectively), defined as an increase of one or more stages by the three-month posttest assessment compared to the standard condition subjects. In contrast, more subjects in the standard group displayed stage stability (58% vs 52%, respectively) or stage regression (15% vs 11%, respectively) compared to the motivationally tailored group ($X^2(2) = 11.17, p < .01$). According to Marcus and colleagues (1998), "An inspection of the standardized residuals from the Chi Square analysis showed that significantly more subjects than expected progressed with the motivationally tailored intervention" (p. 250). Results strongly supported that the efficacy of the motivational stage tailored intervention was influenced by the subject's stage of exercise readiness. Thus the motivationally tailored intervention was more effective in promoting physical activity than the standard non-tailored intervention. Implications of these results are that health promotion practitioners should consider

an individual's stage of change when designing and delivering exercise advice and interventions. Limitations of this study are that results cannot be generalized to sub-populations such as pregnant women.

Evidence from this literature review has provided encouraging results for extending the TTM to the area of exercise behavior in pregnant women. A few limitations of previous studies were: 1) the predominant use of cross-sectional designs, 2) lack of studies related to exercise in pregnancy, 3) a preponderance of subjects from work sites, thus limiting generalizability to others, 4) studies were based on self-report measures, and 5) gender, with less female participants.

Although there were limitations from the literature review, results provided several issues worth considering. First, a stage of change perspective suggests that adopting exercise behavior may be best accomplished by determining an individual's stage of change regarding exercise. Second, self-efficacy may be influenced by the appropriate use of stage based processes highlighted within the TTM. Third, strategies that promote an increase in self-efficacy may be effective in moving an individual to another stage.

The results and limitations obtained from this literature review intensify the need for further research about the relationship of stage of change and perception of self-efficacy regarding exercise behavior among low risk pregnant women. The research presented supported a significant relationship between stage of change and self-efficacy. This relationship needs to be examined in the pregnant population.

Research Question

Is there a relationship between stage of change and perceived self-efficacy regarding exercise among low-risk pregnant women? To answer this question two preliminary questions were necessary:

1. What percentage of the sample aligns themselves with each stage of change?
2. What are the self-efficacy levels for each of the situations within the five self-efficacy groups?

Definition of Terms

1. **Stage of change** – consisting of five stages: (a) Precontemplation measured by a yes or no on question # five, (b) Contemplation measured by a yes or no on question # four, (c) Preparation measured by a yes or no on question # three, (d) Action measured by a yes or no on question # two, and (e) Maintenance measured by a yes or no on question # one, that represents an individual's intentions or actual exercise behavior.
 - a. **Precontemplation** – The stage where individuals do not intend to exercise regularly in the next six months. This stage is chosen by participants answering question # five.
 - b. **Contemplation** – The stage where individuals intend to exercise regularly in the next six months. This stage is chosen by participants answering question # four.
 - c. **Preparation** – The stage where individuals intend to exercise regularly in the next 30 days. This stage is chosen by participants answering question # three.
 - d. **Action** – The stage where individuals have been exercising regularly for less than six months. This stage is chosen by participants answering question # two.
 - e. **Maintenance** – The stage where individuals have been exercising regularly for more than six months. This stage is chosen by participants answering question # one.

2. **Self-efficacy** - The degree of confidence (scale one –five) that the subject believes she can participate in regular exercise when she is tired, feeling bad, in a bad mood, on vacation, and when its raining.
3. **Exercise** – Physical activity that is “planned, structured, and repetitive, bodily movement done to improve or maintain one or more components of physical fitness” (ACSM, 1993).
4. **Regular exercise** - Mild to moderate exercise performed for at least 20-60 minutes per session, three to five times per week (Marcus, Selby, Niaura, & Rossi, 1992).
5. **Low risk pregnant woman** – A pregnant woman any time after diagnosis of conception and prior to date of delivery who does not have an obstetric or medical complication at time of participation.

Relationships Among the Concepts

Across the stages of change, it has been hypothesized that self-efficacy scores increase linearly from Precontemplation to Maintenance (Gorley & Gordon, 1995). In the Precontemplation stage, self-efficacy is very low. In the Maintenance stage, self-efficacy is high.

The pregnant woman may be in any one of the five stages of change. According to the literature, her self-efficacy for exercise behavior will be linearly related to her stage of change. It is expected that those in Precontemplation will have the lowest self-efficacy for exercise behavior, while those in Maintenance will have the highest.

Implications for this study

The conceptual framework used in this study is the TTM, which is an integrative framework for understanding how individuals and populations progress toward adopting and maintaining health behavior change for optimal health. Using the TTM with pregnant women and exercise gives functional importance to a theoretical foundation in health promotion

impacting maternal-infant health. The literature review shows that all studies using the TTM had a positive relationship between stages of change, and self-efficacy, the two most powerful predictors of success in health behavior according to Prochaska, Redding and Evers, in their 1997 publication.

One of the goals of “Healthy People 2000 Objectives for the Nation” is to have at least 30% of all Americans age six and older engaging in regular light to moderate physical activity for at least 30 minutes per day, three times per week (USDHHS, 1991). In 1996, Zhang & Savitz reported on the prevalence of exercise during pregnancy based on women who participated in the National Maternal and Infant Health Survey. They reported that 45% of these women did not perform regular exercise prior to or during pregnancy, and 13% exercised before pregnancy but stopped after they found out they were pregnant. A high attrition and low adoption rate for prenatal exercise represents a major challenge to health professionals. APNs are in one of the most optimum positions to facilitate the this challenge (Lewis & Lynch, 1993).

Evidence from this literature review has provided encouraging results for extending the TTM to the area of exercise behavior in pregnant women. The increasing number of APNs in women’s healthcare settings and the frequency with which pregnant women visit them suggest that even moderately effective interventions would have a substantial impact towards promoting exercise. Currently, APNs have limited knowledge about how to promote health behaviors, such as exercise, in the overall care of women (Kemp & Hatmaker, 1992; Peipert & Ruggiero, 1998). The knowledge of how to promote health likely lies in the stages of change in self-efficacy. APNs should assess and consider the individual’s stage of change before designing and delivering exercise advice and interventions, since stages of change are a significant predictor of future adoption of exercise.

Nursing assessment, interventions, and education are important during the prenatal period. Exercise assessment should be included as part of every initial health history for prenatal women. The pregnant women should receive general guidelines for exercising, such as those prepared by ACOG (Zeanah & Schlosser, 1993). APNs consulting with pregnant women during the first trimester can enhance pregnant women's behaviors to promote well being of the developing fetus as well as the mother's well-being. Desired behavioral changes are now recognized as occurring in stages according to Prochaska, Redding and Evers (1997). APNs have early contact with the pregnant women allowing time for the process of change to be put in place. It is then possible to provide support for adoption of new and more healthful behaviors during pregnancy. Assessment and counseling regarding exercise, as a health behavior, is an essential component of health promotion and education of pregnant women. Interventions, to be effective, must be tailored to unique needs of pregnant women regarding exercise.

Results from this researcher's study adds to the body of nursing knowledge regarding exercise and pregnant women. Study findings have provided data to support the concept that a pregnant woman can be categorized into a different stage of change related to her exercise behavior. During this unique time in a woman's life, interventions need to be designed to accommodate these different stages. With a better understanding of the different stages for exercise behavior as supported by this data, APNs will be able to design more effective interventions to enhance healthy behaviors in pregnancy. They will be more likely to design and deliver care that effectively supports women's efforts towards a healthy pregnancy. It is important for APNs to be aware of the different stages of change for exercise that may increase the likelihood of adherence to exercise during pregnancy. Thus, exercise behavior may then become a permanent part of a woman's lifestyle long after delivery of the baby.

CHAPTER 3

METHODOLOGY

Design

A descriptive, cross-sectional design was used to examine the relationship between stage of change and perceived self-efficacy regarding exercise among low risk pregnant women. Participants placed themselves into the stage of change (Appendix C) and into a level of self-efficacy (Appendix D) that best describes them. There are five stages of change groups and a series of five statements, when averaged, result in a level of self-efficacy.

Threats to External and Internal validity

While low-risk pregnant women had to meet certain criteria for study selection, there may be some differences in subjects that were not controlled such as the level of usual activity. Some physiological aspects of pregnancy such as fatigue, and nausea/vomiting may limit the participant's ability to exercise. Pregnant women may be either enthusiastic or skeptical about the promotion of exercise and this would affect the external validity.

There are always difficulties associated with self-reported questionnaires (e.g. missing items, incorrect responses, and misinterpretation of questions). Women in this study may have answered questions in a particular manner largely because they were aware of their participation in the study. There is also the problem of external validity due to answering questions according to social desirability (Campbell & Stanley, 1963).

Pregnant women with higher educational or social economic background may have a greater sense of control over their lives and have a better feeling of self-esteem, thus the sole use of private offices as the site of data collection may have resulted in selection bias. The results of data collection (demographics, race, testing information, etc.) may not be generalized to all

pregnant women who are not exposed to the same data collection procedures.

Sample and Setting

The sample for this study was 142 low-risk pregnant women derived from two private obstetrician's offices. These offices are located in a Midwest community. Criteria for the selection included:

1. pregnant women of any gestational age who are between the ages of 18-45 years.
2. pregnant women who have the ability to speak, read, and understand English.
3. pregnant women who are free of diagnosed chronic disease.
4. pregnant women who have a single fetus.
5. pregnant women who have no functional limitation that would prevent them from exercising.

Procedure

Prior to proceeding with this study, approval was obtained from the Grand Valley State University Human Subjects Review Committee. Private obstetricians were contacted and approval was obtained for data collection to be done at their two individual sites. Both private obstetrician's offices were provided with the research question, three questionnaires, and a consent form. The researcher met with the office personnel to present her credentials and an overview of the proposed study.

It was agreed at that time that the receptionist would provide a list of qualified pregnant women to the researcher and introduce herself to the potential participants. Participants were approached while they were waiting to see the physician for their prenatal appointments. The researcher introduced herself to the potential clients, verbally explained the reason for the research project, and invited them to participate. Those women who indicated an interest in learning more about the project, were given an information sheet, listing criteria. If they were

interested in participating they were then given a consent form (Appendix A) to sign. It is stated on the consent form that the information they provided would be held in strict confidence. The researcher verbally confirmed that fact. After participants read and signed the consent form, it was immediately placed into an 8 x 10 envelope labeled clearly "Consents Only". The participants were then given three stapled questionnaires to complete: a background questionnaire, the Stages of Change questionnaire, and a Self-Efficacy (Confidence) questionnaire. To assure anonymity, the subjects were instructed not to write their names on the background questionnaire (Appendix B), the Stages of Change questionnaire (Appendix C), or the Self-Efficacy (Confidence) questionnaire (Appendix D). After each participant completed the three questionnaires, the researcher collected them and placed them in a separate envelope from the consent forms. Since was a voluntary participation of self-recordings with anonymity maintained, there were no anticipated risks involved.

Instruments

Background Questionnaire

Authors of previous studies with nonpregnant women population have reported that individuals in the different stages of change have not differed significantly on major background variables. The one exception was reported by Gorley and Gordon in their 1995 publication, stating that their maintenance group was less likely to have dependent children living at home. Therefore, this question was included among the background (Appendix B) variables in this study. There were also questions concerning women's ethnicity, age, number of pregnancies, number of dependent children living with participants, level of education, and weeks of gestation. Two questions regarding the presence of any medical or functional conditions that may have prevented regular exercise such as: morning sickness, fatigue, or premature labor, assisted

in validating the participant's eligibility.

Stages of Change Questionnaire

The stages of Change measure for exercise (Appendix C) is a five-item self-report questionnaire designed to place subjects into either the Precontemplation, Contemplation, Preparation, Action, or Maintenance stage of change as it relates to exercise behavior. It has been utilized in previous exercise studies (Brock, et al., 1998; Marcus et al., 1992a; Marcus, Rossi, et al., 1992b; Marcus, Selby et al., 1992c). Subjects place themselves into the stage of change that best describes themselves. The Kappa index of reliability over a two week period for the stages of change instrument has been reported as .78 (N=20). Concurrent validity for this measure has been demonstrated by its significant association with the Seven-Day Recall Physical Activity Questionnaire (Marcus & Simkin, 1993). Prochaska, O. J. (1991). Stages of Change Questionnaire retrieved June 25, 1999 from the internet Cancer Prevention Research Center site (www.uri.edu/research/cprc/Measures/GHS1991.htm). Permission was granted to use this questionnaire (See Appendix F)

Self-Efficacy (Confidence) Questionnaire

The Self-Efficacy (Confidence) questionnaire measure (Brock et al., 1998; Marcus, Shelby, et al., 1992c) is a five-item self reported instrument designed to measure how confident an individual is that she will perform exercise in adverse conditions, such as when they are tired or when weather is inclement (Appendix D). The items were written to represent three areas presumed by Marcus, Shelby, et al., (1992c) to be important in exercise promotion: negative affect, resisting relapse, and making time for exercise. Subjects rate each item on a five-point Likert type scale (1= "not at all confident" to 5="very confident"). In a previous study (Marcus, Shelby, et al., 1992c) test-retest reliability for the self-efficacy scale over a two week period was

.90 (N=20). Internal consistency for the five-item measure was .80-.85 (N=388) in two separate studies (Marcus & Owen, 1992). Prochaska, O. J. (1991). Self-Efficacy Questionnaire retrieved June 25, 1999 from the internet Cancer Prevention Research Center site (www.uri.edu/research/cprc/Measures/GHS1991.htm). Permission was granted for use (See Appendix F).

CHAPTER 4

DATA ANALYSIS

The purpose of this study was to determine if there was a relationship between the variables of stage of change and perceived self-efficacy regarding exercise among low-risk pregnant women. The independent variable was the stage of change as measured by the stage of change questionnaire. The dependent variable was the level of self-efficacy. The level of measure for the stage of change was nominal. The level of measurement for self-efficacy was interval. The standard Statistical Package for the Social Sciences (SPSS, 1993) was used to analyze the data.

Frequency counts were used to describe background information and to determine the distribution of individuals on the stages of change questionnaire and the self-efficacy questionnaire. A one-way ANOVA was performed to assess the relationship between the stages of change for exercise behavior and self-efficacy scores. This was followed with post hoc comparisons using the Scheffe' Test procedure (Gravetter & Wallnau, 1996) to determine which stages of change the self-efficacy measure was able to differentiate.

A one-way ANOVA was used because the assumptions required were consistent with those of the study. The assumptions: (1) that the dependent variable is measured at the interval level, (2) the groups are mutually exclusive, (3) the dependent variable is normally distributed, and (4) the groups have equal variances (homogeneity) were met, when the precontemplators were removed. There was a 0.4 difference between the smallest and the largest Standard

Deviations when the precontemplation were removed (see Table 2) (Munro & Page, 1993).

Description of Sample

One hundred and forty two pregnant women qualified for this study, but two refused to participate, one because of illness and one with two young children who required the mother's attention during the time period necessary to fill out the questionnaires. Of the 140 women who agreed to participate in the study, eight did not meet the criteria for participation due to a reported medical condition that prevented them from regular exercise. All of these eight women categorized themselves as precontemplators since they had no intention of exercising now or in the next six months. One other woman also categorized herself as a precontemplator, but had no medical condition limiting her from regular exercise. With only one participant left in the precontemplation stage after disqualifying the other precontemplator women with medical conditions, this category, with one qualified subject, was not used for data analysis regarding the relationship between stage of change and perceived self-efficacy regarding exercise among low-risk pregnant women. The data was used for demographics and to determine what percentage of the sample aligned themselves with each stage of change.

The 131 remaining volunteer pregnant women received prenatal care from two private obstetric offices agreed to participate in the study. After signing a consent form, they completed the two questionnaires on exercise and one which provided basic background information. A \$5.00 gift appreciation package was given to each participant after the questionnaires were completed and returned to the researcher. All 131 participants were included in the data analysis as described above. There was no missing data in the 393 questions returned.

The background characteristics of the sample that related to ethnicity and level of education are found in Table 1. Pregnant women in the sample ranged from 18 to 43 years of

age, with a mean age of 26.85 years (SD 5.48). The women ranged in gestational age from 4 to 41 weeks of gestation with a mean gestational age of 27 weeks (SD 10.11). The number of pregnancies for each woman ranged from 1 to 6 with a mean of 2.13 (SD 1.23). The number of dependent children living with the each participant ranged from 0 to 5 with 48% not having children at home and a mean of .83 (SD 1.00). Eight women reported having a physical condition that prevented them from regular exercise. These eight women categorized themselves in the precontemplation stage and their questionnaires were not used for the research question data analysis.

Table 1

Demographics Characteristics of the Study Sample

	Frequency	Percent
<u>Ethnicity</u>		
African American	15	10.7
American Indian	2	1.4
Asian/Pacific Islander	2	1.4
Hispanic	12	8.6
Caucasian	105	75.0
Mixed racial origins	4	2.9
<u>Education</u>		
< 12 years of school	15	10.6
high school graduate	42	30.0
1-4 years of college	67	48
over 4 years of college	16	11.4

Based on the participants' responses to the stages of change questionnaires, subjects were classified into five different stages. Results are listed in Table 2. Results for the self-efficacy levels for each of the five situations within each of the self-efficacy groups is also listed in Table 2.

Table 2

Means and Standard Deviations on the Self-Efficacy Measure in Relation to Stage of Change

Stage	Percentage of subjects in stage of change	(n)	Self-Efficacy Scores	
			M	SD
Precontemplation	6.4	9	10.56	(5.22)
Contemplation	24.3	34	13.11	(3.80)
Preparation	22.1	31	13.54	(3.81)
Action	26.4	37	17.67	(3.74)
Maintenance	20.7	29	13.90	(4.14)

Background data and scores from the stages of change (SOC) and self-efficacy (Confidence) were coded. Cronbach (1953) introduced formulas for reporting the degree of similarity between profiles. Cronbach's alpha (Polit & Hungler, 1995) for reliability was calculated on the confidence measure to determine internal consistency. The internal consistency for the 5 item Confidence measure had a coefficient alpha of .7358. This compares with results from two previous studies where the internal consistency coefficient alphas were .76 (n=388) (Marcus, Selby, Niaura, & Rossi (1992) and .85 (n=1083) (Marcus & Owen, 1992).

Statistical analysis using a one-way ANOVA and further analyses with the Scheffe' method of multicomparison were performed to answer the following research question: Is there a relationship between stage of change and perceived self-efficacy regarding exercise among low-

risk pregnant women?

In order to answer this question, the following two preliminary questions were tested:

1. What percentage of the sample aligns themselves with each stage of change
2. What are the self-efficacy levels for each of the five situations within each of the self-efficacy groups?

One-way ANOVA revealed that the total scores on the self-efficacy items differentiated the women at different stages of change (See Table 3).

Table 3

One-way ANOVA Results for Relationship Between Stage of Change and Perceived Self-Efficacy

Self-efficacy	Sum of squares	df	Mean squares	F score	Sig.
Between groups	472.530	3	157.510	10.550	.000
Within Groups	1896.005	127	14.929		
Total	2368.534	130			

The One-way ANOVA was followed with post hoc comparisons using Scheffe's procedure to determine which stages the self-efficacy measure was able to differentiate. Results can be seen in Table 4.

Table 4

Scheffe' Post Hoc Results Comparing Differences Between Stage of Change and Self-efficacy

Stage of change	Stage of Change	Mean Difference	P value
Action	Maintenance	3.77	.002*
	Preparation	4.12	.000*
	Contemplation	4.55	.000*
Maintenance	Action	-3.77	.002*
	Preparation	.34	.989
	Contemplation	.78	.888
Preparation	Action	-4.12	.000*
	Maintenance	-.34	.989
	Contemplation	.43	.977
Contemplation	Action	-4.55	.000*
	Maintenance	-.78	.888
	Preparation	-.43	.977

Note. * Significant at the $p < .05$.

Discussion of Results

Answers to the two preliminary questions are listed in Table 2. One-way ANOVA scores to assess the relationship of self-efficacy and stage of change measures showed that self-efficacy was significantly related to stage of change $F(3,127) = 10.55, p < .000$. This analysis was followed with post hoc comparisons using the Scheffe' method for multiple comparison. This procedure was used to determine which stage or stages the self-efficacy measure was able to differentiate. Although the ANOVA showed significant differences between the overall stage of change and self-efficacy, the Scheffe' test revealed the Action stage was the only stage that was significantly different from all subjects in all other stages (see Table 4). This is inconsistent with reports of previous studies which demonstrated that the level of self-efficacy is significantly related to all stage of change for exercise (Gorley & Gordon, 1995; Marcus, Eaton, Rossi, & Harlow, 1994; Marcus, Selby, Niaura, & Rossi, 1992; Marcus & Owen, 1992). These previous studies showed that self-efficacy linearly increases with each stage of change for exercise. All of

the studies reported using the Tukey method for multiple comparison. Thus, in those studies, subjects in the Contemplation stage would have less self-efficacy for exercise than individuals in all other stages except Precontemplation. In this present study, the Contemplators had the same self-efficacy score as those in both Preparation and Maintenance stages.

In order to obtain information related to additional areas of interest a Pearson r correlation was performed to examine certain demographic variable including education, age, and weeks of pregnancy with self-efficacy. There were two significant findings (See Table 5). There was a moderate/strong statistically significant relationship between higher education and increased self-efficacy ($r=.426, p<.000$). There was also a weak significant correlation between age and self-efficacy where self-efficacy increased with age ($r=.227, p<.007$). Thus, those pregnant women who were older and/or had higher education had more self-efficacy for exercise than those younger and less educated.

Table 5

Pearson Correlations for Age, Pregnancy, and Education with Self-Efficacy.

	Number	r-Value	P-Value
Age	140	1.00	.007*
Pregnancy Week	140	.000	.997
Education	140	.546	.000*

Note, *Significant at the $p<.05$.

Summary

In summary, the majority of the 140 low risk pregnant women were high school educated. In order to answer the research question, each participant was successfully categorized into one of the five stages of change based on their reported exercise behavior. The levels of self-

efficacy for each of the five situations within each of the self-efficacy groups was successfully determined. The research question, “Is there a relationship between stage of change and self-efficacy regarding exercise among low risk pregnant women?” was supported by the one-way ANOVA. The post-hoc Scheffe’ method only partially supported the research question except for a significant relationship only the Action Stage of Change and Self-efficacy were significantly related.

CHAPTER 5

DISCUSSION AND IMPLICATIONS

Discussion

This investigation did not provide encouraging support for extending the TTM model of behavior change to the area of exercise adoption in low-risk pregnant women. The Action stage of change group was the only group that could be differentiated from the other groups. No other significant relationships were found between stages of change and self-efficacy. This data did not support the notion that self-efficacy may be an important indicator of current and future exercise behavior during pregnancy.

According to previous studies, those who place a high importance on engaging in physical activity, even when they are tired, in a bad mood, have little time, or when it's raining or snowing can be seen as having high self-efficacy for exercise. They are expected to feel much greater readiness for exercise, and to actually engage in a greater amount of physical activity, than those with low self-efficacy. This is consistent with Bandura's (1977) theory, which hypothesizes that an individual's level of confidence to engage in a specific behavior is significantly related to actual behavior. The present study did not provide support for this hypothesis. According to Bandura's theory, pregnant women in the Maintenance stage should have had the greatest self-efficacy for exercise, but the data demonstrated that the Action stage had more self-efficacy for exercise than the Maintenance stage of change group. Also the Maintenance group had nearly the same level of self-efficacy for exercise as the Contemplators

and Preparation groups, which is once again inconsistent with previous studies using the TTM. Although self-efficacy has been found to be the strongest correlate (Armstrong, Sallis, Hovell, & Hofsetter, 1993) and predictor (Sallis, et al., 1986; Sallis, Hovell, & Hofsetter, 1992) of both present and future exercise behavior, this was not supported in the present study.

One can only speculate reasons why the data from this study did not support previous research regarding a linear relationship between the stages of change and self-efficacy. Perhaps the use of only private offices rather than other types of prenatal clinics provided a population that was higher in self-efficacy than most others. Since the pregnant women representing the private offices were from a higher educational and socio-economical level, they may possess higher self-efficacy nondependent on their stage of exercise.

Application to Practice /Education

The applied purpose of this research was to provide a basis for developing more concise intervention strategies to assist pregnant women in adopting and maintaining healthy exercise behavior patterns. The primary objective in applying theoretical models such as the stages of change model to the study of exercise behavior is to better understand the process of behavior change so that more successful programs can be developed to help people start or continue to be active.

This study did provided support for self-efficacy as an important motivator for exercise in the Action stage during pregnancy. Data suggests that a pregnant woman exercising on a regular basis (Action stage) for less than 6 months maintains a much higher level of self-efficacy compared to those in the lower stages. It is uncertain from the results, if pregnant women in the Maintenance stage are influenced by their self-efficacy, since they have a lower self-efficacy than those in the Action stage and at the same level as those in the lower stages.

Although the data from this study did not support the TTM in total, this may be due to the pregnant woman's different needs. It provides support that this population may be different from the non-pregnant population. Without proper assessment and individualized interventions, there may be a mismatch that could result in unsuccessful attempts at promoting exercise behavior during pregnancy (Peipert & Ruggiero, 1998). Results from this study indicate that interventions tailored for the pregnant woman may be more complex than anticipated, since the results were so inconsistent with other studies.

Limitations

There are several limitations to this study. The study was conducted on a sample that overrepresented a higher economic and educational status. The majority were Caucasians with limited numbers of ethnic minorities. Further study with diverse samples should be conducted to determine to what extent these results generalize.

Since previous research has supported the use of the TTM in non-pregnant populations, perhaps the instruments for measuring the stage of change or self-efficacy need to be modified for this population. If the questions are not appropriate for this population then the data may not be accurate. Concurrent validity of both instruments should have been performed prior to using them with this new pregnant population.

Because of the social desirability of being active during pregnancy, overreporting is more likely than underreporting, even among those women who reported exercising before and during pregnancy (Campbell & Stanley, 1963). The purpose of the questionnaire was clear, and this may have led to pregnant women wanting to appear desirable (i.e. being an exerciser) in the questionnaire. Few subjects were classified as Precontemplators (n=9).

As in many surveys, physical activity was assessed by self-report questionnaires rather

than objective measurements. Accuracy of self-report is often questionable.

The subjective definition of exercise may also vary among pregnant women. The questions on exercise during pregnancy do not explicitly separate leisure from occupational activities. A clearer definition of the term physical activity, should included daily chores like gardening and housecleaning as well as leisure time physical activities.

Pregnant women may stop exercising for some reason (e.g., nausea and vomiting in early pregnancy) and then resume. Pregnant women may have to change activity with advancing gestation if physical limitations force her to shift to a less challenging activity. All these limitations inherent in this data set may result in misclassification of exercise during pregnancy.

Suggestions for Further Research

Health professionals need to continue to look for ways to design population appropriate materials and messages. Generalizations made from this study's findings are limited to a small group of low-risk pregnant women who met the selection criteria. Data was collected from a restricted geographical area in the central Midwest, and most subjects were Caucasian. A larger, more ethnicity representative sample is warranted. It is important that further research using the TTM in this population be completed.

Development of successful interventions to increase the adoption and maintenance of exercise behavior for pregnant women would bring our nation closer to attaining the fitness objectives that have been established for the year 2000 (USDHHS, 1991). In attaining these objectives, the health and quality of life of the United States with regards to all populations will be significantly enhanced.

APPENDIX A

APPENDIX A

CONSENT TO PARTICIPATE IN "IS THERE A RELATIONSHIP BETWEEN STAGE OF CHANGE AND PERCEIVED SELF-EFFICACY REGARDING EXERCISE AMONG LOW-RISK PREGNANT WOMEN?"

I understand that this is a research study related to exercise during pregnancy. The knowledge gained is expected to assist nurses and physicians to provide health care in a manner which will benefit pregnant women.

- 1) Participation in this study will involve one 10-15 minute session where I will answer questions on a questionnaire about myself and current exercise patterns.
- 2) I have been selected for participation because I am 18 to 45 years of age and am anticipating an uncomplicated pregnancy and birth.
- 3) I understand that this is a pencil and paper survey requiring a response to approximately 20 questions. I know that I can withdraw from the study by not returning the questionnaires to the investigator, without any adverse consequence to me or my baby.
- 4) I understand that there will be no experimental procedures.
- 5) The investigator nurse has fully described the nature of this study. I understand that this study is of no cost to me and has no anticipated risks that will lead to physical or emotional harm to myself or my baby.
- 6) The information I provide will be kept strictly confidential and the data will be coded so that identification of individual participants will not be possible.
- 7) A summary of the results will be made available to me upon request.

I acknowledge that:

I have been given an opportunity to ask questions regarding this research study, and that these questions have been answered to my satisfaction.

In giving my consent, I understand that my participation in this study is voluntary, and that I may withdraw by not returning the questionnaires to the investigator, without affecting the care I receive from my physician.

I hereby authorize the investigator to release information obtained in this study to scientific literature. I understand I will not be identified by name.

I have been given the investigators phone number (Becky Weiner (616) 895-3671) and Grand Valley State University Human Subjects Review Committee Chair, Paul Huizenga, telephone (616) 895-2472. I may contact them if I have questions.

I acknowledge that I have read and understand the above information and that I agree to participate in this study.

I have no objection to my physician knowing that I am involved with the study.

_____ Participant's Signature	_____ Date	_____ Witness's Signature	_____ Date
_____ Principle Investigator		_____ Date	

APPENDIX B

APPENDIX B

BACKGROUND QUESTIONNAIRE

1. What is your age today? _____
1. What number of pregnancy is this for you? _____
2. How many weeks are you pregnant? _____
3. Ethnicity (check one)
- a) African-American _____
 - b) American Indian _____
 - c) Asian or Pacific Islander _____
 - d) Hispanic _____
 - e) White _____
 - f) Multiracial _____
 - g) Other _____
- 6 Please **circle** the highest grade that you have completed in school:
- | | | | | | | | | | | | | | | | | | |
|--------------|----------|----------|----------|----------|----------|----------|----------|----------|-------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------------|------------|
| <u>K</u> | <u>1</u> | <u>2</u> | <u>3</u> | <u>4</u> | <u>5</u> | <u>6</u> | <u>7</u> | <u>8</u> | <u>9</u> | <u>10</u> | <u>11</u> | <u>12</u> | <u>13</u> | <u>14</u> | <u>15</u> | <u>16</u> | <u>17+</u> |
| Grade school | | | | | | | | | High School | | | | College | | | Graduate School | |
- 7 How much time do you spend standing during the day? (**check one only**)
- 25% _____ 50% _____ 75% _____ 100% _____
- 8 Number of dependent children living with you _____
- 9 Do you have a medical or physical condition that prevents you from exercising regularly? yes _____ no _____
- 10 **Circle** if you are **currently** experiencing :
- | | | |
|------------------|---------|-----------------|
| Morning sickness | Fatigue | Premature Labor |
|------------------|---------|-----------------|

APPENDIX C

APPENDIX C

STAGES OF CHANGE QUESTIONNAIRE

Regular exercise is any *planned* physical activity (e.g., brisk walking, aerobics, jogging, bicycling, swimming, rowing, etc.) performed to increase physical fitness. Such activity should be performed *3-5 times* per week for *20-60 minutes* per session. Exercise does not have to be painful to be effective but should be done at a level that increases your breathing rate and causes you to break a sweat.

Question: (mark one answer only)

Do you exercise regularly according to the above definition?

1. _____ Yes, I have been for MORE than 6 months.
2. _____ Yes, I have been for LESS than 6 months.
3. _____ No, but I intend to in the next 30 days.
4. _____ No, but I intend to in the next 6 months.
5. _____ No, and I do NOT intend to in the next 6 months.

APPENDIX D

APPENDIX D

CONFIDENCE

Please circle a number to indicate how confident you are that you could exercise in each of the following situations:

	Not at all Confident		Moderately Confident		Extremely Confident
1. When I'm tired	1	2	3	4	5
2. When I am in a bad mood	1	2	3	4	5
3. When I feel I don't have time	1	2	3	4	5
4. When I am on vacation	1	2	3	4	5
5. When it is raining or snowing	1	2	3	4	5

APPENDIX E

APPENDIX E

***Miriam Hospital, A Life Time Partner
Division of Behavioral and Preventive Medicine R336 Building
164 Summit Avenue, Providence, RI 02906***

February 12, 1999

Becky Weiner R.N., B.S.N.
KSON Graduate Student
Grand Valley State University
Allendale, MI 49401

Dear Ms Weiner,

This memo is in response to our phone conversation last week regarding your request to use instruments previously used in Dr. Marcus's published exercise studies. Enclosed you will find a copy of the instruments that you requested including the stages of change and self-efficacy for exercise. Dr. Bess Marcus has given you permission to use these instruments for your thesis study regarding exercise in pregnancy. She wishes you success in your study.

Sincerely,



Lyn Robillard
Phone: (401) 331-8500 ext 33736
Fax: (401) 331-2453

APPENDIX F

APPENDIX F

CPRC Measures

<http://www.un.edu/research/cprcmeasures.htm>



Smoking
Alcohol
Cocaine
Mammography
Exercise
Sun Protection



Coping & Stress
Weight Control
Psychotherapy
HIV & Safer Sex
Substance Abuse

The Measures

General Health Survey (GHS - 1991) - Stage of Change assessment for 10 problem behaviors

Here you can find the psychological measures that have been developed at the CPRC. All measures are copyright Cancer Prevention Research Center, 1991.

Dr. James O. Prochaska, Director of the CPRC, is pleased to extend his permission for you to use the Transtheoretical Model-based measures available on this website for research purposes only, provided that the appropriate citation is referenced.

Please Note: All assessment inventories are available for research purposes only and are not for clinical use.

APPENDIX G

APPENDIX G



**GRAND VALLEY
STATE UNIVERSITY**

| CAMPUS DRIVE • ALLENDALE, MICHIGAN 49401-9403 • 616/895-6611

March 24, 2000

Rebecca Weiner
1666 Beard Dr. SE
Grand Rapids, MI 49546

Dear Rebecca:

The Human Research Review Committee of Grand Valley State University is charged to examine proposals with respect to protection of human subjects. The Committee has considered your proposal, **The Relationship Between Stage of Change and Perceived Self-Efficacy with Respect to Exercise Among Low-Risk Pregnant Women**, and is satisfied that you have complied with the intent of the regulations published in the Federal Register 46(16)8386-8392, January 26, 1981.

Sincerely,

A solid black rectangular box redacting the signature of Paul A. Huizenga.

Paul A. Huizenga, Chair
Human Research Review Committee

LIST OF REFERENCES

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American College of Obstetrics and Gynecology (1994). Technical Bulletin No. 189. Exercise during pregnancy and the postpartum period. Washington, DC: American College of Obstetrics and Gynecologists.

American College of Sports Medicine Position Stand (1993). Physical activity, physical fitness, and hypertension. Medicine, Sports, and Exercise, 25 (10), PP I-X.

American heart Association (1989). Cycling for a healthy heart. Dallas: American Heart Association.

American heart Association (1984a). Dancing for a healthy heart. Dallas: American Heart Association.

American heart Association (1984b). Running for a healthy heart. Dallas: American Heart Association.

American heart Association (1984c). Swimming for a healthy heart. Dallas: American Heart Association.

American heart Association (1984d). Walking for a healthy heart. Dallas: American Heart Association.

Armstrong, C. A., Sallis, J. F., Hovell, M. F., & Hofsetter, C. R. (1993). Stages of change, self-efficacy, and the adoption of vigorous exercise: A prospective analysis. Journal of Sport and Psychology, 15, 390-402.

- Bandura, A. (1977). Self-efficacy. Toward a unifying theory of behavioral change. Psychology Review, 84, 191-215.**
- Bandura, A., Adams, N. E., Hardy, A. B., & Howells, G. N. (1988). Tests of generality of self-efficacy theory. Cognition, Theory, and Research, 4, 36-66.**
- Blair, S. N. (1995). How to assess exercise habits and physical fitness. In J. Matarazzo, S. Weiss, J. Herd, N. Miller, (Eds.), Behavioral health: A handbook of health enhancement and disease prevention. NY: Wiley.**
- Bock, B. C., Marcus, B. H., Rossi, J. S., & Redding, C. A. (1998). Motivational readiness for change: Diet, exercise, and smoking. American Journal of Health Behavioral, 22 (4), p.248-258.**
- Buxton, K., Wyse, J., & Mercer, T. (1996). How applicable is the stages of change model to exercise behaviour? A review. Health Education Journal, 55, 239-257.**
- Campbell, D. T. & Stanley, J. C. (1963). Experimental and quasi-experimental designs for research. Boston: Houghton Mifflin Company.**
- Cohen, S. (1977). Statistical power analysis for the behavioral sciences. New York: Academic.**
- DiClemente, C. C., Prochaska, J. O., Fairhurst, S. K., Velcier, W. F., Velasquez, M. M., & Rossi, J. S. (1991). The process of smoking cessation: An analysis of precontemplation, contemplation, and preparation stages of change. Journal of Consulting and Clinical Psychology, 59, 295-304.**
- DiClemente, C. C., Prochaska, J. O., & Gibertini, M. (1985). Self-efficacy and the stages of change of smoking. Cognitive Therapy and Research, 9, 181-200.**

Dishman, R. K. (1994). Advances in exercise adherence. Champaign, IL: Human Kinetics.

Gorley, T., & Gordon, S. (1995). An examining of the transtheoretical model and exercise behavior in older adults. Journal of Sport and Exercise Psychology, 17, 312-324.

Gravetter, F. J. & Wallnau, L. B. (1996). Statistics for the Behavioral Sciences (4th ed). New York: West Publishing Co.

Hellman, E. A. (1997). Use of the stages of change in exercise adherence model among older adults with a cardiac diagnosis. Journal of Cardiopulmonary Rehabilitation, 17, 145-155.

Herrick, A. B., Stone, W. J., & Mettler, M.M. (1997). Stages of change, decisional balance, and self-efficacy across four health behaviors in a worksite environment. American Journal of Health Promotion, 12 (1), 49-56.

Horns, P. N., Ratcliff, L. P., Leggett, J. C., & Swanson, M. S. (1996). Pregnancy outcomes among active and sedentary primiporous women. Journal of Obstetric, Gynecologic, and Neonatal Nursing, 25 (1), 490-54.

Kemp, V. H. & Hatmaker, D. D. (1992). Health practices and anxiety in low-income, high and low-risk pregnant women. Journal of Obstetric, Gynecologic, and Neonatal Nursing, 22, 266-272.

Kost, K., Landry, D. J., & Darroch, J. E. (1998). Predicting maternal behaviors during pregnancy: Does intention status matter? Family Planning Perspectives, 30 (2), 79-88.

Lee, C. (1993). Attitudes, knowledge, and stages of change: A survey of exercise patterns in older Australian women. Health Psychology, 12, 476-480.

Lewis, B. S., & Lynch, W. D. (1993). The effect of physician advice on exercise behavior. Preventive Medicine, 22, 110-121.

Maeder, E. C. (1985). Effect of sports and exercise in pregnancy. Postgraduate Medicine, 77, 112-114.

Marcus, B. H., Banspach, S. W., Lefebvre, R. C., Rossi, F. S., Carleton, R. A., & Abrams, D. B. (1992). Using stages of change model to increase the adoption of physical activity among community participants. American Journal of Health Promotion, 6, 424-429.

Marcus, B. H., Eaton, C. A., Rossi, J. S., & Harlow, L. L. (1994). Self-efficacy, decision making and the stages of change: An integrative model of physical exercise. Journal of Applied Social Psychology, 24, 489-508.

Marcus, B. H., & Owen, N. (1992). Motivational readiness, self-efficacy, and decision making for exercise. Journal of Applied Social Psychology, 22, 3-16.

Marcus, B. H., Rakowski, W., & Rossi, J. S. (1992). Assessing motivational readiness and decision making for exercise. Health Psychology, 11, 257-261.

Marcus, B. H., Rossi, J. S., Selby, V. C., Niaura, R. S., & Abrams, D. B. (1992). The stages and processes of exercise adoption and maintenance in a worksite sample. Health Psychology, 11, 386-395.

Marcus, B. H., Selby, V.C., Niaura, R. S., & Rossi J. S. (1992). Self-Efficacy and the stages of exercise behavior change. Research Quarterly for Exercise and Sport, 63, 60-66.

Marcus, B. H. & Simkin, L. R. (1994). The transtheoretical model: applications to exercise behavior. Medicine and Science in Sports and Exercise, 26, 1400-1404.

Marcus, B. H., Emmons, M., Simkin-Silverman, R., Linnan, A., Taylor, E. R. Bock, B. C., Roberts, M. B., Rossi, J. S., & Abrams, D. B. (1998). Evaluation of motivationally tailored vs standard self-help physical activity interventions at the work place. American Journal of Health Promotion, 12, 246-253.

Nig, C. R., & Courneya, K. S. (1998). Transtheoretical model: Examining adolescent exercise behavior. Journal of Adolescent Health, 22, 214-224.

Peipert, J. F., & Ruggiero, L. (1998). Use of the transtheoretical model for behavioral change in women's health. Women's Health Issues, 8, 304-308.

Polit, D. F. & Hungler, B. P. (1995). Nursing research: Principles and methods (5th ed). Philadelphia, Pa: J. B. Lippincott Co.

Prochaska, O. J., & DiClemente, C. C. (1983). Stages and processes of self-change in smoking: Towards an integrative model of change. Journal of Consulting and Clinical Psychology, 51, 390-395

Prochaska, J. O., Redding, C. A., & Evers, K. E. (1997). The transtheoretical model and stages of change. In K. Glanz, F. M. Lewis, & B. K. Rimer (Eds.), Health behavior and health education: Theory, research, and practice (2nd ed., pp. 60-84). San Francisco: Jossey-Bass.

Prochaska, J. O., Velicer, W. F., Rossi, J. S., Goldstein, M. G., Marcus, B. H., Rakowski, W., Flore, C., Harlow, L. L., Redding, C. A., Rosenbloom, D., & Rossi, S. (1994). Stages of change and decisional balance for 12 problem behaviors. Health Psychology, 13, 39-46.

Sallis, J. F., Haskell, W. L., Fortmann, S. P., & Vranizan, S. P., Taylor, C. B. Solomon, D. S. (1986). Predictors of adoption and maintenance of physical activity in a community sample. Preventive Medicine, 15, 331-341.

Sallis, J. F., Hovell, M. F., & Hofsetter, C. R. (1992). Explanation of vigorous activity during two years using social learning variables. Social Science and Medicine, 34, 25-32.

SPSS, INC. (1993). SPSS base system syntax reference guide. Chicago: Author.

Sternfeld, B. (1997). Physical activity and pregnancy outcome. Sports Medicine, 23, 33-47.

U. S. Department of Health and Human Services (1991). Healthy People 2000: National health promotion and disease prevention objectives (DHHS Publication No. PHS 91-50212). Washington, DC: U. S. Government Printing Office.

Wang, T. W., & Apgar, B. S. (1998). Exercise during pregnancy. American Family Physician, 57 (8), 1846-1852.

Yeo, S. (1996, August). Exercise during pregnancy. The Female Patient, 21, 1-8.

Zeanah, M. & Schlosser, S. P. (1993). Adherence to ACOG guidelines exercise during pregnancy: Effect on pregnancy outcome. Journal of Obstetric, Gynecologic, and Neonatal Nursing, 22 (4), 329-335.

Zhang, J., & Savitz, D. A. (1996). Exercise during pregnancy among US women. Annals of Epidemiology