A CAUSAL MODEL OF THAI WOMEN'S PHYSICAL ACTIVITY DURING SECOND TRIMESTER OF PREGNANCY

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A CAUSAL MODEL OF THAI WOMEN'S PHYSICAL ACTIVITY DURING SECOND TRIMESTER OF PREGNANCY

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ABSTRACT

At present, various studies have confirmed that regular physical activity during pregnancy is beneficial for women's physical and psychological health. However, it has also been found that most women significantly reduce their physical activity during pregnancy due to many barrier factors. The purpose of this cross-sectional descriptive study was to examine the relationships, based on the Theory of Planned Behavior's constructs, among indirect and direct attitudes toward physical activity, indirect and direct subjective norms, indirect and direct perceived behavioral control, intention, and physical activity behavior during the second trimester of pregnancy. A path analysis was used to estimate the parameters of the hypothesized causal model. The sample of this study consisted of 272 pregnant women of Maharaj Nakorn Chiang Mai Hospital and the Health Promotion Hospital. Statistical analyses for descriptives and path analysis were conducted by using SPSS version 11.5 and LISREL 8.53 programs.

The results indicated that indirect attitude toward physical activity ($\beta = 0.13$, $p < .01$), indirect subjective norm ($\beta = 0.24$, $p < .001$) and indirect perceived behavioral control ($\beta = 0.18$, $p < .001$) had a significant positive indirect influences on intention via attitude, subjective norms, and perceived behavioral control, respectively. Attitude, subjective norms, and perceived behavioral control had a significant positive direct influence on intention ($\beta = 0.14$, $p < .01$; $\beta = 0.26$, $p < .001$; $\beta = 0.20$, $p < .001$, respectively). Indirect subjective norms, subjective norms and perceived behavioral control each had a significant positive indirect influence on physical activity behavior via intention ($\beta = 0.03$, $p < .05$; $\beta = 0.04$, $p < .05$; $\beta = 0.03$, $p < .05$, respectively). Intention had a significant positive direct influence on physical activity behavior ($\beta = 0.14$, $p < .05$).

The findings partially supported the Theory of Planned Behavior by providing an empirical explanation of women's physical activity behavior during the second trimester of pregnancy. These findings enhance a better understanding and add to the knowledge base of the Theory of Planned Behavior for developing appropriate intervention programs in the future.

KEY WORDS: PREGNANT WOMEN / PHYSICAL ACTIVITY / INTENTION / THEORY OF PLANNED BEHAVIOR'S CONSTRUCTS

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แบบจำลองเชิงสาเหตุของการทำกิจกรรมทางกายของสตรีไทยในระยะไตรมาสที่สองของการตั้งครรภ์
A CAUSAL MODEL OF THAI WOMEN'S PHYSICAL ACTIVITY DURING SECOND TRIMESTER OF PREGNANCY

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บทคัดย่อ

ในปัจจุบันผลจากการศึกษาวิจัยส่วนใหญ่ยืนยันว่าการทำกิจกรรมทางกายอย่างสม่ำเสมอในขณะตั้งครรภ์มีประโยชน์ต่อสุขภาพทางกายและจิตใจของสตรีตั้งครรภ์ อย่างไรก็ดีพบว่าสตรีส่วนใหญ่เมื่อตั้งครรภ์มักจะลดกิจกรรมทางกายลงอย่างเห็นได้ชัด ทั้งนี้เนื่องมาจากปัจจัยหลายประการที่สตรีตั้งครรภ์คิดว่าเป็นอุปสรรคต่อการทำกิจกรรมดังกล่าว การศึกษาวิจัยเชิงบรรยายครั้งนี้จึงมีวัตถุประสงค์เพื่อศึกษาปัจจัยที่คาดว่าอาจมีอิทธิพลทำนายการทำกิจกรรมทางกายของสตรีที่อยู่ในระยะไตรมาสที่สองของการตั้งครรภ์โดยใช้ทฤษฎีพฤติกรรมที่มีการวางแผน (The Theory of Planned Behavior) เป็นกรอบแนวคิดในการศึกษาวิเคราะห์อิทธิพลโดยหาความสัมพันธ์เชิงสาเหตุของอิทธิพลโดยอ้อมและโดยตรงระหว่างตัวแปร ความเชื่อเกี่ยวกับการทำกิจกรรมทางกาย (Indirect attitude toward physical activity) ความเชื่อในบรรทัดฐานของบุคคลสำคัญ (Indirect subjective norms) ความเชื่อในความสามารถควบคุมให้ทำพฤติกรรม (Indirect perceived behavioral control) ทัศนคติ(Attitude) บรรทัดฐานของบุคคลสำคัญ (Subjective Norms) การรับรู้ความสามารถในการควบคุมพฤติกรรม (Perceived Behavioral Control) ความตั้งใจที่จะทำกิจกรรมทางกาย (Intention) และการทำกิจกรรมทางกาย (Physical Activity)ในระยะไตรมาสที่สองของการตั้งครรภ์ กลุ่มตัวอย่างที่ศึกษาได้แก่ สตรีตั้งครรภ์ที่อยู่ในระยะไตรมาสสองที่มาฝากครรภ์ที่โรงพยาบาลมหาราชนครเชียงใหม่และโรงพยาบาลส่งเสริมสุขภาพเชียงใหม่ จำนวน 272 ราย ทำการวิเคราะห์อิทธิพลเชิงสาเหตุ (Path Analysis)โดยใช้โปรแกรม SPSS และ LISREL 8.53

ผลการศึกษาพบว่า ปัจจัยที่มีอิทธิพลโดยอ้อมทางบวกต่อความตั้งใจที่จะทำกิจกรรมทางกายได้แก่ ความเชื่อเกี่ยวกับการทำกิจกรรมทางกาย ($\beta = 0.13, p < .01$) ความเชื่อในบรรทัดฐานของบุคคลสำคัญ ($\beta = 0.24, p < .001$) และความเชื่อในความสามารถควบคุมให้ทำพฤติกรรม ($\beta = 0.18, p < .001$) สำหรับปัจจัยที่มีอิทธิพลโดยตรงทางบวกต่อความตั้งใจที่จะทำกิจกรรมทางกายได้แก่ ทัศนคติ บรรทัดฐานของบุคคลสำคัญและการรับรู้ความสามารถในการควบคุมพฤติกรรม ($\beta = 0.14, p < .01$; $\beta = 0.26, p < .001$; $\beta = 0.20, p < .001$) ส่วนปัจจัยที่มีอิทธิพลโดยอ้อมทางบวกต่อการทำกิจกรรมทางกายโดยผ่านความตั้งใจได้แก่ ความเชื่อในบรรทัดฐานของบุคคลสำคัญ บรรทัดฐานของบุคคลสำคัญและการรับรู้ความสามารถในการควบคุมพฤติกรรม ($\beta = 0.03, p < .05$; $\beta = 0.04, p < .05$; $\beta = 0.03, p < .05$) ความตั้งใจมีอิทธิพลโดยตรงทางบวกต่อการทำกิจกรรมทางกาย ($\beta = 0.14, p < .05$)

ผลการศึกษาครั้งนี้สนับสนุนทฤษฎีพฤติกรรมที่มีการวางแผนบางส่วนกล่าวคือ สามารถอธิบายความตั้งใจที่จะทำกิจกรรมทางกายและการทำกิจกรรมทางกายของสตรีที่อยู่ในระยะที่สองของการตั้งครรภ์ได้บางส่วน และจากผลการศึกษาครั้งนี้ยังทำให้ผู้วิจัยมีความเข้าใจการทำกิจกรรมทางกายของสตรีตั้งครรภ์ได้ดีขึ้น ซึ่งเป็นการเพิ่มเติมความรู้พื้นฐานเกี่ยวกับทฤษฎีพฤติกรรมที่มีการวางแผน ซึ่งจะช่วยให้เกิดการพัฒนาโปรแกรมสำหรับส่งเสริมให้สตรีตั้งครรภ์ทำกิจกรรมทางกายได้อย่างเหมาะสมต่อไปในอนาคต

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INTRODUCTION

Background and Significance of the Study

The Ninth National Health Development Plan (2002-2006) in Thailand presented a clear vision of the people-centered approach. One important element of the national health agenda had focused on "*Health Promotion*". Health promotion was a key strategy for the sustainable health development of individuals, families, communities, and societies. One recommended activity was to form a group of people or a club for health promotion in order to perform various activities that would enhance participants' health through exercising, eating proper diet, and creating environmental changes. A key success indicator indicated that more than 50% of the populations aged over 6 years perform exercise as appropriate to the age group. Particularly, pregnant women had been encouraged to exercise at least three times per week (Ministry of Public Health, 2001).

The prevalence rate of participations in physical activity of Thai people had increased from 21.3 in 1987 to 30.7 percent in 1997. However, the national survey in 2001 reported that while 24.2 percent of the Thai people aged 15 years and older performed regular physical activity, only 19.3 percent of women performed their exercise at least 30 minutes per day per week, despite the numerous projects designed to promote physical activity (National Statistical Office, 2001; Wibulpolprasert, n.d.). Similarly, according to the study of Kritpet (2001), the prevalence rate of people in Bangkok participating exercise and sport was approximately one-fourth (21.06%). Of this proportion, 61.19% (male 38.15% and female 23.04%) exercised, and 24.72% (male 18.61% and female 6.11%) played sport. Additionally, the National Statistical Office (2004) surveyed the Thai population aged 11 and over participating in exercise behavior in the North-east, Centre, North and South of Thailand, and Bangkok, and found the prevalence rate was 31.8%, 19.6%, 18.9%, 14.5%, and 15.2%, respectively. The total prevalence rate of Thai people aged 11 and over, who exercised one month

before interviewing was only 29.1 percent. Of this figure, it was found that males (55.9%) participated in exercise behavior more than female (44.1%). However, these findings revealed that the Thai population was still exercising at a low level, and there was no survey of the national prevalence rate of pregnant women.

Physical activity, as a complex behavior, is defined as *"any bodily movement produced by skeletal muscles that result in energy expenditure above the resting level"* (Casperson, Powell & Christenson, 1985). Physical activity could be classified by the context in which it occurred including leisure time, occupation, housework, and transportation. These activities could require light, moderate, or vigorous effort.

Leisure-time physical activity (LTPA) was defines as *"an activity undertaken in the individual's discretionary time that leads to any substantial increase in the total daily energy expenditure"* including sports, exercise, and recreational activities (Bouchard & Shephard, 1994; Pender, Murdaugh & Parsons, 2006). Exercise is defined as "physical activity that was planned, structured, repetitive, and purposive in the sense that improvement or maintenance of one or more components of physical fitness was an objective" (Casperson et al., 1985). Alternatively, exercise is leisure-time physical activity conducted with the intention of developing physical fitness (U.S. Department of Health and Human Services, 1999).

Transportation is referred to *"taking or moving from one place to another by such means as walking, riding, and driving"*. Occupation is referred to *"tasking job to be undertaken regularly"*. Owing to advanced technology, people tend to use automobiles, computers, and electronic communications which decrease daily physical activity. Moreover, energy expenditures required for domestic activities also decrease due to using technological electronic devices such as automatic, clothes washers and dryers, dishwashers, self-propelled vacuum cleaners, and powered lawn mowers (Haskell et al., 2007; Haskell, Blair, & Bouchard, 2007).

The Centers for Disease Control and Prevention (CDC) and the American College of Sports Medicine (ACSM) has recommended the accumulation of 30 minutes or more of moderate-intensity physical activity on most, and preferably all days of the week. Moderate intensity requires three to five metabolic equivalents (METS) (Artal, O'Toole & White, 2003). The CDC-ACSM also recommends that

more intense exercise performed in 20-60 minute sessions on three to five days a week results in higher levels of physical fitness. Based on the growing evidence of physical activity benefits in pregnancy, the American College of Obstetricians and Gynecologists (ACOG) (2002) suggested that, in the absence of either medical or obstetric contraindications, pregnant women should also adopt this recommendation.

Regular physical activity not only contributes positively to people's physical and psychological health but also reduces their risk of developing cardiovascular, hypertensive and metabolic diseases (Dishman, Heath & Washburn, 2004; U.S. Department of Health and Human Services, 1999). Maintenance of regular physical activity was largely dependent on sources of personal and social motivation within a person's day-to-day environment (Pender, Murdaugh & Parsons, 2006). As a result, performing physical activity is essential for women even though they are pregnant.

In the past, many pregnant women discontinued performing physical activities because they feared of potential complications for both mother and fetus (Artal et al., 2003). However, various studies confirm that physical activity during pregnancy is beneficial for women. These positive effects include greater sense of well-being, increased energy, improved self-image, improved sleep, increased sense of control, improved self-esteem, decreased depression, decreased backaches, better weight control, improved appearance and posture, enhanced strength and endurance (Brayshaw 2003; Clarke, Gross & Psychol, 2004; Downs & Hausenblas, 2003; Ezmerli, 2000; Larsson & Lindqvist, 2005; Rankin, 2002). Shorter labor and fewer obstetric interventions have also been reported. Moreover, pregnant women who exercise regularly tend to continue it throughout the postpartum period (Brayshaw 2003; Ezmerli, 2000; Larsson & Lindqvist, 2005; Sternfeld, 1997). Leiferman and Evenson (2003) found that women who failed to engage in regular leisure-time physical activity before and during their pregnancy were more likely to give birth to low birth-weight babies compared with those who remained active. Furthermore, previously active women who stopped physical activity during pregnancy were more likely to give birth to low birth-weight or very low birth-weight babies than those who remained active throughout pregnancy.

Interestingly, epidemiological studies show that physical activity might improve glycemic control in gestational diabetes, especially in obese women. This is

congruent with Dempsey et.al. (2004) who reported that recreational physical activity performed before and/or during pregnancy was associated with risk reduction of gestational diabetes mellitus (GDM). Likewise, Rudra, Williams, Lee, Miller and Sorensen (2006) studied perceived a correlation between exertion in physical activity and risk of GDM. The results showed that the risk of gestational diabetes was markedly lower for women who reported very strenuous to maximal exertion in usual activities during the year before pregnancy versus those who reported negligible or minimal exertion. There was a direct inverse relation between perceived exertion and risk of gestational diabetes. Furthermore, physical activity could reduce incidence of pregnancy induced hypertension (PIH), a serious maternal-fetal disease (Weissgerber, Wolfe & Davies, 2004). Occupational and leisure-time physical activity was associated with a reduced incidence of preeclampsia (Weissgerber, et al., 2004). Sorensen et al. (2003) found that women who engaged in any regular physical activity during early pregnancy, compared with inactive women, experienced a 35% reduced risk of preeclampsia. Those who engaged in light or moderate activities experienced a 24% reduced risk of preeclampsia. Moreover, recreational physical activity performed during the year before pregnancy was associated with similar reductions in preeclampsia risk.

Despite recognized benefits, most women decreased their engagement in physical activity and some of them stopped exercising during pregnancy. Zhang and Savitz (1996) reported that nearly 60% of pregnant women in the U.S. were sedentary. Similar or higher proportions of non-exerciser were seen in other countries. For example, Piravet and Saksirinukul (2001) reported that 58% of Thai pregnant women did not exercise.

Rutkowska and Lepecka-Klusek (2002) studied the role of physical activity in preparing women for pregnancy and delivery in Poland. They reported that before pregnancy, most of the women willingly spent their free time in active recreational activities, but they significantly reduced their physical recreation during pregnancy. In addition, Ning et al. (2003) reported that active women who continued to exercise during pregnancy decreased intensity and duration of exercise compared with the year before pregnancy. With regard to the study of Clarke, Rousham, Gross, Halligan, and Bosio (2005), the findings showed that from 16 to 34 weeks of gestation,

the mean of self-reported daily activity level was declined significantly. The mean of recreational activity ratio decreased significantly between 25 and 38 weeks but no significant changes were observed in the mean of domestic activity ratio. Similarly, Rousham, Clarke and Gross (2006) found that the mean of 24h physical activity levels decreased significantly from second to third trimester as assessed by self-report interview and accelerometry.

There were many factors associated with discontinuing or declining physical activity during pregnancy. Barriers to engaging in physical activity included having children (in multiparas), less education and low household incomes; having a prepregnancy BMI of ≥ 25; a higher weight gain in pregnancy; and some adverse pregnant and neonatal outcomes (Hinton & Olson, 2001; Mottola & Campbell, 2003; Piravet & Saksirinukul, 2001). Similarly, Downs and Hausenblas (2004) studied perceived behavioral control and found that the control beliefs obstructing exercise during pregnancy were physical limitations or restrictions, tiredness/fatigue, time limitation, weight gain, caring for other children, fear of harming self and baby, bad weather, and no motivation/ feeling lazy. Additionally, pregnancy was associated with several physiologic changes; thus, responses to exercise were different between women in the pregnant and nonpregnant states (Ezmerli, 2000). Rutkowska and Lepecka-Klusek (2002) reported that physical activity of Polish women dramatically changed during pregnancy due to lack of knowledge regarding the benefits of physical activity and their own abilities. Only a few Polish women perceived the benefits of physical activity in maintaining and improving their own health.

Moving to the Thai pregnant women context, it was evident that there were several factors inhibiting regular exercise. Most Thai pregnant women now work outside the home and perform housework as well. Thus, they could not engage in recreational physical activity because of having limited time and being too weary to exercise. Moreover, a number of researchers reported that Thai pregnant women were also lack of knowledge. They did not know how to engage in physical activity properly as a part of their daily life. Some Thai women were afraid that exercise might be harmful to their fetus. Additional barriers to perform recreational physical activity were protruding abdomen and lack of suitable places for walking (Patanavanichnun, 2000; Thanomroop, 2000; Wiriyawattana, 2002).

Currently, the type and the amount of physical activity for Thai pregnant women are based on recommendations from Western countries. Little was known about factors that found in the Western literature could be generalized to Thai pregnant women. The differences in culture might have influence on the way those individuals participated in physical activity.

Developing appropriate interventions to increase physical activity levels in Thai pregnant women are needed for future. Thus, understanding pregnant women's thoughts, feelings, and beliefs regarding physical activity is foundational to develop further effective interventions. However, there is a scarcity of studies that provide sound descriptions of the Thai physical activity context; therefore, the study of "A causal model of Thai women's physical activity during second trimester of pregnancy" by using the framework of the Theory of Planned Behavior was proposed.

Theoretical Framework

Several theoretical approaches have been developed to guide physical activity research. The Theory of Planned Behavior (TPB) is one of the most widely used for understanding physical activity, especially in the exercise domain (Biddle & Nigg, 2000; Hagger, Chatzisarantis, & Biddle, 2002).

The TPB is a belief-based social cognitive theory developed by Ajzen (1991) to understand and predict human behavior based on people's intentions (motivation/plan) to perform or not perform a behavior. Most reported studies supported the TPB as applied across various behaviors, including physical activity and consumption behavior. It indicated that all antecedents (attitude, subjective norm, and perceived behavioral control) had been found to be significant predictors of behavioral intention.

The TPB was actually derived from the Theory of Reasoned Action (TRA) which was limited to the prediction of such behaviors under full volitional control; therefore, Ajzen (1985) integrated the concept of perceived behavioral control to explain and predict behaviors under partial volitional control (Ajzen, 1985; Ajzen, 1991). The TPB postulated that even though individuals' attitudes and/or subjective norms were positive, if individuals perceived that resources or capabilities were limited, their intentions to perform certain behaviors might be weak (Ajzen & Madden, 1986). In other words, despite positive attitudes and/or subjective norms, individuals

might have low intentions to execute behaviors due to their perception of having little control over performing the behavior.

While attitudinal and normative components indirectly influenced on behavior through intention, perceived behavioral control might influence behavior either directly or indirectly. The direct effect of perceived behavioral control on behavior occurred in cases where actual control (non-motivational factors) over the behavior was low. Additionally, the direct effect of perceived behavioral control was significant when the perceptions of control over the behavior were realistic or accurate. On the other hand, the indirect effect of perceived behavioral control occurred under conditions where the perceptions of control had motivational implications for behavioral intention (Ajzen, 1991).

Intention represented people's strategy for carrying out an action, and it was the central determinant of their behavior. Intention was determined by attitude, subjective norm, and perceived behavioral control. Attitude was a person's positive or negative evaluation of performing a behavior. Subjective norm was the perceived social pressure from significant others to engage or not engage in a behavior. Finally, perceived behavioral control was a person's perceived ease or difficulty in performing a behavior. Consequently, the main TPB proposition was that people intended to engage in a behavior when they evaluated it positively (attitude), believed that significant others wanted them to participate in it (subjective norm), and perceived it to be under their control (perceived behavioral control) (Downs & Hausenblas, 2003).

Ajzen and Fishbein (1980) suggested that a measure of behavior should include four elements: action, target, context, and time. For an accurate prediction, it was important that a measure of behavioral intention incorporated the identical elements of that behavior. Furthermore, intention was able to change over time, and a measure of intention taken some time prior to observation of the behavior might differ from the intention at the time that the behavior was observed. The longer the time interval between the measurement of intention and behavior, the less accurate the prediction of the behavior (Ajzen & Fishbein, 1980). Therefore, to obtain an accurate prediction, it was important to measure intention as close as possible to the behavioral observation.

The TPB has been tested among Western pregnant women and other populations. The literature suggestes that the TPB explaines physical activity well. However, there is a lack of knowledge regarding the adequacy of the TPB in explaining physical activity among Thai pregnant women. Therefore, it was advised that the TPB should be examined for cultural appropriateness prior to its application in Thai culture.

Thus, this study examined the relationship among the TPB's constructs, including attitude toward physical activity, subjective norm, perceived behavioral control, intention, and physical activity during second trimester of pregnancy among Thai women. The theoretical framework of TPB (Figure 1) was tested for the capacity to predict physical activity behavior in pregnancy.

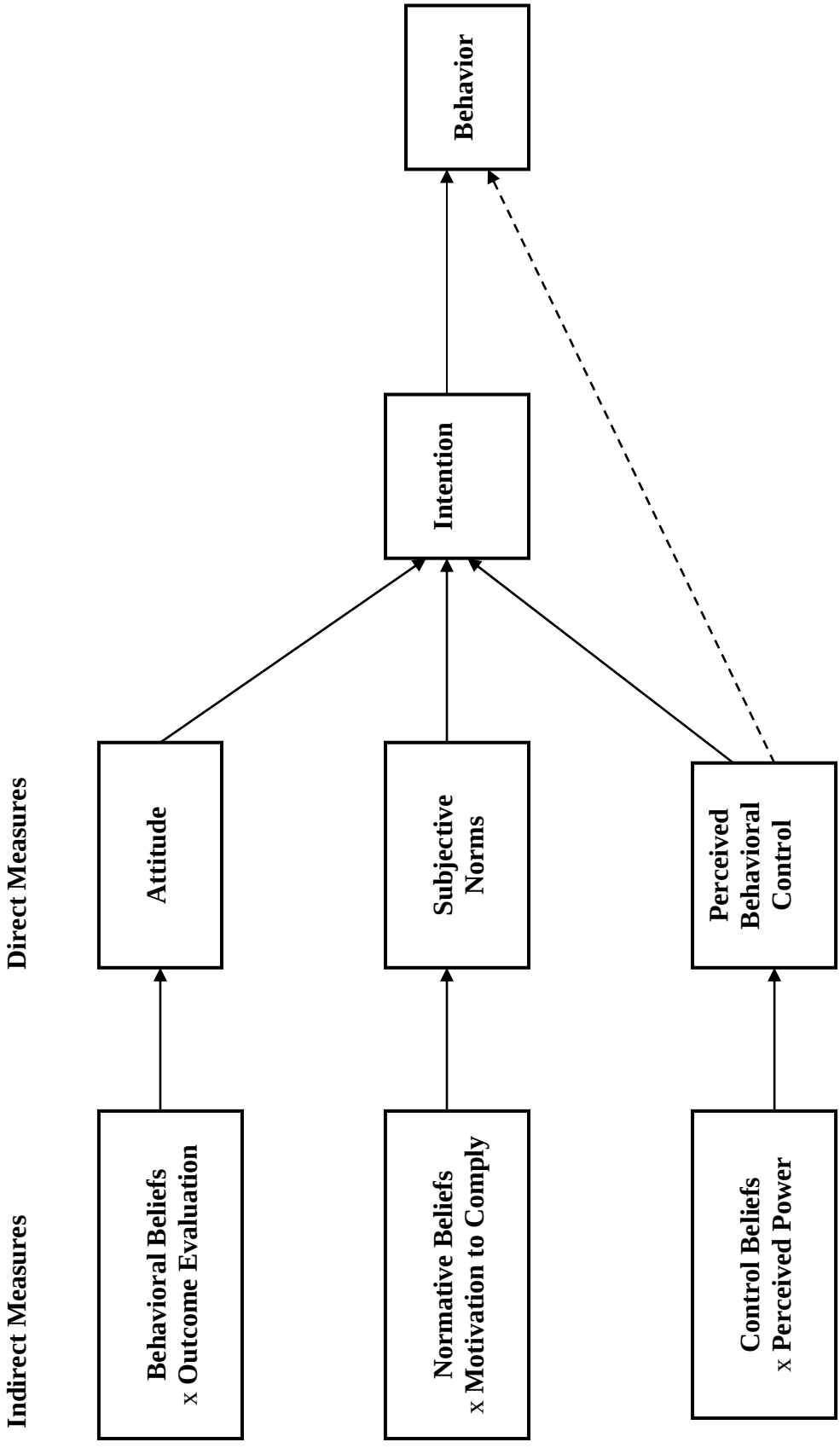


Figure 1 The Theory of Planned Behavior (Ajzen, 1991)

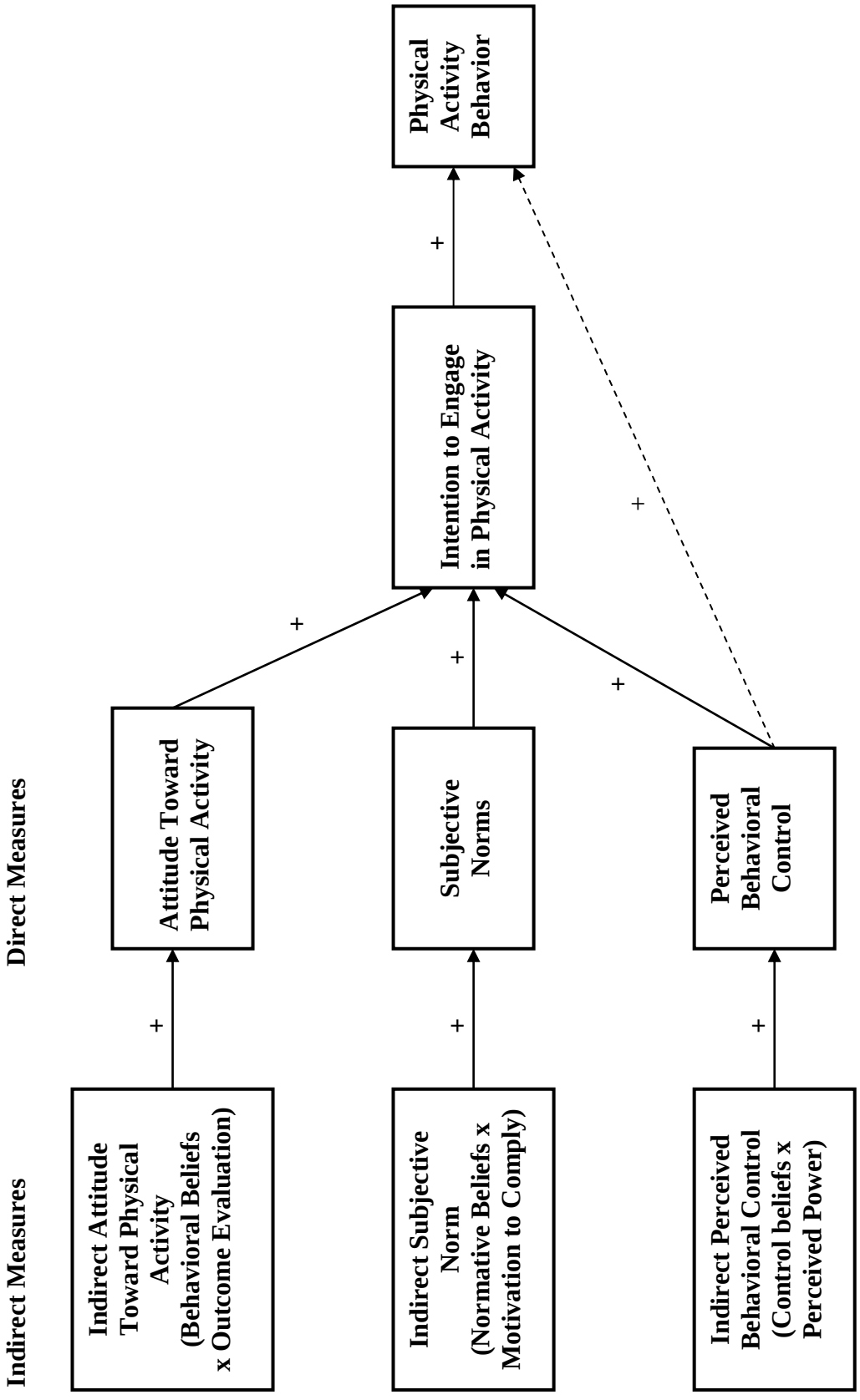


Figure 2 The theoretical framework of the study based on the TPB

Research Questions

1. What are the relationships among the TPB's constructs including indirect attitude toward physical activity, indirect subjective norms, indirect perceived behavioral control, attitude toward physical activity, subjective norms, perceived behavioral control, intention, and physical activity in pregnant women during the second trimester?

2. How effective are the indirect and direct measurements of the TPB' constructs in predicting women's physical activity during the second trimester of pregnancy?

Purpose of the Study

The purpose of this study was to examine the relationships among the TPB's constructs, including indirect attitude toward physical activity, indirect subjective norms, indirect perceived behavioral control, attitude toward physical activity, subjective norms, perceived behavioral control, intention, and physical activity of pregnant women during their second trimester.

Hypotheses

As for pregnant women during their second trimester, the research hypotheses for this study were stated as the following:

1. Indirect attitude toward physical activity, indirect subjective norms and indirect perceived behavioral control have a positive indirect influence on intention via attitude toward physical activity, subjective norms, and perceived behavioral control, respectively.

2. Attitude toward physical activity, subjective norms and perceived behavioral control have a positive direct influence on intention.

3. Indirect attitude toward physical activity, indirect subjective norms and indirect perceived behavioral control have a positive indirect influence on physical activity via attitude toward physical activity, subjective norms, perceived behavioral control, and intention, respectively.

4. Attitude toward physical activity, subjective norms and perceived behavioral control have a positive indirect influence on physical activity via intention.

5. Intention and perceived behavioral control have a positive direct influence on physical activity.

Definition of Terms

The conceptual definitions for the TPB's construct as applied to physical activity during pregnancy were described below.

Indirect Measures

Indirect Attitude toward Physical Activity

Indirect attitude toward physical activity were measured by a salient set of behavioral beliefs multiplied with outcome evaluations. The total score ranged from 12 to 300.

Behavioral beliefs were constructed from beliefs and evaluation items regarding physical activity during pregnancy arising from an elicitation interview, and developed by the researcher. Behavioral beliefs were measured by the Behavioral Beliefs Questionnaire (BBQ) using a 5-point Likert-type scale *(1 = very unlikely to 5 = very likely)* of the 12 behavioral beliefs, and higher scores indicated more positive beliefs to perform physical activity during pregnancy.

Outcome evaluations were measured by the subjects' evaluation of consequence of performing physical activity during pregnancy. Outcome evaluations were measured by the Outcome Evaluations Questionnaire (OEQ) rating on a 5-point Likert-type scale *(1 = very unimportant to 5 = very important)* of 12 outcome evaluations. These items were developed by the researcher based on an elicitation interview, and higher scores indicated more positive outcome evaluations in consequence of performing physical activity during pregnancy.

Indirect Subjective Norms

Indirect subjective norms were measured by a set of normative beliefs multiplied with motivation to comply. The total score ranged from 6 to 150.

Normative beliefs were assessed by the strength of significant others beliefs about whether the subjects should perform physical activity during pregnancy, and measured by the Normative Beliefs Questionnaire (NBQ) rating on a 5-point Likert-type scale *(1 = definitely not true to 5 = definitely true)* of 6 normative beliefs. These items were developed by the researcher based on an elicitation interview, and higher scores reflected greater influence by the pregnant women's significant others.

Motivation to comply was assessed by the corresponding motivation to comply with what the salient referents want the subjects to perform physical activity during their pregnancy, and measured by the Motivation to Comply Questionnaire (MCQ) rating on a 5-point Likert-type scale *(1 = not at all to 5 = very much)* of 6 motivation to comply. These items were developed by the researcher based on an elicitation interview, and higher scores reflected greater influence by the pregnant women's significant others.

Indirect Perceived Behavioral Control

Indirect perceived behavioral control was measured by a set of control beliefs multiplied by the perceived power. The total score ranged from 15 to 375.

Control beliefs were assessed by the corresponding judgments of the situation, whether it was easy or difficult to perform physical activity during pregnancy, and measured by the Control Beliefs Questionnaire (CBQ) rating on a 5-point Likert-type scale *(1 = very difficult to 5 = very easy)* of 15 control beliefs. These items were developed by the researcher based on an elicitation interview, and higher scores reflected greater control beliefs to perform physical activity during pregnancy.

Perceived power was measured by the corresponding judgment of the likelihood to perform physical activity when the facilitating or inhibiting factors identified as 15 item, and measured by the Perceived Power Questionnaire (PPQ) rating on a 5-point Likert-type scale *(1 = very unlikely to 5 = very likely)*. The PPQ was developed by the researcher based on an elicitation interview, and higher scores reflected greater perceived power to perform physical activity during pregnancy.

Direct Measures

Attitude toward Physical Activity

Attitude toward physical activity was an individual's positive or negative evaluation of performing a given behavior (Ajzen & Fishbein, 1980).

Operationally, attitude toward physical activity was measured by the Attitude toward Physical Activity Questionnaire (APAQ) using a 5-point semantic differential bipolar scale (range from *1 = very negative* to *5 = very positive*) of nine items. The scale consisted of adjective pairs assessing the instrument aspect and the affective aspect of attitude. The APAQ was developed by the researcher based on Ajzen (2002) and an elicitation interview. The higher scores indicated the more positive attitude toward physical activity during pregnancy.

Subjective Norm

Subjective norm was the perceived social pressure from significant others to perform or not perform a given behavior (Ajzen & Fishbein, 1980).

Operationally, subjective norm was measured by the Subjective Norm Questionnaire (SNQ). This scale was determined by a four-item rating on a 5-point Likert-type scale *(1 = strongly disagree to 5 = strongly agree)*, and developed by the researcher based on Ajzen (1991) and an elicitation interview. The higher scores indicated greater influence of the significant others on performing physical activity during pregnancy.

Perceived Behavioral Control

Perceived behavioral control was an individual's perception of ease or difficulty in performing a given behavior (Ajzen & Fishbein, 1980).

Operationally, perceived behavioral control was measured by the Perceived Behavioral Control Questionnaire (PBCQ). This scale was determined by a three-item rating on a 5-point Likert-type scale *(1 = very difficult to 5 = very easy; and 1 = strongly disagree to 5 = strongly agree)*, and developed by the researcher based on Ajzen (1991) and an elicitation interview. The higher scores indicated greater perceived behavioral control over performing physical activity during pregnancy.

Intention

Intention was the likelihood of an individual's motivation to perform or not perform a given behavior (Ajzen, 1991; Ajzen & Fishbein, 1980).

Operationally, intention to engage in physical activity was measured by the Intention Questionnaire (INTQ). This scale was developed by the researcher based on Ajzen (1991) and an elicitation interview. This scale consisted of an eight-item rating on a 5-point Likert-type scale *(1 =definitely do not to 5 = definitely do; and 1 = definitely not true to 5 = definitely true)*. The higher scores indicated greater intention to perform physical activity during pregnancy.

Behavior

A specific action relevant to a function of salient information, or beliefs, was performed by an individual (Ajzen, 1991; Ajzen & Fishbein, 1980).

Operationally, women's physical activity during the second trimester of pregnancy was measured with the Pregnancy Physical Activity Questionnaire (PPAQ). This scale was translated into Thai and modified from the questionnaire developed by Chasan-Taber et al. (2004). It was a semi-quantitative questionnaire that asked the subjects to report the time spent participating in 28 activities including household/caregiving (14 activities), occupation (six activities), sports/exercise (five activities), and transportation (three activities). For each activity, the subjects were asked to select the category that best approximates the amount of time spent in that activity per day or week during the second trimester of pregnancy.

In summary, the purpose of this study was to examine the relationships among the TPB's constructs, including behavioral beliefs, normative beliefs, control beliefs, attitude toward physical activity, subjective norms, perceived behavioral control, intention, and physical activity of women during their second trimester of pregnancy.

The expected benefits from this study allow the researcher not only to better understand physical activity behavior of women during their second trimester of pregnancy but also to develop the effective intervention programs in the future in order to promote active lifestyles among Thai pregnant women.

CHAPTER II
LITERATURE REVIEW

This research will examine the predictors of woman's physical activity during the second trimester of pregnancy. The Theory of Planned Behavior provides the framework for this study. To date, its application among various populations of pregnant women is narrow and it has not been extensively tested across cultures. In this chapter, to better understand the constructs' importance for the study of Thai pregnant women's physical activity, the following topics are reviewed.

1. Physical, physiological, and psychological changes during the second trimester of pregnancy
    - 1.1 Maternal considerations
    - 1.2 Fetal considerations
    - 1.3 Physical, Physiological, and Psychological Changes related to Physical Activity
2. Physical activity and pregnancy
    - 2.1 Definition of physical activity
    - 2.2 Prevalence of physical activity among pregnant women
    - 2.3 Benefits of physical activity during pregnancy
    - 2.4 Recommendation of physical activity during pregnancy
3. Theoretical framework and empirical studies
    - 3.1 Construct of the Theory of Planned Behavior
    - 3.2 Empirical Studies of the Theory of Planned Behavior in physical activity

1. Physical, Physiological, Psychological, and Fetal Changes During the Second Trimester of Pregnancy

Pregnancy is an eventful period in a woman's life. From the moment of conception through the postpartum period, significant changes occur in the pregnant woman's body. However, it is considered a normal, temporary, physiologic process that affects the woman physically and emotionally. During this complex process it is necessary to support and nourish the fetus and to prepare the woman for childbirth and lactation (Novak & Broom, 1999; Rankin, 2002; Thompson, 1995; Walsh, 2001). For this reason, pregnancy is distinguished by a number of physiological and endocrinal adjustments, directed toward the creation of an optimal environment for the developing fetus. Every organ in the expectant mother as well as her personality is involved in this complex process. A total period of pregnancy is around 40 weeks (280 days), though pregnancy lengths between 38 and 42 weeks are considered normal.

The period of pregnancy can be divided into three equal parts of 13 weeks each. The first 13 weeks of pregnancy are generally referred to as the first trimester. The second trimester begins with the 14^{th} week of gestation through the end of the 27^{th} week. The third trimester of pregnancy begins at the 28^{th} week through delivery (McKinney, James, Murray & Ashwill, 2005).

During the second trimester of pregnancy, an expectant mother's body continuously changes. Physiologic changes provide for the growth and increasing need of the still immature fetus, and the maintenance of the mother's own state of wellness. During this time, the uterus extends out of the pelvis but uterine enlargement has not yet produced discomfort. Therefore, many pregnant women report that this time is the most comfortable period during pregnancy because some distressing symptoms during the first trimester such as nausea, dizziness, fatigue and urinary frequency have subsided. Hence, an expectant mother develops a sense of physical well-being. She also has more energy, and is less moody (McKinney et al., 2005; Sherwen, Scoloveno & Weingarten, 1995; Thompson, 1995).

During the first trimester of pregnancy, this is a critical period for both developments of the embryo and changes in an expectant mother's body system. A women may experience some kinds of discomfort such as nausea, dizziness and fatigue, which are unsettling and at times unpleasant. Some symptoms continue for

several weeks or months. By this time, she also has concerned over the possibility of miscarriage. Additionally, she may be emotionally labile, with mood swings from joy to despair (London, Ladewig, Ball & Bindler, 2003; McKinney, et al., 2005; Sherwen et al., 1995).

The third trimester of pregnancy is an uncomfortable time for most women because physical discomforts increase. Many of them are related to the large size of the uterus and hormonal changes. Furthermore, some woman may experience shortness of breath, low backache, tingling or numbness in the fingers, edema of the lower extremities and varicose veins. Pregnant women may worry about the health and safety of their unborn child, labor, and delivery. Thus, the discomforts are a matter of concern during the third trimester. Because of the discomforts and anxiety occurring during the first and third trimesters of pregnancy, the woman may stop engaging or decreasing participating in physical activity. Likewise, Clarke, Gross and Psychol (2004) found that 39% of the women who reported participating in some form of weekly exercise before pregnancy did not pursue any similar activities during pregnancy.

Therefore, the second trimester of pregnancy is the most physically enjoyable for a woman when compared with the first and third trimesters. It is an appropriate time to encourage the pregnant woman to perform physical activity.

1.1 Maternal Considerations:

1.1.1 The reproductive system

The uterus continues to enlarge during the second trimester of pregnancy. Growth of the myometrium is attributed mainly to the hypertrophy of muscle cells. As pregnancy progresses, the uterus becomes a soft muscular sac, which exerts increasing pressure on the broad and round ligaments. Braxton Hicks contractions may be experienced. These may become more frequent and intense as the pregnancy progresses (McKinney et al., 2005; Rankin, 2002; Sherwen et al., 1995).

The most obvious cervical changes occur in color and consistency. Estrogen causes the cervix to become congested with blood. Collagen fibers in the connective tissue of the cervix continue to change and cervical softening progresses. The cervical glands continue to proliferate during pregnancy. The cervix

looks like a honeycomb that filled with mucus. Because of eversion or extension of glands and epithelium, the cervix appears to have lesionlike, red velvety patches. Even though it is called cervical erosions, these patches represent a normal occurrence during pregnancy rather than an inflammatory or ulcerating process (McKinney et al., 2005; Sherwen et al., 1995).

Estrogen causes the cells lining the vagina to increase in size, number, and vascularization. Therefore, the vaginal mucosa thickens. The vaginal wall elongates and becomes looser as a result of the loosening of the connective tissue. Vaginal, as well as cervical, secretions increase during the second trimester (McKinney et al., 2005; Novak & Broom, 1999).

During the first trimester, the major function of the ovary is to secrete progesterone for the first six to seven weeks after conception. Progesterone is called the hormone of pregnancy, and if the pregnancy is to be maintained, adequate pregesterone is needed from the corpus luteum. By the second trimester, the placenta is developed and the corpus luteum is not needed to maintain pregnancy. The degenerative process that begins at a late state in the first trimester continues; therefore, during the second trimester, the ovary enlarges in size (McKinney et al., 2005; Sherwen et al., 1995).

Breasts and nipples change in size and appearance because of the effects of estrogen and progesterone. The areola of the breasts are noticeably broader and the color of the areola and nipples deepens to a dark red in fair-skinned women, brown in brunettes, and black in dark-skinned women. Sebaceous glands, the *Tubercles of Montgomery*, become more prominent during pregnancy and secrete a substance that lubricates the nipples (McKinney et al., 2005; Sherwen et al., 1995).

1.1.2 The cardiovascular System

Cardiovascular changes are necessary to meet the extra demands oxygen for the body tissues, the growing fetus, and the maternal organs. There is an increase in heart rate, stroke volume, and blood volume, which cause an increase in cardiac output. As pregnancy progresses, the heart is pushed upwards to the left by elevation of the diaphragm. The apex of the heart is moved to the side (Brayshaw, 2003; Ezmerli, 2000; Rankin, 2002; Sherwen et al., 1995; Thompson, 1995).

During the second trimester, the blood volume expands more rapidly than at any other period of pregnancy. As a result, hemodilution may occur and cause the hemoglobin concentration to decrease. This is referred to as physiologic anemia of pregnancy. The iron needs of the fetus and mother also increase as a result of increased maternal blood volume and fetal and maternal storage of iron (Artal, O'Toole and White, 2003; McKinney et al., 2005; Rankin, 2002; Sherwen et al., 1995).

Cardiac output, which rises markedly by the end of the first trimester, is about 40% beyond non-pregnant levels during the second trimester. The rise in cardiac output is necessary to meet increased blood flow to the uterus, the kidneys, and maternal-placental circulation, and to adapt to the increased plasma volume during the second trimester. Furthermore, most studies show that maternal stroke volume increases about 10% by the end of the first trimester and there is a 20% increase in heart rate during the second and third trimesters (Artal, O'Toole & White, 2003). The heart rate, which is raised about by eight beats per minute during the first trimester, increases by an additional two to seven beats per minute during the second trimester and it is, therefore, about 10 to 15 beats higher than that prior to pregnancy (Sherwen et al., 1995; London, et al., 2003).

Despite the greater cardiac workload during the second trimester, blood pressure tends to decrease, because the total peripheral resistance continues to decline. Thus, mean arterial pressure decreases 5-10 mm. Hg by the middle of the second trimester; however, vasopressin effects increase blood pressure levels to normal by term (Artal, et al., 2003; Novak & Broom, 1999). Arterial blood pressure is also affected by the position of the pregnant woman. Blood pressure is lowest when the pregnant woman is in a lateral recumbent position, higher in a sitting position, and highest in a standing position. Additionally, as the uterus increases in size, it causes partial compression on the inferior vena cava and abdominal aorta, resulting in less blood return to the heart. Stroke volume may then decrease.

The woman's skin requires increased circulation to dissipate the heat generated by increased metabolism during pregnancy. As a result, pregnant woman may experience feelings of warmth. Erythema of the hands (palmar erythema) may occur around the fifth to sixth month and may be related to peripheral vascular changes (Artal et al., 2003; McKinney et al., 2005; Novak & Broom, 1999; Sherwen et al., 1995).

1.1.3 The respiratory System

The changes of the respiratory system during pregnancy are both physiological and mechanical (Brayshaw, 2003; Sherwen et al., 1995). As the blood volume increases, the maternal respiratory system responds so that the lungs can oxygenate the additional blood required during pregnancy. A greater demand of oxygen (a 20% to 30% increase in the second and third trimester) results from the increased BMR and oxygen requirements for the pregnant woman and her fetus. During the second trimester, the expanding uterus presses against the diaphragm. Therefore, the diaphragm is elevated and the substernal angle is increased, causing the rib cage to expand and flares. The increase in the chest circumference compensates for the elevated diaphragm, so that diaphragmatic excursions (elevation and lowering of the diaphragm during breathing) are greater, and tidal volume increases. As pregnancy progress, women may experience shortness of breath (Novak & Broom, 1999; London, et al., 2003; Sherwen et al., 1995).

In the early pregnancy, the woman breathes more deeply but not more frequently under the influence of progesterone. Progesterone plays a role in decreasing airway resistance by relaxing the smooth muscle in the respiratory tract. The respiratory center has increased sensitivity to carbon dioxide. Therefore, minute ventilation increases by 50% above pre-pregnancy levels, which is far more than the need for gas exchange. The capacity for ventilation remains essentially normal throughout pregnancy. Maternal respiratory rate does not vary much during pregnancy from its usual frequency of 14 to 15 per minute. The pregnant woman does, however, breathe more deeply, so that tidal volume and minute volume increase. Tidal volume progressively increases 35 to 50% as pregnancy develops, and minute ventilation rises about 50%. Residual volume, functional residual capacity, and expiratory reserve volume decrease about 20%. By 22 to 24 weeks, the greatest increase (5-10%) in inspiratory capacity is reached (McKinney et al., 2005; Novak & Broom, 1999; Rankin, 2002; Sherwen et al., 1995).

Nasal stuffiness and nosebleeds (epistaxis) are frequently experienced because of edema and vascular congestion of the nasal mucosa, presumably the effects of estrogen (Novak & Broom, 1999; London, et al., 2003).

1.1.4 The urinary System

During the second trimester, changes in renal function may be attributed to factors such as expanded plasma volume and increased maternal and placental hormones: adrenocorticotropic, antidiuretic, aldosterone, and thyroid hormones. The kidneys continue to increase in size. Dilation of the kidneys and ureters, particularly on the right side, takes place. Ureteral dilation may be caused by the expanding uterus. The glomerular filtration rate rises to as much as 50% above the nonpregnant level to process waste materials from the mother and fetus. Therefore, during a normal pregnancy, the urinary system seems to work harder. About 20% of cardiac output flows to the kidneys during rest. By midpregnancy, renal plasma flow has increased to as much as 50% over the nonpregnant level. During the second trimester, glucose may at times appear in the urine because of the increased glomerular filtration rate. Women with glucosuria need to be evaluated carefully. Although occasional episodes may be normal, they may also be a sign of diabetes, which may become apparent in the second trimester (Novak & Broom, 1999; London, et al., 2003; Sherwen et al., 1995).

The uterus extends into the abdominal cavity during the second trimester, so there is less pressure on the bladder. Urinary frequency thus subsides during first trimester, and the woman feels more comfortable (London, et al., 2003; McKinney et al., 2005).

1.1.5 The musculoskeletal System

Under the influence of hormones, possibly including relaxin and progesterone, the sacroiliac, sacrococcygeal, and pubic joints relax. Additionally, there is a progressive lumbar lordosis causing a displacement in the woman’s center of gravity. To compensate for the lordosis, pregnant woman increases the anterior flexion of the cervical spine and abduct the shoulders. Moreover, as the uterus grows larger, the pregnant woman’s center of gravity shifts, and compensatory changes in posture also occur. These anatomical changes may cause a low level of back pain because of the increased strain on the muscles and ligaments of the vertebral column. The weight of the uterus can also pull on the round ligament and cause lower abdominal and inguinal pain. Leg cramps, numbness, or aching are also caused by both uterine

pressure on nerves and changes in phosphorus and calcium levels (Brayshaw, 2003; Ezmerli, 2000; Novak & Broom, 1999; Rankin, 2002; Sherwen et al., 1995).

The increased size and weight of the breasts place a strain on the muscles of the upper back and chest. Some women may experience upper back pain during this time especially at the end of the second trimester (Brayshaw, 2003; London, et al., 2003; Sherwen et al., 1995).

1.1.6 The gastrointestinal System

Hyperemia of the gums continues, in response to the high circulating levels of hormones. During the second trimester, epulis (small vascular swellings on the gum) may become apparent. In response to the enlargement of the uterus during the second trimester, the stomach shifts to the side and the intestines are pushed upward. Pressure on the stomach decreases capacity and requires the consumption of smaller meals, especially late in the second trimester (London, et al., 2003; Sherwen et al., 1995).

Progesterone causes functional changes of the liver and gallbladder. The liver changes little in size, structure, and form during pregnancy. The emptying time of the gallbladder is prolonged during pregnancy. After the first trimester, gallbladder volume also increases; therefore, the organ holds more and empties more slowly. Decreased bile flow and increased retention of bile salts in the gallbladder may be implicated in the development of generalized itching (pruritis gravidarum). It subsides after pregnancy (London, et al., 2003; McKinney et al., 2005; Sherwen et al., 1995).

Hypertrophy, hyperplasia, and hypersecretion take place in the beta cells of the islets of Langerhans in the pancreas as pregnancy progresses, although the precise mechanism explaining these changes remains unknown. The increasing physiologic demands of pregnancy can precipitate gestational diabetes or can complicate existing diabetes mellitus (London, et al., 2003; Sherwen et al., 1995).

During the second trimester, decreased tone and motility of smooth muscle in the gastrointestinal tract mean that food and its breakdown products remain longer in the stomach and intestines. Hence, the benefit of more time for maximum absorption of nutrients and water from the small and large intestines continues. Increased water absorption in the large intestine, however, tends to cause

hard stool. The hard stool and decreased intestinal motility contribute to constipation. Therefore, the pregnant woman may strain during bowel movements and cause additional venous pressure on the rectal vessels. Consequently, hemorrhoids may develop during the second trimester (London, et al., 2003; Sherwen et al., 1995).

1.1.7 The psychological Changes

For most low risk pregnant woman, the second trimester is a happy, contented period, marked by confirmation of the pregnancy, the presence of a live fetus, and developing affection for the fetus since she feels the fetus movement (quickening). This perception of fetal movement helps the woman thinks of her baby as a separate person. She generally becomes excited about the pregnancy even if earlier she was not. The uncertainty and ambivalence of the first trimester are generally resolved (London et al., 2003; Pillitteri, 1999; Sherwen et al., 1995).

The woman becomes increasingly introspective as she evaluates her life, her plans, and her child's future. This introspection helps the woman prepare for her new mothering role. As pregnancy becomes more noticeable, the woman's body image changes. She may feel great pride, embarrassment, or concern. Generally women feel best during the second trimester, which is a relatively tranquil time (London et al., 2003; Pillitteri, 1999).

During the second trimester, some pregnant women continue to work. Indeed, for a healthy woman, work in itself is no problem at any time during pregnancy. However, employed women are concerned with whether and when maternity leave should be taken, how to find child care, how significant others feel about her working before and after the birth, and what effects working will have on the baby and family (Sherwen et al., 1995).

1.2 The fetal Considerations

By the second trimester of pregnancy, organ systems are formed; therefore, the major body systems of the fetus become functional. The fetus looks like a very thin baby by the end of the 16^{th} week of gestation. The musculoskeletal system continues to develop, with advancing ossification of bone and movement of the arms and legs. Fetal movements (quickening) may be first felt by the mother during the fourth month. Fine downy hair (lanugo) begins to develop over the fetal body. Blood

formation shifts from the spleen to the bone marrow. Blood vessels can be seen through the transparent skin, and pads develop on the fingers and toes. The digestive system begins functioning during the fourth month. The fetus swallows amniotic fluid and produces meconium in the intestinal tract. The subcutaneous tissue deposits of brown fat develop in the neck, chest, and inguinal areas by the 20^{th} week of gestation. Glands in the skin begin to produce a cheesy, fatty substance (vernix caseosa) to help protect the skin from the amniotic fluid. Lanugo increases. Maximum brain growth begins with the fifth month. Consequently, the fetal head is heavier than the feet. By the sixth month of gestation, the alveoli of the lungs begin to develop, and mature hemoglobin can be identified in fetal blood. Grasp, startle, and blink reflexes are present, and the fetus makes muscular breathing movements. Hence, the fetus is more likely to survive if born after 24 weekd (McKinney et al., 2005; London et al., 2003; Sherwen et al., 1995).

The fetus requires a continuous and adequate supply of oxygen and nutrients for its metabolism and growth. Severe and acute interference with fetal supply is likely to cause hypoxic damage, whereas milder more chronic reductions may result in suboptimal growth. Fetal heart rate and oxygen consumption are physiological variables that may represent only temporary adjustments (Rankin, 2002).

During pregnancy, basal metabolic rate and heat production is increased above non-pregnant level. The increase in body temperature during exercise is directly related to the intensity of the physical activity. The serious argument against the intensity of activity during pregnancy remains the concern in relation to the increase in body temperature. Maternal hyperthermia and redistribution of blood to the working muscles and skin for thermoregulation may have an adverse effect on the development of the fetus. Generally, fetal body core temperatures are about 1 degree Celsius higher than maternal temperatures (Artal et al., 2005; Ezmerli, 2000; Rankin, 2002).

In animal studies, the results have shown that hyperthermia is associated with teratogenic effects. Hyperthermia is particularly damaging to the central nervous system and can cause neural tube defects if exposure occurs during the first trimester. However, data on the effects of exercise on core temperature during pregnancy are limited and needed further study (Sternfeld, 1997; Ezmerli, 2000). Riemann and

Hansen (2000) review the articles investigated the effects of exercise on the fetus in pregnant women. The results revealed that there were no any studies shown the negative effect of training on human embryogenesis. Fetal growth seems to be influenced by maternal activity, as some investigations have found significantly bigger babies born by moderately trained mothers compared to non-trained or heavily-trained women. Increased maternal temperature during training has not been found to lead to any fetal abnormalities. Likewise, recently, Larsson and Lindqvist (2005) studied temperature and oxygen saturation responses to low-impact exercise in healthy pregnant women. The result showed that the core temperatures among the pregnant women do not increase significantly at maximum exercise or after exercise. None of the pregnant women are even close to approaching a dangerous body temperature at an intensity level of 69% of their maximum heart rate.

The effect of physical activity on fetal outcome during pregnancy is controversial. Some studies report lower birth weight in response to exercise. By contrast, other studies recommend that physical activity can lead to an increase in birth weight. Fetal growth may be affected by the type and intensity of physical activity. In the previous study, Clapp and Capeless (1990) reported decreased birth weight of babies whose mothers exercised at hight intensity throughout pregnancy. Similarly, Hatch et al. (1993) found decreased fetal growth with weightbearing high-intensity exercise. On the other hand, the results from meta-analysis study evaluating the effect of physical activity on perinatal outcomes conducted by Leet and Flick (2003) suggest that exercise during pregnancy does not appreciably affect infant birthweight, except when women continue to exercise vigorously into the third trimester. Moreover, Leiferman and Everson (2003) suggest that participation in regular leisure physical activity both before and during pregnancy may reduce the risk of having a very low birthweight baby.

1.3 Physical, Physiological, and Psychological Changes related to Physical Activity

During uterine contraction, both adrenaline (epinephrine) and noradrenaline (norepinephrine) are released during exertion in both the pregnant and nonpregnant state. Noradrenaline, a uterine stimulant, is raised to a greater extent than adrenaline;

therefore, exertion may cause uterine contractions and result in premature delivery (Sternfeld, 1997). However, there are several studies confirming no adverse maternal or fetal effects in woman engaged in mild and moderate exercise activities (Dempsey, Butler, & Williams, 2005). Leiferman and Evenson (2003) reported that regular leisure physical activity had no negative impact on preterm delivery and it was not associated with an increased risk of post-term delivery. Conversely, Artal and O'Toole (2003) suggested that there are anecdotal reports that strenuous training may cause preterm labour. Only a physically active woman with a history of preterm labor should be advised to reduce her activity in the second and third trimester. Even though maternal catecholamines increase with exercise, fetal catecholamines levels appear to remain relatively stable. This may counteract the stimulatory effect of a preponderance of maternal noradrenaline and protect against excessive uterine activity (Sternfeld, 1997).

During exertion, cardiac output is redistributed away from the splanchnic organs and to the working muscles. This raises two concerns: that significant cardiovascular changes induced by engaging in physical activity may have potentially adverse effects on the fetus. The reduction in blood flow may decrease the oxygen and nutrient availability to the fetus, and uterine contractions and preterm labor may be stimulated. However, in the normal healthy pregnant woman, such occurrences are rarely encountered during mild and moderate exercise, but they are more likely to occur during strenuous and prolonged exercise (Kisner & Colby, 1996; Rankin, 2002; Sternfeld, 1997). Thus, scientific research has focused on the extent to which exercise undertaken during pregnancy can improve physical fitness and elicit a training effect.

One kind of measure of physical fitness is the non-invasive measurement of maximal oxygen consumption (VO_{2max}) which is a measure of cardiovascular endurance. This includes a circulatory component to oxygen uptake (oxygen delivery) and an extraction component (oxygen utilization). Maximal oxygen consumption (VO_{2max}) is defined as the maximal rate at which oxygen can be used by the cells in the body (McArdle, Katch and Katch, 2000; Rankin, 2002). However, maximal exercise testing in pregnant woman may not be safe since it requires increasing heart rate to high levels. Reports from the early studies are varied in relation to aerobic capacity or oxygen consumption. Many studies have investigated maternal adaptations to exercise during pregnancy and shown that exercise undertaken during pregnancy

may improve or maintain physical fitness. Moreover, the results suggest that aerobic capacity or oxygen consumption may be unaffected by exercise during pregnancy or increased during pregnancy (Rankin, 2002; Treuth, Butte & Puyau, 2005).

Anatomical and physiological changes which accompany pregnancy may increase the risk of musculoskeletal injury from exercise and sports. Therefore, a pregnant woman needs to be cautious when undertaken any physical activity since she experiences increased laxity of her ligaments, resulting from increased production of the hormone relaxin (Dumas & Reid, 1997; Rankin, 2002; Sternfeld, 1997). The relaxation of ligaments, combined with lordosis, changes in the centre of gravity and weight gain, may increase stress in most joints. In the presence of mild back pain, it is advisable to engage in exercise that will strengthen the back and abdominal muscles (Ezmerli, 2000; Rankin, 2002). Parsons (1994) recommends that, during early pregnancy, a pregnant woman should be encouraged to do some gentle exercise to offset some of the mechanical strain that arises with postural changes as pregnancy progresses. Interestingly, the results of a study done by Garshasbi and Zadeh (2005) support the conclusion that the exercise group shows significant reduction in the intensity of low back pain after exercise whereas low back pain intensity is increased in the control group. Hence, exercise during the second and beginning of the third trimester of pregnancy could reduce the intensity of low back pain.

Because of traumatic damage after vaginal delivery, many women experience some degree of urinary incontinence. The evidence from the studies suggests that exercise is beneficial to assist the muscles in returning to their pre-pregnant condition and to minimize pelvic floor damage during delivery (Morkvid & Bo, 1996; Rankin, 2002).

2. Physical Activity and Pregnancy

2.1 Definition of Physical Activity

Physical activity is defined as *"any bodily movement produced by skeletal muscles that results in energy expenditure and is usually measured in kilocalories (kcal) per unit of time"* (Casperson et al., 1985, p. 126). Physical activity includes a broad range of leisure-time physical activity, exercise, transportation, occupational, and routine daily activities (Bouchard, Blair, and Haskell, 2007). These activities

require light, moderate, or vigorous effort. The energy expenditure related to physical activity is the only discretionary component of total daily energy expenditure.

Leisure-time physical activity is an important component of overall physical activity, and includes activities apart from work. Leisure-time physical activity refers to any activity undertaken during free time such as sports, exercise, and recreational activities that lead to any substantial increase in the total daily energy expenditure (Bouchard, Shephard & Stephens, 1994; Evenson, Savitz & Huston, 2004; Pender, Murdaugh & Parsons, 2006). This can also include household tasks such as yardwork and gardening. Activities are chosen based on personal needs and interests (Bouchard, Blair, & Haskell, 2007; Evenson et al., 2004).

Exercise is a form of leisure-time physical activity that is planned, structured, repetitive, and purposive in the sense that improvement or maintenance of physical fitness, physical performance, or health is expected. Sport is a form of physical activity that involves competition (Bouchard, Blair, and Haskell, 2007; Casperson et al., 1985; Pender, et al., 2002). Romem, Masaki, and Mittelmark (1991) defined exercise as a process in which chemical energy is transformed into a movement, and inevitably into heat.

Transportation refers moving from one place to another place by such means as walking, riding, and driving. However, daily physical activity has decreased considerably, because of advancing technology regarding personal and public transportation. Moreover, the increased use of vehicles during the 20^{th} century significantly reduced the average daily physical activity of many people (Bouchard et al., 2007; Chasan-Taber et al., 2004).

Occupational physical activity refers to a task or job related to physical activity undertaken voluntarily. In the past, energy expenditures required by occupational work such as working around the house, and the associated demands of transportation such as on foot or by bicycle. Nowadays, for most people, the opportunities to perform physical activity during their work are very limited. An increasing number of jobs require people to be highly productive; therefore, they need to stay in one place, very frequently sitting for much of the work day. For this reason, many office workers are sedentary (Bouchard et al., 2007; Chasan-Taber et al., 2004; Haskell et al., 2007).

Household and other chores also need to be considered. Household physical activity is defined as all activities associated with maintaining the inside and outside of a house, including doing light housework such as meal preparation, washing dishes, ironing, and make beds; heavy cleaning such as vacuuming, mopping, and sweeping (Bouchard et al., 2007; Chasan-Taber et al., 2004). However, since technology devices such as automatic clothes washers and dryers, dishwashers, self-propelled vacuum cleaners, and power lawn mowers has substantially reduced the amount of human energy required for domestic activities and caring for family members, the demand for physical activity on the job has decreased. Most necessary domestic chores fall into the light category (Bouchard et al., 2007).

2.1.1 Dimensions of Physical Activity

Physical activity is a variable, unstable, and complex behavior with many dimensions. Dimensions of physical activity are commonly described by detailing duration of sessions, intensity, frequency and mode or type (Harro & Riddoch, 2000).

2.1.2 Measurement of Physical Activity

Physical activity, a complicated behavior with many dimensions, may be difficult to measure accurately since it is based on an individual's habits and varies from day to day. How to assess activity levels depends on the individual's purpose. For fitness and performance outcomes, it is necessary to assess duration, frequency, and intensity very carefully whereas assessing health-related outcomes, total volume of activity may be more important. Physical activity can be measured directly and indirectly through as self-administered questionnaires and interviews, proxy reports, diaries, heart rate monitoring, mechanical and electronic motion sensors, direct observation, and the doubly labeled water method (Bouchard et al., 1994; Dale, Welk, & Matthews, 2002; Freedson & Kelly, 2000; Harro & Riddoch, 2000).

2.1.3 Energy Expenditure

Energy expenditure refers to the total calories required to complete a given task. It can be estimated from the amount of oxygen consumed during the activity (Wiswell, 1991). The components of total daily energy expenditure are as follows (Bouchard et al., 2007; McArdle et al., 2006):

1) Basal and resting metabolic rate account for about 65% of daily energy expenditure.

2) Because of their high metabolic rates, cardiac muscle, liver, brain, kidney, pancreas, and other organs account for about 70% of the energy expended at rest.

3) The thermic response to food such as absorption, digestion, transport, and storage accounts for about 10% of daily energy expenditure.

4) Physical activity and movement of all types account for about 25% of the energy expended in a typical day by a sedentary person.

Energy expenditure can be computed from the amount of oxygen consumed. The units used to quantify energy expenditure are the metabolic equivalent (METs) and the kilocalorie.

The term *metabolic equivalent (MET)* is used to express the energy cost of exercise or physical activity in simple units. A MET is defined as the oxygen consumed (milliliters) per kilogram of body weight per minute (mL/kg). One MET is equal to energy expenditure for sitting or rest which is approximately 1 kilocalorie (kcal) per kilogram (kg) of body weight per hour or 3.5 ml of oxygen uptake per kg of body weight per minute in an adult (Ainsworth et al., 1992; Bouchard et al., 2007; Burnett & Gleen, 1996; McArdle et al., 2006; Powers & Howley, 2007)

A kilocalorie is a measure expressing the energy value of food. It is the amount of heat necessary to raise 1 kilogram (kg) of water 1ºC. A kilocalorie (kcal) can be expressed in oxygen equivalents. Five kilocalories equal approximately one liter of oxygen consumption. (Ainsworth et al., 1992; Burnett & Glenn, 1996; Harro & Riddoch, 2000; Powers & Howley, 2007; Wiswell, 1991).

2.2 Prevalence of Physical Activity among Pregnant Women

The pregnant woman has received limited attention with regard to clearly articulated guidelines that promote physical activity as a lifestyle choice compatible with good health and disease prevention. Moreover, pregnancy has been seen as a state of confinement in which women are not encouraged to engage in recreational physical activity. Additionally, until the early 20th Century, physical activity during pregnancy has been discouraged primarily because of theoretical concerns of exercise-induced

injury and adverse fetal and maternal outcomes. However, findings from clinical and epidemiological studies, completed since 1985, have shown no adverse maternal or fetal effects in women engaging in mild and moderate exercise activities (Dempsey, Butler & Williams, 2005). In contrast, various studies confirm that exercise during pregnancy is beneficial for women; therefore, it is significant for pregnant women to perform or maintain their exercise in order to improve their health and quality of life (Byrne & Byrne, 1993; Buckelew et al., 1998).

Despite recognized benefits, nearly 60% of pregnant women in the U.S. were found to be sedentary in an earlier study (Zhang & Savitz, 1996). Ning et al. (2003) reported that approximately 39% of women did not participate in any regular physical activity during pregnancy. Active women who continued to exercise during pregnancy decreased the average intensity of their exercise and the weekly duration of exercise compared with the year before pregnancy. In the previous study, Clapp and Dickstein (1984) reported that 60% of pregnant women who engaging exercise at a high level prior to pregnancy reduced their performance markedly during early pregnancy, and all had stopped completely by the 18^{th} week. Of those who performed at a moderate level prior to pregnancy, 58% reduced exercise and then stopped completely, mostly by the 12^{th} week; 68% of those who performed at a minimum level prior to pregnancy stopped completely.

Likewise, Clarke, Gross and Psychol (2004) reported that 39% of women who reported participating in some form of weekly exercise before pregnancy did not pursue any similar activities during pregnancy. Rest and relaxation were perceived as being significantly more important during pregnancy than was regular exercise or the maintenance of an active lifestyle. Hinton and Olson (2001) examined the relationship of sociodemographic and psychosocial characteristics and exercise prior to pregnancy to change in physical activity during pregnancy. The researchers found that overall, women tended to either maintain or decrease their physical activity in pregnancy. The results also showed that 39.8% of women reported becoming less physically active in pregnancy as compared with the prepregnancy period. Similar or higher proportions of non-exercising pregnant Thai women have been reported recently, Piravet and Saksirinukul (2001) reporting that 58% did not exercise. Additionally, Kanshana et al. (2003) studied quasi-experimental research comparing the effects of an exercise

program during pregnancy. Before participating in the study, the researchers found that only 5.8% of total number of the pregnant women both in control and intervention groups did exercise.

Conclusively, in the past, physical activity during pregnancy had been discouraged because of theoretical concerns about exercise-induced injury and adverse fetal and maternal outcomes. Furthermore, pregnancy has been seen as a state of confinement in which a woman was not encouraged to engage in any physical activity. Therefore, most women stop engaging in physical activity during their pregnancy, and some of them decline to perform any activity during this period, even though they are aware of the benefits of physical activity. In the Thai context, the proportions of sedentary pregnant women have been reported as similar to or of a higher ratio when compared with those in the western countries.

2.3 Benefits of Physical Activity during Pregnancy

2.3.1 Physical, Physiological, and Psychological Benefits

Physical activity and exercise are viewed as healthy behaviors. Therefore, regular physical activity not only contributes positively to people's physical and psychological health but also reduces their risk of cardiovascular and other related diseases, such as diabetes mellitus (U.S. Department of Health and Human Services cited in Downs & Hausenblas, 2003). Psychological benefits of exercise during pregnancy are also important to women to help them cope with the changes brought about by pregnancy (Rankin, 2002). A number of studies have demonstrated positive effects of physical activities and exercise during pregnancy. These positive effects include a greater sense of well-being, increased self-esteem, decreased depression and anxiety, increased energy, improved sleep, decreased backaches, better weight control, and enhanced strength and endurance. Shorter labor and fewer obstetric interventions have also been reported (Brayshaw 2003; Buckelew et al., 1998; Byrne & Byrne, 1993; Clarke, Gross, & Psychol, 2004; Downs & Hausenblas, 2003; Ezmerli, 2000; Hausenblas & Downs, 2004; Larsson & Lindqvist, 2005; Rankin, 2002).

Rippen et al. (2003) examined associations between leisure-time physical activity patterns during pregnancy and psychological well-being. The results showed that in each trimester, women who exercised reported significantly less

depressed mood, stress, anxiety, and daily worries in the first and second trimester. Women who exercised in the third trimester reported less anxiety in that trimester compared to non-exercisers. Furthermore, Dewey and McCrory (1994) found that participation in physical activity has also been linked with the promotion of good maternal posture, the prevention of excess maternal weight gain and a reduction in lower back pain. From a psychological perspective, volitional exercise may also improve a woman's body image, reduce depression, and raise her self-esteem (Clarke et al., 2004). Additionally, Deave (cited in Research Digest, 2004) mentioned that the indirect evidence is convincing that overweight women who do not exercise have a higher prevalence of obesity, gestational diabetes, and preeclampsia.

Interestingly, epidemiological data reports that physical activity has been associated with a reduced risk of gestational diabetes mellitus (GDM), especially in obese women. Dempsey, Butler, et al. (2004) studied a case-control study of maternal recreational physical activity and risk of gestational diabetes mellitus. The researchers found that women who participated in any recreational physical activity during the first 20 weeks of pregnancy, as compared with inactive women, experienced a 48% reduction in risk of gestational diabetes mellitus. The number of hours spent performing recreational activities and the energy expended were also related to a decrease in GDM risk. Similarly, Dempsey, Sorensen, et al. (2004) examined the relation between recreational physical activity before and during pregnancy and the risk of gestational diabetes mellitus in a prospective cohort study among women in Seattle and Tacoma, Washington. The results found that compared with inactive women, women who participated in any physical activity during the year before, experienced a 56% risk reduction. Women spending $\geq$ 4.2 metabolic equivalent-hours/week (METs) engaged in physical activity experienced a 76% reduction in gestational diabetes mellitus risk, and those expending $\geq$ 21.1 metabolic equivalent-hours/week (METs) experienced a 74% reduction compared with inactive women, respectively.

Preeclampsia is a serious maternal-fetal disease that affects 2-7% of pregnancies in healthy nulliparous women. However, some epidemiologic studies show that occupational and leisure-time physical activity is associated with a reduced incidence of preeclampsia (Weissgerber, Wolfe & Davies, 2004). Yeo et al.

(2000) studied women who were at risk of maternal hypertension during pregnancy. The findings of the study postulate that exercise may lower the diastolic blood pressure. In addition, physically active women are less likely to develop preeclampsia (Yeo & Davidge, 2001). Similarly, Sorensen et. al. (2003) studied recreational physical activity during pregnancy and risk of preeclampsia. The results show that women who engaged in any regular physical activity, or engaged in light or moderate activities during early pregnancy are at less risk of preeclampsia, compared with inactive women. Women participating in vigorous activities and those who walked briskly, when compared with no walking at all, are also at less risk of preeclampsia. Likewise, Saftlas, Logsden-Sackett, Wang, Woolson, and Bracken (2004) report that women who engaged in any regular leisure-time physical activity (LTPA) regardless of caloric expenditure, and were unemployed or had nonsedentary jobs, were at decreased risk of preeclampsia.

2.4 Recommendation of Physical Activity During Pregnancy

Since physical inactivity is a major risk factor for cardiovascular and obesity-related disorders including hypertension, artherosclerosis, and type 2 diabetes mellitus, in the absence of contraindications, a pregnant woman should be encouraged to engage in regular, moderate intensity physical activity. Furthermore, the health benefits of physical activity are well recognised. Therefore, the Centers for Disease Control and Prevention and the American College of Sports Medicine (CDC-ACSM) (2002) have recommended the accumulation of 30 minutes or more of moderate intensity physical activity on most, and preferably all, days of the week. Moderate intensity physical activity is defined as activity with an energy requirement of 3-5 metabolic equivalents (METS). The CDC-ACSM statement also recognises that more intense exercise performed in 20-45 minute sessions on three to five days a week will result in higher levels of physical fitness (Artal et al., 2003).

The ACOG and CDC-ACSM have published a set of guidelines for exercise during the pregnancy and postpartum period. These recommendations are made for a pregnant woman who does not have any additional risk factors for adverse maternal or perinatal outcome (Artal et al., 2003; Brayshaw 2003; Ezmerli, 2000, Powers & Howley, 2006).

1) Regular exercise is preferable to intermittent activity.

- Type of exercise: Exercise prescription in pregnancy should include the same elements as for non-pregnant woman. Aerobic exercise can consist of any activities that use large muscle groups in a continuous rhythmic manner, such as walking, hiking, swimming, and aerobic dance. However, there are several activities that pose increased risk in pregnancy such as scuba diving and exertion in the supine position. This position is associated with decreased cardiac output in most pregnant women, causing a decreased distribution of blood to splanchnic beds including the uterus. Likewise, some activities that increase the risk of falls, such as skiing and tennis, should include cautionary advice for pregnant woman. Moreover, any type of exercise involving the potential for even mild abdominal trauma should be avoided.

- Intensity of exercise**:** The ACSM recommends that intensity should be 60-90% of maximal heart rate, or 50-85% of either maximal oxygen uptake or heart rate reserve. The lower end of these ranges (60-70%) of maximal heart rate or 50-60% of maximal oxygen uptake appears to be appropriate for most pregnant women who do not engage in regular exercise before pregnancy, and the upper part of these ranges should be considerd for those who wish to continue to maintain fitness during pregnancy.

- Duration of exercise: Two concerns should be addressed before prescribing prolonged exercises (in excess of 45 minutes of continuous exercise) regimens for pregnant women. The first concern is thermoregulation and the second is energy balance.

- Frequency of exercise: The CDC-ACSM recommendations for exercise aimed at the health and well-being of, pregnant women in the absence of either medical or obstetric complications is that an accumulation of 30 minutes a day of exercise should occur on most if not all days of the week.

- Progression: A pregnant woman who has been sedentary before pregnancy should follow a gradual progression of up to 30 minutes a day.

2) A pregnant woman should stop exercising when fatigued, and not exercise to exhaustion.

3) Adequate diet should be ensured.

4) Adequate hydration, appropriate clothing, and optimal environmental surroundings during exercise should be ensured.

5) The physiologic and morphologic changes of pregnancy persist 4-6 weeks postpartum; therefore, prepregnancy exercise routines should be resumed gradually, based on a woman's physical capabilities.

The contraindications to exercise listed are suggested only as guides to determining the appropriateness of exercise during pregnancy for individual women (Artal et al., 2003; Brayshaw, 2003; Ezmerli, 2000).

1) Absolute contraindications: Hemodynamically significant heart disease, restrictive lung disease, incompetent cervix/cerclage, multiple gestations at risk for premature labour, persistent second or third trimester bleeding, placenta previa after 26 weeks gestation, premature labour during the current pregnancy, ruptured membranes, pregnancy induced hypertension.

2) Relative contraindications to aerobic exercise during pregnancy (with permission from ACOG): Severe anemia, unevaluated maternal cardiac arrhythmia, chronic bronchitis, poorly controlled type 1 diabetes, extreme morbid obesity, extreme underweight (body mass index < 12), history of extremely sedentary life-style, intrauterine growth restriction in current pregnancy, poorly-controlled hypertension or preeclampsia, orthopedic limitations, poorly-controlled seizure disorder, poorly-controlled thyroid disease, and heavy smoking.

3) Warning signs to terminate exercise while pregnant: Vaginal bleeding, dyspnea before exertion, dizziness, headache, chest pain, muscle weakness, calf pain or swelling (need to rule out thrombophlebitis), preterm labour, decreased fetal movement, and amniotic fluid leakage.

In summary, physical activity comprises a broad range of occupational, leisure-time, and routine daily activities. These activities require light, moderate, or vigorous effort. Leisure physical activity is defined as any physical activity conducted during free time, and this activity is a significant part of physical activity. According to exercise, it is a subcategory of physical activity undertaken with the intention of developing physical fitness.

Physical activity is a significant component of a pregnant woman's health promotion. A number of studies confirm and recommend that physical activity not only contributes positively to a pregnant woman's physical and psychological health but also reduces her risk of cardiovascular and other related diseases. For this reason, the ACOG and CDC-ACSM have recommended the accumulation of 30 minutes or more of moderate intensity physical activity on most, and preferably all, days of the week. The CDC-ACSM statement also recognises that more intense exercise performed in 20-45 minute sessions on three to five days a week will result in higher levels of physical fitness. However, a pregnant woman who has medical or obstetric complication should avoid participating in physical activity. Likewise, she should stop engaging in any physical activity immediately and consult her physician if one of the following symptoms appears: vaginal bleeding, dyspnea, dizziness, headache, chest pain, muscle weakness, calf pain/swelling, abdominal pain, decreased fetal movement, and amniotic fluid leakage.

3. Theoretical Framework and Empirical Studies

The Theory of Planned Behavior (TPB) is the most widely used and validated theory in the exercise domain for predicting, explaining, and understanding exercise behavior (Biddle & Nigg, 2000). However, exercise is a subcategory of physical activity (Caspersen et al., 1985).

The TPB was derived from the Theory of Reasoned Action (TRA). Both theories focus on theoretical constructs that are concerned with individual motivational factors as determinants of the likelihood of performing a specific behavior (Montano & Kasprzyk, 2002). The TRA assumes that the most important direct determinant of behavior is behavioral intention and, the success of the theory in explaining behavior is dependent upon the degree to which the behavior is under volitional control. Under conditions of high volitional control, motivation as measured by intention and its attitudinal and normative determinants is expected to be the main determinant of behavior (Montano & Kasprzyk, 2002). The TRA has increased in popularity with researchers due to its simplicity, its straightforward operationalization, and its general applicability (Ajzen, 1991).

The TRA includes measures of attitude and social normative perceptions that determine behavioral intention. Behavioral intention in turn affects behavior (Montano & Kasprzyk, 2002). The TRA postulates “a person’s intention to perform (or not perform) a behavior is the immediate determinant of that action” (Ajzen, 1985). Various aspects of the theory have been investigated and several limitations of the TRA have been identified. For example, many previous studies found relatively low correspondence between attitudes and behavior. To overcome some limitations of the TRA and improve the power in predicting goal-directed behavior, Ajzen (1985) included the notion of perceived behavioral control in the TPB as an antecedent of behavioral intention and behavior. The major proposition of the TPB is that individuals intend to perform a certain behavior if they have a positive attitude toward that behavior, a perception that significant others expect they should do it, and a belief that they have a sense of control.

Attitude is determined by the individual’s beliefs about outcomes or attributes of performing the behavior (behavioral beliefs), weighted by evaluations of those outcomes or attributes. Hence, a person who holds strong beliefs that positively valued outcomes will result from performing the behavior will have a positive attitude toward the behavior. Similarly, a person’s subjective norms is determined by his or her normative beliefs, whether important referent individuals approve or disapprove of performing the behavior, weighted by his or her motivation to comply with those referents. Thus, a person who believes that certain referents think he or she should perform a behavior, and is motivated to meet the expectations of those referents, will hold a positive subjective norm (Montano & Kasprzyk, 2002).

However, the theory of planned behavior postulates that even though individuals’ attitudes and/or subjective norms are positive, if individuals perceive that resources or capabilities are limited, their intentions to perform certain behaviors may be weak (Ajzen & Madden, 1986). In other words, despite positive attitudes and/or subjective norms, individuals may have low intentions to execute behaviors due to their perception of having little control over performing the behavior. While attitudinal and normative components indirectly affect behavior through intention, perceived behavioral control may influence behavior either directly or indirectly.

The direct effect of perceived behavioral control on behavior occurs in cases where actual control (non-motivational factors) over the behavior is low (e.g., lack of resources such as time, money, and skills; lack of cooperation from others; and lack of capability) (Dzewaltowski, Noble, & Shaw, 1990). The direct effect of perceived behavioral control is significant when the perceptions of control over the behavior are realistic or accurate (Azen, 1991). In contrast, the indirect effect of perceived behavior control occurs under conditions where the perceptions of control have motivational implications for behavioral intention (Ajzen, 1991; Madden, Ellen, & Ajzen, 1992).

Intention represents people's strategy for carrying out an action, and it is the central determinant of their behavior. Intentions involve four different elements: the behavior, the target object at which the behavior is directed, the situation in which the behavior is to be performed, and the time at which the behavior is to be performed. Each of these elements varies along a dimension of specificity. At the most specific level, a person intends to perform a particular act with respect to a given object in a specified situation at a given point in time (Fishbein & Ajzen, 1975).

Most studies support the theory of planned behavior across various behaviors, including physical activity, and indicating that antecedences (attitude, subjective norms, and perceived behavioral control) are significant predictors of behavior intention. Godin and Kok (1996) extensively reviewed the applicability of theory of planned behavior for health-related behavior. The theory of planned behavior has been applied widely in efforts to understand and predict a number of social and health-related behaviors.

3.1 Construct of the Theory of Planned Behavior

The TPB is the theoretical framework for the current study. There are five major constructs: attitude toward behavior, subjective norms, perceived behavioral control, intention, and behavior. Each construct will be discussed in this section.

Attitude toward Behavior

Attitude is a general positive or negative overall evaluation of a behavior. It is determined by a person's beliefs about outcomes of behavior, and is multiplied by corresponding evaluations of those beliefs. Ajzen and Fishbein (1980) define attitude as

"a person's general feeling of favorableness or unfavorableness for that concept." They also describe an attitude toward behavior as "a person's judgment that performing the behavior is good or bad, that he is in favor of or against performing the behavior."

Attitude can be measured directly by a standard or global measure, or indirectly by a belief-based measure (Ajzen, 1991). A direct measure is usually obtained by means of an evaluation semantic differential. An indirect measure is evaluated by the expectancy-value model, which proposes that the strength of each salient belief is combined in a multiplicative fashion with the subjective evaluation of the belief's attribute, and the resulting products are summed over the *"n"* salient beliefs. A person's attitude is directly proportional to this summative belief index (Ajzen, 1991).

Subjective Norms

A subjective norm refers to a person's perception that important others desire the performance or nonperformance of a specific behavior. The more the person perceives that others who are important to her/him think she/he should perform a behavior, the more she/he will intend to do it. However, this perception may or may not reflect what the important others actually think she/he should do (Ajzen & Fishbein, 1980). Subjective norms are developed from an individual's beliefs about the anticipations of significant others or referent groups regarding such behavior and her/his tendency to agree with those normative beliefs (Ajzen & Fishbein, 1980). It can be assessed by direct or indirect measure (Ajzen, 1991).

Perceived Behavioral Control

Perceived behavioral control is defined as "people's perception of the ease or difficulty of performing the behavior of interest" (Ajzen, 1991). Ajzen argues that a person will expend more effort to perform a behavior when her/his perception of behavioral control is high. A person's perception of control over behavioral performance, together with intention, is expected to have a direct effect on behavior, particularly when perceived control is an accurate assessment of actual control over the behavior and when volitional control is not high (Montano & Kasprzyk, 2002). Perceived control is determined by control beliefs concerning the presence or absence of

facilitations and barriers to behavioral performance, weighted by the perceived power or impact of each factor to facilitate or inhibit the behavior.

Intention

Intention is defined as individual's subjective likelihood of engaging in a given behavior, and is determined by the three conceptually independent variables that are described in the previous three sections; attitude, subjective norms and perceived behavioral control. First, attitude is a person's positive or negative evaluation of performing a behavior. Second, subjective norm is the perceived social pressure from significant others to engage or not engage in a behavior. Lastly, perceived behavioral control is a person's perceived ease or difficulty in performing a behavior. Therefore, the main TPB proposition is that people will intend to engage in a behavior when they evaluate it positively (attitude), believe that significant others want them to participate in it (subjective norms), and perceive it to be under their control (perceived behavioral control) (Ajzen & Fishbein, 1980; Ajzen, 1991).

The magnitude of the relationship between intention and behavior may be influenced by the congruence of the measurement of intention and behavior, and the stability of intention at the time of behavior measurement (Fishbein & Ajzen, 1975). A measure of behavior should include these four elements: action, target, context, and time elements. (Ajzen & Fishbein, 1980). However, intention can alter over time, and a measure of intention taken some time prior to observation of the behavior may differ from the intention at the time that the behavior is observed. The longer the time interval between the measurement of intention and behavior, the less accurate the prediction of the behavior (Ajzen & Fishbein, 1980).

3.2 Empirical Studies of the Theory of Planned Behavior in Physical Activity

Interestingly, a number of research studies in health behavior have been conducted by using the theoretical framework of the TPB for predicting physical activity or explaining exercise behavior in Western countries. However, there are few studies using the TPB to be the framework to predict physical activity behavior in Thailand.

Furthermore, a study of Thai pregnant women by using this theoretical framework has not been found.

For Western countries, Downs and Hausenblas (2003) studied the determinants of exercising during the second trimester of pregnancy by using the Theory of Planned Behavior. The results showed that intention was a significant predictor of exercise behavior, while perceived behavioral control was not. Attitude was the strongest determinant of exercise intention, followed by perceived behavioral control and subjective norms.

A retrospective study of women's exercise beliefs and behaviors during their pregnancy and postpartum conducted by Downs and Hausenblas (2004) showed that the most common exercise beliefs during pregnancy were improving mood, whereas physical limitation obstructs exercise participation. The most common exercise beliefs during postpartum were exercise controls weight gain and a lack of time obstructed exercise participation. The women's husbands/partners and family members most strongly influenced their pregnancy and postpartum exercise behavior. The last finding was that women exercised more before they were pregnant than during pregnancy and postpartum.

The purpose of the study conducted by Hausenblas and Downs (2004) was to prospectively examine pregnant women's exercise intention and behavior during their first trimester. The findings of this study demonstrate that perceived behavioral control was a significant predictor of exercise behavior; attitude and subjective norms were significant predictors of exercise intention. Intention and perceived behavioral control have the strongest correlations with exercise behavior. Attitude has the strongest correlation with intention, followed by subjective norms.

Armitage (2005) conducted the research to test the ability of the TPB to predict actual participation in physical activity and explored the development of activity habits in a 12-week longitudinal study. The results found that perceived behavioral control was significantly predictive of intentions and actual behavior, and stable exercise habits developed in the first five weeks of the study.

As the elderly population, Courneya (1995) examined the TPB in the context of physical activity in older individuals and found that attitude, subjective norms, and perceived behavioral control were all significantly correlated with the

intention to exercise. Intention, attitude, and perceived behavioral control had direct relationships with stage of readiness of physical activity. Gretebeck (2000) investigated the effectiveness of the Theories of Reasoned Action and the Theory of Planned Behavior in predicting physical activity behavior in the elderly. The findings of the study revealed that the TPB accounts for more of the variance in intention (R^2 = *.59*) to engage in physical activity behavior than the TRA (R^2 = *.46*). Within the model constructs, attitude was the best predictor of intention to engage in physical activity.

Rhodes, MacDonald, and McKay (2006) investigated a TPB model for the prediction of child leisure-time physical activity. The findings from the study showed the TBP could explained 35-50% of the variance in physical activity behavior and 74-76% of the variance in intention. Intention and perceived behavioral control were significant contributiors to the direct prediction of behavior. Subjective norms and perceived behavioral control were significant predictors of intention.

In the Thai context, Jitramontree (2003) studied predicting exercise behavior among Thai elders by testing the TPB. The results showed that intention and perceived behavioral control predicted exercise behaviors. Direct attitudes, indirect attitudes-benefits, perceived behavioral control, and barriers to exercise predicted exercise intention. Direct attitudes, indirect attitudes-benefits, indirect attitudes-negative effects, and barriers to exercise predict exercise behavior.

Therefore, to sum up, the results from these studies supported the relationships among the TPB's constructs and physical activity or exercise behavior in various populations in the West and Thailand. However, there is a lack of knowledge about the ability of the TPB to predict physical activity behavior among Thai pregnant woman.

In summary, taken together, this literature review demonstrates the response to physical activity associated with the physical, physiological and psychological changes during the second trimester of pregnancy. It is focused on maternal and fetal considerations. In general, regular physical activity is significant for healthy pregnant women because of the provision of benefits to the women and fetuses. Of note, the fundamental concern is to what extent responses to physical activity during pregnancy differ from those in the non-pregnant state. Findings from clinical and epidimiological studies have shown no adverse maternal or fetal effects in women engaging in mild and moderate physical activity.

Even though the physical, physiological and psychological benefits of physical activity are well documented, and it has been suggested that women should participate in this activity, most women stop engaging in physical activity during pregnancy, and some of them decline to perform any activity during this period. Therefore, the present study will examine the relationships among the factors to gain a better understanding of the role each plays in promoting regular physical activity as part of a healthy lifestyle. The Theory of Planned Behavior provides the framework in this study. In depth knowledge concerning these relationships will provide guidance in structuring effective physical activity interventions for Thai pregnant women during the second trimester of pregnancy.

CHAPTER III
METHODOLOGY

This chapter described the research design and methods used to conduct the study. The research design, population and sampling, measurement, validity and reliability, data collection, protection of human subjects, and data analysis procedures were included. A pilot study and findings of using the Theory of Planned Behavior's constructs (TPB) were also presented.

Research Design

A descriptive, cross-sectional research design was used to investigate causal relationships between the theoretical predictors; including, behavioral beliefs, normative beliefs, control beliefs, attitudes toward physical activity, subjective norms, perceived behavioral control and intention to engage in physical activity, and physical activity among Thai women during the second trimester of pregnancy. The data were obtained from self-report questionnaires. This study was conducted in two phases.

Phase I: Phase one of the study was composed of two steps: (1) an elicitation of the study and (2) a pilot testing.

Step 1: An elicitation of the study: An elicitation was a significant step in applying the TPB in the study. It used open-ended interviews to probe the relevant salient beliefs involving particular behaviors among specific population. This study was performed based on the recommended criteria by Ajzen (1991, 2006); Ajzen and Fishbein (1980); and Ajzen and Madden (1986) in order to develop the measure which reflects the salient behavioral, normative and control beliefs regarding physical activity among women during the second trimester of pregnancy.

Step 2: A Pilot testing: The developed questionnaires based on the elicitation results were used to evaluate for clarity and appropriateness. Cronbach's alpha coefficient was computed to estimate the internal consistency reliability of each questionnaire.

Phase II: Model Testing Phase

A model testing was applied to assess the relationships among the TPB's constructs by using the questionnaires developed from the elicitation study, and modified from the existing instrument.

Population and Sampling

The target population of this study was Thai pregnant women who attended the Antenatal Clinics at Maharaj Nakorn Chiang Mai Hospital and the Health Promotion Hospital located in Chiang Mai.

Sample and Setting

Purposive sampling was used for this study. Data were collected from the pregnant women who attended the Antenatal Clinics at Maharaj Nakorn Chiang Mai Hospital and the Health Promotion Hospital. Then, every subject who met inclusion criteria was consecutively recruited.

Criteria for inclusion in this study were:

1. Healthy pregnant women who were 18 years of age or over, and with gestational age of 16 to 25 weeks regardless of all kinds of complications, i.e., heart disease, diabetes mellitus, hypertension, and so on.
2. Able to read and write Thai language
3. Willing to participate in this study

Criteria for exclusion in this study were:

1. Multiple pregnancies
2. Mobility limitation

Sample Size

Kline (1998) suggested that the results derived within a larger sample had less sampling error and were more likely to be statistically significant than within smaller samples. Moreover, the evaluation of complex models required more subjects than did the evaluation of simpler models. The rough guidelines were mentioned that

sample size of less than 100 could be considered "small." Between 100 and 200 subjects—a *'medium'* sample size— was better than minimum, but again this was not an absolute because things like model complexity had to be considered. Sample sizes that exceeded 200 cases could be considered large and appropriate.

Similarly, Hair, Black, Babin, Anderson & Tatham (2006) mentioned that Structural Equation Modeling (SEM) in general required a large sample relative to multivariate approach. However, large sample sizes were usually more time-consuming and expensive to obtain. Thus, the critical question in SEM involved how large a sample was needed. Normally, the common SEM estimation procedure was maximum likelihood estimation.

Maximum likelihood estimation (MLE) had been found to provide valid results with sample sizes as small as 50, but this small sample size was not recommended. It was generally accepted that the minimum sample size to ensure appropriate use of MLE was 100 to 150. One recommended sample size was 200, to provide a sound basis for estimation. However, if the sample size was large (>400), the method became *'too sensitive'*, and almost any difference was detected, making all goodness-of-fit measures indicate poor fit (Hair et al., 2006).

Additionally, Munro (2005) also recommended that the number of subjects should be 30 for each independent variable in a model, to increase the likelihood that the findings could be replicated. There were seven independent variables in this study. Then, the estimated sample size was suggested to be 210 subjects.

According to the path model in this study, the complexity was not an issue. Moreover, the hypothesized model to predict physical activity among Thai pregnant women proposed seven independent variables. Thus, a minimum requirement of 210 subjects should be appropriate, plus 20 percent for attrition rate to account for the chance of incomplete data. Consequently, the minimum number of subjects in this study was 252.

Settings

Two Antenatal Clinics in Chiang Mai including Maharaj Nakorn Chiang Mai Hospital and the Health Promotion Hospital were chosen since these hospitals were categorized as the government general health sectors.

Maharaj Nakorn Chiang Mai Hospital is a university hospital which serves 3,000 out-patient visits per day, and comprised of 1,400 beds for the tertiary care of complicated patients with various specializing departments and units (Medical Records and Statistics Department, 2008).

The Health Promotion Hospital is a health sector under the Ministry of Public Health which serves 1,435 pregnant women as out-patient visits per year, and comprised of 60 beds for maternal and child patients.

Both hospitals provide clinical services at the Antenatal Unit every weekday from 8:00 A.M. to 4:00 P.M. and serve a diversity of pregnant women in Chiang Mai province.

Protection of Human Rights

This study was conducted with the approval of the Institutional Review Board (IRB) of Mahidol and Chiang Mai University. The official letters from the Graduate Studies Office, Mahidol University were submitted to the directors of the two hospitals, Maharaj Nakorn Chiang Mai Hospital and the Health Promotion Hospital to ask for data collection permission. After the formal permissions were provided, the researcher directly contacted the head nurses of the Antenatal Clinics in order to explain the purpose and processes of the study.

Potential subjects were informed about the purpose of the study and their right to deny or to withdraw from the study at any time, and that was not any risk involved in participation in this study. The voluntary subjects were requested to sign a consent form. Their names would not be attached to the data. A code number was used on the questionnaires instead, and all responses were analyzed as group data and no individual's responses were identified. The potential subjects' names would be included only on the consent form and kept in a locked file cabinet until the completion of the study at which time they would be destroyed.

Instruments

In the present study, self-reported questionnaires were used for collecting data because they were convenient for the subjects to complete, assured anonymity, had a standardized format, and offered no risk of interviewer bias (Waltz, Strickland and

Lenz, 1984). There were twelve questionnaires provided to ask the subjects concerning the TPB's variables. Ten of them were developed based on focus group respondents' description. Only the Pregnancy Physical Activity Questionnaire was translated into Thai and modified. The demographic information questionnaire was modified from Downs and Hausenblas (2003).

Elicitation Study for Development of the Belief Measures

An elicitation study was performed to develop the direct and indirect measures based on the TPB among the pregnant women. The direct measures consisted of attitude toward physical activity, subjective norms and perceived behavioral control. According to the indirect measures, they were reflected in the salient behavioral, normative, and control beliefs including outcome evaluation, motivation to comply, perceived power, and intention related to physical activity behavior.

Seven focus groups were conducted with 52 pregnant women at two Antenatal Clinics: Maharaj Nakorn Chiang Mai Hospital and the Chiang Mai Health Promotion. Data were analyzed by using content analysis then a set of TPB questionnaires were constructed. A Likert-type scale was used to develop nine questionnaires including: (1) behavioral beliefs, (2) normative beliefs, (3) control beliefs, (4) outcome evaluation, (5) motivation to comply, (6) perceived power, (7) subjective norms, (8) perceived behavioral control, and (9) intention. Conversely, attitude toward physical activity used semantic differential bipolar adjective scales.

The developed questionnaires were employed for pilot testing in Phase 1 to test the relationships among the variables of the TPB.

Validity and Reliability

The validity of an instrument was an essential to determine the extent to which the instrument actually reflected the abstract construct being examined. Validity testing was able to validate the utilization of an instrument for a specific group or purpose. An instrument might be very valid in one situation but not valid in another. Thus, validity was required to be reexamined in each study situation (Burns & Grove, 2007).

Reliability plays an important role in the selection of an instrument in a study since reliability testing was able to examine the amount of random error in the

measurement technique. Accordingly, it was necessary to test the reliability of an instrument before using it in a study. Reliability was usually expressed as a form of correlation coefficient. A reliability coefficient of .80 was considered the lowest acceptable value for a well-developed psychosocial measurement instrument. However, a reliability of .70 was considered acceptable for a newly-developed psychosocial instrument (Burns & Grove, 2007).

Validity

All measures in this study were evaluated for content validity by a panel of the TPB and physical activity experts, and revised according to the comments of these experts. Seven experts, including three nurse educators, one obstetrician, one physician, and two educators assessed content validity. Then, a content validity index was computed, both scale-level CVI (S-CVI), and item-level CVI (I-CVI). The results of content validity index (CVI) of each questionnaire were as the following:

Table 3.1 Results of S-CVI and I-CVI scores of the questionnaires

Questionnaire(s)	**S-CVI**	**I-CVI (Range)**
1. Attitude toward Physical Activity Questionnaire (APAQ)	0.78	0.57-0.71
2. Subjective Norms Questionnaire (SN)	0.79	0.71-0.86
3. Perceived Behavioral Control Questionnaire (PBCQ)	0.81	0.71-0.86
4. Behavioral Beliefs Questionnaire (BBQ)	0.90	0.71-1.00
5. Outcome Evaluations Questionnaire (OEQ)	0.61	0.43-0.71
6. Normative Beliefs Questionnaire (NBQ)	0.92	0.86-1.00
7. Motivation to Comply Questionnaire (MCQ)	0.92	0.86-1.00
8. Control Beliefs Questionnaire (CBQ)	0.97	0.86-1.00
9. Perceived Power Questionnaire (PPQ)	0.97	0.86-1.00
10. Intention Questionnaire (INTQ)	0.68	0.57-0.71
11. Pregnancy Physical Activity Questionnaire (PPAQ)	0.90	0.57-1.00

The results of CVI, some showed that questionnaires had low scores; hence, the questionnaires were revised with respect to the comments and recommendations of the experts.

Reliability

The revised questionnaires were used in Step 2 in order to evaluate for clarity and appropriateness. Cronbach's alpha coefficient was computed to estimate the internal consistency reliability of each questionnaire. The analysis indicated that Cronbach's alpha coefficients were ranged from .68 to .92.

As shown in Table 3.2, Cronbach's alpha coefficients of four questionnaires were less than .80 as follows: Subjective Norms Questionnaire (.68), Perceived Power Questionnaire (.76), Perceived Behavioral Control Questionnaire (.77), and Pregnancy Physical Activity Questionnaire (.75).

Table 3.2 Reliability Estimates: Cronbach's alpha coefficients for the constructs of the TPB questionnaires (Pilot testing phase, n = 34)

Questionnaire	Number of items	Cronbach's alpha coefficient
Indirect Measures		
Behavioral Beliefs	12	.86
Outcome Evaluation	12	.87
Indirect Attitude toward Physical Activity (Behavioral Beliefs X Outcome Evaluation)	*12*	*.90*
Normative Beliefs	6	.91
Motivation to Comply	6	.97
Indirect Subjective Norms (Normative Beliefs X Motivation to Comply)	*6*	*.96*
Control Beliefs	15	.81

Table 3.2 Reliability Estimates: Cronbach's alpha coefficients for the constructs of the TPB questionnaires (Pilot testing phase, n = 34) (cont.)

Questionnaire	Number of items	Cronbach's alpha coefficient
Perceived Power	15	.76
Indirect Perceived Behavioral Control (Control Beliefs X Perceived Power)	*15*	*.83*
Direct Measures		
Attitude toward Physical Activity	9	.92
Subjective Norms	4	.68
Perceived Behavioral Control	3	.77
Intention	8	.83
Pregnancy Physical Activity Questionnaire	28	.75

According to the recommendation of Burns & Grove (2007), the reliability of .70 was considered acceptable for a newly-developed psychosocial instrument. Therefore, the Subjective Norms Questionnaire was revised and tested for reliability again before using to collect data in Phase 2. The finding was found that Cronbach's alpha coefficient of this questionnaire was .77.

Measurement of the TPB Variables

In this study, the researcher used the self-reported questionnaire to measure the variables based on the TPB's constructs regarding physical activity behavior among women during the second trimester of pregnancy. Ten questionnaires based on the TPB's constructs were developed from the elicitation's results by the researcher.

There were twelve questionnaires altogether used in this study. Ten of them were developed based on the focus group respondents' descriptions. A single existing questionnaire was translated into Thai and modified. The questionnaires presented were as follows:

1. The Attitude toward Physical Activity Questionnaire (APAQ)
2. The Behavioral Beliefs Questionnaire (BBQ)

3. The Outcome Evaluations Questionnaire (OEQ)
4. The Subjective Norms Questionnaire (SNQ)
5. The Normative Beliefs Questionnaire (NBQ)
6. The Motivation to Comply Questionnaire (MCQ)
7. The Perceived Behavioral Control Questionnaire (PBCQ)
8. The Control Beliefs Questionnaire (CBQ)
9. The Perceived Power Questionnaire (PPQ)
10. The Intention Questionnaire (INTQ)
11. The Pregnancy Physical Activity Questionnaire (PPAQ)
12. The Demographic Information Questionnaire

1. The Attitude toward Physical Activity Questionnaire (APAQ)

Attitude toward Physical Activity were measured both directly and indirectly.

Indirect measures: Indirect attitude toward physical activity was assessed in terms of two questionnaires: The *Behavioral Beliefs Questionnaire (BBQ) and Outcome Evaluation Questionnaire (OEQ).* According to the TPB, the strength of each salient belief *(b)* was combined in a multiplicative fashion with the subjective outcome evaluation *(e)* of the belief's attribute. Thus, an attitude was directly proportional ($\propto$) to the resulting products across the *n* salient beliefs and outcome evaluation (Ajzen, 1991).

The Behavioral Beliefs and Outcome Evaluations Questionnaires were developed based on focus group respondents' descriptions of advantages and disadvantages. The Behavioral Beliefs Questionnaire (BBQ) consisted of 12 behavioral beliefs using a five-point Likert-type scale *(1 = very unlikely to 5 = very likely)*. Outcome evaluations were measured by the Outcome Evaluations Questionnaire (OEQ) rating on a five-point Likert-type scale *(1 = very unimportant to 5 = very important)* of 12 outcome evaluations.

To formulate the indirect attitude toward physical activity, the subjects rated their beliefs and evaluation of consequences. Then, each belief was combined in a multiplicative with each outcome evaluation. The total score of indirect attitude toward physical activity ranged from 12 to 300, and could be classified into three levels; low level (12-107), moderate level (108-203), and high level (204-300). The

higher scores indicated positive beliefs and outcome evaluations with regard to physical activity during pregnancy.

Direct measures: The attitude toward physical activity was measured by the Attitude toward Physical Activity Questionnaire (APAQ). This questionnaire was developed by the researcher based on Ajzen (2006) and the focus group response, and measured by using a five -point semantic differential bipolar scale (ranging from 1 to 5). This scale consisted of nine adjective pairs that were constructed from the results of the elicitation study, and was measured into two aspects of attitude. The total score ranged from 9 to 45, and could be classified into three levels; low level (9-20), moderate level (21-32), and high level (33-45). The higher attitude scores indicated more positive attitude toward physical activity during pregnancy.

2. Subjective Norms: Subjective Norms were measured both directly and indirectly.

Indirect measures: Indirect subjective norms were assessed in terms of two questionnaires: The *Normative Beliefs Questionnaire (NBQ) and Motivation to Comply Questionnaire (MCQ).* According to the TPB, the strength of each normative belief *(n)* was multiplied by the person's motivation to comply *(m)* with the significant referent. Therefore, the subjective norms (SN) were directly proportional ($\propto$) to the sum of the resulting products across the *n* salient referents (Ajzen, 1991).

The Normative Beliefs and Motivation to Comply Questionnaire were developed based on focus group respondents' descriptions of normative beliefs and motivation to comply. The subjects rated their perceptions of the strength of significant others beliefs about whether the subjects should perform physical activity during pregnancy, and their motivation to comply with these significant referents. The Normative Beliefs Questionnaire (NBQ) consisted of six normative beliefs rating on a five-point Likert-type scale *(1 = definitely not true to 5 = definitely true.* Motivation to comply was measured by the Motivation to Comply Questionnaire (MCQ) rating on a five-point Likert-type scale *(1 = not at all to 5 = very much)* of six motivations to comply.

To formulate the indirect subjective norms, the strength of each normative belief was multiplied by the corresponding motivation to comply with the referent(s), and the products were summed across the salient important others. The total score

ranged from 6 to 150, and could be classified into three levels; low level (6-53), moderate level (54-101), and high level (102-150). Higher scores reflected greater influence by individuals who were important to the subjects.

Direct measure: Subjective norms were measured by the Subjective Norms Questionnaire (SNQ). This questionnaire was developed by the researcher based on Ajzen (1991, 2006) and focus group responses, and determined by four items rating on a five-point Likert-type scale. The total score ranged from 4 to 20, and could be classified into three levels; low level (4.0-9.2), moderate level (9.3-14.6), and high level (14.7-20). Higher scores indicated greater influence of significant others on performing physical activity during pregnancy.

3. Perceived Behavioral Control: Perceived Behavioral Control was measured both directly and indirectly.

Indirect measures: Indirect perceived behavioral control was assessed in terms of two questionnaires: The *Control Beliefs Questionnaire (CBQ) and Perceived Power Questionnaire (PPQ).* Based on the TPB, each control belief (c) was combined in a multiplicative fashion with the perceived power (p) of the particular control factor to facilitate or inhibit performance of the behavior. Thus, the perceived behavioral control (PBC) was directly proportional ($\propto$) to the sum of the resulting products across the *n* salient control beliefs and perceived powers (Ajzen, 1991).

The Control Beliefs and Perceived Power Questionnaire were developed based on focus group respondents' description of control beliefs and perceived powers. The Control Beliefs Questionnaire consisted of 15 control beliefs rated on a five-point Likert-type scale *(1 = very difficult to 5 = very easy).* Perceived power was measured by the Perceived Power Questionnaire (PPQ) rating on a five-point Likert-type scale *(1 = very unlikely to 5 = very likely)* of 15 perceived powers. According to the PPQ, there were eight negative items (item 3, 4, 6, 8, 9, 10, 13, and 14). All these items were reversed scored before calculating. To formulate the indirect perceived behavioral control, each control belief was combined in a multiplicative with each perceived power. The products were summed across all of the indirect perceived behavioral control. The total score ranged from 15 to 375, and could be classified into three levels; low level (15-134), moderate level (135-254), and high

level (255-375). Higher scores were represented greater perceived behavioral control over performing physical activity during pregnancy.

Direct measures: Perceived behavioral control was measured by the Perceived Behavioral Control Questionnaire (PBCQ). This questionnaire was developed by the researcher based on Ajzen (1991, 2006) and focus group response, and determined by 3 items rating on a five-point Likert-type scale (1 = very difficult to 5 = very easy; and 1 = strongly disagree to 5 = strongly agree). The total score ranged from 3-15, and could be classified into three levels; low level (3-6), moderate level (7-10), and high level (11-15). Higher scores indicated perceived behavioral control over performing physical activity during pregnancy.

4. Intention

Intention was developed by the researcher based on focus group respondents, and determined by eight items consistent with household/caregiving, transportation, exercise, and occupation rating on a five-point Likert-type scale *(1 =definitely do not to 5 = definitely do; and 1 = definitely not true to 5 = definitely true)*. The total scores ranged from 8 to 40, and could be classified into three levels; low level (8-18.6), moderate level (18.7-29.3), and high level (29.4-40). Higher scores indicated greater intention to perform physical activity during pregnancy.

5. Pregnancy Physical Activity Behavior

The Pregnancy Physical Activity Questionnaire (PPAQ) was developed by Chasan-Taber, et al. (2004). It was translated into Thai language and modified to study physical activity among Thai pregnant women. It was a semi-quantitative questionnaire that asked the subjects to report the time spent participating in 28 activities including household/caregiving (14 activities), occupation (six activities), sports/exercise (five activities), and transportation (three activities). For each activity, the subjects were asked to select the category that best approximates the amount of time spent in that activity per day or week during the second trimester of pregnancy.

The PPAQ was calculated energy expenditure by multiplying each activity with its intensity to arrive at a measure of weekly energy expenditure (MET-h·wk^{-1}) attributable to each activity. Field-based measurements in pregnant women were used

to represent activity intensity for walking, and light- to moderate- intensity household tasks. The Compendium-based MET value was used to estimate the intensity of the remainder of the PPAQ activity and summed to obtain average MET hours per week for total activity. Additionally, each activity was classified by intensity: sedentary (<1.5 METs), light (1.5 to less than 3.0 METs), moderate (3.0-6.0 METs), or vigorous (>6.0 METs), and the average number of MET-hours per week expended in each intensity level was calculated (Chasan-Taber, et al., 2004). The total score of PPAQ ranged from 0 to 1680, and could be classified into three levels; low level (0-559), moderate level (560-1119), and high level (1120-1680).

Where the instruments are concerned, the researcher should take into account cross-cultural appropriateness when comparing behaviors across two or more cultures. Consequently, the translation of research materials such as questionnaires is a significant procedure in a study. The researcher should be aware of the need for discrimination in translating. The most common translation technique used by nurse researchers is the translation/back translation method (Brislin, 1986; Willgerodt, Kataoka-Yahiro, & Ceria, 2005).

Behling and Law (2000) suggested that the translation/back-translation procedure involved four steps as follows:

1. A bilingual individual translated the original source language instrument into the target language.

2. Another bilingual translator who was not exposed to the original instrument blindly back-translated the draft target language into the source language.

3. The two versions of the source language were compared for the detection of errors.

4. If there were major differences between the two source language versions, modifications needed to be made until there were only minor discrepancies.

By using the simple translation-back translation technique (Brislin, 1986; Behling, & Law, 2000), the PPAQ questionnaire was translated into Thai, and back-translated into English by three bilingual translators including two doctoral nurses and one doctoral candidate. Then, the two versions of the source language were compared for errors. The PPAQ was revised before measuring by a pilot-tested cross-culturally for validity and reliability.

Data Collection

Upon approval by the Institutional Review Board (IRB) of Mahidol and Chiang Mai University, and with the permission of the directors of the two hospitals, the purpose and process of the study was explained to the head nurses of the two Antenatal Clinics at Maharaj Nakorn Chiang Mai Hospital and the Health Promotion Hospital informing them that the study was conducted in two phases.

Phase I: There were two steps of this phase; an elicitation of the study and the pilot testing.

1. An elicitation of the study

An elicitation study was conducted to develop the measures that reflect the salient behavioral, normative and control beliefs regarding to physical activity in the women during the second trimester of pregnancy. According to the TPB, the salient beliefs, the most important and prominent beliefs, became the immediate determinants of a person's attitudes, subjective norms and perceived behavioral control (Azjen & Fishbein, 1980, Azjen, 1991).

Using procedures outlined by Ajzen (1991, 2006), Azjen and Fishbein (1980), and Azjen and Madden (1986), three and four focus groups were conducted in a childbirth preparation room at Maharaj Nakorn Chiang Mai Hospital and the Chiang Mai Health Promotion, respectively. Each group consisted of six to nine pregnant women. Purposive sampling was used to recruit healthy pregnant women in the elicitation study. The participants who met the inclusion criteria and waited for service at the Antenatal Clinic were directly asked by the researcher to join the study. Each participant was informed concerning the purpose of this study and procedures. Signed consent was obtained from the pregnant women who wanted to participate in this study. If they did not want to participate in this study, they were excluded.

Each focus group was able to be conducted in a day. During this process, the researcher provided a brief explanation of the objectives of the study and asked open-ended questions in order to elicit salient beliefs. Then, the researcher also made attempts to involve each participant in responding to questions. Open-ended, semi-structured elicitation interviews were conducted with 52 pregnant women in seven focus groups.

The researcher asked the following questions: "*What would be the advantages/disadvantages if you perform physical activity during the second trimester*

of pregnancy?", "Who are the significant people who think that you should/should not perform physical activity during the second trimester of pregnancy?", and "What would make it easy/difficult for you to perform physical activity during the second trimester of pregnancy?"

The results from the elicitation study were analyzed by using the content analysis method for developing a set of questionnaires used to test the relationships among all variables of the TPB in the model testing phase.

2. Pilot testing

A set of questionnaires was evaluated for clarity and appropriateness by testing the content validity and reliability of all instruments.

After the subjects were recruited in the pilot study, the researcher introduced herself and explained the objectives of the study to them. The subjects were informed of their right to participate or to reject participating in the study. The written consent form was signed if the subject was willing to participate in this study.

To test the questionnaires, the subjects were instructed to complete the questionnaires, and responded to the following questions:

(a) Were the questions clearly stated?

(b) Was the format easy to answer?

Subjects were also asked to indicate the times they began and completed the questionnaires. The nature of the questions and subjects' reaction to them was discussed. On the basis of the results from this pilot test the questionnaires were modified.

The results from the pilot testing were analyzed to estimate the internal consistency reliability by using Cronbach's alpha coefficients. In this step, a reliability of .70 was considered acceptable in accordance with a newly developed psychosocial instrument. However, one questionnaire, subjective norms, was revised after analyzing for the reliability of the instruments.

Phase II: Model Testing Phase

The sets of the TPBs and PPAQ questionnaires were administered to test the model. Data collection took place from April to August, 2008, in two hospitals, Maharaj Nakorn Chiang Mai Hospital and the Health Promotion Hospital located in Chiang Mai province. There were 272 cases in the model testing phase. The number of

subjects from Maharaj Nakorn Chiang Mai Hospital and the Health Promotion Hospital were 152 and 120, respectively.

The data collection procedure was conducted as the following:

1. Permission was obtained from the directors of these two setting for the researcher to approach pregnant women at the Antenatal Clinics. The head nurse and staff of each unit were also approached and informed about the purpose of the study and details of the data collection process.

2. Subjects who met the inclusion criteria while waiting for service at the Antenatal Clinic were directly asked by the researcher to join the study.

3. Once the potential subjects were recruited at the Antenatal Clinics by purposive sampling technique, the researcher introduced herself, established rapport, and explained the purpose of the study and how they were selected. They were informed that the confidentiality or anonymity of the information was seriously maintained.

4. The subjects were asked to sign consent forms if they were willing to join this study. The researcher interviewed the subjects by using the demographic information questionnaire and completed some data from the hospital records. The subjects were explained how to complete the ten questionnaires measuring independent variables: BBQ, OEQ, NBQ, MCQ, CBQ, PPQ, APAQ, SNQ, PBCQ and INTQ. All these questionnaires were collected by means of self-reporting at the Antenatal Clinic of both hospitals.

5. After each subject had answered the questionnaires, the researcher checked all items again to make sure that all questionnaires were completed. Then, the researcher made an appointment with the subjects to complete the last questionnaire (PPAQ) one month later in order to assess their actual physical activity.

6. Finally, the subjects received a gift from the researcher in appreciation of their time and effort after finishing all procedures in this study.

Data Analysis

Data analysis was completed by using the Statistical Package of the Social Sciences (SPSS) for Windows, version 11.5, and the Linear Structural Relationship

(LISREL) statistical package, version 8.53, which were provided by Mahidol University.

Data analyses included the application of descriptive and inferential statistics as the following:

1. Descriptive statistics were used to delineate characteristics of the samples and the variables of interest in terms of frequency, mean, median, standard deviation, range of scores, skewness, and kurtosis.

2. Cronbach's Alpha Coefficient was examined to determine the reliability of the instruments.

3. The statistical assumptions underlying multivariate for path analysis including normality, linearity and homoscedasticity, and multicollinearity were examined. Pearson's Product Moment correlation was employed to analyze the bivariate relationships among observed variables as well as to examine multicollinearity among the variables. The normality and linearity were determined by use of a PRELIS program.

Path Analysis

A path analysis under the LISREL program was used to solve the structural equations for dependent variables in terms of independent and random disturbance. Measured variables were theoretical constructs and called observed variables. To estimate the parameters of the hypothesized model, path coefficients and square multiple correlations were estimated; the standardized coefficient was employed to estimate the structural effect. Beta (β) represented the direct effect of endogeneous variables on other endogeneous variables, while, gamma (γ) referred to the structural effects of exogeneous variables on endogeneous variable. Phi (Φ) signified the variance/covariance matrix of exogeneous variables. Epsilon (ε) reflected the measurement errors associated with dependent observed variables (y). Theta-delta (Θδ) represented the measurement errors associated with independent observed variables (x). Theta-delta-epsilon (Θδε) referred to the measurement errors associated with independent and dependent observed variables (x and y).

The fit of the hypothesized model was analyzed using maximum likelihood estimation. The structural model was refined by adding and evaluating the modified

model for the best model fit to answer the hypotheses. The modification indices were used as guidelines for model improvements of relationships between indicators, according to the theoretical basis. To evaluate the model, the overall model fit-index was determined to establish how well the model fit the empirical data (Hair, Anderson, Tatham, & Black, 1998). To establish the suitability of the Overall Model Fit Index, the following points should be examined:

1. Nonsignificant Chi-square ($p > .05$). Nonsignificant differences were desired because it demonstrated the theoretical model fit of the observed empirical data.

2. Goodness-of-Fit Index (GFI). The possible range of GFI values was 0 to 1. The higher values indicated a better fit. GFI greater than .90 was considered good (Hair et al., 1998).

3. Adjusted GFI was an extension of the GFI. The recommended acceptance level of AGFI was a value greater than or equal to .90 (Hair et al., 1998).

4. Comparative Fit Index (CFI). The CFI was an incremental fit index. A value greater than .90 was associated with a model fit (Hair et al., 1998).

5. Root Mean Square Error of Approximation (RMSEA). The RMSEA was a misfit index. Values closed to zero indicated a good fit. The RMSEA less than .05 indicated a very good fit (Munro, 2005). The higher RMSEA than the value of .10 indicated a poor fitting model (Tabachnick & Fidell, 2001).

In summary, this study was utilized with a quantitative approach. A descriptive, cross-sectional research design was applied to collect data regarding Thai women's physical activity during the second trimester of pregnancy by using the Theory of Planned Behavior. Population and sampling, measurement, data collection, protection of the human subject, and data analysis employed in this study, were described.

Summary

In summary, this chapter presented research methods including the design of a cross-sectional descriptive study, population and sampling, measurements constructions, data collection and analyses. Additionally, the discussion of protection of human rights, and instrument development and psychometric properties of this study were described.

CHAPTER IV
RESULTS

This chapter presents the results of the data analyses for each phase of the study. Phase I is the tools development phase, which includes the results from an elicitation study and a pilot study, and the results of Phase II which focuses on the model testing.

Sample Characteristics

The characteristics of the sample were illustrated as the following:

1. Elicitation study phase

The sample (N = 52) for the elicitation study consisted of 28 pregnant women during the second trimester and 25 pregnant women during the third trimester. The average age was 25.92 years (Min-Max = 18-36 years; SD = 5.02).

2. Pilot testing phase

The sample for the pilot test of the instruments consisted of 34 pregnant women. An average age was 26.53 years (Min-Max = 18-37 years; SD = 5.62).

3. Model testing phase

Two hundred and seventy-two pregnant women during the second trimester from two hospitals were recruited for the model testing phase. The subjects were selected from the Antenatal Clinic at Maharaj Nakorn Chiang Mai Hospital and the Health Promotion Hospital. The number of subjects from each hospital were 152 and 120, respectively.

The demographic characteristics of the sample in the model testing are presented in Table 4.1.

Table 4.1 Demographic Characteristics of the Samples (n = 272)

Variables	Number	Percentage
Age (year)		
18 - 20	15	5.50
21 - 30	181	66.60
31 - 40	76	27.90
Mean = 27.51, SD = 4.33, Range = 18 - 40		
Marital status		
Single	13	4.80
Married	259	95.20
Education level		
Primary school	21	7.70
Secondary school	61	22.40
High school	60	22.10
Vocational school	31	11.40
Bachelor Degree	92	33.80
Master Degree	7	2.60
Family income		
Less than 10,000 Baht	52	19.10
10,000 – 19,999 Baht	122	44.90
20,000 - 29,999 Baht	59	21.70
30,000 – 39,999 Baht	27	9.90
≥ 40,000 Baht	12	4.40
Occupation		
Employee	182	66.90
Civil servant/State enterprise	26	9.60
Merchant	26	9.60
Owner of business	21	7.70
Housewife	11	4.00
Student	5	1.80
Politician	1	0.400

Table 4.1 Demographic Characteristics of the Samples (n = 272) (cont.)

Variables	Number	Percentage
Gravida		
1	131	48.20
2	117	43.00
≥ 3	24	8.80
Gestational age		
15 - 20 weeks	147	54.00
21 - 26 weeks	125	46.00
Mean = 20.42, SD = 2.95, Range = 15 - 26		
Number of children		
0	173	63.60
1	92	33.80
2	7	2.60
Abortion		
No	214	78.70
Yes	58	21.3
Pre-pregnancy exercise experience		
None	175	64.30
Exercise	97	35.70

The majority of the participants were 21 - 30 years (66.6%). An average age of the sample was 27.51 years (*SD* = 4.33 years). Most of the subjects were married (95.2%). The findings revealed that one-third of the pregnant women were graduated with a bachelor degree (33.8%). Approximately, two-thirds of the subjects were employees (66.9%) and had family incomes, ranging 10,000 - 19,999 baht per month (44.9%). Nearly half of the participants (48.2%) were experiencing first time pregnancy. Most of these subjects had gestational ages of 15 - 20 (54.0%); and did not have any children (63.6%). More than two-thirds of the subjects did not have abortion experience (78.7%). Approximately two-thirds (64.3%) did not exercise before pregnancy.

Descriptive Characteristics of Study Variables

Scores of the TPB's variables including direct and indirect attitude toward physical activity, direct and indirect subjective norm, direct and indirect perceived behavioral control, intention, and physical activity during the second trimester of pregnancy were constructed based on descriptive statistics in each variable. Descriptive statistics for each variable were shown in Tables 4.2 - Tables 4.6.

Table 4.2 Descriptive Statistics for each Item of Indirect and Direct Measure of Attitude (n = 272)

Variables (Independent Variable)	Possible Range	Actual Range	Mean	SD	Median	Skewness	Kurtosis
Indirect Attitude toward physical activity ***(Behavioral beliefs x Outcome evaluations)***	12-300	37-300	187.17	39.75	184.50	-0.02	0.79
1) Make me healthy	1-25	4-25	17.15	4.09	16.00	-0.07	0.57
2) Shorter labour	1-25	3-25	16.03	4.89	16.00	0.12	-0.14
3) Increase my muscle strength	1-25	4-25	15.97	4.11	16.00	0.06	0.32
4) Keep me active	1-25	2-25	14.52	4.88	16.00	-0.13	-0.16
5) Increase back pain	1-25	1-25	11.83	4.88	12.00	0.31	-0.21
6) Better weight control	1-25	2-25	12.88	5.12	12.00	0.25	-0.30
7) Improved sleep	1-25	3-25	15.69	5.03	16.00	-0.23	-0.10
8) Improved blood circulation	1-25	3-25	15.59	4.40	16.00	0.22	0.12
9) Normal digestion and defecation	1-25	2-25	14.88	5.35	16.00	-0.07	-0.27
10) Improved my mental health	1-25	4-25	17.41	4.84	16.00	-0.15	-0.03
11) Feeling cheerful and relaxed	1-25	4-25	17.00	4.76	16.00	-0.07	0.09
12) Make my unborn baby healthy	1-25	4-25	18.22	4.83	20.00	-0.26	-0.32

Table 4.2 Descriptive Statistics for each Item of Indirect and Direct Measure of Attitude (n = 272) (cont.)

Variables (Independent Variable)	Possible Range	Actual Range	Mean	SD	Median	Skewness	Kurtosis
Direct Attitude toward Physical Activity	9-45	17-45	34.33	4.28	35.00	-0.47	1.19
1) Unpleasant – Pleasant	1-5	1-5	3.67	0.74	4.00	-0.78	0.67
2) Harmful – Beneficial	1-5	2-5	3.89	0.72	4.00	-0.49	0.41
3) Bad – Good	1-5	2-5	4.05	0.60	4.00	-0.22	0.52
4) Unhealthy – Healthy	1-5	2-5	3.98	0.57	4.00	-0.37	1.42
5) Stressful – Relaxing	1-5	2-5	3.92	0.55	4.00	-0.71	2.31
6) Unenjoyable – Enjoyable	1-5	1-5	3.65	0.70	4.00	-0.79	1.51
7) Humble - Proud	1-5	1-5	3.88	0.60	4.00	-0.45	1.64
8) Inactive - Active	1-5	1-5	3.57	0.81	4.00	-0.98	0.88
9) Unattractive - Admirable	1-5	2-5	3.73	0.65	4.00	-0.29	0.17

Table 4.3 Descriptive Statistics for each Item of Indirect and Direct Measure of Subjective Norm (n = 272)

Variables (Independent Variable)	Possible Range	Actual Range	Mean	SD	Median	Skewness	Kurtosis
Indirect Subjective Norms ***(Normative beliefs x Motivation to comply)***	6-150	16-150	89.00	25.55	96.00	-0.23	0.35
1) My husband	1-25	2-25	14.83	4.97	16.00	-0.16	-0.01
2) My mother	1-25	2-25	14.71	4.75	16.00	-0.24	0.22
3) My father	1-25	2-25	14.03	4.70	16.00	-0.08	0.02
4) My relatives	1-25	2-25	14.06	4.75	16.00	-0.26	-0.05
5) My friends	1-25	2-25	14.48	4.70	16.00	-0.02	0.26
6) Physician/nurse	1-25	3-25	16.89	5.05	16.00	-0.14	-0.19
Direct Subjective Norms	4-20	8-20	15.50	2.20	16.00	-0.63	1.67

Table 4.3 Descriptive Statistics for each Item of Indirect and Direct Measure of Subjective Norm (n = 272) (cont.)

Variables (Independent Variable)	Possible Range	Actual Range	Mean	SD	Median	Skewness	Kurtosis
1) The important persons inside my family think I should perform physical activity during pregnancy.	1-5	2-5	3.87	0.69	4.00	-0.66	0.95
2) The important persons outside my family think I should perform physical activity during pregnancy.	1-5	2-5	3.90	0.62	4.00	-0.49	1.05
3) The important persons inside my family push me to perform physical activity during pregnancy.	1-5	2-5	3.85	0.67	4.00	-0.47	0.58
4) The important persons outside my family push me to perform physical activity during pregnancy.	1-5	2-5	3.89	0.62	4.00	-0.47	0.92

Table 4.4 Descriptive Statistics for each Item of Indirect and Direct Measure of Perceived Behavioral Control (n = 272)

Variables (Independent Variable)	Possible Range	Actual Range	Mean	SD	Median	Skewness	Kurtosis
Indirect Perceived Behavioral Control ***(Control beliefs x Perceived power)***	15-375	85-326	166.40	35.31	162.00	1.05	2.46
1) Because of hearing about exercise from media,	1-25	3-25	15.78	3.66	16.00	-0.13	1.92
2) Because of liking to do exercise	1-25	4-25	15.99	3.83	16.00	0.26	0.92
3) Because of abdomen enlargement	1-25	1-20	8.24	3.52	8.00	0.79	0.91
4) Because of back pain	1-25	2-20	8.11	3.63	8.00	0.91	0.88
5) Because of having more time	1-25	4-25	15.08	4.49	16.00	-0.26	0.31
6) Because of being tired from working	1-25	1-25	7.06	3.92	6.00	1.13	1.85
7) Because of confidence in capability	1-25	3-25	13.70	4.12	16.00	0.03	0.31
8) Because of fear about illness, abortion, preterm labour and accidents	1-25	1-25	7.22	3.96	6.00	0.91	1.62
9) Because of worry about not having enough time to sleep/rest	1-25	1-20	7.88	3.81	8.00	0.79	0.30
10) Because of being under a lot of stress	1-25	1-20	7.48	4.28	6.00	0.92	0.18
11) Because of having a place for exercise	1-25	4-25	14.61	4.53	16.00	0.01	0.32
12) Because of going to a place for exercise easily	1-25	2-25	14.48	4.82	16.00	-0.20	0.15
13) Because of bad weather such as cold or warm weather, with rain and smog	1-25	1-20	5.47	3.73	4.00	1.36	2.00

Table 4.4 Descriptive Statistics for each Item of Indirect and Direct Measure of Perceived Behavioral Control (n = 272) (cont.)

Variables (Independent Variable)	Possible Range	Actual Range	Mean	SD	Median	Skewness	Kurtosis
14) Because of having no friend(s)	1-25	1-25	8.67	4.54	9.00	0.73	0.28
15) Because of concern about the unborn baby's health	1-25	2-25	16.65	6.11	16.00	-0.10	-0.90
Perceived Behavioral Control	3-15	6-15	11.48	1.55	12.00	-0.13	0.44
1) For me, to perform physical activity during pregnancy would be difficult/easy	1-5	2-5	3.63	0.71	4.00	-0.61	0.19
2) If I wanted to, I could easily perform physical activity during pregnancy	1-5	2-5	3.76	0.63	4.00	-0.32	0.30
3) To perform physical activity depends on me	1-5	2-5	4.09	0.59	4.00	-0.35	1.15

Table 4.5 Descriptive Statistics for each Item of Intention Measure (n = 272)

Variables (Independent Variable)	Possible Range	Actual Range	Mean	SD	Median	Skewness	Kurtosis
Intention	8-40	11-40	29.65	4.13	30.00	-0.45	1.50
1) I intend to engage in physical activity while I am doing housework or caregiving in the forthcoming month.	1-5	2-5	3.66	0.75	4.00	-0.33	-0.09
2) I will try to engage in physical activity while I am doing housework or caregiving in the forthcoming month.	1-5	1-5	3.75	0.64	4.00	-0.72	1.43
3) I intend to walk or bike (such as to work, or nearby places) in the forthcoming month.	1-5	1-5	3.59	0.84	4.00	-0.86	1.03
4) I will try to walk or bike (such as to work, or nearby places) in the forthcoming month.	1-5	1-5	3.59	0.83	4.00	-0.72	0.52
5) I intend to exercise in the forthcoming month.	1-5	1-5	3.65	0.72	4.00	-0.73	1.32
6) I will try to exercise in the forthcoming month.	1-5	1-5	3.74	0.72	4.00	-0.70	1.56
7) I intend to engage in physical activities such as walking, and walking up and down stairs while I am working in the forthcoming month.	1-5	1-5	3.83	0.79	4.00	-0.78	0.98
8) I will try to engage in physical activities such as walking, and walking up and down stairs while I am working in the forthcoming month.	1-5	1-5	3.83	0.81	4.00	-0.93	1.57

Table 4.6 Descriptive Statistics for each Item of Women's Physical Activity during Pregnancy Measure (n = 272)

Variables (Independent Variable)	Possible Range	Actual Range	Mean	SD	Median	Skewness	Kurtosis
Physical Activity During Pregnancy	**0-1680**	**45.98 - 1183.80**	274.99	146.09	242.49	1.77	6.09
1. Household/ caregiving activity							
1) Preparing meals (cook, set table, wash dishes)	**0-52.50**	**0-52.50**	14.51	13.26	13.13	1.32	1.28
2) Dressing, bathing, feeding children while you are sitting	**0-42.00**	**0-42.00**	5.83	9.02	0.00	1.86	3.18
3) Dressing, bathing, feeding children while you are standing	**0-63.00**	**0-63.00**	6.51	10.56	0.00	2.19	5.44
4) Playing with children while you are sitting or standing	**0-56.70**	**0-56.70**	13.38	18.12	4.73	1.28	0.35
5) Playing with children while you are walking or running	**0-84.00**	**0-84.00**	10.06	16.68	7.00	2.53	6.89
6) Carrying children	**0-63.00**	**0-63.00**	5.42	10.44	0.00	3.08	10.82
7) Taking care of an older adult	**0-84.00**	**0-84.00**	7.03	17.52	0.00	3.20	9.82
8) Sitting and using a computer or writing, while not at work	**0-37.80**	**0-37.80**	8.67	10.89	3.15	1.55	1.30
9) Watching TV or a video	**0-42.00**	**0-42.00**	16.14	10.57	8.75	0.65	-0.31
10) Sitting and reading, talking, or on the phone, while not at work	**0-46.20**	**0-46.20**	8.84	8.80	9.63	2.07	5.17
11) Playing with pets	**0-67.20**	**0-67.20**	6.34	11.70	0.00	3.18	11.80
12) Light cleaning (making beds, laundry, iron, put things away)	**0-48.30**	**0-48.30**	16.53	11.79	12.08	1.11	0.54

Table 4.6 Descriptive Statistics for each Item of Women's Physical Activity during Pregnancy Measure (n = 272) (cont.)

Variables (Independent Variable)	Possible Range	Actual Range	Mean	SD	Median	Skewness	Kurtosis
13) Shopping (for food, clothes, or other items)	**0-48.30**	**0-48.30**	15.10	11.34	12.08	1.10	0.69
14) Heavier cleaning (vacuum, mop, sweep, wash windows)	**0-8.40**	**0-8.40**	2.57	2.26	2.10	1.07	0.37
2. Transportation							
15) Walking slowly to places (such as to the bus, work, visiting) Not for fun or exercise	**0-52.50**	**0-52.50**	11.52	11.63	4.38	1.77	3.11
16) Walking quickly to places (such as to the bus, work, or school) Not for fun or exercise	**0.84.00**	**0-84.00**	10.32	14.67	7.00	2.93	10.06
17) Driving or riding in a car or bus	**0-31.50**	**0-31.50**	5.85	6.92	2.63	1.98	4.18
3. Exercise							
18) Walking slowly for fun or exercise	**0-9.60**	**0-9.60**	3.11	2.75	2.40	1.14	0.38
19) Walking more quickly for fun or exercise	**0-13.80**	**0-13.80**	2.36	3.00	1.15	2.03	3.97
20) Walking quickly up hills for fun or exercise	**0-19.50**	**0-19.50**	1.82	2.95	1.63	2.99	11.60
21) Prenatal exercise class	**0-10.50**	**0-10.50**	0.48	1.32	0.00	4.40	23.90
22) Swimming	**0-18.00**	**0-9.00**	0.19	1.07	0.00	6.95	51.48

Table 4.6 Descriptive Statistics for each Item of Women's Physical Activity during Pregnancy Measure (n = 272) (cont.)

Variables (Independent Variable)	Possible Range	Actual Range	Mean	SD	Median	Skewness	Kurtosis
4. Occupational activity							
23) Sitting at work or in class	**0-67.20**	**0-67.20**	44.72	25.69	56.00	-0.67	-1.16
24) Standing or slowly walking at work while carrying things (heavier than 4 kilograms)	**0-126.00**	**0-126.00**	9.19	20.59	5.25	4.00	17.62
25) Standing or slowly walking at work while not carrying anything	**0-92.40**	**0-92.40**	26.68	29.25	19.25	1.26	0.36
26) Walking quickly at work while carrying things (heavier than 4 kilograms)	**0-168.00**	**0-168.00**	5.82	17.93	0.00	6.60	51.88
27) Walking quickly at work while not carrying anything	**0-138.60**	**0-138.60**	11.83	23.83	5.78	3.77	15.26
28) Farming grain, crops or gardening	**0-105.00**	**0-105.00**	4.18	11.78	0.00	5.13	32.38

The Theory of Planned Behavior Measurement

1. Attitude toward Physical Activity

Indirect Attitude toward Physical Activity (Behavioral Beliefs x Outcome Evaluations)

Indirect attitude toward physical activity was measured by 12 items of behavioral beliefs multiplied by 12 items of outcome evaluations. The total scores ranged from 37 to 300 with a mean score of 187.17 (*SD* = 39.75) which was at a moderate level. Among 12 items of indirect attitude toward physical activity, each item got 1-25 points. The results indicated that eleven items had scores higher than the cut-off point of 12.50, with the means ranging from 12.50 to 18.22 (*SD* =4.09 - 5.35). There was only one item *"Decrease back pain"* had the lowest scores with a mean

11.83 (*SD* = 4.88). The item *"Make my unborn baby healthy"* had the highest scores (Mean = 18.22, *SD* = 4.83) (Table 4.2).

Direct Attitude toward Physical Activity

Direct attitude toward physical activity was composed of nine items using the five-point semantic differential bipolar adjective scale (ranging from 1 to 5). The total scores ranged from 17 to 45 with a mean score of 34.33 (*SD* = 4.28) which was at a high level. Among nine items of this measurement, the results revealed that all items had scores higher than the cut-off point of 2.5, with the mean ranging from 3.57 to 4.05 (*SD* = 0.55 - 0.81). The findings demonstrated that attitude toward physical activity was highest for the item *"bad-good"* (Mean = 4.05, *SD* = 0.60) and lowest for the item *"inactive-active"* (Mean = 3.57, *SD* = 0.81) (Table 4.2).

2. Subjective Norms

Indirect Subjective Norms (Normative Beliefs x Motivation to Comply)

Indirect subjective norms were measured by six items of normative beliefs multiplied by six items of motivation to comply. The total scores ranged from 16-150 with a mean score of 89.00 (*SD* = 25.55) which was at the moderate level. Among six items of normative beliefs x motivation to comply, the results revealed that all items had scores higher than the cut-off point of 12.5, with the mean ranging from 14.03 to 16.89 (*SD* = 4.70 - 5.05). The score was highest for the indirect subjective norms of physician/nurse (Mean = 16.89, *SD* = 5.05). The item of father's subjective norms had the lowest score (Mean = 14.03, *SD* = 4.70) (Table 4.3). The findings showed that women held a positive opinion regarding the influence important persons had on performing physical activity during pregnancy.

Direct Subjective Norms

Direct subjective norms composed of four items rating on the five-point Likert-type scale (ranging from 1 to 5). The total scores ranged from 8 to 20 with a mean score of 15.50 (*SD* = 2.20) which was at a high level. Among the items of this measure, all items had scores higher than the cut-off point of 2.5, with the mean

ranging from 3.85 to 3.90 (*SD* = 0.62 - 0.69). The results showed that the item, *"The important person outside my family think I should perform physical activity during pregnancy,"* had the highest scores (Mean = 3.90, *SD* = 0.62). The item, *"The important persons inside my family push me to perform physical activity during pregnancy,"* had the lowest scores (Mean = 3.85, *SD* = 0.67) (Table 4.3). The findings demonstrated that the participants hold a positive subjective norms belief that referents think they should perform physical activity during pregnancy, and they were motivated to meet the expectations of those referents.

3. Perceived Behavioral Control

Indirect Perceived Behavioral Control (Control Beliefs x Perceived Power)

Indirect perceived behavioral control was measured by 15 items of control beliefs multiplied by 15 items of perceived power. The total scores ranged from 85 to 326 with a mean score of 166.40 (*SD* = 35.31) which was at the moderate level. According to the Perceived Power Questionnaire, negative items (items 3, 4, 6, 8, 9, 10, 13, and 14) were reverse scored before multiplying by control belief.

Among 15 items of indirect perceived behavioral control, each item got 1-25 points. As shown in Table 4.4, the mean scores for 15 items of control beliefs ranged from 5.47 to 16.65, (*SD* = 3.52 – 6.11), and seven items had scores higher than the cut-off point of 12.50. The item *"Because of concern about unborn baby's health, I will perform difficult/easy physical activity,"* had the highest score (Mean = 16.65, *SD* = 6.11). The item of *"Because of bad weather, such as cold or warm weather, with rain and smog, I will perform physical activity"* had the lowest score (Mean = 5.47, *SD* = 3.73).

Direct Perceived Behavioral Control

Direct perceived behavioral control was composed of three items rating on the five-point Likert-type scale (ranging from 1 to 5). The total scores ranged from 6 to 15 with a mean score of 11.48 (*SD* = 1.55) which was at a high level. Among the items of this measurement, all items had scores higher than the cut-off point of 2.5, with the mean ranging from 3.63 to 4.09 (*SD* = 0.59 -0.71) (Table 4.4). The item *"To*

perform physical activity depends on me." had the highest scores (Mean = 4.09, *SD* = 0.59). The results demonstrated that the women believed they had great control over whether or not they performed physical activity.

4. Intention

As shown in Table 4.5, intention in this study composed of eight items rating on the five-point Likert-type scale (ranging from 1 to 5). The total scores ranged from 11 to 40 with a mean score of 29.65 (*SD* = 4.13) which was at a high level. Among the items of this measurement, all items had scores higher than the cut-off point of 2.5, with the mean ranging from 3.59 to 3.83 (*SD* = 0.64-0.83), and all items had the median score of 4.00. Two items of intention, *"I intend to engage in physical activities such as walking, and walking up and down stairs while I am working in the forthcoming month"*; and, "*I try to engage in physical activities such as walking, and walking up and down stairs while I am working in the forthcoming month."* were both the same highest score (Means = 3.83, SD = 0.79 and 0.81). There were also two items intentions. Both *"I intend to walk or bike (such as to work, or nearby places) in the forthcoming month"*; and *"I will try to walk or bike (such as to work, or nearby places) in the forthcoming month,"* had the same lowest score (Means = 3.59, SD = 0.84 and 0.83). These findings indicated that the pregnant women had high intention to engage in physical activity in the forthcoming month.

5. Women's Physical Activity during Pregnancy

As can be seen in Table 4.6, women's physical activity during the second trimester of pregnancy was measured by 28 items and divided into four categories; household/caregiving, transportation, exercise and occupational activity. Total scores of physical activity ranged from 45.98-1183.80 with a mean score of 274.99 (*SD* = 146.09). Among the 14 items of the first category, household/caregiving activity, the item of *"Light cleaning (making beds, laundry, iron, put things away)"* had the highest score (Mean = 16.53, *SD* = 11.79). The item, *"Heavier cleaning (vacuum, mop, sweep, wash windows)"* had the lowest score (Mean = 2.57, *SD* = 2.26).

The second category, transportation, had three items. The item, *"Walking slowly to go places (such as to the bus, work, visiting), Not for fun or exercise"* had the highest mean score with 11.52 (*SD* = 11.63).

The third category, exercise, had five items. The item, *"Walking slowly for fun or exercise"* had the highest score (Mean = 3.11, *SD* = 2.75). The item, *"Swimming"* had the lowest score (Mean = 0.19, *SD* = 1.07).

The last category, occupational activity, had six items. The item, *"Sitting at working or in class"* had the highest score (Mean = 44.72, *SD* = 25.69). The item, *"Farming grain crops or gardening"* had the lowest score (Mean = 4.18, *SD* = 11.78).

The results showed that the women had a low level of performing physical activity during pregnancy.

Preliminary Analysis: Assumption Testing

Testing the assumption underlying multivariate analysis for the structural equation model (SEM) was performed to approve that the assumptions were not violated. There were three assumptions of SEM that were required to be achieved: normality, linearity, and multicollinearity. The results were as follows:

Normality

Testing for a normal distribution was an important procedure. Normality could be easily examined by plotting the P-P and Q-Q plots, with a visual check for comparing ordered values of a variable with quantiles of a specific theoretical distribution (the normal distribution). If two distributions matched, the points on the plot would form a linear pattern passing through the origin with unit slopes. These plots were used to see how well the empirical data fit the theoretical distribution (Hair, 1998). The results showed that the data had a normal distribution because the points on the plot formed a linear pattern passing through the origin with unit slopes (Appendix I).

Moreover, normality could be examined by using skewness and kurtosis values. Skewnesss values were between +1 and -1, and kurtosis values were not beyond +1.96 and -1.96 (Tabachnick & Fidell, 2001). Of the statistical tests to assess normality, one was a rule of thumb based on the skewnesss value. The Z-score was calculated by dividing the measure of skewness or kurtosis by the standard error for

skewness or kurtosis (Munro, 2005). If the calculated Z value exceeds a critical value, then the distribution was non-normal. The critical value was from a Z distribution, based on the significance level. Skewness and kurtosis coefficient values beyond ±1.96 or ±2.58 were significant at the level of .05 and .01 (Hair et al., 1998). However, testing the normality of the data could also be done by the test of univariate normality for variables as performed by PRELIS 2.30 program.

Six variables were normal and only two variables were non-normality: indirect perceived behavioral control (TCP) and physical activity (PA). Then, a transformation with natural log was chosen as a selected method to remedy non-normality.

Linearity

The common method to assess linearity is to graph the coordinate data points to examine scatter plots of the variables, including identifying any nonlinear patterns in the data (Hair et al., 1998). Based on this step the relationships among the study variables were investigated through a bivariate scatter plots procedure under the PRELIS. By examining the scatter plots between all independent variables and a dependent variable (women's physical activity during pregnancy), there was no evidence of non-linearity between pairs of variables.

Homoscedasticity or variance homogeneity was an assumption related to normal distribution, which exhibits equal variance across all data values. To test this assumption, the residuals from regression analysis plotted the predicted values against the dependent variables (Hair et al., 1998). Among variables in this study, standardized predicted values were plotted against observed values and the data displayed a straight line from the lower left corner to the upper right corner, indicating that the model fit the data well.

Multicollinearity

Multicollinearity occurred when intercorrelations among some variables were too high. If the data set showed multicollinearity, it would impact the results because multivariate procedures reduced any single independent variables predictive power by the extent to which it was associated with the other independent variables (Hair, et al., 2006). Three indicators were used to assess multicollinearity: 1) correlation coefficients between variables should not exceed 0.85; 2) tolerance

values were greater than 0.19 and variance inflation factors (VIF) are less than 5.3; and 3) all condition indices were above a threshold value of 30, and identifying variables with variance proportion were above or equal to 0.90 if there were two or more coefficients, indicating the evidence of multicollinearity (Hair, et al., 2006).

Table 4.7 Testing for Multicollinearity of the Study Variables (n = 272)

Variables	**Tolerance**	**VIF**
1. Indirect attitude toward physical activity (TBB)	0.680	1.471
2. Indirect subjective norms (TNM)	0.551	1.816
3. Indirect perceived behavioral control (TCP)	0.624	1.603
4. Attitude toward physical activity (ATT)	0.447	2.238
5. Subjective norms (SN)	0.549	1.823
6. Perceived behavioral control (PBC)	0.519	1.926
7. Intention (TINT)	0.715	1.399

Model Dimension	**Eigen Value**	**Condition Index**	**Constant**	**Variance Proportions**						
				TBB	**TNM**	**TCP**	**ATT**	**SN**	**PBC**	**TINT**
1	7.884	1.000	.00	.00	.00	.00	.00	.00	.00	.00
2	.053	12.235	.00	.01	.61	.00	.00	.00	.01	.00
3	.027	17.113	.00	.92	.09	.00	.00	.02	.00	.01
4	.012	25.424	.00	.01	.02	.00	.06	.20	.05	.57
5	.010	27.815	.03	.04	.01	.01	.02	.07	.45	.10
6	.008	30.660	.02	.01	.23	.01	.02	.67	.05	.26
7	.005	38.245	.00	.01	.03	.00	.87	.04	.40	.05
8	.001	115.190	.94	.01	.01	.98	.02	.00	.04	.00

Table 4.8 Correlation Matrix of the Study Variables (n = 272)

Variables	TBB	TNM	TCP	ATT	SN	PBC	TINT	PA
TBB	1.000							
TNM	.452**	1.000						
TCP	.405**	.398**	1.000					
ATT	.480**	.510**	.533**	1.000				
SN	.369**	.577**	.420**	.569**	1.000			
PBC	.419**	.373**	.520**	.628**	.464**	1.000		
TINT	.336**	.432**	.368**	.387**	.368**	.431**	1.000	
PA	.088	.029	.045	.000	-.036	.012	.133*	1.000

*p<0.05, **p< 0.01

TBB = Indirect attitude toward physical activity, TNM = Indirect subjective norms,

TCP = Transformed Indirect perceived behavioral control, ATT = Attitude toward physical activity,

SN = Subjective norms, PBC = Perceived behavioral control, TINT = Intention

PA = Transformed physical activity

The result indicated no evidence of multicollinearity probably due to three reasons. First, the result demonstrated the strength of correlation coefficients between all combinations of variables was no more than 0.85 (Table 4.8). The correlation matrix showed that the bivariate of variables was low to moderate, and ranging from -.036 to .628. Second, all tolerance values were more than 0.19. There were no VIF values higher than 5.3. As shown in Table 4.7, tolerance values and VIF of this study ranged from 0.447 to 0.715 and 1.399 to 2.238, respectively. Lastly, overall condition indices were under the threshold values of 30, and all proportion of variance of coefficients were under 0.90. Thus, the assumption of no multicollinearity problem was accepted.

In conclusion, the statistical assumption regarding the normality, linearity, and multicollinearity testing of the data in this study did not violated the criteria for Path Analysis.

Principle Analysis: Model Testing

Path analysis was performed to analyze the model by using the LISREL 8.53 program to specify the causal relationships among the study variables, and to describe the causal effects including testing the hypothesized model of physical activity. The results for the hypothesized model of physical activity for the sample in the model testing phase were indicated as follows:

Hypothesized Model Assessment

The hypothesized model was composed of three exogenous variables: indirect attitude toward physical activity, indirect subjective norms and indirect perceived behavioral control- and five endogenous variables: attitude toward physical activity, subjective norms, perceived behavioral control, intention, and physical activity. The four processes of model evaluation and assessment of fit were focused on the adequacy of parameter estimates, measurements of the overall model fit, standardized residuals, and the modification indices.

According to parameter estimates, almost all paths of the hypothesized model had significant parameters, and each of eight major paths had the same direction consistent with the TPB. Only one path coefficient from PBC to PA was a non-significant parameter (β = -.05, p > .05) (Figure 3).

When examining the squared multiple correlation (R^2) for each variables, the findings indicated that the model accounted for and explained 16% (R2 = 0.16) of variance in intention, and 2% (R2 = 0.02) in physical activity.

The findings of model testing revealed that the hypothesized model demonstrated the over all fit indices: χ2 = 202.33.07, df = 23, p-value = .000, GFI = 0.84, AGFI = 0.75, RMSEA = 0.17, χ2/df = 8.80 (Table 9). These results showed that the Fit Index Statistics of the hypothesized model were not in an acceptable range. There was evidence of misspecified parameters, the smallest and largest standardized residual ranging from -1.09 to 10.72, which exceeded normal values (± 2.58). In the model testing phase, the initial model of physical activity did not fit the empirical data, as reflected by the poor goodness of fit coefficients and the misspecification parameters.

Table 4.9 Statistical Fitted Index Values of Hypothesized Model (n = 272)

Fitted Index	**Chi-square (χ^2)**	**χ2/df**	**GFI**	**AGFI**	**RMSEA**	**Largest Standardized Residual**
Hypothesized Model	202.33 (df = 23, *p* = .000)	8.80	0.84	0.75	0.17	10.72

Note: χ2 = Chi-square, df = Degree of Freedom,
GFI = Goodness of Fit Index,
AGFI = Adjusted Goodness of Fit Index,
RMSEA = Root Mean Square Error of Approximation

As shown in Figure 3 and Table 10, the results of the initial model showed that seven path coefficients were significant. They were the path from indirect attitude toward physical activity (TBB) to attitude toward physical activity (ATT) (β= 0.48, p< .001), indirect subjective norms (TNM) to subjective norms (SN) (β = 0.58, p < .001), and indirect perceived behavioral control (TCP) to perceived behavioral control (β= 0.52, p < .001). According to the direct measure, attitude toward physical activity (ATT) had a significant positive direct influence on intention (INT) (β = 0.12, p< .01), subjective norms (SN) had a significant positive direct influence on intention (INT) (β = 0.18, p< .01), and perceived behavioral control (PBC) had a significant positive direct influence on intention (INT) (β = 0.29, p< .001). Intention (INT) also had a significant positive direct influence on physical activity (PA) (β = 0.15, p< .05) but perceived behavioral control (PBC) had a non-significant direct influence on physical activity (β = -0.05, p > .05).

In conclusion, the hypothesized model did not fit the empirical data because of poor goodness-of-fit statistics and some misspecified parameters. Thus, the hypothesized model should be modified to achieve the best fitted in the next step.

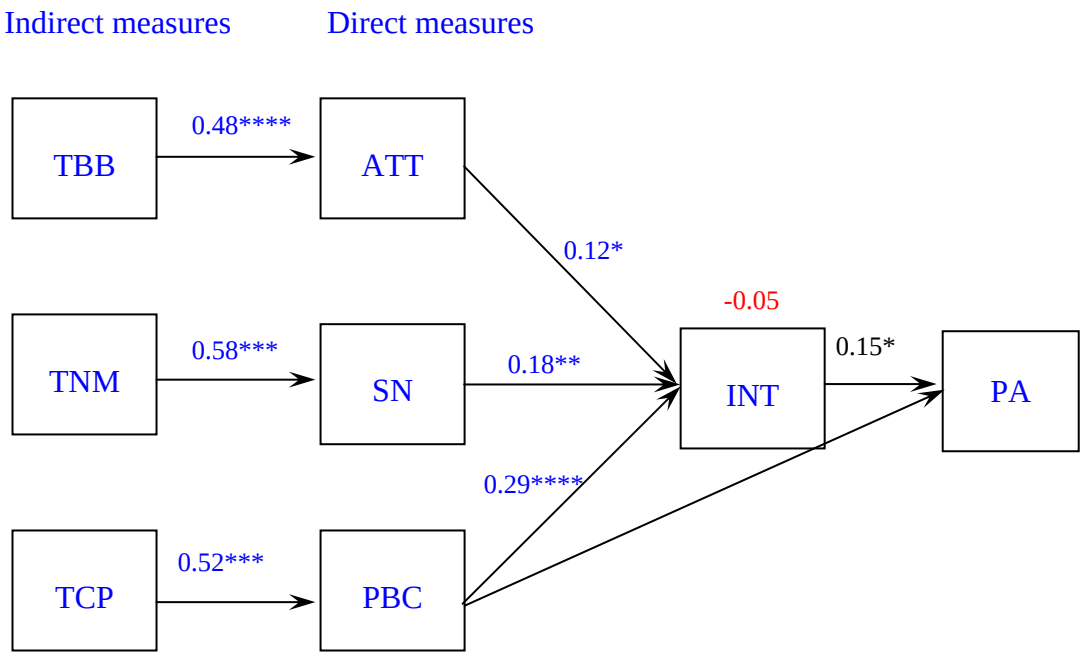


Figure 3 A Hypothesized Model of Thai Women's Physical Activity during Second Trimester of Pregnancy

Table 4.10 Effects Decomposition of Predictive Factors in the Hypothesized Model for the Sample (n= 272)

Affected Variables	R^2	Effects	Causal Variables (Standardized Value)						
			TBB	TNM	TCP	ATT	SN	PBC	INT
ATT	0.23	DE IE TE	0.48*** - 0.48***	-	-	-	-	-	-
SN	0.33	DE IE TE	-	0.58*** - 0.58***	-	-	-	-	-
PBC	0.27	DE IE TE	-	-	0.52*** - 0.52***	-	-	-	-
INT	0.16	DE IE TE	- 0.06* 0.06*	- 0.11*** 0.11**	- 0.15*** 0.15***	0.12* - 0.12*	0.18** - 0.18**	0.29*** - 0.29***	-
PA	0.02	DE IE TE	- 0.01 0.01	- 0.02 0.02	- -0.01 -0.01	- 0.02 0.02	- 0.03 0.03	$-.05^{NS}$ 0.04* -0.01^{NS}	0.15* - 0.15*

Note: $t > |1.96|$, *p<.05; $t > |2.58|$, *p<.01; $t > |4.00|$, *p<.001

TE = Total effect, DE = Direct effect, IE = Indirect effect

Modification of Physical Activity Model (n=272)

Since the hypothesized model did not fit the empirical data, the initial model was modified by using the modification indices and theoretical support. The modifications were continued until the goodness of fit indices was within acceptable levels. Error covariance of TBB, ATT, TNM-SN, TCP-PBC, ATT-ATT, SN-SN, PBC-PBC, and TNM-PBC were set free. Three parameters, ATT-ATT, SN-SN and PBC-PBC, were set constraining error variances to 1.00.

The modification model showed a better goodness-of-fit to the empirical data at values of χ^2 =23.94, df = 19, *p*-value = .26, χ^2/df = 1.26, GFI = 0.98, AGFI = 0.96. Overall, the fit of the modified model to the data was adjusted and improved (Table 4.11).

Table 4.11 Statistical Fitted Index Values of Modified Model (n = 272)

Fitted Index	Chi-square (χ^2)	χ^2/df	GFI	AGFI	RMSEA	Largest Standardized Residual
Modification of Physical Activity Model	23.94 (df = 19,	1.26 p = .26)	0.98	0.96	0.031	1.38

Note: χ2 = Chi-square, df = Degree of Freedom, GFI = Goodness of Fit Index,
AGFI = Adjusted Goodness of Fit Index,
RMSEA = Root Mean Square Error of Approximation

As shown in Figure 4 and Table 12, the results demonstrated that seven paths were significant and had the same direction which conformed to the theory of this study excepting one path of perceived behavioral control to physical activity. The findings indicated that indirect attitude toward physical activity (TBB), indirect subjective norms (TNM), and indirect perceived behavioral control (TCP) had significant positive direct influence on attitude toward physical activity (ATT) (β= 0.98, p< .001), subjective norms (SN) (β = 0.91, p < .001), and perceived behavioral control (PBC) (β= 0.88, p < .001), respectively. Additionally, attitude toward physical activity (ATT) (β = 0.14, p< .01), subjective norms (SN) (β = 0.26, p< .001), and perceived behavioral control (PBC) (β = 0.20, p< .001) had significant positive direct influence on intention (INT). Moreover, intention also had a significant positive direct influence on physical activity (PA) (β = 0.14, p< .05). However, perceived behavioral control (PBC) had a non- significant direct influence on physical activity (PA) (β = 0.01, p > .05).

For the square multiple correlations (R^2) for structural equation of each outcome's variables, the final modified model accounted for and explained 21% (R^2 = 0.21) of variance in intention, and 2% (R^2 = 0.02) of variance in physical activity (Table 4.12).

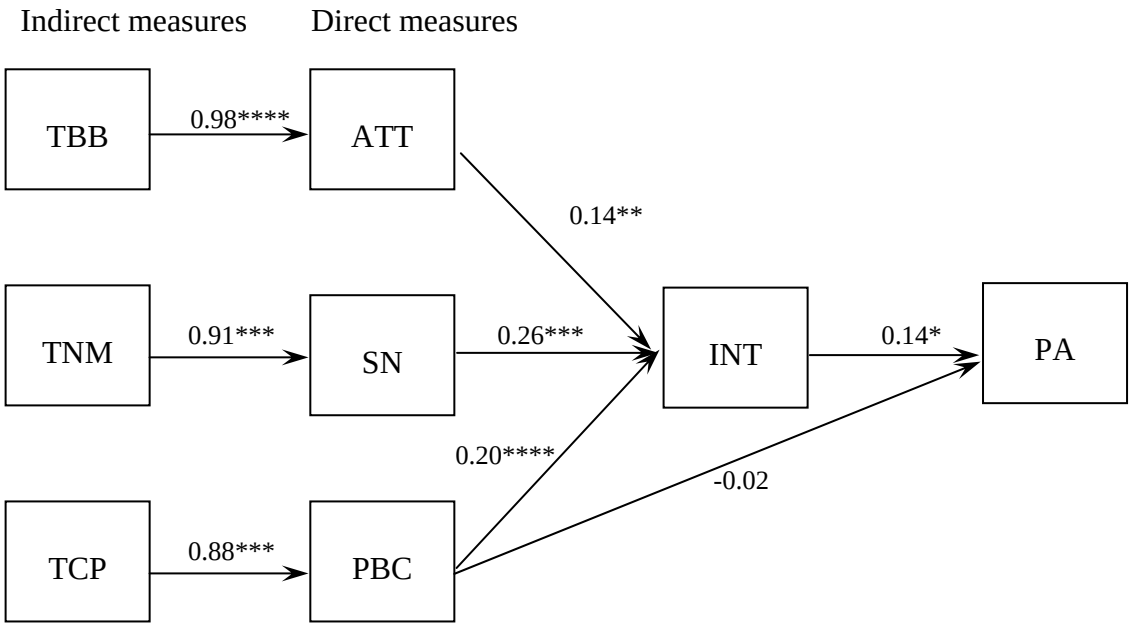


Figure 4 A Modified Model of Thai Women's Physical Activity during Second Trimester of Pregnancy

Table 4.12 Effects Decomposition of Predictive Factors in the Modified Model for the Sample (n= 272)

Affected Variables	R^2	Effects	Causal Variables (Standardized Value)						
			TBB	TNM	TCP	ATT	SN	PBC	INT
ATT	0.92	DE	0.98***						
		IE	-	-	-	-	-	-	-
		TE	0.98***						
SN	0.82	DE		0.91***					
		IE	-	-	-	-	-	-	-
		TE		0.91***					
PBC	0.77	DE			0.88***				
		IE	-	-	-	-	-	-	-
		TE			0.88***				
INT	0.21	DE	-	-	-	0.14**	0.26***	0.20***	-
		IE	0.13**	0.24***	0.18***	-	-	-	
		TE	0.13**	0.24***	0.18***	0.14**	0.26***	0.20***	
PA	0.02	DE	-	-	-	-	-	-0.02^{NS}	0.14*
		IE	0.02	0.03*	0.00	0.02	0.04*	0.03*	-
		TE	0.02	0.03*	0.00	0.02	0.04*	0.01^{NS}	0.14*

Note: $t > |1.96|$, *p<.05; $t > |2.58|$, *p<.01; $t > |4.00|$, *p<.001

TE = Total effect, DE = Direct effect, IE = Indirect effect

In conclusion, a comparison between the hypothesized initial model and the modified model revealed that the modified model had a better fit to the empirical data than the initial model. The schematic of the modified model of physical activity was presented in Figure 3.

Based on the theoretical constructs, the overall modified model of physical activity was interpreted to test the research hypotheses. The discussion of the research findings followed the results of the modified model.

Hypotheses Testing Results

By analyzing the influence effects of variables in the model, five hypotheses of the research study were answered. The influence effects of all variables consisted of three components: direct, indirect and total effect. Path coefficient determination was based on Kline's guidelines (1998), that is, the standardized path

coefficient with absolute value less than 0.10 indicates a “small” effect, while values around 0.30 reflects a “medium” effect, and values of 0.50 or more indicate a “large” effect. The results of the influence effects on each variable were summarized in Table 4.13. In this study, five hypotheses were tested as follows:

Hypothesis 1: Indirect attitude toward physical activity, indirect subjective norms and indirect perceived behavioral control have a positive indirect influence on intention via attitude toward physical activity, subjective norms, and perceived behavioral control, respectively.

As shown in Table 12, among three variables of indirect measure (indirect attitude toward physical activity, indirect subjective norms and indirect perceived behavioral control), three paths indicated indirect relationships between the causal variables and intention to engage in physical activity, through attitude toward physical activity, subjective norms and perceived behavioral control. The statistic analysis showed that indirect attitude toward physical activity had a significant positive indirect effect on intention through attitude toward physical activity ($\beta = 0.13$, $p < .01$), indirect subjective norms had a significant positive indirect effect on intention through subjective norms ($\beta = 0.24$, $p < .001$), while indirect perceived behavioral control had a significant positive indirect effect on intention through perceived behavioral control ($\beta = 0.18$, $p < .001$).

Therefore, the findings above confirmed hypothesis one in this study.

Hypothesis 2: Attitude toward physical activity, subjective norms and perceived behavioral control have a positive direct influence on intention.

The statistical analytic results found that all three factors of direct measure had direct effects on intention. The parameter estimates in Table 4.12 and Figure 4 indicated that attitude toward physical activity had a significant positive direct influence on intention ($\beta = 0.14$, $p < .01$). Subjective norms had a significant positive direct influence on intention ($\beta = 0.26$, $p < .001$), and perceived behavioral control had a significant positive direct influence on intention ($\beta = 0.20$, $p < .001$).

Therefore, research hypothesis two was supported by the causal relationship among the direct measure variables and intention as proposed in the TPB model.

Hypothesis 3: Indirect attitude toward physical activity, indirect subjective norms and indirect perceived behavioral control have a positive indirect influence on physical activity via attitude toward physical activity, subjective norms, perceived behavioral control, and intention, respectively.

Among three variables of indirect measure (indirect attitude toward physical activity, indirect subjective norms and indirect perceived behavioral control), the results showed that only one path, indirect subjective norms, had a significant positive indirect effect on physical activity via intention ($\beta = 0.03$, $p < .05$). However, indirect attitude toward physical activity had a non-significant positive indirect effect on physical activity via intention ($\beta = 0.02$, $p > .05$), while indirect perceived behavioral control had no effect on physical activity (Table 12).

Hypothesis 4: Attitude toward physical activity, subjective norms and perceived behavioral control have a positive indirect influence on physical activity via intention.

The parameter estimates in Table 4.12 revealed that attitude toward physical activity had a non-significant positive indirect influence on physical activity ($\beta = 0.02$, $p > .05$). Subjective norms had a significant positive indirect influence on physical activity via intention ($\beta = 0.04$, $p < .05$). Perceived behavioral control had a significant positive indirect influence on physical activity via intention ($\beta = 0.03$, $p < .05$).

Only two factors of direct measure, subjective norms and perceived behavioral control, were significantly positive indirect effects on physical activity mediated through intention.

Hypothesis 5: Intention and perceived behavioral control have a positive direct influence on physical activity.

Based on the modified model of physical activity, the statistic analysis found that the direct path from intention to physical activity was statistically significant. The result indicated that intention had a significant positive direct influence on physical activity ($\beta = 0.14$, $p < .05$) (Table 13 and Figure 3). However, perceived behavioral control had a non-significant positive direct influence on physical activity ($\beta = -0.02$, $p > .05$).

Summary

This chapter illustrated the demographic characteristics of Thai pregnant women. Based on the Theory of Planned Behavior (TPB) model, descriptive statistics of the study variables were proposed. The statistic program SPSS 11.5 and PRELIS were used to analyze preliminary results. The LISREL 8.52 was employed to test the hypothesized and modified model. The modified model of physical activity among Thai pregnant women was a good fit to the sample data. The findings of the modified model indicated that seven path coefficients were significant, while perceived behavioral control had no significant positive direct influence on physical activity. For the square multiple correlations (R^2) for structural equation of each outcome variables, the final modified model accounted for and explained 21% (R2 = 0.21) of variance in intention, and 2% ($R^2 = 0.02$) of variance in physical activity.

CHAPTER V
DISCUSSION

A discussion of the research findings was provided in this chapter. First, demographic characteristics of the sample in the model testing phase were discussed. Then, the model of the TPB's constructs, including indirect attitude toward physical activity, indirect subjective norms and indirect perceived behavioral control, attitude toward physical activity, subjective norms, perceived behavioral control, intention, and physical activity were discussed.

Demographic Characteristics of the Sample

The subjects in this study comprised of 272 Thai women during their second trimester of pregnancy whose age was between 18 and 40 years old. The average age of the sample was 27.51 years. Most of the subjects were married (95.2%). The findings revealed that one-third of the pregnant women graduated with a bachelor degree (33.8%). Approximately, two-thirds of the subjects were employees (66.9%) and their family incomes ranged between 10,000 and 19,999 baht per month (44.9%). Nearly half of the subjects (48.2%) were experiencing first time pregnancy. Most of these subjects were in the gestational age of 15 - 20 (54.0%), and did not have any children (63.6%). More than two-thirds of the subjects did not have abortion experience (78.7%). Approximately two-thirds (64.3%) did not exercise prior to their pregnancies.

In Downs and Hausenblas' study of the determinants of exercising during the second trimester of pregnancy among American women by using the theory of Planned Behavior (2003), it was found that average age of the sample was 29.96 years old (range of 22 to 43 years). The subjects had family incomes between US $40,000 and $100,000 per years (62%). Their jobs were in medicine (26%), business (21%), homemaking (20%), and education (18%). Most subjects had one child (46%). The results showed no group differences in family income, employment status, and number of children.

Discussion of the Causal Model of Women's Physical Activity Behavior During Pregnancy

The purpose of this study was to examine the relationships among the TPB's constructs, including indirect attitude toward physical activity, indirect subjective norms, indirect perceived behavioral control, attitude toward physical activity, subjective norms, perceived behavioral control, intention, and physical activity during second trimester of pregnancy.

The major constructs of TPB (Ajzen 1985, 1991) can be measured both directly and indirectly. Three variables of indirect measures (indirect attitude toward physical activity, indirect subjective norms and indirect perceived behavioral control) were associated with three variables of direct measures (attitude toward physical activity, subjective norms, perceived behavioral control). Likewise, both indirect and direct measures were significant predictors of intention. Of these, three indirect measures were exogenous variables and three direct measures were endogenous variables in the causal model of physical activity behavior during pregnancy and act through intention as the mediating factor. The discussion of the causal model for the modified model of physical activity behavior during pregnancy includes model fit and the causal relationships among the TPB's constructs, with indirect attitude toward physical activity, indirect subjective norms, indirect perceived behavioral control, attitude toward physical activity, subjective norms, perceived behavioral control, intention, and physical activity behavior during pregnancy also discussed.

Model Fit

Hypothesized model testing was one of the objectives in the present study. Model fitting was done to determine the goodness of fit between the hypothesized model and the sample data, indicating whether the theoretical model was consistent with the model tested.

The findings showed that the final model of the physical activity behavior during pregnancy fitted well according to its goodness of fit index (Chi-square = 23.94, df = 19, p = 0.20, GFI = 0.98, AGFI = 0.96, RMSEA = 0.031). In conclusion, the findings from the modified model indicated that the final model had a good fit with the empirical data.

The Causal Variables

The following section mainly discussed the model of the fit for testing women's physical activity behavior during the second trimester of pregnancy.

The modified model adequately fitted with the data for the model in this study. The dependent variable of interest, physical activity behavior, was represented by one observed variable in which subjects were asked about their physical activities one month later.

Attitude toward Physical Activity

Specific to the TPB, attitude toward physical activity was represented by indirect measure as exogenous variable and direct measure as endogenous variable. Attitude toward a behavior is measured directly by a standard measure, or indirectly by a belief-based measure (Ajzen & Fishbein, 1980; Ajzen, 1991). A direct measure is usually obtained by means of an evaluation semantic differential. An indirect measure is evaluated by the expectancy-value model, which proposes that the strength of each salient belief is combined in a multiplicative style with the subjective evaluation of the belief's attribute, and the resulting products are summed over the *n* salient beliefs (Ajzen, 1991). Attitude is determined by the person's salient beliefs about that object (Ajzen & Fishbein, 1980).

The findings showed that the indirect attitude toward physical activity, and attitude toward physical activity, were at a moderate level (Mean = 187.17, SD = 39.75) with a score ranging from 37 to 300. Similarly, the direct measures were at a moderate level (Mean = 34.33, SD = 4.28), with a score ranging from 17 to 45. The findings demonstrated that the pregnant women had a positive attitude toward physical activity behavior. Additionally, the findings from this study indicated that behavioral beliefs had a significant and positive direct influence on attitude ($\beta = 0.98$, $p < .001$).

According to the behavioral beliefs items, the pregnant women were mostly concerned with their unborn baby health since the item *"Make my unborn baby healthy"* had the highest scores (Mean = 18.22, *SD* = 4.83). This item also had the scores higher than the cut-off point of 12.50. The lowest score was *"Decrease back pain"* (Mean 11.83, *SD* = 4.88). Downs and Hausenblas (2004) studied women's exercise beliefs and behavior during their pregnancy and postpartum. They found that the salient exercise beliefs during pregnancy were that exercise improved mood 33.8% and increased energy and

stamina/endurance (29.7%); however, the least exercise belief was providing stress reduction/relaxation (8.1%).

Evenson and Bradley (2009) studied exercise and physical activity beliefs among pregnant women and reported that women agreed that exercise could improve labor and delivery and approximately three-fourths of them believed that exercise could improve their baby's health.

Gretebeck (2000) studied physical activity in older adults by using the TPB. The findings disclosed that the subjects had high scores for behavioral beliefs that physical activity would increase muscle tone, strength, and flexibility, keep them active, improve health, make them feel better, and assist with controlling or losing weight. The item of *"Be too time consuming."* had the lowest scores (Mean = 6.80, *SD* = 4.05).

Direct attitude were measured by nine items. Total score of direct attitude ranged from 17 to 45 with a mean score of 34.33 (*SD* = 4.28). Among nine items of this measure, the results revealed that all items had scores higher than the cut-off point of 2.5. The findings demonstrated that attitude toward physical activity was highest for the item of *"bad-good"* (Mean = 4.05, *SD* = 0.60), and lowest for the item of *"inactive-active"* (Mean = 3.57, *SD* = 0.81).

Subjective norms

Subjective norms were represented by indirect measure as exogenous variables and direct measure as endogenous variables. Subjective norms refer to the perceived social pressure to perform or not perform the behavior. The more the person perceives that others who are important to her/him think she/he should perform a behavior, the more she/he will intend to do so. Subjective norms are developed from an individual's beliefs about the anticipations of significant others or referent groups regarding such behavior, and her/his tendency is to agree with those normative beliefs. Thus, subjective norms are determined by the normative beliefs (Ajzen & Fishbein, 1980; Ajzen, 1991). The result from this study supported the theory of Planned Behavior since it found that normative beliefs had a significant and positive direct influence on subjective norms ($\beta = 0.91$, $p < .001$).

According to an indirect measure, normative beliefs, was composed of six items multiplied by six items of motivation to comply. Total score of indirect subjective norms ranged from 16 to 150 with a mean score of 89.00 (*SD* = 25.55). The

findings indicated that the pregnant women had a moderate level score of normative beliefs. The score was highest for the indirect subjective norms of physicians/nurses (Means = 16.89, *SD* = 5.05). The item of my father's subjective norms had the lowest score (Means = 14.03, *SD* = 4.70). Corresponding with Gretebeck (2000), the result showed that doctors or other healthcare professionals were the most important persons for older adults (Mean = 18.35, *SD* = 5.44). Differently, Downs and Hausenblas (2004) revealed that the salient normative beliefs were those of family members, including husband or fiancé (36.4%).

Direct subjective norms were measured by four items. Total score of direct subjective norm ranged from 8 - 20 with a mean score of 15.50 (*SD* = 2.20). According to this measurement, the scores of all items were higher than the cut-off point of 2.5, with the means ranging from 3.85 to 3.90 (*SD* = 0.62-0.69). Therefore, the findings indicated that the pregnant women had a high level score. The results showed that the item *"The important person outside my family think I should perform physical activity during pregnancy,"* had the highest scores (Mean = 3.90, *SD* = 0.62). The item of *"The important persons inside my family push me to perform physical activity during pregnancy,"* had the lowest scores (Mean = 3.85, *SD* = 0.67).

The findings demonstrated that the subjects hold a positive subjective norms belief that referents, especially physicians or nurses, think they should perform physical activity during pregnancy, and they were motivated to meet the expectations of those referents.

Perceived Behavioral Control

The last pair of observed variables was measured by an indirect PBC considered exogenous and a direct PBC considered endogenous variables. Theoretically, perceived behavioral control is defined as *"people's perception of the ease or difficulty of performing the behavior of interest"* (Ajzen, 1991, p. 183). Control beliefs can be developed from a person's perception that he/she has the essential resources, skills, and power to perform a behavior in question. Perceived behavioral control is determined by control beliefs concerning the presence or absence of facilitations and barriers to behavioral performance, weighted by the perceived power or impact of each factor to facilitate or inhibit the behavior (Ajzen, 1991). The findings from this study supported

the assertion that control beliefs had a significant and positive direct influence on perceived behavioral control ($\beta = 0.88$, $p < .001$).

According to the present study, the indirect measures of PBC comprised of control beliefs regarding 15 items multiplied by 15 items of perceived power. Total scores of indirect perceived behavioral control ranged from 85 to 326, with a mean score of 166.40 (*SD* = 35.31). The findings indicated that the pregnant women had a moderate level of control beliefs. The item of *"Because of concern about the unborn baby's health, I will perform difficult/easy physical activities,"* had the highest score (Mean = 16.65, *SD* = 6.11). The item, *"Because of bad weather such as cold or warm weather, with rain and smog, I will perform physical activity"* had the lowest score (Mean = 5.47, *SD* = 3.73). Downs and Hausenblas (2004) reported that the salient control beliefs obstructing exercise during pregnancy were physical limitations or restrictions (56.8%), tiredness/fatigue (27.0%), time limits (25.7%), and gaining weight (13.5%). According to the study of Gretebeck (2000), it was found that the item, *"You were healthy"* had the highest score (Mean = 20.52, *SD* = 5.66). The item, *"You had a physical limitation"* had the lowest score (Mean = 6.52, *SD* = 5.02).

Direct perceived behavioral control was measured by three items. The total scores of direct perceived behavioral control ranged from 6 to 15 with a mean score of 11.48 (*SD* = 1.55). Among three items of this measure, the results of the direct PBC measure showed high levels of perceived control for all three items (Range 3.63 to 4.09, *SD* = 0.59–0.71). Thus, the findings indicated that the pregnant women had a high level of perceived behavioral control.

The highest score was the item of control belief, *"To perform physical activity depends on me."* (Mean = 4.09, *SD* = 0.59).

Intention

Intention as an endogenous observed variable of the TPB was measured by 8 items. Total score of Intention ranged from 11 to 40 with a mean score of 29.65 (*SD* = 4.13) which was at a high level (29.40 – 40.00). Moreover, when considering each item of this measure, all items had the scores higher than the cut-off point of 2.5, with the means ranged from 3.59 to 3.83 (*SD* = 0.64-0.83). In addition, all items had the

median score of 4.00. Thus, the findings demonstrated that the pregnant women had a high level of intention to engage in physical activity during pregnancy.

Theoretically, the TPB suggests that an individual's intention to engage in a behavior is the immediate proximal predictor of that behavior. Intention is theorized to mediate the influence of three principle constructs on behavior: attitude, subjective norms and perceived behavioral control. Therefore, intention is conceived as the primary motivation to perform a behavior (Ajzen, 1991).

Physical Activity Behavior During the Second Trimester of Pregnancy

The Physical Activity Pregnancy Questionnaire (PPAQ) was measured by 28 items including household/caregiving (14 activities), transportation (three activities), sports/exercise (five activities), and occupation (six activities). The total score of this questionnaire was 1680. However, the total score of physical activity during pregnancy in this study ranged from 45.98 to 1183.80 with a mean score of 274.99 (*SD* = 146.09). Among 14 items of the first category, the household/caregiving activity, the item, *"Light cleaning (making beds, laundry, iron, put things away)"* had the highest score (Mean = 16.53, *SD* = 11.79). The item, *"Heavier cleaning (vacuum, mop, sweep, wash windows)"* had the lowest score (Mean = 2.57, *SD* = 2.26).

The second category, transportation, had three items. The item, *"Walking slowly to go places (such as to the bus, work, visiting), Not for fun or exercise,"* had the highest mean score with 11.52 (*SD* = 11.63).

The third category, exercise, had five items. The item, *"Walking slowly for fun or exercise"* had the highest score (Mean = 3.11, *SD* = 2.75). The item, *"Swimming"* had the lowest score (Mean = 0.19, *SD* = 1.07).

The last category, occupational activity, had six items. The item, *"Sitting at working or in class"* had the highest score (Mean = 44.72, *SD* = 25.69). The item, *"Farming grain crops or gardening"* had the lowest score (Mean = 4.18, *SD* = 11.78).

According to this study, the findings showed that physical activity during pregnancy was at a low level. Therefore, there were many factors with regard to these results. Nearly half of the participants (48.2%) were experiencing first time pregnancy, and did not have any children (63.6%). Two-thirds of the subjects was employee

(66.9%). Most of them (64.3%) reported that they did not exercise prior to pregnancy. Moreover, 21.3% of the subjects reported that they had had abortion experience.

Correspondingly, nearly 60% of pregnant women in the U.S. were sedentary in an earlier study (Zhang & Savitz, 1996). Ning et al. (2003) reported that approximately 39% of women did not participate in any regular physical activity during pregnancy. In addition, Clapp and Dickstein (1984) reported that 60% of pregnant women who engaged in exercise at a high level prior to pregnancy reduced their performance markedly during early pregnancy, and all had stopped completely by the 18th week. Likewise, Clarke, Gross, & Psychol (2004) demonstrated that 39% of the women who reported doing some form of weekly exercise before pregnancy did not pursue any similar activities during pregnancy. They perceived that rest and relaxation were more important than regular exercise or the maintenance of physical activity during pregnancy. In addition, Everson and Bradley (2009) reported that 22% of pregnant women disagreed with the question that most women could continue regular exercise during pregnancy, which contrasted with the ACOG guideline.

In brief, it could say that all of the above reasons had an effect on on a low level of the mean score of physical activity in this study.

Discussion on Hypotheses Testing

From the literature reviews, the TPB has been used widely for understanding physical activity from other populations. However, there was presently a lack of study regarding physical activity during pregnancy by using the TPB. However, there were some studies applied to the TPB model to explain exercise intention and behavior during first and second trimester of pregnancy. Correspondingly, some consequences in this study were congruent with the findings from those studies. Therefore, based on the research findings from the current study obtained from the modified model, hypotheses' testing was discussed as follows:

Hypothesis 1: Indirect attitude toward physical activity, indirect subjective norms and indirect perceived behavioral control have a positive indirect influence on intention via attitude toward physical activity, subjective norms, and perceived behavioral control, respectively.

The findings indicated that indirect attitude toward physical activity (behavioral beliefs), indirect subjective norms (normative beliefs), and indirect perceived behavioral control (control beliefs) had positive indirect influence on intention to engage in physical activity.

The results from this study showed that indirect attitude toward physical activity ($\beta = 0.13$, $p < .01$), indirect subjective norms ($\beta = 0.24$, $p < .001$), and indirect perceived behavioral control ($\beta = 0.18$, $p < .001$) had a significant and positive indirect influence on intention to engage in physical activity.

Importantly, the findings from the modified model also demonstrated that indirect attitude toward physical activity (behavioral beliefs) had a significant and positive direct influence on attitude ($\beta = 0.98$, $p < .001$). Indirect subjective norms (normative beliefs) had a significant and positive direct influence on subjective norms ($\beta = 0.91$, $p < .001$). Additionally, indirect perceived behavioral control (control beliefs) had a significant and positive direct influence on perceived behavioral control ($\beta = 0.88$, $p < .001$). Interestingly, all standardized path coefficients indicated large effect to attitude, subjective norms and perceived behavioral control, respectively.

In order to explain the behavioral intention, it was necessary to assess deep understanding of the factors influencing intention. Behavioral intentions were predicted by three main components: attitude, subjective norms, and perceived behavioral control. Thus, it required looking for the determinants of the attitude, subjective norms and perceived behavioral control. According to the TPB, attitude toward a behavior is determined by the salient beliefs regarding to perform the behavior. Subjective norms are predicted by normative beliefs, whereas perceived behavioral control is determined by control beliefs. For these reasons, it could be supposed that the effects of behavioral beliefs, normative beliefs, and control beliefs on behavioral intention were thus mediated by attitude, subjective norms, and perceived behavioral control, respectively (Ajzen & Fishein, 1980; Ajzen, 1991; Ajzen, 2006).

Even though there were few studies regarding physical activity behavior during pregnancy by using the TPB, the results from those studies were related to the proposition of the theory. The results from this study were in accordance with the study of Black, Kieffer, Villarruel and Sinco's (2007). They found that behavioral beliefs (subjective benefits) and control beliefs (ability to overcome environmental barriers and

ability to overcome personal barriers) had significantly positive relationships with intention to exercise among the pregnant Latina women.

Congruented with the findings from other studies that applied to the TPB model to explain health behavior in other populations, Gretebeck (2000) studied physical activity in older adults by using the TPB and indicated that behavioral beliefs had a significant and positive direct influence on attitude ($\beta = 0.61$, $p < .05$), and also had a significant and positive indirect influence on intention ($\beta = 0.40$, $p < .05$). Normative beliefs had a significant and positive direct influence on subjective norms ($\beta = 0.52$, $p < .05$), and also had a significant and positive indirect influence on intention to perform physical activity in older adults ($\beta = 0.19$, $p < .05$). Control beliefs had a significant and positive direct influence on perceived behavioral control ($\beta = 0.53$, $p < .05$), and also had a significant and positive indirect influence on intention to perform physical activity in older adults ($\beta = 0.35$, $p < .05$). Likewise, Conn, Tripp-Reimer and Maas (2003) reported that behavioral beliefs, normative beliefs and control beliefs were significant predictors of exercise intention among older women.

In accordance with other populations, Wellington, White, and Liossis (2006) reported that behavioral beliefs and normative beliefs were significant predictors of intention to participate in group parenting education. Behavioral beliefs emerged as the strongest predictor of intention, followed by normative beliefs. However, control beliefs did not significantly predict participation intention among group parenting education. According to the study of Wayuhuerd (2009), the results showed that behavioral beliefs ($\beta = 0.18$, $p < .001$), normative beliefs ($\beta = 0.17$, $p < .01$), and control beliefs ($\beta = 0.16$, $p < .05$) had significant positive indirect effect on intention to use condom behavior among Thai adolescences.

In brief, the findings from this study indicated that the effects of indirect attitude toward physical activity, indirect subjective norms, and indirect perceived behavioral control were mediated by attitude toward physical activity, subjective norms, and perceived behavioral control to intention to engage in physical activity during pregnancy. Thus, the pregnant women believed that performing physical activity during pregnancy would lead to positive consequences. They believed that the specific salient referents thought that they should perform physical activity, and they believed that

they could easily do so. Therefore, the women should have a strong intention to perform physical activity during pregnancy.

Hypothesis 2: Attitude toward physical activity, subjective norms and perceived behavioral control have a positive direct influence on intention.

The findings demonstrated that attitude toward physical activity, subjective norms, and perceived behavioral control had a positive direct influence on intention to engage in physical activity.

These findings were consonant with the basis of the TPB since it was found that attitude had a significant and positive direct influence on intention to engage in physical activity ($\beta = 0.14$, $p < .01$). Likewise, subjective norms and perceived behavioral control had significant and positive direct influence on intention to engage in physical activity ($\beta = 0.26$, $p < .001$; $\beta = 0.20$, $p < .001$, respectively).

Based on the TPB, intention was determined by the three conceptually independent variables: attitude, subjective norms, and perceived behavioral control. In general, the more favorable the attitude and subjective norms concerning behavior, and the greater the perceived behavioral control, the stronger should be an individual's intention to perform the behavior under consideration. This finding indicated that women hold positive attitudes toward physical activity, thought that there was normative support for performing physical activity, and perceived that they could easily perform physical activity. Therefore, they should have a strong intention to perform physical activity during pregnancy.

This finding was consisted with the previous studies of physical activity using the TPB. Downs and Hausenblas (2003) studied the determinants of exercising during the second trimester of pregnancy. The results showed that attitude was the strongest determinant of exercise intention, followed by perceived behavioral control and subjective norms. Furthermore, Hausenblas and Down (2004) studied pregnant women's exercise intention and behavior during their first trimester. They also found that attitude and subjective norms were significant predictors of exercise intention. However, perceived behavioral control did not predict pregnant women's exercise intention. In addition, Hausenblas, & Giacobbi, & Tuccitto, and Cook, (2008) studied a multilevel of

exercise intention and behavior during pregnancy. The findings revealed that attitude was significantly associated with exercise intention.

In other populations, Gretebeck (2000) studied physical activity in older adults by using the TPB and reported that attitude ($\beta = 0.66$, $p < .05$), subjective norms ($\beta = 0.66$, $p < .05$), and perceived behavioral control ($\beta = 0.36$, $p < .05$) had significant and positive direct influence on intention. Similarly, Jitramontree (2003) studied exercise behavior among Thai elders by using the TPB and found that direct attitude ($\beta = 0.15$, $p < .05$) and perceived behavioral control significantly contributed to the prediction of exercise intention. Likewise, Courneya (1995) examined the TPB in the context of physical activity in older individuals and found that attitude, subjective norms, and perceived behavioral control were all significantly correlated with the intention to exercise. Similarly, Armitage (2005) conducted the research to test the ability of the TPB to predict actual participation in physical activity and found that perceived behavioral control was significantly predictive of intentions. Correspondingly, Everson, Daley, & Ussher (2007) reported that attitude ($\beta = 0.31$, $p < .005$), subjective norms ($\beta = 0.29$, $p < .005$) and perceived behavioral control ($\beta = 0.25$, $p < .01$) made significant contributions to physical activity intention among young people who smoke. Likewise, Rhodes, MacDonald, and McKay (2006) investigated a TPB model for the prediction of child leisure-time physical activity and found that subjective norms and perceived behavioral control were significant predictors of intention. Latimer and Ginis (2005) studied the TPB in prediction of leisure time physical activity (LTPA) among individuals with spinal cord injury, and found that attitude ($\beta = 0.29$, $p < .001$), subjective norms (($\beta = 0.29$, $p < .001$), and perceived behavioral control ($\beta = 0.47$, $p < .001$) were each unique predictors of intention. Blanchard, et al. (2008) also found that affective ($\beta = 0.23$, $p < .001$) and instrumental ($\beta = 0.28$, $p < .001$) attitudes and perceived behavioral control ($\beta = 0.59$, $p < .001$) were significantly predictive of intention for the Caucasian students whereas affective attitudes ($\beta = 0.18$, $p < .01$) and perceived behavioral control ($\beta = 0.56$, $p < .001$) were significant for African American students. Mummery, Spence and Hudec (2000) studied physical activity intention in Canadian School children, and found that attitudes, subjective norms, and perceived behavioral control contributed significantly to predicting physical activity intention.

Consistent with the results from other health behavior, Steele and Porch (2005) tested the TPB to predict mammography intention and found that attitude (β = 0.244, $p < .001$), subjective norms ((β = 0.176, $p < .001$), and perceived behavioral control (β = 0.288, $p < .001$) had a statistically significant direct effect on intention to obtain an annual mammogram.

Because the hypothesized relationships among the TPB's constructs were supported, it could be summarized that attitude toward physical activity, subjective norms, and perceived behavioral control could form the intention to engage in physical activity behavior among the pregnant women (Ajzen & Fishbein, 1980).

These findings indicated that when pregnant women held a positive attitude toward physical activity, perceived significant others believed they should participate in physical activity, and perceived it to be under their control. They would form a strong intention to engage in physical activity.

Hypothesis 3: Indirect attitude toward physical activity, indirect subjective norms and indirect perceived behavioral control have a positive indirect influence on physical activity via attitude toward physical activity, subjective norms, perceived behavioral control, and intention, respectively.

The findings indicated that both indirect attitude toward physical activity (behavioral beliefs) and indirect perceived behavioral control (control beliefs) had nonsignificant indirect influence on physical activity behavior. In contrast, only indirect subjective norms (normative beliefs) had a significant and positive indirect influence on physical activity behavior (β = 0.03, $p < .05$).

Presently, there were the limitations of the literature reviews about the influence of indirect attitude toward physical activity, indirect subjective norms, and indirect perceived behavioral control on physical activity among pregnant women by using the TPB. However, there were few studies which reported the effect of these constructs on other health behavior.

According to the present study, the findings demonstrated that only indirect subjective norms (normative beliefs) were salient and influential among pregnant women with regard to intention to perform physical activity. Physicians or nurses were the most important referents for these pregnant women, followed by their husbands.

Correspondingly, Gross & Bee (2004) reported that health professionals were to play a substantial role in disseminating advice at or before 12 weeks of pregnancy. Family and friends were also a much more constant source of advice and support across pregnancy. Furthermore, by 25 weeks into pregnancy, family and friends had become the most important sources of information.

The results from this study contradicted to White, Terry, Troup & Rempel's (2007) findings, which reported that behavioral beliefs were important determinants for both physical activity and low-fat food consumption, but supported the conclusion that the pressure from significant others was an important consideration for low-fat food consumption. Laziness, as a barrier to engaging in physical activity, also emerged as an important factor.

There were some explanations why indirect attitude toward physical activity and indirect perceived behavioral control had nonsignificant indirect influence on physical activity behavior. Ajzen (2006) mentioned that people's attitudes toward a behavior could be ambivalent if they believed that the behavior was likely to produce positive as well as negative outcomes, and similarly for the set of accessible control beliefs.

These conclusions were supported by Liamputtong, Yimyam, Parisunyakul, Baosoung and Sansiriphun, (2005) who study traditional beliefs about pregnancy and childbirth among women from Chiang Mai. The findings were that pregnancy was seen as a transitional state and different from one women to another. Pregnant women should be cautious when performing physical activity in order to avoid danger and give the best possible chance to carry their pregnancy to term. During pregnancy, rigorous physical activities in farm work such as lifting heavy objects were seen as detrimental to them and their fetuses since these activities might lead to a miscarriage or stillbirth. Driving a car was seen as having an exertion on the fetus that might also cause miscarriage. Likewise, some Thai women were afraid that exercise might be harmful to their fetus. Additional barriers to performing recreational physical activity were a protruding abdomen and lack of suitable places for walking (Patanavanichnun, 2000; Thanomroop, 2000).

Therefore, the findings from this study found that indirect attitude toward physical activity and indirect perceived behavioral control had nonsignificant indirect influence on physical activity behavior.

Hypothesis 4: Attitude toward physical activity, subjective norms and perceived behavioral control have a positive indirect influence on physical activity via intention.

The findings demonstrated that attitude toward physical activity had nonsignificant indirect influence on physical activity behavior, but subjective norms and perceived behavioral control had a positive indirect influence on physical activity behavior.

The result showed that attitude had no significant indirect influence on physical activity behavior ($\beta = 0.02$, $p > .05$), but subjective norms ($\beta = 0.04$, $p < .05$) and perceived behavioral control ($\beta = 0.03$, $p < .05$) had significant and positive indirect influence on physical activity behavior. However, both standardized path coefficients indicated small effect to physical activity behavior.

These findings were partially consistent with the results of Hausenblas and Down's study (2004) which found that attitude and subjective norms did not predict exercise behavior during women's first trimester of pregnancy. According to other populations or health behaviors, Gretebeck (2000) studied physical activity in older adults by using the TPB and reported that attitude ($\beta = 0.23$, $p < .05$), subjective norms ($\beta = 0.13$, $p < .05$), and perceived behavioral control ($\beta = 0.23$, $p < .05$) had significant and positive indirect influence on physical activity via intention. Similarly, Wayuhuerd (2009) also found that attitude ($\beta = 0.08$, $p < .01$), subjective norms ($\beta = 0.08$, $p < .01$), and perceived behavioral control ($\beta = 0.07$, $p < .05$) had significant positive indirect effect on condom use behavior among Thai adolescents via intention. Horne, Skelton, Speed and Todd (2009) demonstrated that primary health care professionals' and physicians' advice and support were significant motivation to initiation of exercise and physical activity among white American and Southest Asian older adults.

Similarly, the findings from this study indicated that the effects of subjective norms and perceived behavioral control on physical activity behavior were thus mediated by intention to engage in physical activity. Although the pregnant women had a positive attitude toward physical activity behavior, they did not favor performing physical activity because of some physical and psychological limitations such as nausea, fatigue, and lack of time.

Hypothesis 5: Intention and perceived behavioral control have a positive direct influence on physical activity.

The findings indicated that intention had a positive direct influence on physical activity behavior, but perceived behavioral control had a non-significant direct influence on physical activity behavior.

The results of in this study showed that intention had a significant and positive direct influence on physical activity behavior ($\beta = 0.14$, $p < .05$), but perceived behavioral control had a non-significant direct influence on physical activity behavior ($\beta = -0.02$, $p > .05$). This means that the pregnant women with higher levels of intention might have a higher level of performance of physical activity behavior. On the other hand, Ajzen (1991) argued that a person would expend more effort in performing a behavior when her/his perception of behavioral control was high. This finding reflected that the women made less effort to perform physical activity during their second trimester of pregnancy because the perception of behavioral control was low.

Theoretically, the magnitude of the relationship between intention and behavior might be influenced by the correspondence of the measurement of intention and behavior, and the stability of intention at the time of behavior measurement (Fishbein & Ajzen, 1975). A measure of behavior should include these four elements: action, target, context, and time elements. (Ajzen & Fishbein, 1980). However, intention might change over time, and an assessment of intention taken some time prior to observation of the behavior might differ from the intention at the time that the behavior was observed. Intention was assumed to capture the motivational factors that influence a behavior. It was indicated how much people were willing to try, and how much effort they were planning to exert, in order to perform the behavior (Ajzen & Fishbein, 1980; Ajzen, 1991).

These findings were consistent with the results of Downs and Hausenblas (2003) which found that intention ($\beta = 0.58$, $p < .01$) was a significant predictor of exercise behavior during the second trimester of pregnancy, while perceived behavioral control was not ($\beta = 0.17$, $p = .10$). Likewise, Hausenblas, Downs, Giacobbi, Tuccitto, & Cook (2008) reported that exercise intention was the only longitudinal predictor of changes in exercise behavior during pregnancy. However, the results from this study contradicted Hausenblas and Down's (2004) findings that only perceive behavioral control was a significant determinant of intention to exercise during pregnancy.

According to other populations and health behaviors, these findings were consistent with Latimer and Ginis' (2005) study which reported that LTPA intention ($\beta = 0.45$, $p < .001$) was a predictor of LTPA behavior but PBC did not predict LTPA. Similarly, Blanchard, et al. (2008) reported that intention was a significant predictor of physical activity for Caucasian students ($\beta = 0.33$, $p < .001$) but perceived behavioral control was not.

Partially consistent with previous studies of other populations, Gretebeck (2000) indicated that both intention ($\beta = 0.35$, $p < .05$) and perceived behavioral control ($\beta = 0.50$, $p < .05$) had significant and positive direct influence on physical activity behavior in older adults.

Results from the present study demonstrated that only intention had a positive direct influence on physical activity behavior during pregnancy. Differently, perceived behavioral control could not directly predict physical activity behavior, but had significant and positive indirect influence on physical activity behavior via intention. Thus, the effects of perceived behavioral control on physical activity behavior were only mediated by intention to engage in physical activity. It might be that pregnancy was a unique period in a woman's life resulting in decreased personal control over physical activity behavior because of the rapid physical and psychological changes that occur during pregnancy. These changes such as nausea, fatigue, and enlargement of abdomen might be consequential in either decreased or unrecognised control over physical activity behavior (Hausenblas, Downs, Giacobbi, Tuccitto, & Cook, 2008).

Characteristics of Women's Physical Activity Behavior During Pregnancy

The following section discussed the characteristics of women's physical activity behavior during the second trimester of pregnancy in this study.

The characteristics of women's physical activity behavior during second trimester of pregnancy in this study were evaluated by the questionnaire, PPAQ, translated into Thai, and modified from existing measures. The PPAQ was divided into four categories; household/caregiving, transportation, exercise and occupational activity. The findings demonstrated that the average score of this scale ranged from 45.98 to 1183.80 with a mean score of 274.99, which was very low. Additionally, the mean score of each

item in this questionnaire was quite low as well. This result reflected that some items of the PPAQ were not fitted well for the subjects in this study, and also for the Thai pregnant women context, because most subjects answered that they did not spend time on most activities in this questionnaire; for example, *"Dressing, bathing, feeding children while you are sitting", "Carrying children", "Taking care of an older adult", "Playing with pets", " Driving or riding in a car or bus", "Walking quickly up hills for fun or exercise", "Prenatal exercise class", "Swimming", "Walking quickly at work while carrying things heavier than 4 kilograms", and "Farming grain crops and gardening"*. However, these results might have an effect on the characteristics of the samples.

According to the demographic characteristics of these subjects, the results showed that nearly half of the women (48.2%) were experiencing first time of pregnancy. Most of them did not have any children (63.6%). Moreover, approximately two-thirds of the subjects were employees (66.9%). Thus, the score, *"Farming grain crops and gardening"* was at a low level. The subjects reported that 21.3% had had an abortion experience.

With respect to exercise activity in the Thai pregnant women context, cases of swimming and attending prenatal exercise classes were rare. The findings from the elicitation phase revealed that the participants preferred walking, which corresponded to this result because the item, *"Walking slowly for fun or exercise"* had the highest score, whereas the item, *"Swimming"* had the lowest score (See Table 4.6). In addition, at the present, most pregnant women have to work outside homes. Therefore, the subjects might not be interested in participating in prenatal exercise classes because they have to hurry back to their work after attending antenatal care clinics. Moreover, the significant barrier factor was that there were not enough health personnel and prenatal exercise classes available in the hospitals.

Additionally, approximately two-thirds (64.3%) did not exercise before pregnancy. From the literature reviews, various studies reported similar results, that although active pregnant women performed more physical activities such as exercise before pregnancy, they decreased those activities or stopped exercising when they got pregnant, because of concern about the potential complications to both mother and fetus, such as exercise-induced injury and adverse fetal outcome. Additionally, some women perceived that pregnancy had been seen as a state of confinement in which women

were not encouraged to engage in any physical activity. Rest and relaxation were significantly more important during pregnancy than was regular exercise or the maintenance of an active lifestyle (Artal et al., 2003; Clapp & Dickstein, 1984; Clarke, Gross & Psychol, 2004; Hinton & Olson, 2001; Ning et al., 2003).

In addition, there were numerous factors associated with discontinuing or decreased physical activity during pregnancy, including physical limitations or restrictions, tiredness/fatigue, time limits, working outside the home caring for other children, fear of harming self/baby, bad weather, and no motivation/ feeling lazy, as well as lack of knowledge regarding the benefits of physical activity (Downs & Hausenblas, 2004; Ezmerli, 2000; Rutkowska & Lepecka-Klusek, 2002). Similarly, Thai pregnant women might not perform physical activity especially exercise, to the ACSM recommended level because of protruding abdomen, working outside the home and also doing housework, limited time, being too weary to exercise, and lack of suitable places for walking. Furthermore, most Thai pregnant women might also lack knowledge regarding how to engage in physical activity, especially exercising properly as a part of their daily life, and some Thai women were afraid that exercise might be harmful to their fetus. (Patanavanichnun, 2000; Thanomroop, 2000; Wiriyawattana, 2002). Besides, the details of physical activity recommendations might be varied and not sufficiently clear for the pregnant women (Gross & Bee, 2004).

Similarly, Liamputtong, Yimyam, Parisunyakul, Baosoung & Sansiriphun (2005) reported about the traditional beliefs regarding pregnancy and childbirth among women from Chiang Mai. The findings revealed that it was thought that pregnant women should be cautious when performing physical activity in order to protect them from danger and give the best possible chance to carry their pregnancy to term. During pregnancy, rigorous physical activities such as lifting heavy objects in farm work were seen as detrimental to them and their fetuses since these activities might lead to a miscarriage or stillbirth. Driving a car was seen as an exertion on the fetus that might also cause a miscarriage. Based on the results from this study, 21.3% of the subjects reported that they had undergone abortion.

Additionally, the subjects were asked to complete the PPAQ one month after completing the prior set of questionnaires (the TPB’s variables) in order to assess their actual physical activity behavior. Consequently, there were both inherent biases

in self-reported and recalled data. Especially, the PPAQ provided an indirect assessment of behavior based on the self-report by the subjects. It was less valid than objective measurement such as energy providing by expenditure monitors. According to the TPB, intention could change over time, and a measure of intention taken some time prior to observation of the behavior moight be different from the intention at the time that the behavior was observed. The longer the time interval between the measurement of intention and behavior, the less accurate the prediction of the behavior (Ajzen, 1991; Ajzen & Fishbein, 1980).

All of these consequences might be significant barrier factors for the women to perform physical activity during their pregnancy. For this reason, it was found that the mean score of physical activity in the present study was at a low level.

Summary

This chapter had discussed study results. The discussion emphasized interpreting characteristics of the subjects, major variables of the TPB regarding physical activity behavior, research hypotheses and the causal model of physical activity behavior among Thai women during second trimester of pregnancy.

CHAPTER VI
CONCLUSION

This chapter provides a summary of the study as well as its implications and recommendations for nursing science, and includes observations on the strengths and limitations of the study and suggestions for future investigations.

Summary of the Study

Based on the TPB, the purpose of this study was to examine the relationships among the TPB's constructs, including behavioral beliefs, normative beliefs, control beliefs, attitude toward physical activity, subjective norms, perceived behavioral control, intention to engage in physical activity, and physical activity of women during their second trimester of pregnancy.

Sample and Data Collection

Two hundred and seventy-two healthy pregnant women were recruited in the model testing phase by using the convenience sampling method. However, this study was conducted in two phases. Phase one was composed of two parts: an elicitation of the study based on the TPB's recommendations and the pilot tests. Phase two, the model testing phase assessed the relationships among the TPB's variables by using questionnaires constructed from the elicitation study. Data collection was conducted in two steps: Phase 1, the elicitation of the study, during December, 2006 to January, 2007; and Phase 2, testing the model, during April to August, 2008.

The demographic characteristics of the sample were presented as follows. The average age of the sample was 27.51 years old (*SD* = 4.33 years) with a range from 18 to 40 years old. Most of the subjects were married (95.2%). The findings revealed that one-third of the pregnant women had graduated with bachelor degrees (33.8%). Approximately, two-thirds of the subjects were employees (66.9%) and had family income, ranging between 10,000 and 19,999 baht per month (44.9%). Nearly half of the participants (48.2%) were undergoing first time pregnancy. Most of these

subjects had gestational ages of 15 - 20 (54.0%); and did not have any children (63.6%). Approximately two-thirds (64.3%) did not exercise before pregnancy.

Instruments

This study consisted of nine questionnaires as the following:

1. Indirect attitude measure; including behavioral beliefs (12 items) and outcome evaluations (12 items)
2. Direct attitude measure (9 items)
3. Indirect subjective norms measure; including normative beliefs (6 items) and motivation to comply (6 items)
4. Direct subjective norms measure (4 items)
5. Indirect perceived behavioral control measure; including control beliefs (15 items) and perceived powers (15 items)
6. Direct perceived behavioral control measure (3 items)
7. Intention measure (8 items)
8. Pregnancy Physical Activity Questionnaire (PPAQ) (28 items)
9. Demographic characteristics and background information

Seven questionnaires were developed by the researcher based on the Theory of Planned Behavior constructs, including indirect attitude measure, direct attitude measure, indirect subjective norms measure, direct subjective norms measure, indirect perceived behavioral control measure, direct perceived behavioral control measure, and intention measure. Only the PPAQ was translated into a Thai version using the translation process which was confirmed for accuracy by back translation and pilot testing, and modified later from Chasan-Taber and colleagues (2004).

The demographic characteristics and background information were collected by using measurements developed by the researcher and modified from Downs and Hausenblas (2003). The validity and reliability of the measurements were tested. LISREL was used to examine path analysis of the causal model among the TPB's constructs to explain the relationships among these constructs for Thai pregnant women.

Research Findings

The results demonstrated that the modified model fitted with the empirical data (Chi-square =23.94, df = 19, *p*-value = .26, RMSEA = 0.031, GFI = 0.98, AGFI =.96, and decreased in $\chi 2/df$ (1.26). The modified model could explain 21% of variance in intention to engage in physical activity, and only 2% of variance in physical activity. The findings of causal relationships testing the modified model were summarized as follows:

1. Indirect attitude toward physical activity had a significant positive indirect influence on intention via attitude ($\beta = 0.13$, $p < .01$). Indirect subjective norms had a significant positive indirect influence on intention via subjective norms ($\beta = 0.24$, $p < .001$). Indirect perceived behavioral control had a significant positive indirect influence on intention via perceived behavioral control ($\beta = 0.18$, $p < .001$).

2. Attitude, subjective norms, and perceived behavioral control had a significant positive direct influence on intention ($\beta =0.14$, $p < .01$; $\beta = 0.26$, $p < .001$; $\beta= 0.20$, $p < .001$, respectively).

3. Indirect subjective norms had a significant positive indirect influence on physical activity behavior ($\beta = 0.03$, $p < .05$). Conversely, indirect attitude toward physical activity had a non-significant positive indirect effect on physical activity behavior via intention ($\beta = 0.02$, $p > .05$), whereas indirect perceived behavioral control had no effect on physical activity behavior.

4. Attitude had a non-significant positive indirect influence on physical activity behavior ($\beta = 0.02$, $p > .05$). Subjective norms and perceived behavioral control had significant positive indirect influence on physical activity behavior via intention ($\beta = 0.04$, $p < .05$; $\beta = 0.03$, $p < .05$).

5. Intention had a significant positive direct influence on physical activity behavior ($\beta = 0.14$, $p < .05$). However, perceived behavioral control had a non-significant direct influence on physical activity behavior ($\beta = -0.02$, $p >.05$).

The results above indicated that the research hypotheses were partially supported.

Implications and Recommendations

The important issue for doing research was to contribute the findings to nursing knowledge, nursing science, nursing practice, nursing education, health care policy and nursing research in the future, although these results were only partially consonant with the underlying of theoretical framework of the present study. The implications were presented as the following.

Implications for Nursing Science

The findings from the present study contributed to nursing knowledge, although the results only partially supported the research hypotheses. The empirical findings increased the understanding of salient beliefs, intention, and pregnant women's physical activity behavior. The belief strengths and outcome evaluations for the physical activity behavior provided substantive information about attitudinal toward physical activity that guided women's decisions to engage or not to engage in physical activity behavior during pregnancy. Additionally, some beliefs about performing physical activity behavior during pregnancy might involve important referents. The results of this study indicated that normative beliefs with motivation to comply and subjective norms had significant positive indirect influence on physical activity behavior during pregnancy via intention. In contrast, neither control beliefs weighted by perceived power nor perceived behavioral control was predictor of physical activity behavior as a result of the unique life events of pregnant women that might place them at greater need for decreased physical activity than at other of their life-time periods. The results from this study showed a total score of pregnancy physical activity at a low level.

Implications for Nursing Practice

The study findings provided an essential obvious basis for nursing practice on pregnant women's physical activity behavior. In partial support of these hypotheses, intention had a significant positive direct influence on physical activity behavior. In turn, the subjective norms were the strongest predictors of intention, followed by perceived behavioral control and attitude. However, perceived behavioral control had a non-significant direct influence on physical activity behavior, but it

could indirectly predict physical activity via intention. These results provide a good opportunity for nurses to understand and encourage women to perform physical activity during pregnancy as follows:

First, these findings could assist nurses to promote women's physical activity during pregnancy by identifying women's intention, women's thoughts and beliefs about physical activity, and their salient referents.

Second, the findings from this study reveal that the subjects had moderate scores on the indirect subject norms measure of the influence of the important persons encouraging them to perform physical activity during pregnancy. The score was highest for the indirect subjective norms of physicians/nurses followed by their husbands. Consequently, nurses and healthcare providers were the most important persons for the pregnant women in providing advice and encouraging them to perform physical activity during their pregnancy. Moreover, nurses should encourage and reinforce the significant persons who have influence over pregnant women to motivate the pregnant women to perform physical activity, especially their husbands.

Third, nurses should assist pregnant women to realize the benefits of physical activity and understand how to overcome the impediments such as fatigue, being tired from working, and bad weather, by conducting programs to meet specific needs for the women, teaching time management skills, and helping women to restructure their priorities in order to increase and maintain physical activity during their pregnancy.

Finally, nurses should conduct intervention programs, including salient beliefs, attitude, subjective norms, perceived behavioral control, and intention concerning physical activity. Additionally, the programs should be designed to be easily implemented in the hospitals in order to encourage women to participate in physical activity behavior during their pregnancy.

Implications for Health Policy

The 10th National Health Development Plan (2007-2011), which followed the 9th Plan Outlook emphasized a clear vision regarding a people-centered approach and the Philosophy of Sufficiency Economy. Thus, the national health agenda has also focused on health activities and sports for healthy behaviors and lifestyles in order to

sustain physical and psychological health development of individuals, families, communities, and society (Bureau of Policy and Strategy, 2009).

Based on these policies, nurses should actively involve themselves in the national health policy making by generating knowledge regarding physical activity during pregnancy not only for the health care policy makers but also for the educational policy makers. In accordance with the health care policy makers, nurses' roles as primary care providers could launch intervention programs for health promotion in various settings to serve pregnant women. To encourage pregnant women to participate in physical activity, the programs should include salient beliefs, attitude, subjective norms, perceived behavioral control, and intention regarding to physical activity. Thus, these kinds of programs will have a substantial impact on the majority of people not only in terms of the health care providers' tasks but also in terms of pregnant women, families, community, and society involvement in physical activity behavior.

According to educational policy makers, the knowledge of physical activity behavior and intervention programs should be integrated into nursing curriculum. Education programs should include all constructs in the Theory of Planned Behavior as the significant factors that influence physical activity behavior during pregnancy. Thus, nursing educators have a responsibility to teach nursing students or staff nurses to promote, encourage, and support physical activity among pregnant women.

Finally, funding and scholarship support from government organizations or non-government organizations to accomplish intervention programs and further research studies regarding physical activity during pregnancy should be allocated on a regular basis in order to not only support the nursing profession but also institutionalize the body of knowledge regarding physical activity behavior within the Thai pregnant women context.

Strengths of the Study

There were many strengths of this study as follows: First, this study was conducted based on the theoretical model, the TPB, which guided the research in order to elicit the salient beliefs of physical activity behavior from the Thai pregnant women context. Secondly, the appropriate sample size was assembled with appropriate

heterogeneity. Lastly, it was the first study to examine the relationships among the TPB's constructs, including behavioral beliefs, normative beliefs, control beliefs, attitude toward physical activity, subjective norms, perceived behavioral control, intention to engage in physical activity, and physical activity during the second trimester of pregnancy. Thus, the results could facilitate nurses' and healthcare professionals' acquisition of more knowledge and provide guidelines for better nursing care regarding physical activity behavior during pregnancy.

Limitations of the Study

The limitations of this study related to the study design, data collection, and analysis, and should be considered when interpreting the findings of this study. First, because of the purposive sampling used in this study, the results cannot be generalized to the whole pregnant women population.

Second, most of the measures used in this study were developed by the researcher based on the TPB as a conceptual framework, and evaluated for content validity by a panel of the TPB. However, these measures should be assessed by construct validity as well. Moreover, some items of the PPAQ were not well fitted for the Thai pregnant women context, as for example, "*Walking quickly up hills for fun or exercise", "Prenatal exercise class", and "Swimming"*. Additionally, some events did not occur during the second trimester of pregnancy: for example, *"Taking care of child or children", "Taking care of an older adult", and "Playing with pets"*. For this reason, the findings of the study might contain errors.

Finally, the method of self-report was used for the participants to complete all questionnaires might contain errors. In accordance with the PPAQ, the subjects were asked to complete this questionnaire one month after meeting the researcher in order to assess their actual physical activity. Consequently, there were both inherent biases in self-reporting and recalled data. Especially, the PPAQ provided an indirect assessment of behavior based on the self-report of the subjects. It was less valid than objective measures such as providing by energy expenditure monitors.

Recommendations for Future Studies

This study was the first time that examines the relationships among the TPB's constructs, including indirect attitude toward physical activity, indirect subjective norms, indirect perceived behavioral control, attitude, subjective norms, perceived behavioral control, intention, and physical activity behavior among Thai women during the second trimester of pregnancy. Although the results from this study would not be generalizable to the whole pregnant women population, the findings suggest several areas for future studies.

First, in order to increase generalizability of the study and expand the TPB, replication of studies should be conducted across a variety of settings and population relating to teenage pregnancy and postpartum mothers.

Second, the findings indicate that the indirect subjective norms and subjective norms have positive influence on intention and physical activity behavior. Future research is needed to examine these salient referents' beliefs about physical activity behavior, and to determine how much influence they have on women's own beliefs and behavior; additionally, how salient referents can be further motivated to encourage women to perform physical activity.

Third, according to a cross-sectional design of this study which did not allow for changes over time and did not measure the actual physical activity behavior, longitudinal study should be conducted since it may concisely explain and predict actual behavior better than a cross-sectional study. Moreover, an objective measure for physical activity should be used in order to assess accurate energy expenditure.

Fourth, an intervention study aimed to enhance physical activity in women during pregnancy should be further implemented. This intervention study should be carefully designed to effectively promote physical activity behavior, motivation, and adherence during pregnancy. Theoretical research examining women's physical activity beliefs is needed before conducting the program.

Fifth, it was found that some items of the PPAQ translated into Thai were not well fitted for the Thai pregnant women context. For future studies, it is suggested that the researchers should develop an instrument to assess physical activity behavior based on the Thai pregnant women context.

Finally, a cross-cultural research to compare the differences of the TPB's constructs between Western and Eastern culture should be conducted to enhance and deepen understanding and helpfulness which will develop pregnant women's physical activity programs.

BIBLIOGRAPHY

Ainsworth, B. E., Haskell, W. L., Leon, A. S., Jacobs, D. R., Montoye, H. J., Sallis, J. F. & Paffenbarger, R. S. (1992). Compendium of physical activities: Classification of energy costs of human activities. *Medicine and Science in Sports and Exercise, 25*(1), 71-80.

Ainsworth, B. E., Montoye, H. J. & Leon, A. S. (1994). Methods of assessing physical activity during leisure and work**.** In C. Bouchard, R. J. Shephard, & T. Stephens (Eds), *Physical activity, fitness, and health: international proceedings and consensus statement* (pp. 146-159). Champaign, IL: HumanKinetics.

Ajzen, I. (1985). From intentions to action: A theory of planned behavior. In J. Kuhl & J. Beckman (Eds.), *Action control: from cognition to behavior* (pp. 11-39), New York: Springer.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50,*179-211.

Ajzen, I. (2006). Constructing a TPB questionnaire: Conceptual and methodological considerations. Retrieved September 13, 2006, from http://www.people. umass.edu/aizen/pdf/tpb.measurement.pdf

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. New Jersey: Prentice-Hall.

Ajzen, I., & Madden, T. J. (1986). Prediction of goal-oriented behavior: attitudes, intentions, and perceived behavioral control. *Journal of Experimental Social Psychology, 22,* 453-474.

American College of Obstetricians and Gynecologists (ACOG) Committee on Obstetric Practice. (2002). ACOG Committee opinion. Exercise during pregnancy and the postpartum period. Number 267, January 2002. *Obstet Gynecol, 99,* 171-173.

Armitage, C. L. (2005). Can the TPB predict the maintenance of physical activity? *Health Psychology, 24*(3), 235-245

Artal, R. (2003). Exercise and pregnancy. *Clinical Obstetrics and Gynecology, 46*(2), 377-378.

Artal, R., O'Toole, M., & White, S. (2003). Guidelines of the American College of Obstetricians and Gynecologists for exercise during pregnancy and the postpartum period. *British Journal of Sports Medicine, 37,* 6-12.

Behling, O., & Law, K. S. (2000). *Translating questionnaires and other research instrument: Problem and solution.* Thousand Oaks, CA: Sage.

Biddle, S. J. H., & Nigg, C. R. (2000). Theories of exercise behavior. *International Journal of Sport Psychology, 31,* 290-304.

Black, J. E., Kieffer, E. C., Villarruel, A. M., & Sinco, B. R. (2007). Predicting the exercise intention of pregnant Latina women. *Hispanic Health Care International, 5*(1), 5-12.

Blanchard, C., et at. (2008). Understanding physical activity behavior in African American and Caucasian college students: an application of the Theory of Planned Behavior. *Journal of American College Health, 56*(4), 341-346.

Blue, C. L. (1995). The predictive capacity of the theory of reasoned action and in exercise research: An integrated literature review the theory of planned behavior. *Research in Nursing & Health, 18,* 105-121.

Bouchard, C., Blair, S. N., & Haskell, W. L. (2007). Why study physical activity and health? In C. Bouchard., S. N., & W. Haskell (Eds.), *Physical activity and health* (pp. 3-19). Champaign, IL: Human Kinetics.

Bouchard, C., Shephard, R. J., & Stephens, T. (Eds.). (1994). *Physical activity,fitness, and health. International Proceedings and Consensus Statement.* The second International Conference held in Toronto, May 1992. Champaign, IL: Human Kinetics.

Brayshaw, E. (2003). *Exercises in pregnancy and childbirth: A practical guide for educators*. Edinburgh: Books for Midwives.

Brislin, R. W. (1986). The wording and translation of research instruments. In W. J. Lonner, & J. W. Berry (Eds.), *Field methods in cross-cultural research* (pp. 137-164). Beverly Hills, CA: Sage.

Broman, C. L. (1995). Leisure-time physical activity in an African-American population. *Journal of Behavioral Medicine, 18*(4), 341-353.

Buckelew, S. P.,et al. (1998). Biofeedback/relaxation training and exercise interventions for fibromyalgia: A prospective trial. *Arthritis Care and Research, 11*, 196–209.

Bureau of Policy and Strategy. (2009). *Health Policy in Thailand 2009*. Bangkok: Ministry of Public Health.

Burnett, C. N., & Gleen, T. M. (1996). Principles of aerobic exercise. In C. Kisner, & L. A. Colby (Eds), *Therapeutic exercise foundations and techniques* (pp. 111-142) (3rd ed.). Philadelphia: F.A. Davis Company.

Burns, N., & Grove, S. K. (2007). *The practice of nursing research: Conduct, critique, and utilization* (6th Ed.). Missouri: Elsevier Saunders.

Byrne, A., & Byrne, D. G. (1993). The effect of exercise on depression, anxiety and other mood states: A review. *Journal of Psychosomatic Research, 37*, 565-574.

Casperson, C. J., Powell, K. E., & Christenson, G. M. (1985). Physical activity, exercise, and physical fitness definitions and distinctions for health-related research. *Public Health Report, 100,* 126-131.

Chasan-Taber, L., Schmidt, M. D., Roberts, D. E., Hosmer, D., Markenson, G., & Freedson, P. S. (2004). Development and validation of a Pregnancy Physical Activity Questionnaire. *Medicine & Science in Sports & Exercise, 36*(10), 1750-1760.

Clapp, J. F., & Capeless, E. L. (1990). Neonatal morhometrics after endurance exercise during pregnancy. *Am. J. Obstet Gynecol, 163,* 1805-1811.

Clapp, J. F., & Dickstein, S. (1984). Endurance exercise and pregnancy outcome. *Med Sci Sports Exercise, 16,* 556-562.

Clarke, P. E., Gross, H., & Psychol, C. (2004). Women's behaviour, beliefs and information sources about physical exercise in pregnancy. *Midwifery, 20,* 133-141.

Clarke, P. E., Rousham, E. K., Gross, H., Halligan, A. W. F., & Bosio, P. (2005). Activity patterns and time allocation during pregnancy: A longitudinal study of British women. *Annals of Human Biology, 32*(3), 247-258.

Conn, V. S., Tripp-Reimer, T., & Maas, M. L. (2003). Older women and exercise: Theory of Planned Behavior Beliefs. *Plublic Health Nursing, 20*(2), 153-163.

Courneya, K. S. (1995). Understanding readiness for regular physical activity in older individuals: An application of the TPB. *Health Psychology, 14*(1), 80-87.

Dale, D., Welk, G. J., & Matthews, C. E. (2002). Methods for assessing physical activity and challenges for research. In G. J. Welk (Eds). *Physical activity assessments for health-related research* (pp. 19-34). Champaign, IL: Human Kinetics Publishers.

Dempsey, J. C., Butler, C. L., & Sorensen, T. K., et al. (2004). A case-control study of maternal recreational physical activity and risk of gestational diabetes mellitus. *Diabetes Research and Clinical Practice, 66,* 203-215.

Dempsey, J. C., Butler, C. L., & Williams, M. A. (2005). No need for a pregnant pause: physical activity may reduce the occurrence of gestational diabetes mellitus and preeclampsia. *Exercise and Sport Sciences Reviews, 33*(3), 141-149.

Dempsey, J. C., Sorensen, T. K., & Williams, M. A., et al. (2004). Prospective study of gestational diabetes mellitus risk in relation to maternal recreational physical activity before and during pregnancy. *American Journal of Epidemiology, 15* (7), 663-670.

Dewey, K. G., & McCrory, M. A. (1994). Effects of dieting and physical activity on pregnancy and lactation. *American Journal of Clinical Nutrition, 59*(Suppl.), 4465-4535.

Dishman, R. K., Heath, G. W., & Washburn, R. (2004). Physical activity epidemiology. *American Journal of Epidemiology, 159*(9), 910-912.

Downs, D. S., & Hausenblas, H. A. (2003). Exercising for two: Examining pregnant women's second trimester exercise intention and behavior using the framework of the Theory of Planned Behavior. *Women's Health Issue, 13,* 222-228.

Downs, D. S., & Hausenblas, H. A. (2004). Women's exercise beliefs and behaviors during their pregnancy and postpartum. *Journal of Midwifer & Women's Health, 49*(2), 138-144.

Dzewaltowski, D. A., Noble, J. M., & Shaw, M. (1990). Physical activity participation: Social cognitive theory versus the theories of reason action and planned behavior. *Journal of Sport and Exercise Psychology*, 12, 388-405.

Dumas, G. A., & Reid, J. G. (1997). Laxity of knee cruciate ligaments during pregnancy. *Journal of Orthopaedic, Sports Physical Therapy, 26*, 2-6.

Everson, E. S., Daley, A. J., & Ussher, M. (2007). Brief report: The theory of planned behavior applied to physical activity in young people who smoke. *Journal of Adolescence*, 30, 347-351.

Evenson, K. R., & Bradley, C. B. (2009). Beliefs about exercise and physical activity among pregnant women. *Patient Education and Counseling.* Retrieved October 8, 2009, from http://www.elsevier.com/locate/pateducou

Evenson, K. R., Savitz, D. A., & Huston, S. L. (2004). Leisure-time physical activity among pregnant women in the US. *Paediatric and Perinatal Epidemiology, 18,* 400-407.

Ezmerli, N. M. (2000). Exercise in pregnancy. *Prim Care Update Ob/Gyns. 7*(6), 260-264.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research*. Massachusetts: Addison-Wesley.

Freedson, P. S., & Kelly, M. (2000). Objective monitoring of physical activity using motion sensors and heart rate. *Research Quarterly for Exercise and Sport,71*(2), 21-29.

Garshasbi, A., & Zadeh, S. F. (2005). The effect of exercise on the intensity of low back pain in pregnant women. *International Journal of Gynecology & Obstetrics. 88,* 271-275.

Godin, G., & Kok, G. (1996). The theory of planned behavior: A review of its applications to health-related behaviors. *American Journal of Health Promotion, 11*(2), 87-98.

Gretebeck, K. A. (2000). *Predicting physical activity in older adults: the Theories of Reasoned Action and Planned Behavior.* Published Doctoral Dissertation. Purdue University Indiana.

Gross, H., & Bee, P. E. (2004). Perceptions of effective advice in pregnancy–The case of activity. *Clinical Effectiveness in Nursing, 8*, 161-169.

Hagger, M., Chatzisarantis, N. L. D., & Biddle, S. J. H. (2002). A meta-analytic review of the theories of reasoned action and planned behavior in physical activity: Predictive validity and the contribution of additional variables. *Journal of Sport and Exercise Psychology, 24,* 1-12.

Hair, J. F., Anderson , R. E., Tatham, R. L., & Black, W. C. (1998). *Multivariate Data Analysis* **(**5th ed). NJ : Prentice-Hall.

Hair, J. F., Black, W. C., Babin, B. J., Anderson , R. E., & Tatham, R. L. (2006). *Multivariate Data Analysis* (6th ed). NJ : Prentice-Hall.

Harro, M., & Riddoch, C. (2000). Physical activity. In N. Armstrong, & W. V. Mechelen (Eds.), *Paediatric exercise science and medicine* (pp. 77-84). New York: Oxford University Press.

Haskell, W. L., Blair, S. N., & Bouchard, C. (2007). An integrated view of physical activity, fitness, and health. In C. Bouchard., S. N., & W. Haskell (Eds.), *Physical activity and health* (pp. 359-374). Champaign, IL: Human Kinetics.

Haskell, W. L., Lee, I., Pate, R. R., Powell, K. E., Blair, S. N., & Franklin, B. A. (2007). Physical activity and public health: Updated recommendation for adults from the American College of Sports Medicine and the American Heart Association. *Med. Sci. Sports Exerc, 39*(8), 1423-1434.

Hatch, M. C., Xiao-Ou, S., McLean, D. E., et al. (1993). Maternal exercise during pregnancy, physical fitness, and fetal growth. *Am. J. Epidemiol, 137,* 1105-1114.

Hausenblas, H. A., & Downs, D. S. (2004). Prospective examination of the Theory of Planned Behavior applied to exercise behavior during women's first trimester of pregnancy. *Journal Reproductive and Infant Psychology,* 22(3), 199-210.

Hausenblas, H. A., Downs, D. S., Giacobbi, P., Tuccitto, D., & Cook, B. (2008). A multilevel examination of exercise intention and behavior during pregnancy. *Social Science & Medicine;* 66, 2555-2561.

Hinton, P. S., & Olson, C. M. (2001). Predictors of pregnancy-associated change in physical activity in a rural white population. *Maternal and Child Health Journal, 5*(1), 7-14.

Horne, M., Skelton, D., Speed, S., & Todd, C. (2009). The influence of primary health care professionals in encouraging exercise and physical activity uptake among White and South Asian older adults. *Patient Education and Counseling* ,Retrieved November 2009, from http://www.elsevier.com/locate/pateducou

Jitramontree, N. (2003). *Predicting exercise behavior among Thai elders: Testing the Theory of Planned Behavior*. Published Doctoral Dissertation. The University of Iowa City, Iowa.

Kanshana, S., et al. (2003). *Exercise program during pregnant women: The effects to mother's and fetus' health*. Bangkok: Division of Physical Activities and Health, Ministry of Public Health.

Kisner, C., & Colby, L. A. (1996). *Therapeutic exercise foundations and techniques* (3rd ed.). Philadelphia: F.A. Davis Company.

Kline, R. B. (1998). *Principles and practice of structural equation modeling.* New York: The Guilford Press.

Kritpet, T. (2001). Exercise, sport, and watching sport behavior among people in Bangkok. *Journal of Health, Physical, Education and Recreation, 27*(1-4), 25-33.

Larsson, L., & Lindqvist, P. G. (2005). Low-impact exercise during pregnancy: A study of safety. *Acta Obstet Gynecol Scand, 84*, 34-38.

Latimer, A. E., & Ginis, K. A. M. (2005). The Theory of Planned Behavior in prediction of leisure time physical activity among individuals with spinal cord injury. *Rehabilitation Psychology, 50*(4), 389-396.

Leet, T., & Flick, L. (2003). Effect of exercise on birthweight. *Clinical Obstetrics and Gynecology, 46*(2), 423-431.

Leiferman, J. A., & Everson, K. R. (2003). The effect of regular leisure physical activity on birth outcomes. *Maternal and Child Health Journal, 7*(1), 59-64.

Liamputtong, P., Yimyam, S., Parisunyakul, S., Baosoung, C., & Sansiriphun, N. (2005). Tranditional beliefs about pregnancy and childbirth among women from Chaing Mai, Northern Thailand. *Midwifery, 21*, 139-153.

London, M. L., Ladewig, P. W., Ball, J. W., & Bindler, R. C. (2003). *Maternal-Newborn & Child Nursing: Family-centered care*. New Jersey: Pearson Education.

Madden, T. J., Ellen, P. S., & Ajzen, I. (1992). A comparison of the theory of planned behavior and the theory of reasoned action. *Personality and Social Bulletin, 18,* 3-9.

McArdle, W. D., Katch, F. I., & Katch, V. L. (2000). *Essentials of exercise physiology* (2nd ed.). Philadelphia: Lippincott Williams & Wilkins.

McKinney, E. S., James, S. R., Murray, S. S., & Ashwill, J. W. (2005). *Maternal-child Nursing* (2nd ed.). St. Louis, MO: Elsevier Saunders.

Medical Records and Statistics Department, Maharaj Nakorn Chiang Mai Hospital. (2008). *Medical records and statistics*. Faculty of Medicine, Chiang Mai University.

Ministry of Public Health. (2001). National Health Development Plan under the 9th National Economic and Social Development Plan, 2002-2006. Bureau of Policy and Strategy, Ministry of Public Health.

Montano, D. E., & Kasprzyk, D. (2002). The theory of reasoned action and the theory of planned behavior. In K. Glanz., B. K. Rimer., & F. M. Lewis. (Eds.), *Health behavior and health education: Theory, research, and practice* (3rd ed.). (pp 67-98). San Francisco: Jossey-Bass.

Morkvid, S., & Bo, K. (1996). The effect of postnatal exercises to strengthen the pelvic floor muscles. *Acta Obstetrica et Gynecologica Scandinavica, 75,* 382-385.

Mottola, M. F., & Campbell, M. K. (2003). Activity patterns during pregnancy. *Can.J. Appl. Physiol, 28*(4), 642-653.

Mummery, W. K., Spence, J. C., & Hudec, J. C. (2000). Understanding physical activity intention in Canadian school children and youth: an application of the TPB. *Research Quarterly for Exercise and Sport, 71*(2), 116-124.

Munro, B. H. (2005). *Statistical methods for health care research* (5th ed.). Philadelphia: Lippincott Williams & Wilkins.

National Statistical Office. (2001). *Report of the exercise behavior survey 2001*. Bangkok: Ministry of Information and Communication Technology.

National Statistical Office. (2004). *Report of the exercise behavior survey 2004*. Bangkok: Ministry of Information and Communication Technology.

Ning, Y., Williams, M. A., Dempsey, J. C., Sorensen, T. K., Frederick, I. O., & Luthy, D. A. (2003). Correlates of recreational physical activity in early pregnancy. *J. Matern. Fetal Neonatal. Med, 13,* 385-393.

Novak, J. C., & Broom, B. L. (1999). Ingalls and Salerno's maternal and child health nursing (9th ed.). St. Louis, Mo.: Mosby.

Parsons, C. (1994). Back care in pregnancy. *Modern Midwife, 4*(10), 16-19.

Patanavanichnun, N. (2000). *Perceived self-efficacy and health promoting behaviors among pregnant industrial workers.* Master's thesis in Maternal and Child Nursing, Faculty of Graduate Studies, Mahidol University.

Pender, N. J., Murdaugh, C. L., & Parsons, M. A. (2006). *Health promotion in nursing practice* (5th ed.). New Jersey: Prentice Hall.

Pillitteri, A. (1999). *Maternal & child health nursing: Care of the childbearing & childrearing family* (3rd ed.). Philadelphia: Lippincott.

Piravej, K, & Saksirinukul, R. (2001). Survey of patterns, attitudes and the general effects of exercise during pregnancy in 203 Thai pregnant women at King Chulalongkorn Memorial Hospital. *J Med Assoc Thai, 84(Suppl 1),* 276-282.

Powers, S. K., & Howley, E. T. (2007). *Exercise physiology: Theory and application to fitness and performance* (6th ed.). New York: McGraw-Hill.

Rankin, J. (2002). *Effect of antenatal exercise on psychological well-being, pregnancy and birth outcome*. London: Whurr Publishers.

Research Digest. (2004). Exercise and pregnancy. *Primary Health Care, 14*(1), no page.

Rhodes, R. E., Macdonald, H. M., & McKay, H. A. (2006). Predicting physical activity intention and behavior among children in a longitudinal sample. *Social Science & Medicine, 62,* 3146-3156

Riemann, M. K., & Hansen, K. I. (2000). Effects on the foetus of exercise in pregnancy. *Scandinavian Journal of Medicine & Science in Sports, 10,* 12-19.

Rippen, D. C., et al. (2003). Leisure-time physical activity during pregnancy and relationship to psychological well-being. *Journal of Psychosomatic Obstetrics & Gynecology, 24*(2), 111-119.

Romem, Y., Masaki, D. I., & Mittelmark, R. A. (1991). Physiological and endocrine adjustments to pregnancy. In R. A. Mittelmark., R. A. Wiswell., & B. L. Drinkwater (Eds.), *Exercise in pregnancy* (2nd ed.). Baltimore, Maryland: Williams & Wilkins.

Rousham, E. K., Clarke, P. E., & Gross, H. (2006). Significant changes in physical activity among pregnant women in the UK as assessed by accelerometry and self-reported activity. *European Journal of Clinical Nutrition, 60,* 393-400.

Rudra, C. B., Williams, M. A., Lee, I. M., Miller, R. S., & Sorensen, T. K. (2006). Perceived Exertion in Physical Activity and Risk of Gestational Diabetes Mellitus. *Epidemiology, 17*(1), 31–37.

Rutkowska, E., & Lepecka-Klusek, C. (2002). The role of physical activity in repairing women for pregnancy and delivery in Poland [Electronic version]. *Health Care for Women International, 23,* 919-923.

Saftlas, A. F., Logsden-Sackett, N., Wang, W., Woolson, R., & Bracken, M. B. (2004). Work, Leisure-time physical activity, and risk of preeclampsia and gestational hypertension. *American Journal of Epidemiology, 160*(8), 758-765.

Sherwen, L. N., Scoloveno, M. A., & Weingarten, C. T. (1995). *Nursing care of the childbearing family* (2nd ed.). Connecticut: Appleton & Lange.

Siasiriwattana, S. (2005). *Health Policy in Thailand 2005*. Bangkok: Bureau of Policy and Strategy, Ministry of Public Health.

Sorensen, T. K., Williams, M. A., Lee, I., Dashow, E. E., Thompson, M. L., & Luthy, D. A. (2003). Recreational physical activity during pregnancy and risk of preeclampsia. *Hypertension, 41,* 1273-1280.

Steele, S. K., & Porch, D. J. (2005). Testing the Theory of Planned Behavior to predict mammography intention. *Nursing Research, 54*(5), 332-338.

Sternfield, B. (1997). Physical activity and pregnancy outcomes: Review and recommendations. *Sport Medicine, 23*, 22-47.

Tabachnick, B. G., & Fidell, L. S. (2001). *Using multivariate statistics.* (4th ed.). California State University, Northridge, CA: Harper Collins College Publishers.

Thanomroop, W. (2000). *Health-promoting behaviors in pregnant women: a study of perceived benefits and barriers to action.* Master's thesis in Maternal and Child Nursing, Faculty of Graduate Studies, Mahidol University.

Thompson, E. D. (1995). *Introduction to maternity and pediatric nursing* (2nd ed.). Philadelphia: W.B. Saunders Company.

Treuth, M. S., Butte, N. F., & Puyau, M. (2005). Pregnancy-related changes in physical activity, fitness, and strength. *Medicine & Science in Sports & Exercise, 37*(5), 832-837.

United States Department of Health and Human Services. (1996). *Physical activity and health: A report of the Surgeon General.* Retrieved September 9, 2006, from http://www.cdc.gov/nccdphp/sgr/smm.html

United States Department of Health and Human Services. Public Health Service, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Nutrition and Physical Activity. (1999). *Promoting physical activity: A guide for community action.* Champaign, IL: Human Kinetics.

Walsh, L. V. (2001). *Midwifery: Community-based care during the childbearing year.* Philadelphia: W.B. Saunders Company.

Waltz, C. F., Strickland, O. L., & Lenz, E. R. (1984). *Measurement in nursing Research* (2nd ed.). Philadelphia: F.A. Davis.

Wayuhuerd, S. (2009). *Predictive factors of condom use behavior among Thai adolescents.* Published Doctoral Dissertation. Mahidol University, Bangkok.

Weissgerber, T. L., Wolfe, L. A., & Davies, G. A. L. (2004). The role of regular physical activity in preeclampsia prevention. *Medicine & Science in Sports & Exercise, 36*(12), 2024-2031.

Wellington, L., White, K. M., & Liossis, P. (2006). Beliefs underlying intentions to participate in group parenting education. Australian e-Journal for the *Advancement of Mental Health (AeJAMH), 5*(3), 1-9. Retrieved November 26, 2009. from http://www.auseinet.com/journal/vol5iss3/wellington.pdf

Wibulpolprasert, S. (Ed.). (n.d.). *Thailand health profile 2001-2004*. Bangkok: Bureau of Policy and Strategy, Ministry of Public Health.

Willgerodt, M. A., Kataoka-Yahiro, M., Kim, E., & Ceria, C. (2005). Issues of instrument translation in research on Asian immigrant populations. *J Prof Nurs, 21*, 231-239.

Wiriyawattana, P. (2002). *Health promoting behavior of pregnant thalassemia carriers: A study of perceived benefits, perceived barriers, and spouse support.* Master's thesis in Maternity and Newborn Nursing, Faculty of Graduate Studies, Mahidol University.

Wiswell, R. A. (1991). Exercise physiology. In R. A. Mittelmark., R. A. Wiswell., & B. L. Drinkwater (Eds.), *Exercise in pregnancy* (pp. 141-155) (2nd ed.). Baltimore, Maryland: Williams & Wilkins.

Yeo, S., & Davidge, S. T. (2001). Possible beneficial effect of exercise, by reducing oxidative stress, on the incidence of preeclampsia. *Journal of Women's Health & Gender-Based Medicine, 10*(10), 983-989.

Yeo, S., Steel, N. M., Chang, M. C., et al. (2000). Effect of exercise on blood pressure in pregnant women with a high risk of gestational hypertensive disorders. *Journal of Reproductive Medicine, 45*(4), 293-298.

Zhang, J., & Savitz, D. A. (1996). Exercise during pregnancy among US women. *Annals of Epidemiology, 6*(1), 53-59.

APPENDICES

APPENDIX A

(Thai Version)

<u>แนวคำถามที่ใช้สำหรับการสนทนากลุ่ม (Focus Group)</u>

1. คุณมีความคิดเห็นอย่างไรบ้าง เกี่ยวกับการเคลื่อนไหวร่างกายในช่วงตั้งครรภ์ 4-7 เดือน

2. คุณมีความเชื่อว่า **ข้อดี** หรือ **ประโยชน์**ที่คุณจะได้รับ ถ้าคุณมีการเคลื่อนไหวร่างกายในช่วงตั้งครรภ์ 4 - 7 เดือน มีอะไรบ้าง

3. คุณมีความเชื่อว่า **ข้อเสีย** หรือ **โทษ**ที่คุณจะได้รับ ถ้าคุณมีการเคลื่อนไหวร่างกายในช่วงตั้งครรภ์ 4 - 7 เดือน มีอะไรบ้าง

4. ใครคือ**คนที่สำคัญ** หรือ**มีอิทธิพล**สำหรับคุณ ที่ทำให้คุณคิดว่าคุณ**ควร**จะมีการเคลื่อนไหวร่างกายในในช่วงตั้งครรภ์ 4 - 7 เดือน

5. ใครคือ**คนที่สำคัญ** หรือ**มีอิทธิพล**สำหรับคุณ ที่ทำให้คุณคิดว่าคุณ**ไม่ควร**จะมีการเคลื่อนไหวร่างกายในในช่วงตั้งครรภ์ 4 - 7 เดือน

6. คุณเชื่อว่ามีปัจจัยอะไรบ้างที่ช่วย **สนับสนุน/ส่งเสริม** ทำให้คุณ**สามารถ**มีการเคลื่อนไหวร่างกายในช่วงตั้งครรภ์ 4 - 7 เดือน

7. คุณเชื่อว่ามีปัจจัยอะไรบ้างที่เป็น**อุปสรรคขัดขวาง/ยับยั้ง** ทำให้คุณ**ไม่มี**การเคลื่อนไหวร่างกาย/อยู่เฉยๆ ในช่วงตั้งครรภ์ 4 - 7 เดือน

ELICITATION STUDY INTERVIEW GUIDE

You believe that……

1. What do you think about performing physical activity during the second trimester of pregnancy?
2. What would be the advantages that would happen if you perform physical activity during the second trimester of pregnancy?
3. What would be the disadvantages that would happen if you perform physical activity during the second trimester of pregnancy?
4. Who are the significant people who think that you should perform physical activity during the second trimester of pregnancy?
5. Who are the significant people who think that you should not perform physical activity during the second trimester of pregnancy?
6. What would make it easier for you to perform physical activity during the second trimester of pregnancy?
7. What would make it difficult for you to perform physical activity during the second trimester of pregnancy?

APPENDIX B

แบบสัมภาษณ์ข้อมูลส่วนบุคคล

วันที่..... เดือน ..... พ.ศ. 2551

<u>ส่วนที่ 1</u>: ข้อมูลที่ได้จากการสัมภาษณ์หญิงมีครรภ์

1. ปัจจุบันท่านอายุ ..... ปี
2. สถานภาพสมรส ☐ 1. โสด/ไม่ได้แต่งงาน ☐ 2. คู่ ☐ 3. หย่า/หม้าย
3. ท่านจบการศึกษาระดับสูงสุด
   ☐ 1. ประถมต้น ☐ 2. มัธยมต้น ☐ 3. มัธยมปลาย/ปวช
   ☐ 4. ประกาศนียบัตร/อนุปริญญา/ปวส ☐ 5. ปริญญาตรี
   ☐ 6. ปริญญาโท/เอก ☐ 7. อื่นๆ ระบุ.....
4. รายได้ครอบครัว .....บาท/เดือน (รวมรายได้ของท่านและสามี)
5. อาชีพของท่าน
   ☐ 1. แม่บ้าน ☐ 2. รับจ้าง ระบุ..... ☐ 3. ข้าราชการ/รัฐวิสาหกิจ
   ☐ 4. ธุรกิจส่วนตัว ☐ 5. ค้าขาย ระบุ..... ☐ 6. เกษตรกรรม ระบุ .....
   ☐ 7. นักศึกษา ☐ 8. อื่นๆ ระบุ.....
6. ก่อนการตั้งครรภ์ครั้งนี้ ท่านออกกำลังกายเป็นประจำหรือไม่
   ☐ ไม่ได้ทำ
   ☐ ทำเป็นประจำ ท่านออกกำลังกายอย่างไร .....
   ความถี่ของการออกกำลังกาย สัปดาห์ละ ..... วัน นานครั้งละ ..... นาที

<u>ส่วนที่ 2</u>: ข้อมูลที่ได้จากสมุดฝากครรภ์/แบบบันทึกของโรงพยาบาล

7. ลำดับที่ของการตั้งครรภ์ ……LMP……EDC……..อายุครรภ์ …… สัปดาห์

8. จำนวนบุตร ……. คน คนที่ 1 อายุ ……ปี คนที่ 2 อายุ …….ปี คนที่ 3 อายุ …….ปี

APPENDIX C

คำชี้แจงเกี่ยวกับแบบสอบถาม

✯ แบบสอบถามนี้จะเป็นข้อมูลที่เป็นประโยชน์เพื่อจะได้ทราบว่าหญิงมีครรภ์คิด รู้สึก และมีการทำกิจกรรมทางกายอย่างไรบ้าง ในระหว่างตั้งครรภ์ 14 - 28 สัปดาห์

✯ คำตอบของท่านจะถูกเก็บไว้เป็นความลับ และคำตอบของท่านไม่มีผิดหรือถูกใดๆ ทั้งสิ้น

✯ แบบสอบถามนี้มีทั้งหมด 12 หน้า กรุณาอ่านแต่ละข้อคำถามด้วยความระมัดระวัง และเลือกคำตอบที่ตรงกับความเป็นจริงของท่านมากที่สุด และกรุณาตอบให้ครบทุกข้อ

✯ คำจำกัดความของ **การทำกิจกรรมทางกาย หมายถึง การที่ท่านมีการเคลื่อนไหวส่วนต่างๆ ของร่างกายในชีวิตประจำวัน เช่น ในขณะที่ท่านทำงานบ้าน ดูแลเด็กหรือผู้สูงอายุ เดินไปทำงานหรือไปขึ้นรถประจำทาง ออกกำลังกาย ทำงานอาชีพ หรือทำกิจกรรมอื่นๆ**

✯ สำหรับข้อคำถามชุดที่ 2 และ 3 ขอให้ท่านเขียนวงกลมล้อมรอบตัวเลขที่ตรงกับความเป็นจริงของท่านมากที่สุด โดยมีความหมายของตัวเลข 1-5 ดังนี้

เลข 1 หมายถึง ท่านมีความเชื่อหรือความรู้สึกด้านลบในระดับมาก ตามข้อความด้านซ้ายมือแต่ละข้อ

เลข 2 หมายถึง ท่านมีความเชื่อหรือความรู้สึกด้านลบในระดับน้อย ตามข้อความด้านซ้ายมือแต่ละข้อ

เลข 3 หมายถึง ท่านมีความเชื่อหรือความรู้สึกระดับไม่แน่ใจในข้อความแต่ละข้อ

เลข 4 หมายถึง ท่านมีความเชื่อหรือความรู้สึกด้านบวกในระดับน้อย ตามข้อความด้านขวามือแต่ละข้อ

เลข 5 หมายถึง ท่านมีความเชื่อหรือความรู้สึกด้านบวกในระดับมาก ตามข้อความด้านขวามือแต่ละข้อ

APPENDIX D

ชุดที่ 1: แบบสอบถามเกี่ยวกับปัจจัยด้านความเชื่อที่มีผลต่อการทำกิจกรรมทางกายของหญิงมีครรภ์

ชุดย่อยที่ 1.1 แบบสอบถามความเชื่อของหญิงมีครรภ์เกี่ยวกับผลของการทำกิจกรรมทางกาย

<u>คำชี้แจง</u> ข้อความต่อไปนี้ แสดงถึงความเชื่อของท่านเกี่ยวกับผลที่เกิดขึ้นหรืออาจเกิดขึ้นจากการทำกิจกรรมทางกายในช่วงตั้งครรภ์ 4-7 เดือน ส่วนทางด้านขวาของแต่ละข้อความเป็นตัวเลือกเกี่ยวกับความเชื่อของท่านที่ตรงกับข้อความทางซ้ายมือตั้งแต่ "ไม่น่าเป็นไปได้อย่างยิ่ง" จนถึง "เป็นไปได้มากที่สุด"
โปรดกาเครื่องหมาย ✓ ลงในช่องทางด้านขวาที่ตรงกับ<u>ความเชื่อ</u>ของท่านมากที่สุด โดยประเมินจาก "ไม่น่าเป็นไปได้อย่างยิ่ง" จนถึง "เป็นไปได้มากที่สุด" เพียงช่องเดียว

<u>ฉันเชื่อว่า</u>การทำกิจกรรมทางกายในขณะตั้งครรภ์มีผลทำให้.....	ความเป็นไปได้หรือไม่ได้				
	ไม่น่าเป็นไปได้อย่างยิ่ง	ไม่น่าเป็นไปได้	ไม่แน่ใจ	เป็นไปได้	เป็นไปได้มากที่สุด
1. ฉันมีสุขภาพแข็งแรง					
2. ฉันคลอดง่าย					
3. กล้ามเนื้อต่างๆ ของฉันมีความแข็งแรง					
4. ฉันคล่องแคล่ว กระฉับกระเฉงขึ้น					
5. ฉันมีอาการปวดหลังลดลง					
6. น้ำหนักของฉันไม่เพิ่มมากเกินไปในช่วงตั้งครรภ์					
7. ฉันนอนหลับง่าย					
8. เลือดลมของฉันไหลเวียนดี					
9. การย่อยอาหารและการขับถ่ายของฉันเป็นปกติ					
10. ฉันมีสุขภาพจิตดี					
11. ฉันรู้สึกสดชื่นผ่อนคลาย					
12. ลูกในท้องของฉันมีสุขภาพแข็งแรง					

ชุดย่อยที่ 1.2 แบบสอบถามการประเมินผลลัพธ์จากการทำกิจกรรมทางกายของหญิงมีครรภ์

<u>คำชี้แจง</u> ข้อความต่อไปนี้ แสดงถึงการประเมินผลที่เกิดขึ้นหรืออาจเกิดขึ้นจากการทำกิจกรรมทางกายในช่วงตั้งครรภ์ 4-7 เดือน ส่วนทางด้านขวาของแต่ละข้อความเป็นตัวเลือกให้ท่านประเมิน<u>ระดับความสำคัญ</u>ของผลที่เกิดขึ้นหรืออาจเกิดขึ้น ที่ตรงกับข้อความทางซ้ายมือตั้งแต่ระดับ "ไม่สำคัญอย่างยิ่ง" จนถึง "สำคัญมากที่สุด" โปรดกาเครื่องหมาย ✓ลงในช่องที่ตรงกับ<u>ความเชื่อหรือความคิดเห็น</u>ของท่านมากที่สุด โดยประเมินจากระดับ "ไม่สำคัญอย่างยิ่ง" จนถึง "สำคัญมากที่สุด" เพียงช่องเดียว

ฉันคิดว่า.....	ระดับความสำคัญของผลที่เกิดขึ้นหรืออาจเกิดขึ้น				
	ไม่สำคัญอย่างยิ่ง	ไม่ค่อยสำคัญ	ไม่แน่ใจ	สำคัญมาก	สำคัญมากที่สุด
1. การมีสุขภาพแข็งแรงจากการทำกิจกรรมทางกาย เป็นสิ่งที่.....					
2. การคลอดง่ายจากการทำกิจกรรมทางกาย เป็นสิ่งที่.....					
3. การที่กล้ามเนื้อต่างๆ มีความแข็งแรงจากการทำกิจกรรมทางกาย เป็นสิ่งที่.....					
4. การมีความคล่องแคล่ว กระฉับกระเฉงขึ้นจากการทำกิจกรรมทางกาย เป็นสิ่งที่.....					
5. การมีอาการปวดหลังลดลงจากการทำกิจกรรมทางกาย เป็นสิ่งที่.....					
6. การที่น้ำหนักของฉันไม่เพิ่มมากเกินไปในช่วงตั้งครรภ์จากการทำกิจกรรมทางกาย เป็นสิ่งที่.....					
7. การนอนหลับง่ายจากการทำกิจกรรมทางกาย เป็นสิ่งที่.....					
8. การมีเลือดลมไหลเวียนดีจากการทำกิจกรรมทางกาย เป็นสิ่งที่.....					
9. การย่อยอาหารและการขับถ่ายปกติจากการทำกิจกรรมทางกาย เป็นสิ่งที่.....					
10. การมีสุขภาพจิตดีจากการทำกิจกรรมทางกาย เป็นสิ่งที่.....					
11. ความรู้สึกสดชื่นผ่อนคลายจากการทำกิจกรรมทางกาย เป็นสิ่งที่.....					
12. การที่ลูกในท้องมีสุขภาพแข็งแรงจากการทำกิจกรรมทางกาย เป็นสิ่งที่.....					

ชุดย่อยที่ 1.3 แบบสอบถามความเชื่อของหญิงมีครรภ์เกี่ยวกับความคิดเห็นของบุคคลที่มีความสำคัญต่อการทำกิจกรรมทางกาย

คำชี้แจง ข้อความต่อไปนี้เป็นความคิดเห็นของบุคคลที่มีความสำคัญต่อท่านว่า ท่านควรทำกิจกรรมทางกายในช่วงตั้งครรภ์ 4-7 เดือน ส่วนทางด้านขวาของแต่ละข้อความเป็นตัวเลือกเกี่ยวกับความเชื่อของท่านที่ตรงกับข้อความทางซ้ายมือว่าความคิดเห็นของบุคคลเหล่านี้เป็นความจริงหรือไม่อย่างไร ตั้งแต่ "ไม่เป็นจริงเลย" จนถึง "เป็นจริงมากที่สุด"

โปรดกาเครื่องหมาย ✓ ลงในช่องทางด้านขวาที่ตรงกับความเชื่อของท่านมากที่สุด โดยประเมินจาก "ไม่เป็นจริงเลย" จนถึง "เป็นจริงมากที่สุด" เพียงช่องเดียว

ความคิดเห็นของบุคคลที่สำคัญเกี่ยวกับการทำกิจกรรมทางกายในช่วงตั้งครรภ์	ความเชื่อของท่าน				
	ไม่เป็นจริงเลย	ไม่ค่อยจริง	ไม่แน่ใจ	เป็นจริงมาก	เป็นจริงมากที่สุด
1. สามีของฉันคิดว่า ฉันควรจะทำกิจกรรมทางกายในช่วงตั้งครรภ์					
2. แม่ของฉันคิดว่า ฉันควรจะทำกิจกรรมทางกายในช่วงตั้งครรภ์					
3. พ่อของฉันคิดว่า ฉันควรจะทำกิจกรรมทางกายในช่วงตั้งครรภ์					
4. ญาติๆ ของฉัน (เช่น พี่น้อง ปู่ย่า ตายาย ลุง ป้า น้าอา) คิดว่า ฉันควรจะทำกิจกรรมทางกายในช่วงตั้งครรภ์					
5. เพื่อนของฉันคิดว่า ฉันควรจะทำกิจกรรมทางกายในช่วงตั้งครรภ์					
6. แพทย์หรือพยาบาล คิดว่าฉันควรจะทำกิจกรรมทางกายในช่วงตั้งครรภ์					

ชุดย่อยที่ 1.4 แบบสอบถามแรงจูงใจของหญิงมีครรภ์ที่จะปฏิบัติตามความต้องการของบุคคลที่มีความสำคัญเกี่ยวกับการทำกิจกรรมทางกาย

<u>คำชี้แจง</u> ข้อความต่อไปนี้เป็นความคิดเห็นของบุคคลที่มีความสำคัญต่อท่านเกี่ยวกับความต้องการให้ท่านทำกิจกรรมทางกายในช่วงตั้งครรภ์ 4-7 เดือน ส่วนทางด้านขวาของแต่ละข้อความเป็นตัวเลือกที่ตรงกับข้อความทางซ้ายมือว่า ท่านอยากทำตามความต้องการของบุคคลเหล่านี้เพียงไร ตั้งแต่ "น้อยที่สุด" จนถึง "มากที่สุด" โปรดกาเครื่องหมาย ✓ ลงในช่องทางด้านขวาที่ตรงกับความต้องการของท่านที่จะทำตามความคิดเห็นของบุคคลเหล่านี้ มากที่สุดเพียงช่องเดียว โดยประเมินจาก "น้อยที่สุด" จนถึง "มากที่สุด"

ความคิดเห็นของบุคคลที่มีความสำคัญ	ท่านอยากทำตามความต้องการนี้.....				
	น้อยที่สุด	น้อย	ไม่แน่ใจ	มาก	มากที่สุด
1. ถ้า<u>สามี</u>ของฉันต้องการให้ฉันทำกิจกรรมทางกาย ฉันอยากทำตาม.....					
2. ถ้า<u>แม่</u>ของฉันต้องการให้ฉันทำกิจกรรมทางกาย ฉันอยากทำตาม.....					
3. ถ้า<u>พ่อ</u>ของฉันต้องการให้ฉันทำกิจกรรมทางกาย ฉันอยากทำตาม.....					
4. ถ้า<u>ญาติๆ</u> ของฉัน (เช่น พี่น้อง ปู่ย่า ตายาย ลุง ป้า น้าอา) ต้องการให้ฉันทำกิจกรรมทางกาย ฉันอยากทำตาม.....					
5. ถ้า<u>เพื่อน</u>ของฉัน ต้องการให้ฉันทำกิจกรรมทางกาย ฉันอยากทำตาม.....					
6. ถ้า<u>แพทย์หรือพยาบาล</u> ต้องการให้ฉันทำกิจกรรมทางกาย ฉันอยากทำตาม.....					

ชุดย่อยที่ 1.5 แบบสอบถามความเชื่อของหญิงมีครรภ์เกี่ยวกับการควบคุมตนเองให้ทำกิจกรรมทางกาย

<u>คำชี้แจง</u> ข้อความต่อไปนี้เป็นสถานการณ์ที่ผลักดันหรือยับยั้งให้ท่านทำกิจกรรมทางกายในช่วงตั้งครรภ์ 4-7 เดือน ส่วนทางด้านขวาของแต่ละข้อความเป็นตัวเลือกเกี่ยวกับ<u>ความเชื่อ</u>ของท่านที่จะควบคุมตนเองให้ทำกิจกรรมทางกายที่ตรงกับข้อความทางซ้ายมือ ตั้งแต่ "ยากมาก" จนถึง "ง่ายมาก"
โปรดกาเครื่องหมาย ✓ ลงในช่องทางด้านขวาที่ตรงกับ<u>ความเชื่อ</u>ของท่านมากที่สุดเพียงช่องเดียวโดยประเมินจาก "ยากมาก" จนถึง "ง่ายมาก"

สถานการณ์ผลักดันหรือยับยั้งให้ทำกิจกรรมทางกาย	ความยาก-ง่ายที่จะทำกิจกรรมทางกาย ตามความเชื่อของท่าน				
	ยากมาก	ยาก	ไม่แน่ใจ	ง่าย	ง่ายมาก
1. การฟังคำแนะนำจากสื่อต่างๆ เรื่องการออกกำลังกาย มีผลให้ฉันทำกิจกรรมทางกายได้.....					
2. ความชอบที่จะออกกำลังกายหรือบริหารร่างกาย มีผลให้ฉันทำกิจกรรมทางกายได้.....					
3. ขนาดท้องที่โตขึ้น มีผลให้ฉันทำกิจกรรมทางกายได้.....					
4. อาการปวดหลัง มีผลให้ฉันทำกิจกรรมทางกายได้.....					
5. การมีเวลา มีผลให้ฉันทำกิจกรรมทางกายได้.....					
6. ความเหน็ดเหนื่อยจากงาน มีผลให้ฉันทำกิจกรรมทางกายได้.....					
7. การที่มั่นใจในความสามารถของตนเอง มีผลให้ฉันทำกิจกรรมทางกายได้.....					
8. เมื่อเกิดความกลัวต่างๆ เช่น กลัวไม่สบาย กลัวแท้ง กลัวคลอดก่อนกำหนดหรือกลัวอุบัติเหตุ มีผลให้ฉันทำกิจกรรมทางกายได้.....					
9. เมื่อเกิดความกังวลว่าจะมีเวลาพักผ่อนไม่พอ มีผลให้ฉันทำกิจกรรมทางกายได้.....					
10. เมื่อเกิดความรู้สึกเครียดขึ้น มีผลให้ฉันทำกิจกรรมทางกายได้.....					
11. การมีสถานที่สำหรับออกกำลังกาย มีผลให้ฉันทำกิจกรรมทางกายได้.....					

สถานการณ์ผลักดันหรือยับยั้งให้ทำกิจกรรมทางกาย	ความยาก-ง่ายที่จะทำกิจกรรมทางกาย ตามความเชื่อของท่าน				
	ยากมาก	ยาก	ไม่แน่ใจ	ง่าย	ง่ายมาก
12. การเดินทางไปยังสถานที่สำหรับออกกำลังกายได้สะดวกมีผลให้ฉันทำกิจกรรมทางกายได้.....					
13. สภาพอากาศที่ไม่ดี เช่น อากาศหนาว แดดร้อน ฝนตก ควันบุหรี่หรือควันรถยนต์ มีผลให้ฉันทำกิจกรรมทางกายได้.....					
14. การที่ฉัน**ไม่**มีเพื่อนไปออกกำลังกายด้วย มีผลให้ฉันมีการออกกำลังกายได้.....					
15. การคิดถึงสุขภาพของลูกในท้อง มีผลให้ฉันทำกิจกรรมทางกายได้.....					

ชุดย่อยที่ 1.6 แบบสอบถามการรับรู้พลังอำนาจของหญิงมีครรภ์เกี่ยวกับการทำกิจกรรมทางกาย

คำชี้แจง ข้อความต่อไปนี้เป็นการรับรู้โอกาสเกิดสถานการณ์ที่จะผลักดันหรือยับยั้งให้ท่านทำกิจกรรมทางกายในช่วงตั้งครรภ์ 4-7 เดือน ส่วนทางด้านขวาของแต่ละข้อความเป็นตัวเลือกเกี่ยวกับการรับรู้ความสามารถในการทำกิจกรรมทางกายโดยการประเมินจากความเป็นไปได้ที่จะกระทำ ที่ตรงกับข้อความทางซ้ายมือ ตั้งแต่ "ไม่น่าเป็นไปได้อย่างยิ่ง" จนถึง "เป็นไปได้มากที่สุด"

โปรดกาเครื่องหมาย ✓ ลงในช่องทางด้านขวาที่ตรงกับการรับรู้ของท่านมากที่สุดเพียงช่องเดียว โดยประเมินจาก "ไม่น่าเป็นไปได้อย่างยิ่ง" จนถึง "เป็นไปได้มากที่สุด"

โอกาสเกิดสถานการณ์	การรับรู้ความเป็นไปได้ที่จะทำกิจกรรมทางกายของท่าน				
	ไม่น่าเป็นไปได้อย่างยิ่ง	ไม่น่าเป็นไปได้	ไม่แน่ใจ	เป็นไปได้	เป็นไปได้มากที่สุด
1. โอกาสที่ฉันได้ฟังคำแนะนำจากสื่อต่างๆ เรื่องการออกกำลังกาย จะทำให้ฉันทำกิจกรรมทางกาย					
2. โอกาสที่ฉันชอบออกกำลังกายหรือบริหารร่างกายจะทำให้ฉันทำกิจกรรมทางกาย					
3. โอกาสที่ท้องของฉันโตขึ้น จะทำให้ฉัน**ไม่**ทำกิจกรรมทางกาย					

โอกาสเกิดสถานการณ์	การรับรู้ความเป็นไปได้ที่จะทำกิจกรรมทางกายของท่าน				
	ไม่น่าเป็นไปได้อย่างยิ่ง	ไม่น่าเป็นไปได้	ไม่แน่ใจ	เป็นไปได้	เป็นไปได้มากที่สุด
4. โอกาสที่ฉันมีอาการปวดหลัง จะทำให้ฉัน**ไม่**ทำกิจกรรมทางกาย					
5. โอกาสที่ฉันมีเวลา จะทำให้ฉันทำกิจกรรมทางกาย					
6. โอกาสที่ฉันมีความเหน็ดเหนื่อยจากงาน จะทำให้ฉัน**ไม่**ทำกิจกรรมทางกาย					
7. โอกาสที่ฉันมั่นใจในความสามารถของตนเอง จะทำให้ฉันทำกิจกรรมทางกาย					
8. โอกาสที่ฉันมีความกลัวเกิดขึ้น เช่น กลัวไม่สบาย กลัวแท้ง กลัวคลอดก่อนกำหนด กลัวอุบัติเหตุ จะทำให้ฉัน**ไม่**ทำกิจกรรมทางกาย					
9. โอกาสที่ฉันกังวลว่าจะมีเวลาพักผ่อนไม่พอ จะทำให้ฉัน**ไม่**ทำกิจกรรมทางกาย					
10. โอกาสที่ฉันรู้สึกเครียด จะทำให้ฉัน**ไม่**ทำกิจกรรมทางกาย					
11. โอกาสที่มีสถานที่สำหรับออกกำลังกาย จะทำให้ฉันทำกิจกรรมทางกาย					
12. โอกาสที่ฉันเดินทางไปยังสถานที่สำหรับออกกำลังกายได้สะดวก จะทำให้ฉันทำกิจกรรมทางกาย					
13. โอกาสที่มีสภาพอากาศ**ไม่**ดี เช่น อากาศหนาว แดดร้อน ฝนตก ควันรถยนต์หรือควันบุหรี่ จะทำให้ฉัน**ไม่**ทำกิจกรรมทางกาย					
14. โอกาสที่ฉัน**ไม่**มีเพื่อนไปออกกำลังกายด้วย จะทำให้ฉัน**ไม่**ไปออกกำลังกาย					
15. โอกาสที่ฉันคิดถึงสุขภาพของลูกในท้อง จะทำให้ฉันทำกิจกรรมทางกาย					

ชุดที่ 2: แบบสอบถามเกี่ยวกับปัจจัยด้านทัศนคติ บรรทัดฐานของบุคคลสำคัญ และการรับรู้ความสามารถในการควบคุมตนเองที่มีผลต่อ การทำกิจกรรมทางกายของหญิงมีครรภ์

ชุดย่อยที่ 2.1 แบบสอบถามทัศนคติของหญิงมีครรภ์เกี่ยวกับการทำกิจกรรมทางกาย

<u>คำชี้แจง</u> ข้อความต่อไปนี้แสดงถึงความเชื่อหรือความรู้สึกของท่านเกี่ยวกับการทำกิจกรรมทางกาย ในช่วงตั้งครรภ์ 4-7 เดือน
โปรดวงกลมรอบตัวเลข ที่ตรงกับความเชื่อหรือความรู้สึกตามความเป็นจริงของท่านมากที่สุด

ตัวอย่าง.....
1. การรับประทานอาหารที่มีประโยชน์เป็นสิ่งที่.....

ไม่ดี	1	2	3	4	5	**ดี**
	ไม่ดีอย่างมาก	ไม่ดี	ไม่แน่ใจ	ดี	ดีมาก	

1) การทำกิจกรรมทางกายในช่วงตั้งครรภ์ 4-7 เดือน ทำให้ฉันรู้สึก……..

ไม่ชอบ	1	2	3	4	5	**ชอบ**
	ไม่ชอบอย่างมาก	ไม่ค่อยชอบ	ไม่แน่ใจ	ชอบ	ชอบมาก	

2) การทำกิจกรรมทางกายในช่วงตั้งครรภ์ 4-7 เดือน ทำให้ฉันรู้สึกว่า.....

เป็นอันตราย	1	2	3	4	5	**มีประโยชน์**
	เป็นอันตรายมาก	เป็นอันตราย	ไม่แน่ใจ	มี	มีประโยชน์	

3) ฉันรู้สึกว่าการทำกิจกรรมทางกายในช่วงตั้งครรภ์ 4-7 เดือน เป็นสิ่งที่.....

ไม่ดี	1	2	3	4	5	**ดี**
	ไม่ดีอย่างมาก	ไม่ดี	ไม่แน่ใจ	ดี	ดีมาก	

4) ฉันรู้สึกว่าการทำกิจกรรมทางกายในช่วงตั้งครรภ์ 4-7 เดือน ทำให้.....

สุขภาพไม่ดี	1	2	3	4	5	**สุขภาพดี**
	สุขภาพไม่ดีเลย	สุขภาพไม่ค่อยดี	ไม่แน่ใจ	สุขภาพดี	สุขภาพดีมาก	

5) การทำกิจกรรมทางกายในช่วงตั้งครรภ์ 4-7 เดือน ทำให้ฉันรู้สึก.....

เครียด	1	2	3	4	5	**ผ่อนคลาย**
	เครียดมาก	เครียด	ไม่แน่ใจ	ผ่อนคลาย	ผ่อนคลายมาก	

6) การทำกิจกรรมทางกายในช่วงตั้งครรภ์ 4-7 เดือน ทำให้ฉันรู้สึก.....

ไม่สนุก	1	2	3	4	5	**สนุก**
	ไม่สนุกเลย	ไม่สนุก	ไม่แน่ใจ	สนุก	สนุกมาก	

7) การทำกิจกรรมทางกายในช่วงตั้งครรภ์ 4-7 เดือน ทำให้ฉันรู้สึก.....

ไม่มี	1	2	3	4	5	**ภาคภูมิใจ**
คุณค่า	ไม่มีคุณค่าเลย	ไม่มีคุณค่า	ไม่แน่ใจ	ภาคภูมิใจ	ภาคภูมิใจมาก	

8) การทำกิจกรรมทางกายในช่วงตั้งครรภ์ 4-7 เดือน ทำให้ฉันรู้สึกว่า.....

อึดอาด	1	2	3	4	5	**กระฉับ**
	อึดอาดมาก	อึดอาด	ไม่แน่ใจ	กระฉับกระเฉง	กระฉับกระเฉงมาก	**กระเฉง**

9) การทำกิจกรรมทางกายในช่วงตั้งครรภ์ 4-7 เดือน ทำให้ฉันรู้สึกว่า.....

ไม่น่าดู	1	2	3	4	5	**น่าชื่นชม**
	ไม่น่าดูอย่างมาก	ไม่น่าดู	ไม่แน่ใจ	น่าชื่นชม	น่าชื่นชมอย่างมาก	

ชุดย่อยที่ 2.2 แบบสอบถามบรรทัดฐานของบุคคลสำคัญเกี่ยวกับการทำกิจกรรมทางกายของหญิงมีครรภ์

<u>คำชี้แจง</u> ข้อความต่อไปนี้เป็นการถามความเชื่อหรือความคิดเห็นของท่านต่อความคิดเห็นของบุคคลที่มีความสำคัญของท่าน เกี่ยวกับการทำกิจกรรมทางกายในช่วงตั้งครรภ์ 4-7 เดือน
โปรด วงกลม รอบตัวเลขที่ตรงกับความเชื่อหรือความคิดเห็นตามความเป็นจริงของท่านมากที่สุด

1) บุคคล**<u>ภายใน</u>**ครอบครัว (เช่น สามี พ่อแม่ พี่น้อง ปู่ย่า ตายาย ลุงป้า น้าอา เป็นต้น) ที่มีความสำคัญต่อฉันคิดว่าฉันควรทำกิจกรรมทางกายในช่วงตั้งครรภ์ 4-7 เดือน

1	2	3	4	5
ไม่เห็นด้วยอย่างยิ่ง	ไม่เห็นด้วย	ไม่แน่ใจ	เห็นด้วย	เห็นด้วยอย่างยิ่ง

2) บุคคล**<u>ภายนอก</u>**ครอบครัว (เช่น เพื่อน ผู้ร่วมงาน แพทย์ พยาบาล เป็นต้น) ที่มีความสำคัญต่อฉันคิดว่าฉันควรทำกิจกรรมทางกายในช่วงตั้งครรภ์ 4-7 เดือน

1	2	3	4	5
ไม่เห็นด้วยอย่างยิ่ง	ไม่เห็นด้วย	ไม่แน่ใจ	เห็นด้วย	เห็นด้วยอย่างยิ่ง

3) บุคคล**<u>ภายใน</u>**ครอบครัว (เช่น สามี พ่อแม่ พี่น้อง ปู่ย่า ตายาย ลุงป้า น้าอา เป็นต้น) ที่มีความสำคัญต่อฉันมีส่วนสนับสนุนส่งเสริมให้ฉันทำกิจกรรมทางกายในช่วงตั้งครรภ์ 4-7 เดือน

1	2	3	4	5
ไม่เห็นด้วยอย่างยิ่ง	ไม่เห็นด้วย	ไม่แน่ใจ	เห็นด้วย	เห็นด้วยอย่างยิ่ง

4) บุคคล**<u>ภายนอก</u>**ครอบครัว (เช่น เพื่อน ผู้ร่วมงาน แพทย์ พยาบาล เป็นต้น) ที่มีความสำคัญต่อฉันมีส่วนสนับสนุนส่งเสริมให้ฉันทำกิจกรรมทางกายในช่วงตั้งครรภ์ 4-7 เดือน

1	2	3	4	5
ไม่เห็นด้วยอย่างยิ่ง	ไม่เห็นด้วย	ไม่แน่ใจ	เห็นด้วย	เห็นด้วยอย่างยิ่ง

ชุดย่อยที่ 2.3 แบบสอบถามการรับรู้ความสามารถของหญิงมีครรภ์ในการควบคุมตนเองให้ทำกิจกรรมทางกาย

<u>คำชี้แจง</u> ข้อความต่อไปนี้เป็นการถามความเชื่อหรือความคิดเห็นของท่านเกี่ยวกับการรับรู้ความสามารถของท่านในการควบคุมตนเองให้ทำกิจกรรมทางกายในช่วงตั้งครรภ์ 4-7 เดือน
โปรดวงกลมรอบตัวเลขที่ตรงกับความเชื่อหรือความคิดเห็นตามความเป็นจริงของท่านมากที่สุด

1) การทำกิจกรรมทางกายในช่วงตั้งครรภ์ 4-7 เดือน เป็นสิ่งที่ฉันกระทำได้.....

1	2	3	4	5
ยากมาก	ยาก	ไม่แน่ใจ	ง่าย	ง่ายมาก

2) ถ้าฉัน<u>ต้องการ</u>ที่จะทำกิจกรรมทางกายในช่วงตั้งครรภ์ 4-7 เดือน ฉันก็สามารถกระทำได้<u>ง่าย</u>

1	2	3	4	5
ไม่เห็นด้วยอย่างยิ่ง	ไม่เห็นด้วย	ไม่แน่ใจ	เห็นด้วย	เห็นด้วยอย่างยิ่ง

3) การทำกิจกรรมทางกายในช่วงตั้งครรภ์ 4-7 เดือน ขึ้นอยู่กับตัวฉันเอง

1	2	3	4	5
ไม่เห็นด้วยอย่างยิ่ง	ไม่เห็นด้วย	ไม่แน่ใจ	เห็นด้วย	เห็นด้วยอย่างยิ่ง

ชุดที่ 3: แบบสอบถามเกี่ยวกับความตั้งใจที่จะทำกิจกรรมทางกายของหญิงมีครรภ์

<u>คำชี้แจง</u> ข้อความต่อไปนี้แสดงถึง<u>ความตั้งใจ</u>ของท่านที่จะทำกิจกรรมทางกายในช่วง 1 เดือนข้างหน้า โปรดวงกลมรอบตัวเลขที่ตรงกับความเป็นจริงของท่านมากที่สุดเพียงตัวเลขเดียว

ตัวอย่าง.....

1. ฉันตั้งใจที่จะรับประทานอาหารที่มีประโยชน์

1	2	3	4	5
ไม่ได้ตั้งใจเลย	ไม่ได้ตั้งใจ	ไม่แน่ใจ	ตั้งใจมาก	ตั้งใจมากที่สุด

1. ฉัน<u>ตั้งใจ</u>ที่จะทำกิจกรรมทางกายในขณะดูแลบ้านและคนในบ้าน ในช่วง 1 เดือนข้างหน้า

1	2	3	4	5
ไม่ได้ตั้งใจเลย	ไม่ได้ตั้งใจ	ไม่แน่ใจ	ตั้งใจมาก	ตั้งใจมากที่สุด

2. ฉัน<u>พยายาม</u>ที่จะทำกิจกรรมทางกายในขณะดูแลบ้านและคนในบ้าน ในช่วง 1 เดือนข้างหน้า

1	2	3	4	5
ไม่เป็นจริงเลย	ไม่ค่อยเป็นจริง	ไม่แน่ใจ	เป็นจริงมาก	เป็นจริงมากที่สุด

3. ฉัน<u>ตั้งใจ</u>ที่จะเดินไปทำงานหรือทำธุระในสถานที่ที่ไม่ไกลมาก ในช่วง 1 เดือนข้างหน้า

1	2	3	4	5
ไม่ได้ตั้งใจเลย	ไม่ได้ตั้งใจ	ไม่แน่ใจ	ตั้งใจมาก	ตั้งใจมากที่สุด

4. ฉัน<u>พยายาม</u>ที่จะเดินไปทำงานหรือทำธุระในสถานที่ที่ไม่ไกลมาก ในช่วง 1 เดือนข้างหน้า

1	2	3	4	5
ไม่เป็นจริงเลย	ไม่ค่อยเป็นจริง	ไม่แน่ใจ	เป็นจริงมาก	เป็นจริงมากที่สุด

5. ฉัน<u>ตั้งใจ</u>ที่จะออกกำลังกายหรือบริหารร่างกาย ในช่วง 1 เดือนข้างหน้า

1	2	3	4	5
ไม่ได้ตั้งใจเลย	ไม่ได้ตั้งใจ	ไม่แน่ใจ	ตั้งใจมาก	ตั้งใจมากที่สุด

6. ฉัน<u>พยายาม</u>ที่จะออกกำลังกายหรือบริหารร่างกาย ในช่วง 1 เดือนข้างหน้า

1	2	3	4	5
ไม่เป็นจริงเลย	ไม่ค่อยเป็นจริง	ไม่แน่ใจ	เป็นจริงมาก	เป็นจริงมากที่สุด

<u>คำชี้แจง</u> สำหรับท่านที่ทำงาน กรุณาตอบคำถามข้อ 7-8 <u>หาก</u>ท่านเป็นแม่บ้าน ไม่ได้ทำงานหารายได้ <u>ไม่</u>ต้องตอบคำถามข้อ 7-8 นี้

7. ฉัน<u>ตั้งใจ</u>ที่จะทำกิจกรรมทางกายในขณะทำงาน เช่น เดินไป-มา เดินขึ้นบันได ถือหรือหิ้วของ ในช่วง 1 เดือนข้างหน้า

1	2	3	4	5
ไม่ได้ตั้งใจเลย	ไม่ได้ตั้งใจ	ไม่แน่ใจ	ตั้งใจมาก	ตั้งใจมากที่สุด

8. ฉัน<u>พยายาม</u>ที่จะทำกิจกรรมทางกายในขณะทำงาน เช่น เดินไป-มา เดินขึ้นหรือลงบันได ถือหรือหิ้วของในช่วง 1 เดือนข้างหน้า

1	2	3	4	5
ไม่เป็นจริงเลย	ไม่ค่อยเป็นจริง	ไม่แน่ใจ	เป็นจริงมาก	เป็นจริงมากที่สุด

ขอขอบคุณในความร่วมมือของท่าน

APPENDIX E

ชุดที่ 4: แบบสอบถามการทำกิจกรรมทางกายของหญิงมีครรภ์

<u>คำชี้แจง</u> กรุณาตอบคำถามเกี่ยวกับ<u>เวลา</u>ที่ใช้ในการทำกิจกรรมทางกายในด้านต่างๆ ได้แก่ การดูแลบ้านและคนในบ้าน การเดินทางไปยังสถานที่ใกล้เคียง การทำงานอาชีพ และการออกกำลังกาย/บริหารร่างกาย ในช่วง 1 เดือน ที่ผ่านมา

โปรดกาเครื่องหมาย ✓ ในช่อง ☐ ที่ตรงกับความเป็นจริงของท่านมากที่สุดเพียงคำตอบเดียว คำตอบของท่านไม่มีผิดหรือถูกใดๆ ทั้งสิ้น

ก. <u>ด้านงานบ้าน การดูแลเด็กและผู้สูงอายุ</u>

1. การจัดเตรียมอาหาร (ทำอาหาร, จัดโต๊ะอาหาร, ล้างจาน)
   - ☐ ไม่ได้ทำ เพราะว่า.....
   - ☐ น้อยกว่า 30 นาที ต่อวัน
   - ☐ 30 – 59 นาที ต่อวัน
   - ☐ 1 ชั่วโมง – 1 ชั่วโมง 59 นาที ต่อวัน
   - ☐ 2 ชั่วโมง – 2 ชั่วโมง 59 นาที ต่อวัน
   - ☐ 3 ชั่วโมงขึ้นไป ต่อวัน
2. แต่งตัว อาบน้ำ และป้อนอาหารให้ลูกหรือเด็กเล็ก (เช่น หลาน) ในขณะที่ท่านกำลัง<u>นั่ง</u>
   - ☐ ไม่ได้ทำ เพราะว่า.....
   - ☐ น้อยกว่า 30 นาที ต่อวัน
   - ☐ 30 – 59 นาที ต่อวัน
   - ☐ 1 ชั่วโมง – 1 ชั่วโมง 59 นาที ต่อวัน
   - ☐ 2 ชั่วโมง – 2 ชั่วโมง 59 นาที ต่อวัน
   - ☐ 3 ชั่วโมงขึ้นไป ต่อวัน

3. แต่งตัว อาบน้ำ และป้อนอาหารให้ลูกหรือเด็กเล็ก (เช่น หลาน) ในขณะที่ท่านกำลังยืน

- ☐ ไม่ได้ทำ เพราะว่า.....
- ☐ น้อยกว่า 30 นาที ต่อวัน
- ☐ 30 – 59 นาที ต่อวัน
- ☐ 1 ชั่วโมง – 1 ชั่วโมง 59 นาที ต่อวัน
- ☐ 2 ชั่วโมง – 2 ชั่วโมง 59 นาที ต่อวัน
- ☐ 3 ชั่วโมงขึ้นไป ต่อวัน

4. เล่นกับลูกหรือหลานในขณะที่ท่านกำลังนั่งหรือยืน

- ☐ ไม่ได้ทำ เพราะว่า.....
- ☐ น้อยกว่า 30 นาที ต่อวัน
- ☐ 30 – 59 นาที ต่อวัน
- ☐ 1 ชั่วโมง – 1 ชั่วโมง 59 นาที ต่อวัน
- ☐ 2 ชั่วโมง – 2 ชั่วโมง 59 นาที ต่อวัน
- ☐ 3 ชั่วโมงขึ้นไป ต่อวัน

5. เล่นกับลูกหรือหลานในขณะที่ท่านกำลังเดินหรือวิ่ง

- ☐ ไม่ได้ทำ เพราะว่า.....
- ☐ น้อยกว่า 30 นาที ต่อวัน
- ☐ 30 – 59 นาที ต่อวัน
- ☐ 1 ชั่วโมง – 1 ชั่วโมง 59 นาที ต่อวัน
- ☐ 2 ชั่วโมง – 2 ชั่วโมง 59 นาที ต่อวัน
- ☐ 3 ชั่วโมงขึ้นไป ต่อวัน

6. การอุ้มลูกหรือเด็กเล็ก (เช่น หลาน)

- ☐ ไม่ได้ทำ เพราะว่า.....
- ☐ น้อยกว่า 30 นาที ต่อวัน
- ☐ 30 – 59 นาที ต่อวัน
- ☐ 1 ชั่วโมง – 1 ชั่วโมง 59 นาที ต่อวัน
- ☐ 2 ชั่วโมง – 2 ชั่วโมง 59 นาที ต่อวัน
- ☐ 3 ชั่วโมงขึ้นไป ต่อวัน

7. การดูแลผู้สูงอายุ

- ☐ ไม่ได้ทำ เพราะว่า.....
- ☐ น้อยกว่า 30 นาที ต่อวัน
- ☐ 30 – 59 นาที ต่อวัน
- ☐ 1 ชั่วโมง – 1 ชั่วโมง 59 นาที ต่อวัน
- ☐ 2 ชั่วโมง – 2 ชั่วโมง 59 นาที ต่อวัน
- ☐ 3 ชั่วโมงขึ้นไป ต่อวัน

8. การนั่งพิมพ์คอมพิวเตอร์ หรือเขียนหนังสือ นอกเวลาทำงาน

- ☐ ไม่ได้ทำ เพราะว่า.....
- ☐ น้อยกว่า 30 นาที ต่อวัน
- ☐ 30 – 59 นาที ต่อวัน
- ☐ 1 ชั่วโมง – 1 ชั่วโมง 59 นาที ต่อวัน
- ☐ 2 ชั่วโมง – 2 ชั่วโมง 59 นาที ต่อวัน
- ☐ 3 ชั่วโมงขึ้นไป ต่อวัน

9. การนั่งดูโทรทัศน์ หรือวิดีโอ

- ☐ ไม่ได้ทำ เพราะว่า.....
- ☐ น้อยกว่า 30 นาที ต่อวัน
- ☐ 30 นาที – 1 ชั่วโมง 59 นาที ต่อวัน
- ☐ 2 ชั่วโมง – 3 ชั่วโมง 59 นาที ต่อวัน
- ☐ 4 ชั่วโมง – 5 ชั่วโมง 59 นาที ต่อวัน
- ☐ 6 ชั่วโมงขึ้นไป ต่อวัน

10. การนั่งอ่านหนังสือ พูดคุยสนทนา หรือพูดคุยทางโทรศัพท์ นอกเวลาทำงาน

- ☐ ไม่ได้ทำ เพราะว่า.....
- ☐ น้อยกว่า 30 นาที ต่อวัน
- ☐ 30 นาที – 1 ชั่วโมง 59 นาที ต่อวัน
- ☐ 2 ชั่วโมง – 3 ชั่วโมง 59 นาที ต่อวัน
- ☐ 4 ชั่วโมง – 5 ชั่วโมง 59 นาที ต่อวัน
- ☐ 6 ชั่วโมงขึ้นไป ต่อวัน

11. การเล่นกับสัตว์เลี้ยง เช่น สุนัข

- ☐ ไม่ได้ทำ เพราะว่า.....
- ☐ น้อยกว่า 30 นาที ต่อวัน
- ☐ 30 – 59 นาที ต่อวัน
- ☐ 1 ชั่วโมง – 1 ชั่วโมง 59 นาที ต่อวัน
- ☐ 2 ชั่วโมง – 2 ชั่วโมง 59 นาที ต่อวัน
- ☐ 3 ชั่วโมงขึ้นไป ต่อวัน

12. การทำความสะอาดบ้านโดยไม่ต้องออกแรงมาก (ทำเตียง, ซักผ้าโดยใช้เครื่องซักผ้า, รีดผ้า, เก็บสิ่งของที่ไม่ใช้)

- ☐ ไม่ได้ทำ เพราะว่า.....
- ☐ น้อยกว่า 30 นาที ต่อวัน
- ☐ 30 – 59 นาที ต่อวัน
- ☐ 1 ชั่วโมง – 1 ชั่วโมง 59 นาที ต่อวัน
- ☐ 2 ชั่วโมง – 2 ชั่วโมง 59 นาที ต่อวัน

☐ 3 ชั่วโมงขึ้นไป ต่อวัน

13. การเดินดูหรือซื้อสินค้า (เพื่อซื้ออาหาร, เสื้อผ้า, หรือสิ่งของอื่นๆ)

☐ ไม่ได้ทำ เพราะว่า.....
☐ น้อยกว่า 30 นาที ต่อวัน
☐ 30 – 59 นาที ต่อวัน
☐ 1 ชั่วโมง – 1 ชั่วโมง 59 นาที ต่อวัน
☐ 2 ชั่วโมง – 2 ชั่วโมง 59 นาที ต่อวัน
☐ 3 ชั่วโมงขึ้นไป ต่อวัน

14. การทำความสะอาดบ้านโดยต้องออกแรงมาก (ดูดฝุ่น, ถูบ้าน กวาดบ้าน, เช็ดล้างหน้าต่าง)

☐ ไม่ได้ทำ เพราะว่า.....
☐ น้อยกว่า 30 นาที ต่อสัปดาห์
☐ 30 – 59 นาที ต่อสัปดาห์
☐ 1 ชั่วโมง – 1 ชั่วโมง 59 นาที ต่อสัปดาห์
☐ 2 ชั่วโมง – 2 ชั่วโมง 59 นาที ต่อสัปดาห์
☐ 3 ชั่วโมงขึ้นไป ต่อสัปดาห์

ข. <u>ด้านการเดินทางไปยังสถานที่ที่ไม่ไกลมาก</u>

15. การเดินอย่าง<u>ช้าๆ</u> ไปยังสถานที่ต่างๆ เช่น ไปตลาด, ไปขึ้นรถประจำทาง (รถสองแถว หรือรถคิว), ไปทำงาน, ไปเยี่ยมญาติ หรือเพื่อนฝูง (<u>ไม่ใช่</u>การเดินเล่น หรือเพื่อการออกกำลังกาย)

☐ ไม่ได้ทำ เพราะว่า.....
☐ น้อยกว่า 30 นาที ต่อวัน
☐ 30 – 59 นาที ต่อวัน
☐ 1 ชั่วโมง – 1 ชั่วโมง 59 นาที ต่อวัน
☐ 2 ชั่วโมง – 2 ชั่วโมง 59 นาที ต่อวัน
☐ 3 ชั่วโมงขึ้นไป ต่อวัน

16. การเดิน<u>เร็วๆ</u>ไปยังสถานที่ต่างๆ เช่น ไปตลาด, ไปขึ้นรถประจำทาง (รถสองแถว หรือรถคิว), ไปทำงาน, หรือไปโรงเรียน (<u>ไม่ใช่</u>การเดินเล่น หรือเพื่อการออกกำลังกาย)

☐ ไม่ได้ทำ เพราะว่า.....
☐ น้อยกว่า 30 นาที ต่อวัน
☐ 30 – 59 นาที ต่อวัน
☐ 1 ชั่วโมง – 1 ชั่วโมง 59 นาที ต่อวัน

☐ 2 ชั่วโมง – 2 ชั่วโมง 59 นาที ต่อวัน

☐ 3 ชั่วโมงขึ้นไป ต่อวัน

17. การขับขี่รถยนต์ หรือนั่งรถประจำทาง (รถสองแถว หรือรถคิว)

☐ ไม่ได้ทำ เพราะว่า.....

☐ น้อยกว่า 30 นาที ต่อวัน

☐ 30 – 59 นาที ต่อวัน

☐ 1 ชั่วโมง – 1 ชั่วโมง 59 นาที ต่อวัน

☐ 2 ชั่วโมง – 2 ชั่วโมง 59 นาที ต่อวัน

☐ 3 ชั่วโมงขึ้นไป ต่อวัน

ค. ด้านการออกกำลังกายหรือบริหารร่างกาย

18. การเดินอย่างช้าๆเพื่อความเพลิดเพลิน หรือเพื่อการออกกำลังกาย

☐ ไม่ได้ทำ เพราะว่า.....

☐ น้อยกว่า 30 นาที ต่อสัปดาห์

☐ 30 – 59 นาที ต่อสัปดาห์

☐ 1 ชั่วโมง – 1 ชั่วโมง 59 นาที ต่อสัปดาห์

☐ 2 ชั่วโมง – 2 ชั่วโมง 59 นาที ต่อสัปดาห์

☐ 3 ชั่วโมงขึ้นไป ต่อสัปดาห์

19. การเดินเร็วๆเพื่อความเพลิดเพลิน หรือเพื่อการออกกำลังกาย

☐ ไม่ได้ทำ เพราะว่า.....

☐ น้อยกว่า 30 นาที ต่อสัปดาห์

☐ 30 – 59 นาที ต่อสัปดาห์

☐ 1 ชั่วโมง – 1 ชั่วโมง 59 นาที ต่อสัปดาห์

☐ 2 ชั่วโมง – 2 ชั่วโมง 59 นาที ต่อสัปดาห์

☐ 3 ชั่วโมงขึ้นไป ต่อสัปดาห์

20. การเดินขึ้นเนินอย่างเร็วๆ เพื่อความเพลิดเพลิน หรือเพื่อการออกกำลังกาย

☐ ไม่ได้ทำ เพราะว่า.....

☐ น้อยกว่า 30 นาที ต่อสัปดาห์

☐ 30 – 59 นาที ต่อสัปดาห์

☐ 1 ชั่วโมง – 1 ชั่วโมง 59 นาที ต่อสัปดาห์

☐ 2 ชั่วโมง – 2 ชั่วโมง 59 นาที ต่อสัปดาห์

☐ 3 ชั่วโมงขึ้นไป ต่อสัปดาห์

21. การเข้าร่วมการอบรมการออกกำลังกายของหญิงมีครรภ์ในชั้นเรียน

- ☐ ไม่ได้ทำ เพราะว่า.....
- ☐ น้อยกว่า 30 นาที ต่อสัปดาห์
- ☐ 30 – 59 นาที ต่อสัปดาห์
- ☐ 1 ชั่วโมง – 1 ชั่วโมง 59 นาที ต่อสัปดาห์
- ☐ 2 ชั่วโมง – 2 ชั่วโมง 59 นาที ต่อสัปดาห์
- ☐ 3 ชั่วโมงขึ้นไป ต่อสัปดาห์

22. การว่ายน้ำ

- ☐ ไม่ได้ทำ เพราะว่า.....
- ☐ น้อยกว่า 30 นาที ต่อสัปดาห์
- ☐ 30 – 59 นาที ต่อสัปดาห์
- ☐ 1 ชั่วโมง – 1 ชั่วโมง 59 นาที ต่อสัปดาห์
- ☐ 2 ชั่วโมง – 2 ชั่วโมง 59 นาที ต่อสัปดาห์
- ☐ 3 ชั่วโมงขึ้นไป ต่อสัปดาห์

ง. ด้านการทำงานอาชีพ

คำชี้แจง สำหรับท่านที่ทำงาน กรุณาตอบคำถามข้อ 24 - 29 ว่าท่านใช้เวลาเท่าไรในการทำกิจกรรมดังกล่าวนี้ในช่วง 1 เดือนที่ผ่านมา หากท่านเป็นแม่บ้าน ไม่ได้ทำงานหารายได้ ไม่ต้องตอบคำถามข้อ 24 - 29

23. การนั่งทำงาน หรือนั่งเรียน

- ☐ ไม่ได้ทำ เพราะว่า.....
- ☐ น้อยกว่า 30 นาที ต่อวัน
- ☐ 30 นาที – 1 ชั่วโมง 59 นาที ต่อวัน
- ☐ 2 ชั่วโมง – 3 ชั่วโมง 59 นาที ต่อวัน
- ☐ 4 ชั่วโมง – 5 ชั่วโมง 59 นาที ต่อวัน
- ☐ 6 ชั่วโมงขึ้นไป ต่อวัน

24. การยืนหรือเดิน**ช้าๆ** พร้อมทั้ง**ถือ** หรือ**หิ้ว**ของที่มีน้ำหนักมากกว่า **4** กิโลกรัม

- ☐ ไม่ได้ทำ เพราะว่า.....
- ☐ น้อยกว่า 30 นาที ต่อวัน
- ☐ 30 นาที – 1 ชั่วโมง 59 นาที ต่อวัน
- ☐ 2 ชั่วโมง – 3 ชั่วโมง 59 นาที ต่อวัน
- ☐ 4 ชั่วโมง – 5 ชั่วโมง 59 นาที ต่อวัน
- ☐ 6 ชั่วโมงขึ้นไป ต่อวัน

25. การยืน หรือเดินช้าๆ โดยไม่ได้ถือ หรือหิ้วของใดๆ

- ☐ ไม่ได้ทำ เพราะว่า.....
- ☐ น้อยกว่า 30 นาที ต่อวัน
- ☐ 30 นาที – 1 ชั่วโมง 59 นาที ต่อวัน
- ☐ 2 ชั่วโมง – 3 ชั่วโมง 59 นาที ต่อวัน
- ☐ 4 ชั่วโมง – 5 ชั่วโมง 59 นาที ต่อวัน
- ☐ 6 ชั่วโมงขึ้นไป ต่อวัน

26. การเดิน**เร็ว ๆ** พร้อมทั้ง**ถือ**หรือ**หิ้ว**ของที่มีน้ำหนักมากกว่า **4** กิโลกรัม

- ☐ ไม่ได้ทำ เพราะว่า.....
- ☐ น้อยกว่า 30 นาที ต่อวัน
- ☐ 30 นาที – 1 ชั่วโมง 59 นาที ต่อวัน
- ☐ 2 ชั่วโมง – 3 ชั่วโมง 59 นาที ต่อวัน
- ☐ 4 ชั่วโมง – 5 ชั่วโมง 59 นาที ต่อวัน
- ☐ 6 ชั่วโมงขึ้นไป ต่อวัน

27. การเดินเร็วๆ โดยไม่ได้ถือ หรือหิ้วของใดๆ

- ☐ ไม่ได้ทำ เพราะว่า.....
- ☐ น้อยกว่า 30 นาที ต่อวัน
- ☐ 30 นาที – 1 ชั่วโมง 59 นาที ต่อวัน
- ☐ 2 ชั่วโมง – 3 ชั่วโมง 59 นาที ต่อวัน
- ☐ 4 ชั่วโมง – 5 ชั่วโมง 59 นาที ต่อวัน
- ☐ 6 ชั่วโมงขึ้นไป ต่อวัน

28. ทำนา ทำสวน ทำไร่ เช่น คราดใบไม้ ใบหญ้าทิ้ง พรวนดิน รดน้ำต้นไม้ เก็บเกี่ยวพืชผล

- ☐ ไม่ได้ทำ เพราะว่า.....
- ☐ น้อยกว่า 30 นาที ต่อวัน
- ☐ 30 นาที – 1 ชั่วโมง 59 นาที ต่อวัน
- ☐ 2 ชั่วโมง – 3 ชั่วโมง 59 นาที ต่อวัน
- ☐ 4 ชั่วโมง – 5 ชั่วโมง 59 นาที ต่อวัน
- ☐ 6 ชั่วโมงขึ้นไป ต่อวัน

ขอขอบคุณในความร่วมมือของท่าน

DEMOGRAPHIC INFORMATION QUESTIONNAIRE

Part 1: Information from interviewing pregnant woman

1. Age……..years
2. Marital status…… ☐ Single ☐ Married ☐ Divorce/Widow
3. Your present or highest education level…….
4. Average monthly income of your family (from all sources)……Baht/month
5. Occupation

☐ Housewife ☐ Civil servant/State enterprise ☐ Agriculture/Farmer

☐ Owner of business ☐ Employee, specify..... ☐ Merchant

☐ Others please specify.....

6. Did you perform exercise regularly before getting pregnant?

☐ No

☐ Yes, please specify…….

Frequency……day(s)/week Duration……minute/day

Part 2: Information from Medical record

7. Gravida……Para…….Gestational age……weeks
8. Number of your child/children……..How old is he/she?

1st Child……Years 2nd Child……Years 3rd Child ……Years

INDIRECT MEASURES OF PHYSICAL ACTIVITY DURING PREGNANCY

1. Behavioral Beliefs Questionnaire

Directions: The following questionnaires would like to know your beliefs about the likelihood of the consequences that may happen when you perform physical activity during pregnancy. Look at each questionnaire below and check ✓ in the column that best indicates your response.

Physical activity is any bodily movement while doing housework, caring, walking, running, exercising, or working occupation.

Consequences of Physical Activity during Pregnancy	Your Beliefs				
	Very Unlikely	Unlikely	Unsure	Likely	Very likely
1. Make me healthy					
2. Shorter labour					
3. Increase my muscle strength					
4. Keep me active					
5. Decrease back pain					
6. Better weight control					
7. Improved sleep					
8. Improved blood circulation					
9. Normal digestion and defecation					
10. Improved my mental health					
11. Feeling cheerful and relaxed					
12. Make my unborn baby healthy					

2. Outcome Evaluations Questionnaire

Directions: The following questionnaires would like you to indicate an important level of the consequence that may happen when you perform physical activity during pregnancy. Look at each questionnaire below and check ✓ in the column that best describes how important outcome is/would be for you.

> Physical activity is any bodily movement while doing housework, caring, walking, running, exercising, or working occupation.

Consequences of Physical Activity during Pregnancy	Level of Important				
	very unimportant	unimportant	Unsure	Important	Very important
1. Making me healthy is…….					
2. Shorter labour is……..					
3. Increasing my muscle strength is…….					
4. Keeping me active is……..					
5. Decreasing back pain is……..					
6. Better weight control is…….					
7. Improving sleep is…….					
8. Improving blood circulation is…					
9. Normal digestion and defecation is…….					
10. Improving my mental health is……..					
11. Feeling cheerful and relaxed is…….					
12. Making my unborn baby healthy is…….....					

3. Normative Beliefs Questionnaire

Directions: Look at each questionnaire below and check ✓ in the column that best describes what you believe each of these important people mentioned below thinks about the possibility of you performing physical activity during pregnancy.

Physical activity is any bodily movement while doing housework, caring, walking, running, exercising, or working occupation.

The important people	Beliefs of the important people				
	Definitely not true	Not true	Unsure	True	Definitely true
1. My husband thinks I should perform physical activity during pregnancy.					
2. My mother thinks I should perform physical activity during pregnancy.					
3. My father thinks I should perform physical activity during pregnancy.					
4. My relatives (such as siblings, grandmother, grandfather, uncle and aunt) think I should perform physical activity during pregnancy.					
5. My friends think I should perform physical activity during pregnancy.					
6. Doctor or nurse thinks I should perform physical activity during pregnancy.					

4. Motivation to Comply Questionnaire

Directions: Look at each questionnaire below and check ✓ in the column that best describes how strongly do you want to do what each of these people mentioned below thinks you should perform physical activity during pregnancy.

Physical activity is any bodily movement while doing housework, caring, walking, running, exercising, or working occupation.

The important people	How much will you comply with their opinion?				
	Not at all	Not very much	Unsure	Much	Very much
1. If my husband wants me to perform physical activity, how much I will comply with his opinion					
2. If my mother wants me to perform physical activity, how much I will comply with her opinion					
3. If my father wants me to perform physical activity, how much I will comply with his opinion					
4. If my relatives (such as siblings, grandmother, grandfather, uncle, and aunt) want me to perform physical activity, how much I will comply with their opinion					
5. If my friends want me to perform physical activity, how much I will comply with their opinion					
3. If the doctor or nurse wants me to perform physical activity, how much I will comply with his/her opinion					

5. Control Beliefs Questionnaire

Directions: Look at each questionnaire below and check ✓ in the column that best describes how easy or difficult it is, or it would be for you to perform physical activity during pregnancy in the forthcoming month if you meet with the following situation.

Physical activity is any bodily movement while doing housework, caring, walking, running, exercising, or working occupation.

Situations happen/may happen	How easy or difficult it is/it would be				
	Very difficult	Difficult	Unsure	Easy	Very easy
1. Because of hearing about exercise from media, I will perform physical activity……					
2. Because of liking to do exercise, I will perform physical activity……					
3. Because of abdomen enlargement, I will perform physical activity……					
4. Because of back pain, I will perform physical activity……					
5. Because of having more time, I will perform physical activity……					
6. Because of being tired from working, I will perform physical activity……					
7. Because of confidence in capability, I will perform physical activity……					
8. Because of fear about illness, abortion, preterm labour and accidents, I will perform physical activity……					
9. Because of worry about not having enough time to sleep/rest, I will perform physical activity……					
10. Because of being under a lot of stress, I will perform physical activity……					

Situations happen/may happen	How easy or difficult it is/it would be				
	Very difficult	Difficult	Unsure	Easy	Very easy
11. Because of having a place for exercise, I will perform physical activity……					
12. Because of going to the place for exercise easily, I will perform physical activity……					
13. Because of bad weather such as cold or warm weather, with rain and smog, I will perform physical activity……					
14. Because of having no friend(s), I will perform physical activity……					
15. Because of concern about the unborn baby's health, I will perform physical activity…….					

6. Perceived Power Questionnaire

Directions: Look at each questionnaire below and check ✓ in the column that best describes whether you agree or disagree to perform physical activity with the following situation in the forthcoming month.

Physical activity is any bodily movement while doing housework, caring, walking, running, exercising, or working occupation.

Situations happen/may happen	Opinion to perform physical activity				
	Very unlikely	Unlikely	Unsure	likely	Very likely
1. If I hear about exercise from media, I will perform physical activity.					
2. If I have a favorite to exercise, I will perform physical activity.					

Situations happen/may happen	Opinion to perform physical activity				
	Very unlikely	**Unlikely**	**Unsure**	**likely**	**Very likely**
3. If my abdomen enlarges, I will not perform physical activity.					
4. If I have back pain, I will not perform physical activity.					
5. If I have more time, I will perform physical activity.					
6. If I am tired from working, I will not perform physical activity.					
7. If I am confident in my capability, I will perform physical activity.					
8. If I fear about illness, abortion, preterm labour and accidence, I will not perform physical activity.					
9. If I worry about not enough time to sleep/rest, I will not perform physical activity.					
10. If I am under a lot of stress, I will not perform physical activity.					
11. If there is a place for exercise, I will perform physical activity.					
12. If I can go to a place for exercise easily, I will perform physical activity.					
13. If the weather is bad such as cold or warm weather, having rain and smoking, I will not perform physical activity.					
14. If I do not have friend(s), I will not perform physical activity.					
15. If I concern about unborn baby health, I will perform physical activity.					

DIRECT MEASURES OF PHYSICAL ACTIVITY DURING PREGNANCY

1. Attitude toward Physical Activity Questionnaire

Directions: The following statements refer to physical activity during pregnancy. Look at each pair of words lists below and mark with a cross (X) on the number that reflects your feelings about physical activity.

Number 1 refers to the strongly negative feelings on left side of each statement

Number 2 refers to the slightly negative feelings on left side of each statement

Number 3 refers to unsure feelings

Number 4 refers to the slightly positive feelings on right side of each statement

Number 5 refers to the strongly positive feelings on right side of each statement

Physical activity is any bodily movement while doing housework, caring, walking, running, exercising, or working occupation.

1) My performing physical activity during pregnancy is……

Unpleasant	1	2	3	4	5	**Pleasant**
	Extremely	slightly	Unsure	slightly	Extremely	

2) My performing physical activity during pregnancy is……

Harmful	1	2	3	4	5	**Beneficial**
	Extremely	slightly	Unsure	slightly	Extremely	

3) My performing physical activity during pregnancy is……

Bad	1	2	3	4	5	**Good**
	Extremely	slightly	Unsure	slightly	Extremely	

4) My performing physical activity during pregnancy is……..……

Unhealthy	1	2	3	4	5	**Healthy**
	Extremely	slightly	Unsure	slightly	Extremely	

5) My performing physical activity during pregnancy is……..……

Stressful	1	2	3	4	5	**Relaxing**
	Extremely	slightly	Unsure	slightly	Extremely	

6) My performing physical activity during pregnancy is……..……

Unenjoyable	1	2	3	4	5	**Enjoyable**
	Extremely	slightly	Unsure	slightly	Extremely	

7) My performing physical activity during pregnancy is……..……

Worthless	1	2	3	4	5	**Proud**
	Extremely	slightly	Unsure	slightly	Extremely	

8) My performing physical activity during pregnancy is……..……

Inactive	1	2	3	4	5	**Active**
	Extremely	slightly	Unsure	slightly	Extremely	

9) My performing physical activity during pregnancy is……..……

Ugly	1	2	3	4	5	**Admirable**
	Extremely	slightly	Unsure	slightly	Extremely	

2. Subjective Norms Questionnaire

Directions: The following questionnaires refer to the significant people's opinion about physical activity during pregnancy. Look at each questionnaire below and mark with a cross (X) on the number that best describes your response to each statement.

Number 1 refers to the strongly negative feelings on left side of each statement

Number 2 refers to the slightly negative feelings on left side of each statement

Number 3 refers to unsure feelings

Number 4 refers to the slightly positive feelings on right side of each statement

Number 5 refers to the strongly positive feelings on right side of each statement

Physical activity is any bodily movement while doing housework, caring, walking, running, exercising, or working occupation.

1) The important persons (such as husband, parents, sister, brother, and relatives) who are inside my family think I should perform physical activity during pregnancy.

1	2	3	4	5
Strongly disagree	Disagree	Unsure	Agree	Strongly agree

2) The important persons who are outside my family (such as friends, colleague, physician, and nurses) think I should perform physical activity during pregnancy.

1	2	3	4	5
Strongly disagree	Disagree	Unsure	Agree	Strongly agree

3) The important persons who are inside (such as husband, parents, sister, brother, and relatives) my family push me to perform physical activity during pregnancy.

1	2	3	4	5
Strongly disagree	Disagree	Unsure	Agree	Strongly agree

4) The important persons who are outside my family such as friends, colleague, physician and nurses) push me to perform physical activity during pregnancy.

1	2	3	4	5
Strongly disagree	Disagree	Unsure	Agree	Strongly agree

INTENTION TO ENGAGE IN PHYSICAL ACTIVITY

Directions: The following statement describes your intention to engage in physical activity during pregnancy such as doing housework, caring, going to the near places, exercising, or working (occupation). Look at each statement below and mark with a cross (X) on the number that best indicates your intention to engage in physical activity in the forthcoming month.

Number 1 refers to the strongly negative feelings on left side of each statement
Number 2 refers to the slightly negative feelings on left side of each statement
Number 3 refers to unsure feelings
Number 4 refers to the slightly positive feelings on right side of each statement
Number 5 refers to the strongly positive feelings on right side of each statement

Physical activity is any bodily movement while doing housework, caring, walking, running, exercising, or working occupation.

1. I intend to engage in physical activity while I am doing housework or caregiving in the forthcoming month.

1	2	3	4	5
Definitely do not	Somewhat do not	Unsure	Somewhat do	Definitely do

2. I will try to engage in physical activity while I am doing housework or caregiving in the forthcoming month.

1	2	3	4	5
Definitely not true	Not true	Unsure	True	Definitely true

3. I intend to walk or bike (such as to work, or nearby places) in the forthcoming month.

1	2	3	4	5
Definitely do not	Somewhat do not	Unsure	Somewhat do	Definitely do

4. I will try to walk or bike (such as to work, or nearby places) in the forthcoming month.

1	2	3	4	5
Definitely not true	Not true	Unsure	True	Definitely true

5. I intend to exercise in the forthcoming month.

1	2	3	4	5
Definitely do not	Somewhat do not	Unsure	Somewhat do	Definitely do

6. I will try to exercise in the forthcoming month.

1	2	3	4	5
Definitely not true	Not true	Unsure	True	Definitely true

Directions: For the following statement (No 7-8), if you are still working for wages, please mark with a cross (X) on the number that best indicates your intention to engage in physical activity in the forthcoming month.

7. I intend to engage in physical activities such as walking, and walking up and down stairs while I am working in the forthcoming month.

1	2	3	4	5
Definitely do not	Somewhat do not	Unsure	Somewhat do	Definitely do

8. I try to engage in physical activities such as walking, and walking up and down stairs while I am working in the forthcoming month.

1	2	3	4	5
Definitely not true	Not true	Unsure	True	Definitely true

Thank you

3. Perceived Behavioral Control Questionnaire

Directions: The following statement refers to your confidence that be able to perform physical activity during pregnancy. Look at each questionnaire below and mark with a cross (X) on the number that best describes your response to each statement.

Number 1 refers to the strongly negative feelings on each left side of statement
Number 2 refers to the slightly negative feelings on each left side of statement
Number 3 refers to unsure feelings
Number 4 refers to the slightly positive feelings on each right side of statement
Number 5 refers to the strongly positive feelings on each right side of statement

Physical activity is any bodily movement while doing housework, caring, walking, running, exercising, or working occupation.

1) For me, to perform physical activity during pregnancy would be…….

1	2	3	4	5
Very difficult	Difficult	Unsure	Easy	Very easy

2) If I wanted to, I could easily perform physical activity during pregnancy.

1	2	3	4	5
Strongly disagree	Disagree	Unsure	Agree	Strongly agree

3) To perform physical activity depends on me.

1	2	3	4	5
Strongly disagree	Disagree	Unsure	Agree	Strongly agree

APPENDIX F

Documentary Proof of Mahidol University Institutional Review Board

COA. No. MU-IRB 2008/063.0708

Documentary Proof of Mahidol University Institutional Review Board

Title of Project: A Causal Model of Thai Women's Physical Activity during Second Trimester of Pregnancy
(Thesis for Ph.D.)

Principle Investigator: Miss Bungorn Supavititpatana

Name of Institution: Faculty of Nursing

Approval includes: 1) MU-IRB Submission form version received date 7 August 2008
2) Participant Information sheet version date 7 August 2008
3) Informed consent form version date 7 August 2008
4) Questionnaire version received date 7 August 2008

Mahidol University Institutional Review Board is in full compliance with International Guidelines for Human Research Protection such as Declaration of Helsinki, The Belmont Report, CIOMSGuidelines and the International Conference on Harmonization in Good Clinical Practice (ICH-GCP)

Date of Approval: 7 August 2008

Date of Expiration: 6 August 2009

Signature of Chairman: .....
(Professor Shusee Visalyaputra)

Signature of Head of the Institute: .....
(Associate Professor Sansanee Chaiyaroj)
Vice President for Research and Academic Affairs

Office of the President, Mahidol University, 999 Phuttamonthon 4 Rd., Salaya, Phuttamonthon District, Nakhon Pathom 73170. Tel. (662) 8496223-5 Fax. (662) 8496223

Certificate of Approval, Faculty of Medicine, Chiang Mai University

Certificate of Approval

No. 080/2008

Name of Ethics Committee : Research Ethics Committee **3**,
Faculty of Medicine, Chiang Mai University
Address of Ethics Committee : 110 Intavaroros Rd., Amphoe Muang, Chiang Mai, Thailand 50200

Principal Investigator : Bungorn Supavititpatana
Faculty of Nurse, Mahidol University.

Protocol title: A Causal Model of Thai Women's Physical Activity during Second Trimester of Pregnancy
STUDY CODE : 08FEB131136

Documents filed	Document reference
Research protocol	- Version 1 date 1 April 2006
Informed consent documents /Patient information sheet	- Version 1 date 1 April 2006
Principal Investigator Curriculum vitae	- Version date 7 February 2008
Questionaire	- Version date 7 February 2008
Case Record Form	- Version date 7 February 2008

Opinion of the Ethics Committee/Institutional Review Board : PLS. CHECK ONE

__✓__ Approval

_____ Conditional approval (Specify on space below)

.....

.....

Date of Approval : March 7 , 2008 **Expiration Date:** March 7 , 2009

This Ethics Committee is organized and operates according to GCPs and relevant international ethical guidelines, the applicable laws and regulations.

Signed : .....P. Kulapongs.....
Emeritus Professor Panja Kulapongs, M.D.
Chairperson, Faculty of Medicine

Signed : .....N. Nantachit.....
Associate Professor Niwes Nantachit, M.D.
Dean, Faculty of Medicine

เอกสารชี้แจงผู้เข้าร่วมการวิจัย

1

เอกสารชี้แจงผู้เข้าร่วมการวิจัย

ในเอกสารนี้อาจมีข้อความที่ท่านอ่านแล้วยังไม่เข้าใจ โปรดสอบถามหัวหน้าโครงการวิจัย หรือผู้แทนให้ช่วยอธิบายจนกว่าจะเข้าใจดี ท่านอาจจะขอเอกสารนี้กลับไปอ่านที่บ้านเพื่อปรึกษาหารือกับญาติพี่น้อง เพื่อนสนิท แพทย์ประจำตัวของท่าน หรือแพทย์ท่านอื่น เพื่อช่วยในการตัดสินใจเข้าร่วมการวิจัย

ชื่อโครงการ "แบบจำลองเชิงสาเหตุของการทำกิจกรรมทางกายของสตรีไทยในระยะไตรมาสที่สองของการตั้งครรภ์"

ชื่อผู้วิจัย นางสาวบังอร ศุภวิทิตพัฒนา

สถานที่ทำการวิจัย คลินิกตรวจครรภ์ ที่โรงพยาบาลมหาราชนครเชียงใหม่ โรงพยาบาลนครพิงค์ โรงพยาบาลสันป่าตอง และโรงพยาบาลส่งเสริมสุขภาพเชียงใหม่

สถานที่ทำงาน คณะพยาบาลศาสตร์ มหาวิทยาลัยเชียงใหม่ หมายเลขโทรศัพท์ที่ติดต่อได้ทั้งในและนอกเวลาราชการ 083-153-5512

คณะกรรมการจริยธรรมการวิจัยในคน สำนักงานอธิการบดีมหาวิทยาลัยมหิดล ถนนพุทธมณฑล สาย 4 ตำบลศาลายา อำเภอพุทธมณฑล จังหวัดนครปฐม 73170 หมายเลขโทรศัพท์ 02-849-6223-5 โทรสาร 02-849-6223

ผู้ให้ทุน ไม่มี

โครงการวิจัยนี้ทำขึ้นเพื่อ ศึกษาปัจจัยที่มีผลต่อการทำกิจกรรมทางกายในหญิงมีครรภ์ในระยะไตรมาสที่สองของการตั้งครรภ์ (อายุครรภ์อยู่ระหว่าง 14-28 สัปดาห์) ซึ่งมีประโยชน์ที่คาดว่าจะได้รับคือ ความเชื่อและความคิดเห็นของท่านจะใช้เป็นข้อมูลที่มีความสำคัญเป็นอย่างยิ่งสำหรับบุคลากรทางด้านสุขภาพ เช่น แพทย์ และพยาบาล หรือหน่วยงานที่เกี่ยวข้อง เพื่อให้เข้าใจถึงปัจจัยที่ส่งเสริมหรือเป็นอุปสรรคที่ส่งผลต่อการทำกิจกรรมทางกายของหญิงมีครรภ์ เพื่อจะได้นำผลของการศึกษามาวางแผนในการดำเนินงานส่งเสริมให้หญิงมีครรภ์มีการทำกิจกรรมทางกายที่เหมาะสม เช่น การทำงานบ้าน การทำงานอาชีพ และการออกกำลังกาย เพราะจะเป็นผลดีต่อสุขภาพทั้งร่างกาย จิตใจของหญิงมีครรภ์และทารกในครรภ์

ท่านได้รับเชิญให้เข้าร่วมการวิจัยนี้เพราะ ท่านกำลังตั้งครรภ์อยู่ระหว่าง 14-28 สัปดาห์ มีสุขภาพแข็งแรง สามารถอ่านและเขียนภาษาไทยได้ และที่สำคัญคือให้ความร่วมมือในการศึกษาวิจัยครั้งนี้

จะมีผู้เข้าร่วมการวิจัยนี้ทั้งสิ้นประมาณ 252 คน ระยะเวลาที่จะทำวิจัยทั้งสิ้นประมาณ 2 ปี

หากท่านตัดสินใจเข้าร่วมการวิจัยแล้ว จะมีขั้นตอนการวิจัยดังต่อไปนี้คือ ท่านจะถูกขอร้องให้เซ็นชื่อลงในหนังสือแสดงเจตนายินยอมเข้าร่วมการวิจัย หลังจากนั้นผู้วิจัยจะขอให้ท่านตอบแบบสอบถามทั้งหมดจำนวน 2 ครั้ง ครั้งแรกได้แก่ แบบสัมภาษณ์ข้อมูลส่วนบุคคลจำนวน 11 ข้อ แบบสอบถามเกี่ยวกับปัจจัยด้านความเชื่อที่มีผลต่อการทำกิจกรรมทางกายของหญิงมีครรภ์จำนวน 66 ข้อ แบบสอบถามเกี่ยวกับปัจจัยด้านทัศนคติ บรรทัดฐานของบุคคลสำคัญ แบบสอบถามการรับรู้ความสามารถในการควบคุมตนเองที่มีผลต่อการทำกิจกรรมทางกายของหญิงมีครรภ์จำนวน 16 ข้อ และแบบสอบถามเกี่ยวกับความตั้งใจที่จะทำกิจกรรมทางกายของหญิงมีครรภ์จำนวน 8 ข้อ ซึ่งจะใช้เวลาในการตอบแบบสอบถามประมาณ 25 - 30 นาที สำหรับครั้งที่

สองนั้น ผู้วิจัยจะขอให้ท่านตอบแบบสอบถามการทำกิจกรรมทางกายระหว่าง 1 เดือนต่อมาที่ท่านกระทำจริงอีกครั้ง ในวันที่ทางคลินิกตรวจครรภ์ของโรงพยาบาลนัดให้ท่านมาตรวจครรภ์ซ้ำ ในเวลา 1 เดือนต่อมา

ในการตอบแบบสอบถามดังกล่าวไม่มีความเสี่ยงหรืออันตรายที่อาจจะเกิดขึ้นจากการวิจัย เนื่องจากการวิจัยครั้งนี้ไม่ได้กระทำการทดลองหรือปฏิบัติหัตถการใดๆที่มีการลุกล้ำร่างกายของท่าน แต่อย่างไรก็ตามท่านอาจจะรู้สึกอึดอัดหรือไม่สบายใจอยู่บ้างกับบางคำถาม ท่านมีสิทธิ์ที่จะไม่ตอบคำถามเหล่านั้นได้

ภายหลังจากท่านตอบแบบสอบถามเสร็จเรียบร้อยแล้วในแต่ละครั้ง ท่านจะได้รับของที่ระลึกที่ผู้วิจัยได้จัดเตรียมไว้ให้เป็นการตอบแทนในการให้ความร่วมมือในโครงการวิจัยครั้งนี้

ค่าใช้จ่ายที่ผู้เข้าร่วมการวิจัยจะต้องรับผิดชอบเองนั้น ไม่มี

หากมีข้อมูลเพิ่มเติมทั้งด้านประโยชน์และโทษที่เกี่ยวข้องกับการวิจัยนี้ ผู้วิจัยจะแจ้งให้ทราบโดยรวดเร็วไม่ปิดบัง

ข้อมูลส่วนตัวของผู้เข้าร่วมการวิจัยจะถูกเก็บรักษาไว้ ไม่เปิดเผยต่อสาธารณะเป็นรายบุคคล แต่จะรายงานผลการวิจัยเป็นข้อมูลส่วนรวม ข้อมูลของผู้เข้าร่วมการวิจัยเป็นรายบุคคลอาจมีคณะบุคคลบางกลุ่มเข้ามาตรวจสอบได้ เช่น สถาบัน หรือองค์กรของรัฐที่มีหน้าที่ตรวจสอบ คณะกรรมการจริยธรรมฯ เป็นต้น

ผู้เข้าร่วมการวิจัยมีสิทธิ์ถอนตัวออกจากโครงการวิจัยเมื่อใดก็ได้ โดยไม่ต้องแจ้งให้ทราบล่วงหน้า และการไม่เข้าร่วมการวิจัยหรือถอนตัวออกจากโครงกายวิจัยนี้ จะไม่มีผลกระทบต่อการบริการและการรักษาที่สมควรจะได้รับแต่ประการใด

โครงการวิจัยนี้ได้รับการพิจารณารับรองจากคณะกรรมการจริยธรรมการวิจัยในคนของมหาวิทยาลัยมหิดล ซึ่งมีสำนักงานอยู่ที่ สำนักงานอธิการบดีมหาวิทยาลัยมหิดล ถนนพุทธมณฑล สาย 4 ตำบลศาลายา อำเภอพุทธมณฑล จังหวัดนครปฐม 73170 หมายเลขโทรศัพท์ 02-849-6223-5 โทรสาร 02-849-6223 หากท่านได้รับการปฏิบัติไม่ตรงตาม ที่ระบุไว้ ท่านสามารถติดต่อกับประธานคณะกรรมการฯ หรือผู้แทน ได้ตามสถานที่และหมายเลขโทรศัพท์ข้างต้น

ข้าพเจ้าได้อ่านรายละเอียดในเอกสารนี้ครบถ้วนแล้ว

ลงชื่อ..... ผู้เข้าร่วมวิจัย

(.....)

วันที่.....

APPENDIX G

หนังสือแสดงเจตนายินยอมเข้าร่วมการวิจัยโดยได้รับการบอกกล่าวและเต็มใจ

หนังสือแสดงเจตนายินยอมเข้าร่วมการวิจัยโดยได้รับการบอกกล่าวและเต็มใจ

วันที่.....เดือน.....พ.ศ.....

ข้าพเจ้า.....อายุ.....ปี อาศัยอยู่บ้านเลขที่.....ถนน.....
หมู่ที่.....ตำบล.....อำเภอ.....จังหวัด.....รหัสไปรษณีย์.....โทรศัพท์.....

ขอแสดงเจตนายินยอมเข้าร่วมโครงการวิจัยเรื่อง "เบบจำลองเชิงสาเหตุของการทำกิจกรรมทางกายของสตรีไทยในระยะไตรมาสที่สองของการตั้งครรภ์"

โดยข้าพเจ้าได้รับทราบรายละเอียดเกี่ยวกับที่มาและจุดมุ่งหมายในการทำวิจัย รายละเอียดขั้นตอนต่างๆ ที่จะต้องปฏิบัติหรือได้รับการปฏิบัติ ประโยชน์ที่คาดว่าจะได้รับของการวิจัยและความเสี่ยงที่อาจจะเกิดขึ้นจากการเข้าร่วมการวิจัย รวมทั้งแนวทางป้องกันและแก้ไขหากเกิดอันตรายขึ้น ค่าตอบแทนที่จะได้รับ ค่าใช้จ่ายที่ข้าพเจ้าจะต้องรับผิดชอบจ่ายเอง โดยได้อ่านข้อความที่มีรายละเอียดอยู่ในเอกสารชี้แจงผู้เข้าร่วมการวิจัยโดยตลอด อีกทั้งยังได้รับคำอธิบายและตอบข้อสงสัยจากหัวหน้าโครงการวิจัยเป็นที่เรียบร้อยแล้ว

ข้าพเจ้าจึงสมัครใจเข้าร่วมโครงการวิจัยนี้

หากข้าพเจ้ามีข้อข้องใจเกี่ยวกับขั้นตอนของการวิจัยหรือหากเกิดเหตุการณ์ที่ไม่พึงประสงค์จากการวิจัยขึ้นกับข้าพเจ้า ข้าพเจ้าจะสามารถติดต่อกับ นางสาวบังอร ศุภวิทิตพัฒนา หมายเลขโทรศัพท์ 083-1535512

หากข้าพเจ้าได้รับการปฏิบัติไม่ตรงตามที่ระบุไว้ในเอกสารชี้แจงผู้เข้าร่วมการวิจัย ข้าพเจ้าสามารถติดต่อกับประธานคณะกรรมการจริยธรรมการวิจัยในคนหรือผู้แทนได้ที่สำนักงานคณะกรรมการจริยธรรมการวิจัยในคน สำนักงานอธิการบดี มหาวิทยาลัยมหิดล ถนนพุทธมณฑล สาย 4 ตำบลศาลายา อำเภอพุทธมณฑล จังหวัดนครปฐม รหัสไปรษณีย์ 73170 หรือหมายเลขโทรศัพท์ 02-849-6223-5 โทรสาร 02-849-6223

ข้าพเจ้าได้ทราบถึงสิทธิ์ที่ข้าพเจ้าจะได้รับข้อมูลเพิ่มเติมทั้งทางด้านประโยชน์และโทษจากการเข้าร่วมการวิจัย และสามารถถอนตัวหรือองค์เข้าร่วมการวิจัยได้ทุกเมื่อ โดยจะไม่มีผลกระทบต่อการบริการและการรักษาพยาบาลที่ข้าพเจ้าจะได้รับต่อไปในอนาคต และยินยอมให้ผู้วิจัยใช้ข้อมูลส่วนตัวของข้าพเจ้าที่ได้รับจากการวิจัย แต่จะไม่เผยแพร่ต่อสาธารณะเป็นรายบุคคล โดยจะนำเสนอเป็นข้อมูลโดยรวมจากการวิจัยเท่านั้น

ข้าพเจ้าเข้าใจข้อความในเอกสารชี้แจงผู้เข้าร่วมการวิจัย และหนังสือแสดงเจตนายินยอมนี้โดยตลอดแล้ว จึงลงลายมือชื่อไว้

ลงชื่อ..... ผู้เข้าร่วมการวิจัย/ วันที่.....
(.....)

ลงชื่อ..... ผู้ให้ข้อมูลและขอความยินยอม/หัวหน้า
(.....) โครงการวิจัย วันที่.....

APPENDIX H

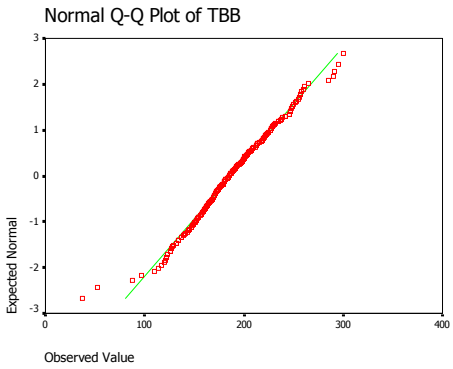
LIST OF EXPERTS

1. Prof. Dr. Ruja Phuphaibul
   Department of Nursing, Faculty of Medicine, Ramathibodi hospital,
   Mahidol University
2. Assoc. Prof. Dr. Roongrote Poomriew
   Faculty of Public Health, Mahasarakam University
3. Assoc. Prof. Dr. Thanomwong Kritpet
   School of Sports Science, Chulalong University
4. Assist. Prof. Dr. Nantawon Suwonnaroop
   Department of Public Health Nursing, Faculty of Nursing,
   Mahidol University
5. Assist. Prof. Dr. Narirat Jitramontree
   Department of Fundamental Nursing, Faculty of Nursing,
   Mahidol University
6. Chakarg Pongurgsorn, M.D., Ph.D.
   Department of Rehabilitation, Faculty of Medicine, Mahidol University
7. Assoc. Prof. Chanane Wanapirak, M.D.
   Department of Obstetrics and Gynecology, Faculty of Medicine,
   Chiang Mai University

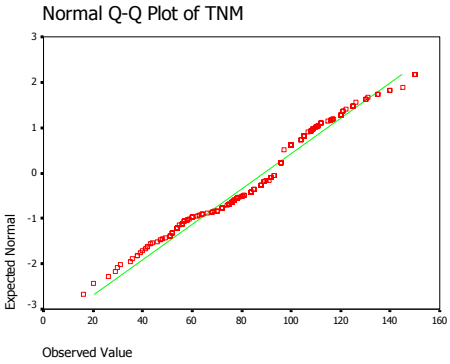
APPENDIX I

Normality Testing

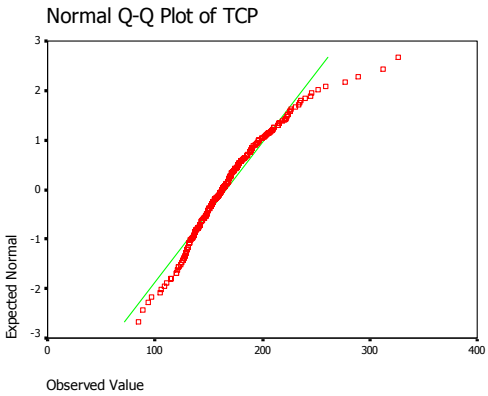
Q-Q Plot of the Study Variables



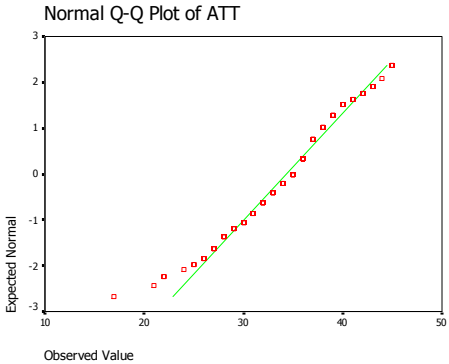
Indirect attitude toward physical activity (TBB)



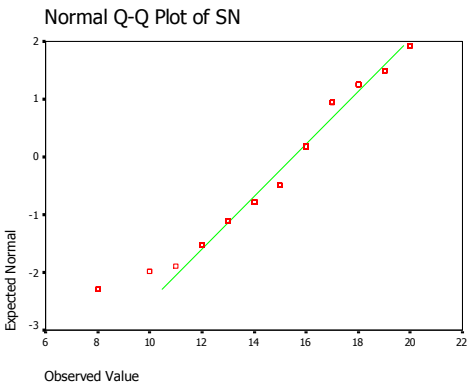
Indirect subjective norms (TNM)



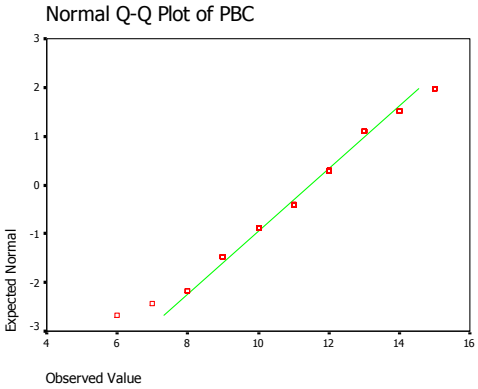
Indirect perceived behavioral control (TCP)



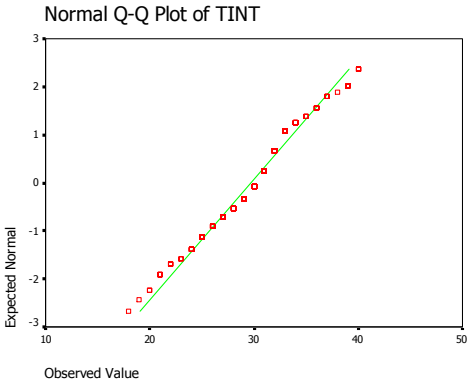
Attitude toward physical activity (ATT)



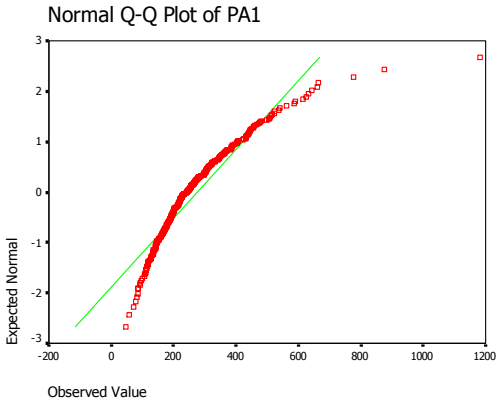
Subjective norms (SN)



Perceived behavioral control (PBC)



Intention (TINT)



Physical activity (PA1)

DATE: 10/ 1/2009

TIME: 15:51

L I S R E L 8.53

BY

Karl G. J”reskog & Dag S”rbom

The following lines were read from file C:\Documents and Settings\bungorrn Supavititp\Desktop\All-analysis-23-Aug-09\Fit_model\Analysis full2_PA1\PA10.LS8:

```
TI Physical Activity analysis data
DA NI=8 NO=272 NG=1 MA=CM
La
'tbb''tnm''tcp''att''sn''pbc''tint''pa1'
KM
1.000
0.452 1.000
0.405 0.398 1.000
0.480 0.510 0.533 1.000
0.369 0.577 0.420 0.569 1.000
0.419 0.373 0.520 0.628 0.464 1.000
0.336 0.432 0.368 0.387 0.368 0.431 1.000
0.088 0.029 0.045 0.000 -0.036 0.012 0.133 1.000
SD
39.75124 25.55350 .08830 4.27911 2.20030 1.55337 3.97495 .21818
SE
4 5 6 7 8 1 2 3 /
MO NX=3 NY=5 BE=FU,FI GA=FU,FI PH=FU,FI PS=DI,FR
FR BE 4 1 BE 4 2 BE 4 3 BE 5 4 BE 5 3
FR GA 1 1 GA 2 2 GA 3 3
FR TE 1 1
FR TE 2 2
FR TH 1 1
FR TH 3 3
FR TH 2 2
FR TH 2 3
FI PS(3,3)
VA 1.00 PS(3,3)
FI PS(2,2)
VA 1.00 PS(2,2)
FI PS(1,1)
VA 1.00 PS(1,1)
FR TE 3 3
PD
OU PC RS EF FS SS SC PT MR MI TV AD=OFF
```

TI Physical Activity analysis data

Number of Input Variables	8
Number of Y - Variables	5
Number of X - Variables	3
Number of ETA - Variables	5
Number of KSI - Variables	3
Number of Observations	272

TI Physical Activity analysis data

Covariance Matrix

	att	sn	pbc	tint	pa1	tbb
att	18.31					
sn	5.36	4.84				
pbc	4.17	1.59	2.41			
tint	6.58	3.22	2.66	15.80		
pa1	- -	-0.02	0.00	0.12	0.05	
tbb	81.65	32.27	25.87	53.09	0.76	1580.16
tnm	55.77	32.44	14.81	43.88	0.16	459.13
tcp	0.20	0.08	0.07	0.13	0.00	1.42

Covariance Matrix

	tnm	tcp
tnm	652.98	
tcp	0.90	0.01

TI Physical Activity analysis data

Parameter Specifications

BETA

	att	sn	pbc	tint	pa1
att	0	0	0	0	0
sn	0	0	0	0	0
pbc	0	0	0	0	0
tint	1	2	3	0	0
pa1	0	0	4	5	0

GAMMA

	tbb	tnm	tcp
att	6	0	0
sn	0	7	0
pbc	0	0	8
tint	0	0	0
pa1	0	0	0

PSI

att	sn	pbc	tint	pa1
0	0	0	9	10

TI Physical Activity analysis data

Initial Estimates (TSLS)

BETA

	att	sn	pbc	tint	pa1
att	- -	- -	- -	- -	- -
sn	- -	- -	- -	- -	- -
pbc	- -	- -	- -	- -	- -
tint	0.10	0.32	0.72	- -	- -
pa1	- -	- -	0.03	-0.01	- -

GAMMA

	tbb	tnm	tcp
att	0.05	- -	- -
sn	- -	0.05	- -
pbc	- -	- -	0.50
tint	- -	- -	- -
pa1	- -	- -	- -

Covariance Matrix of Y and X

	att	sn	pbc	tint	pa1	tbb
att	5.22					
sn	1.18	2.61				
pbc	- -	- -	1.00			
tint	0.92	0.95	0.72	13.10		
pa1	0.00	0.00	0.02	-0.05	0.05	
tbb	81.65	22.81	0.71	16.20	-0.06	1580.16
tnm	23.72	32.44	0.45	13.02	-0.05	459.13
tcp	0.07	0.04	0.00	0.02	0.00	1.42

Covariance Matrix of Y and X

	tnm	tcp
tnm	652.98	
tcp	0.90	0.01

PHI

	tbb	tnm	tcp
tbb	1580.16		
tnm	459.13	652.98	
tcp	1.42	0.90	0.01

PSI
Note: This matrix is diagonal.

att	sn	pbc	tint	pa1
1.00	1.00	1.00	12.20	0.05

Squared Multiple Correlations for Structural Equations

att	sn	pbc	tint	pa1
0.81	0.62	- -	0.07	0.02

Squared Multiple Correlations for Reduced Form

att	sn	pbc	tint	pa1
0.81	0.62	- -	0.02	0.00

Reduced Form

	tbb	tnm	tcp
att	0.05	- -	- -
sn	- -	0.05	- -
pbc	- -	- -	0.50
tint	0.01	0.02	0.36
pa1	0.00	0.00	0.01

TI Physical Activity analysis data

Number of Iterations = 49

LISREL Estimates (Maximum Likelihood)

BETA

	att	sn	pbc	tint	pa1
att	- -	- -	- -	- -	- -
sn	- -	- -	- -	- -	- -
pbc	- -	- -	- -	- -	- -
tint	0.10	0.44	0.38	- -	- -
	(0.03)	(0.09)	(0.08)		
	3.55	4.95	4.91		
pa1	- -	- -	0.00	0.01	- -
			(0.00)	(0.00)	
			-0.57	2.28	

GAMMA

	tbb	tnm	tcp
att	0.14	- -	- -
	(0.01)		
	16.41		
sn	- -	0.08	- -
		(0.01)	
		12.60	
pbc	- -	- -	20.82
			(1.58)
			13.21
tint	- -	- -	- -
pa1	- -	- -	- -

Covariance Matrix of Y and X

	att	sn	pbc	tint	pa1	tbb
att	30.04					
sn	5.25	5.64				
pbc	4.01	1.58	4.38			
tint	6.77	3.58	2.76	15.82		
pa1	0.04	0.02	0.01	0.12	0.05	
tbb	214.21	38.72	29.60	49.21	0.31	1580.16
tnm	62.24	55.07	18.70	37.26	0.24	459.13
tcp	0.19	0.08	0.16	0.11	0.00	1.42

Covariance Matrix of Y and X

	tnm	tcp
tnm	652.98	
tcp	0.90	0.01

PHI

	tbb	tnm	tcp
tbb	1580.16		
tnm	459.13	652.98	
tcp	1.42	0.90	0.01

PSI
Note: This matrix is diagonal.

att	sn	pbc	tint	pa1
1.00	1.00	1.00	12.54	0.05
			(1.03)	(0.00)
			12.16	11.58

Squared Multiple Correlations for Structural Equations

att	sn	pbc	tint	pa1
0.97	0.82	0.77	0.21	0.02

Squared Multiple Correlations for Reduced Form

att	sn	pbc	tint	pa1
0.97	0.82	0.77	0.19	0.00

Reduced Form

	tbb	tnm	tcp
att	0.14	- -	- -
	(0.01)		
	16.41		
sn	- -	0.08	- -
		(0.01)	
		12.60	
pbc	- -	- -	20.82
			(1.58)
			13.21
tint	0.01	0.04	7.99
	(0.00)	(0.01)	(1.51)
	3.66	5.34	5.28
pa1	0.00	0.00	0.01
	(0.00)	(0.00)	(0.09)
	1.93	2.09	0.12

Goodness of Fit Statistics

Degrees of Freedom = 19
Minimum Fit Function Chi-Square = 22.53 (P = 0.26)
Normal Theory Weighted Least Squares Chi-Square = 23.94 (P = 0.20)
Estimated Non-centrality Parameter (NCP) = 4.94
90 Percent Confidence Interval for NCP = (0.0 ; 21.64)

Minimum Fit Function Value = 0.083
Population Discrepancy Function Value (F0) = 0.018
90 Percent Confidence Interval for F0 = (0.0 ; 0.081)
Root Mean Square Error of Approximation (RMSEA) = 0.031
90 Percent Confidence Interval for RMSEA = (0.0 ; 0.065)
P-Value for Test of Close Fit (RMSEA < 0.05) = 0.79

Expected Cross-Validation Index (ECVI) = 0.22
90 Percent Confidence Interval for ECVI = (0.20 ; 0.28)
ECVI for Saturated Model = 0.27
ECVI for Independence Model = 4.51

Chi-Square for Independence Model with 28 Degrees of Freedom = 1192.67
Independence AIC = 1208.67
Model AIC = 57.94
Saturated AIC = 72.00
Independence CAIC = 1245.51
Model CAIC = 136.24
Saturated CAIC = 237.81

Normed Fit Index (NFI) = 0.98
Non-Normed Fit Index (NNFI) = 1.00
Parsimony Normed Fit Index (PNFI) = 0.67
Comparative Fit Index (CFI) = 1.00
Incremental Fit Index (IFI) = 1.00
Relative Fit Index (RFI) = 0.97

Critical N (CN) = 436.30

Root Mean Square Residual (RMR) = 2.24
Standardized RMR = 0.032
Goodness of Fit Index (GFI) = 0.98
Adjusted Goodness of Fit Index (AGFI) = 0.96
Parsimony Goodness of Fit Index (PGFI) = 0.52

TI Physical Activity analysis data

Fitted Covariance Matrix

	att	sn	pbc	tint	pa1	tbb
att	18.43					
sn	5.25	4.94				
pbc	4.01	1.58	2.42			
tint	6.77	3.58	2.76	15.82		
pa1	0.04	0.02	0.01	0.12	0.05	
tbb	86.45	38.72	29.60	49.21	0.31	1580.16
tnm	62.24	33.04	15.04	37.26	0.24	459.13
tcp	0.19	0.08	0.07	0.11	0.00	1.42

Fitted Covariance Matrix

	tnm	tcp
tnm	652.98	
tcp	0.90	0.01

Fitted Residuals

	att	sn	pbc	tint	pa1	tbb
att	-0.12					
sn	0.11	-0.10				
pbc	0.16	0.01	-0.01			
tint	-0.19	-0.36	-0.10	-0.02		
pa1	-0.04	-0.04	-0.01	0.00	0.00	
tbb	-4.81	-6.45	-3.73	3.88	0.45	- -
tnm	-6.47	-0.60	-0.24	6.62	-0.08	- -
tcp	0.01	0.01	0.00	0.02	0.00	- -

Fitted Residuals

	tnm	tcp
tnm	- -	
tcp	- -	- -

```
Summary Statistics for Fitted Residuals

Smallest Fitted Residual =   -6.47
  Median Fitted Residual =    0.00
 Largest Fitted Residual =    6.62

Stemleaf Plot

- 6|54
- 4|8
- 2|7
- 0|64221111000000000000000000
  0|125
  2|9
  4|
  6|6
```

Standardized Residuals

	att	sn	pbc	tint	pa1	tbb
att	-0.16					
sn	0.29	-0.60				
pbc	0.67	0.06	-0.09			
tint	-0.36	-1.39	-0.65	-0.07		
pa1	-0.84	-1.55	-0.83	-0.26	- -	
tbb	-0.53	-1.28	-1.05	0.50	0.92	- -
tnm	-0.97	-0.20	-0.13	1.38	-0.26	- -
tcp	0.37	0.52	0.35	0.82	0.41	- -

Standardized Residuals

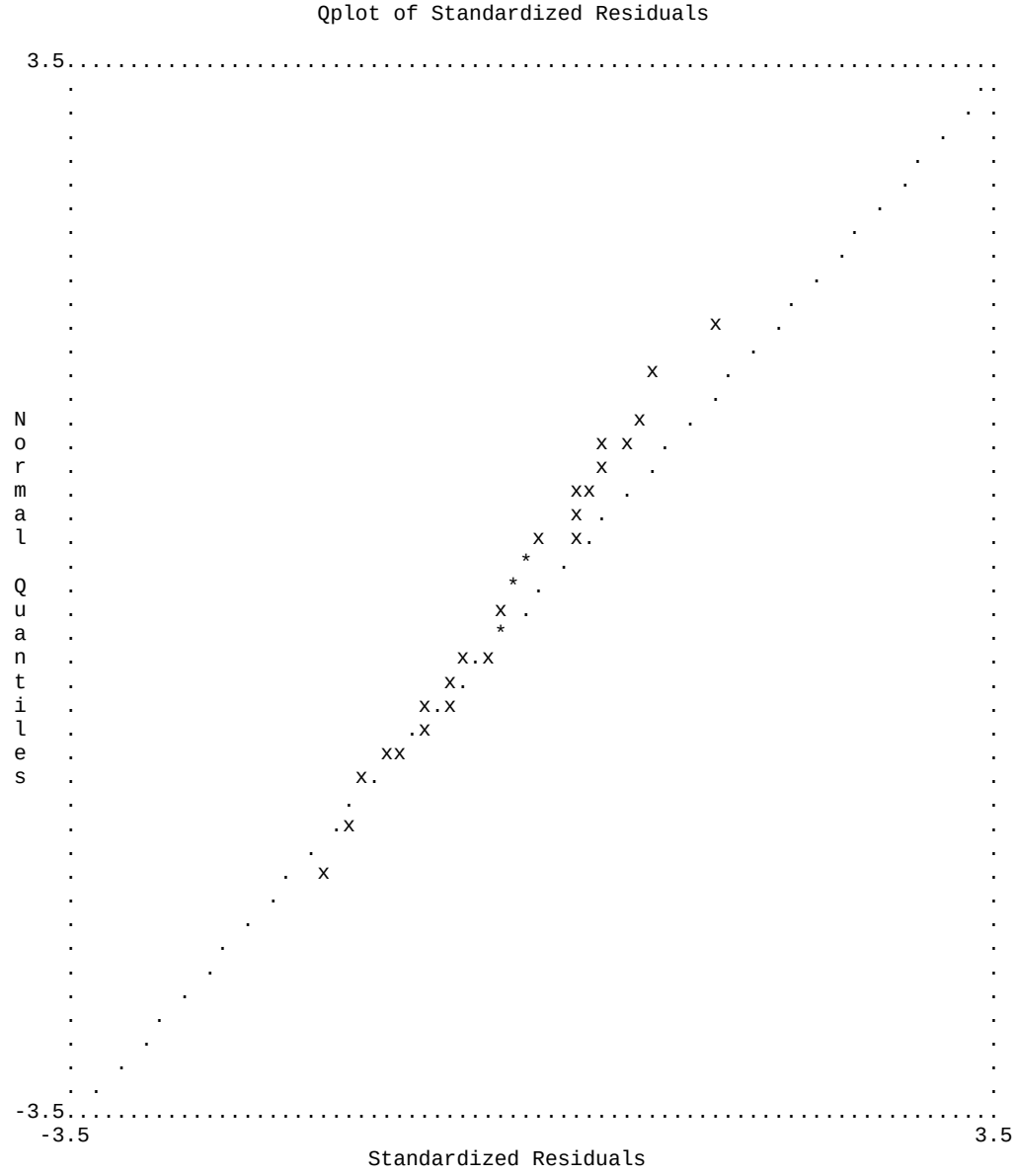
	tnm	tcp
tnm	- -	
tcp	- -	- -

```
Summary Statistics for Standardized Residuals

Smallest Standardized Residual =   -1.55
  Median Standardized Residual =   -0.03
 Largest Standardized Residual =    1.38
Stemleaf Plot

- 1|5
- 1|4310
- 0|88665
- 0|433221110000000
  0|13344
  0|55789
  1|4
```

TI Physical Activity analysis data



TI Physical Activity analysis data

Modification Indices and Expected Change

Modification Indices for BETA

	att	sn	pbc	tint	pa1
att	2.32	0.17	3.02	1.54	0.63
sn	0.06	5.61	0.66	4.93	2.66
pbc	0.01	0.25	0.68	0.52	0.09
tint	- -	- -	- -	- -	1.06
pa1	0.00	1.68	- -	- -	- -

Expected Change for BETA

	att	sn	pbc	tint	pa1
att	-8.16	-0.06	0.20	-0.11	-0.68
sn	0.01	-1.36	0.04	-0.09	-0.79
pbc	0.00	0.02	-0.49	-0.03	-0.17
tint	- -	- -	- -	- -	2.56
pa1	0.00	-0.01	- -	- -	- -

Standardized Expected Change for BETA

	att	sn	pbc	tint	pa1
att	-0.27	0.00	0.02	-0.01	-0.57
sn	0.00	-0.24	0.01	-0.01	-1.52
pbc	0.00	0.00	-0.11	0.00	-0.37
tint	- -	- -	- -	- -	2.95
pa1	0.00	-0.01	- -	- -	- -

Modification Indices for GAMMA

	tbb	tnm	tcp
att	- -	1.10	2.76
sn	0.02	- -	0.93
pbc	0.04	0.38	- -
tint	2.32	5.61	0.74
pa1	0.00	1.24	0.05

Expected Change for GAMMA

	tbb	tnm	tcp
att	- -	-0.01	4.95
sn	0.00	- -	1.26
pbc	0.00	0.00	- -
tint	0.22	0.10	8.32
pa1	0.00	0.00	0.12

Standardized Expected Change for GAMMA

	tbb	tnm	tcp
att	- -	-0.07	0.08
sn	0.01	- -	0.05
pbc	-0.01	0.04	- -
tint	2.17	0.64	0.18
pa1	0.00	-0.06	0.05

Modification Indices for PHI

	tbb	tnm	tcp
tbb	- -		
tnm	- -	- -	
tcp	0.10	0.54	0.30

Expected Change for PHI

	tbb	tnm	tcp
tbb	- -		
tnm	- -	- -	
tcp	0.03	0.06	0.00

Standardized Expected Change for PHI

	tbb	tnm	tcp
tbb	- -		
tnm	- -	- -	
tcp	0.01	0.03	-0.03

Modification Indices for PSI

	att	sn	pbc	tint	pa1
att	2.32				
sn	2.13	5.61			
pbc	1.40	0.03	0.68		
tint	2.32	5.61	0.74	- -	
pa1	0.46	2.00	0.05	1.06	- -

Expected Change for PSI

	att	sn	pbc	tint	pa1
att	-16.32				
sn	0.60	-2.71			
pbc	0.38	0.03	-0.99		
tint	-1.60	-1.18	-0.40	- -	
pa1	-0.03	-0.03	-0.01	0.12	- -

Standardized Expected Change for PSI

	att	sn	pbc	tint	pa1
att	-0.54				
sn	0.05	-0.48			
pbc	0.03	0.01	-0.23		
tint	-0.07	-0.13	-0.05	- -	
pa1	-0.02	-0.06	-0.01	0.14	- -

Modification Indices for THETA-EPS

	att	sn	pbc	tint	pa1
att	- -				
sn	3.51	- -			
pbc	1.87	0.30	- -		
tint	1.82	4.33	0.64	1.06	
pa1	0.49	2.10	0.10	1.06	- -

Expected Change for THETA-EPS

	att	sn	pbc	tint	pa1
att	- -				
sn	0.75	- -			
pbc	0.43	0.08	- -		
tint	-1.39	-1.02	-0.37	-15.47	
pa1	-0.03	-0.03	-0.01	0.12	- -

Modification Indices for THETA-DELTA-EPS

	att	sn	pbc	tint	pa1
tbb	- -	4.34	2.74	1.13	2.05
tnm	5.78	- -	- -	5.03	0.02
tcp	0.12	0.30	- -	0.39	0.33

Expected Change for THETA-DELTA-EPS

	att	sn	pbc	tint	pa1
tbb	- -	-7.25	-4.14	7.83	0.61
tnm	-9.72	- -	- -	10.18	0.03
tcp	0.00	0.00	- -	0.01	0.00

Modification Indices for THETA-DELTA

	tbb	tnm	tcp
tbb	- -		
tnm	0.92	0.26	
tcp	0.05	0.14	0.31

Expected Change for THETA-DELTA

	tbb	tnm	tcp
tbb	- -		
tnm	37.15	18.85	
tcp	0.03	-0.03	0.00

Maximum Modification Index is 5.78 for Element (2, 1) of THETA DELTA-EPSILON

Covariance Matrix of Parameter Estimates

	BE 4,1	BE 4,2	BE 4,3	BE 5,3	BE 5,4	GA 1,1
BE 4,1	0.00					
BE 4,2	0.00	0.01				
BE 4,3	0.00	0.00	0.01			
BE 5,3	0.00	0.00	0.00	0.00		
BE 5,4	0.00	0.00	0.00	0.00	0.00	
GA 1,1	0.00	0.00	0.00	0.00	0.00	0.00
GA 2,2	0.00	0.00	0.00	0.00	0.00	0.00
GA 3,3	0.01	0.00	-0.05	0.00	0.00	0.00
PS 4,4	0.00	0.00	0.01	0.00	0.00	0.00
PS 5,5	0.00	0.00	0.00	0.00	0.00	0.00
TE 1,1	0.02	-0.01	-0.02	0.00	0.00	-0.02
TE 2,2	0.00	0.02	0.00	0.00	0.00	0.00
TE 3,3	0.00	0.00	0.01	0.00	0.00	0.00
TH 1,1	0.08	-0.06	-0.12	0.00	0.00	-0.07
TH 2,2	-0.02	0.13	-0.01	0.00	0.00	0.00
TH 2,3	-0.01	0.01	0.02	0.00	0.00	0.00
TH 3,3	0.00	0.00	0.00	0.00	0.00	0.00

Covariance Matrix of Parameter Estimates

	GA 2,2	GA 3,3	PS 4,4	PS 5,5	TE 1,1	TE 2,2
GA 2,2	0.00					
GA 3,3	0.00	2.48				
PS 4,4	0.00	0.12	1.06			
PS 5,5	0.00	0.00	0.00	0.00		
TE 1,1	0.00	-0.07	-0.01	0.00	6.35	
TE 2,2	0.00	-0.12	-0.04	0.00	-0.03	0.29
TE 3,3	0.00	-0.57	-0.03	0.00	-0.07	0.03
TH 1,1	0.00	0.84	0.02	0.00	22.97	-0.35
TH 2,2	-0.02	-0.85	-0.29	0.00	-0.76	1.57
TH 2,3	0.00	-0.37	-0.03	0.00	-0.94	0.02
TH 3,3	0.00	-0.01	0.00	0.00	0.00	0.00

Covariance Matrix of Parameter Estimates

	TE 3,3	TH 1,1	TH 2,2	TH 2,3	TH 3,3
TE 3,3	0.15				
TH 1,1	-0.57	117.84			
TH 2,2	0.20	-4.59	12.40		
TH 2,3	0.09	-4.26	0.59	2.01	
TH 3,3	0.00	-0.02	0.01	0.00	0.00

TI Physical Activity analysis data

Correlation Matrix of Parameter Estimates

	BE 4,1	BE 4,2	BE 4,3	BE 5,3	BE 5,4	GA 1,1
BE 4,1	1.00					
BE 4,2	-0.19	1.00				
BE 4,3	-0.07	-0.21	1.00			
BE 5,3	0.01	0.00	-0.02	1.00		
BE 5,4	0.00	0.00	-0.01	-0.22	1.00	
GA 1,1	-0.24	0.03	0.07	0.00	0.00	1.00
GA 2,2	0.13	-0.38	0.02	0.01	0.00	0.11
GA 3,3	0.21	0.03	-0.37	0.05	-0.02	0.11
PS 4,4	0.06	0.01	0.15	0.00	0.00	0.02
PS 5,5	0.00	0.00	0.00	-0.03	0.01	0.00
TE 1,1	0.28	-0.06	-0.12	0.00	0.00	-0.95
TE 2,2	-0.17	0.43	-0.04	-0.01	0.00	-0.03
TE 3,3	-0.24	-0.04	0.45	-0.06	0.02	-0.03
TH 1,1	0.28	-0.06	-0.14	0.01	0.00	-0.83
TH 2,2	-0.20	0.42	-0.02	-0.01	0.00	0.02
TH 2,3	-0.19	0.09	0.15	-0.01	0.00	0.21
TH 3,3	-0.25	-0.04	0.43	-0.06	0.02	0.02

Correlation Matrix of Parameter Estimates

	GA 2,2	GA 3,3	PS 4,4	PS 5,5	TE 1,1	TE 2,2
GA 2,2	1.00					
GA 3,3	0.17	1.00				
PS 4,4	0.08	0.08	1.00			
PS 5,5	0.00	0.00	0.00	1.00		
TE 1,1	-0.06	-0.02	-0.01	0.00	1.00	
TE 2,2	-0.86	-0.14	-0.08	0.00	-0.03	1.00
TE 3,3	-0.15	-0.94	-0.07	0.00	-0.07	0.13
TH 1,1	-0.02	0.05	0.00	0.00	0.84	-0.06
TH 2,2	-0.79	-0.15	-0.08	0.00	-0.09	0.83
TH 2,3	0.01	-0.16	-0.02	0.00	-0.26	0.03
TH 3,3	-0.13	-0.85	-0.06	0.00	-0.13	0.12

Correlation Matrix of Parameter Estimates

	TE 3,3	TH 1,1	TH 2,2	TH 2,3	TH 3,3
TE 3,3	1.00				
TH 1,1	-0.14	1.00			
TH 2,2	0.15	-0.12	1.00		
TH 2,3	0.16	-0.28	0.12	1.00	
TH 3,3	0.88	-0.18	0.14	0.23	1.00

TI Physical Activity analysis data

Covariances

TI Physical Activity analysis data

Factor Scores Regressions

Y

	att	sn	pbc	tint	pa1	tbb
att	2.19	-0.65	-1.79	-0.06	-0.28	0.11
sn	-0.13	1.02	0.06	-0.05	0.01	-0.01
pbc	-0.29	-0.17	2.31	-0.14	0.30	-0.02
tint	0.00	0.00	0.00	1.00	0.00	0.00
pa1	0.00	0.00	0.00	0.00	1.00	0.00

Y

	tnm	tcp
att	-0.09	-15.60
sn	0.05	-1.66
pbc	0.01	12.54
tint	0.00	0.00
pa1	0.00	0.00

X

	att	sn	pbc	tint	pa1	tbb
tbb	15.28	-4.51	-12.46	-0.45	-1.93	0.80
tnm	-1.13	7.86	1.71	-0.77	0.25	-0.06
tcp	-0.01	-0.01	0.07	-0.01	0.01	0.00

X

	tnm	tcp
tbb	-0.63	-108.69
tnm	0.78	-15.69
tcp	0.00	0.74

TI Physical Activity analysis data

Standardized Solution

BETA

	att	sn	pbc	tint	pa1
att	- -	- -	- -	- -	- -
sn	- -	- -	- -	- -	- -
pbc	- -	- -	- -	- -	- -
tint	0.14	0.26	0.20	- -	- -
pa1	- -	- -	-0.02	0.14	- -

GAMMA

	tbb	tnm	tcp
att	0.98	- -	- -
sn	- -	0.91	- -
pbc	- -	- -	0.88
tint	- -	- -	- -
pa1	- -	- -	- -

Correlation Matrix of Y and X

	att	sn	pbc	tint	pa1	tbb
att	1.00					
sn	0.40	1.00				
pbc	0.35	0.32	1.00			
tint	0.31	0.38	0.33	1.00		
pa1	0.04	0.05	0.02	0.13	1.00	
tbb	0.98	0.41	0.36	0.31	0.04	1.00
tnm	0.44	0.91	0.35	0.37	0.04	0.45
tcp	0.40	0.36	0.88	0.33	0.03	0.41

Correlation Matrix of Y and X

	tnm	tcp
tnm	1.00	
tcp	0.40	1.00

PSI
Note: This matrix is diagonal.

att	sn	pbc	tint	pa1
0.03	0.18	0.23	0.79	0.98

Regression Matrix Y on X (Standardized)

	tbb	tnm	tcp
att	0.98	- -	- -
sn	- -	0.91	- -
pbc	- -	- -	0.88
tint	0.13	0.24	0.18
pa1	0.02	0.03	0.00

TI Physical Activity analysis data
Total and Indirect Effects

Total Effects of X on Y

	tbb	tnm	tcp
att	0.14	- -	- -
	(0.01)		
	16.41		
sn	- -	0.08	- -
		(0.01)	
		12.60	
pbc	- -	- -	20.82
			(1.58)
			13.21
tint	0.01	0.04	7.99
	(0.00)	(0.01)	(1.51)
	3.66	5.34	5.28
pa1	0.00	0.00	0.01
	(0.00)	(0.00)	(0.09)
	1.93	2.09	0.12

Indirect Effects of X on Y

	tbb	tnm	tcp
att	- -	- -	- -
sn	- -	- -	- -
pbc	- -	- -	- -
tint	0.01	0.04	7.99
	(0.00)	(0.01)	(1.51)
	3.66	5.34	5.28
pa1	0.00	0.00	0.01
	(0.00)	(0.00)	(0.09)
	1.93	2.09	0.12

Total Effects of Y on Y

	att	sn	pbc	tint	pa1
att	- -	- -	- -	- -	- -
sn	- -	- -	- -	- -	- -
pbc	- -	- -	- -	- -	- -

	att	sn	pbc	tint	pa1
tint	0.10	0.44	0.38	- -	- -
	(0.03)	(0.09)	(0.08)		
	3.55	4.95	4.91		
pa1	0.00	0.00	0.00	0.01	- -
	(0.00)	(0.00)	(0.00)	(0.00)	
	1.91	2.07	0.12	2.28	

Largest Eigenvalue of B*B' (Stability Index) is 0.347

Indirect Effects of Y on Y

	att	sn	pbc	tint	pa1
att	- -	- -	- -	- -	- -
sn	- -	- -	- -	- -	- -
pbc	- -	- -	- -	- -	- -
tint	- -	- -	- -	- -	- -
pa1	0.00	0.00	0.00	- -	- -
	(0.00)	(0.00)	(0.00)		
	1.91	2.07	2.07		

TI Physical Activity analysis data

Standardized Total and Indirect Effects

Standardized Total Effects of X on Y

	tbb	tnm	tcp
att	0.98	- -	- -
sn	- -	0.91	- -
pbc	- -	- -	0.88
tint	0.13	0.24	0.18
pa1	0.02	0.03	0.00

Standardized Indirect Effects of X on Y

	tbb	tnm	tcp
att	- -	- -	- -
sn	- -	- -	- -
pbc	- -	- -	- -
tint	0.13	0.24	0.18
pa1	0.02	0.03	0.00

Standardized Total Effects of Y on Y

	att	sn	pbc	tint	pa1
att	- -	- -	- -	- -	- -
sn	- -	- -	- -	- -	- -
pbc	- -	- -	- -	- -	- -
tint	0.14	0.26	0.20	- -	- -
pa1	0.02	0.04	0.01	0.14	- -

Standardized Indirect Effects of Y on Y

	att	sn	pbc	tint	pa1
att	- -	- -	- -	- -	- -
sn	- -	- -	- -	- -	- -
pbc	- -	- -	- -	- -	- -
tint	- -	- -	- -	- -	- -
pa1	0.02	0.04	0.03	- -	- -

Time used: 0.047 Seconds

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