Using Theory of Planned Behavior to Predict Physical Activity Intention among Pregnant Thais

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Abstract: The purpose of this descriptive, cross-sectional design, using the Theory of Planned Behavior, was to examine factors influencing physical activity intention of pregnant Thais during their second trimester. Theoretical relationships among attitude, subjective norms, perceived behavioral control and physical activity intention were examined via path analysis.

Purposive random sampling was employed to recruit 272 pregnant Thais who were attending one of two selected antenatal clinics in northern Thailand. Two instruments were used to collect data, including: the Demographic Data Questionnaire; and, a modified version of the Theory of Planned Behavior Questionnaire.

The proposed model showed a goodness of fit with the empirical data. The results supported the theoretical propositions and hypotheses. Indirect attitude, indirect subjective norms and indirect perceived behavioral control had significant positive direct influence on attitude toward physical activity, subjective norms and perceived behavioral control, respectively. The indirect measures had a positive indirect influence on the subjects' physical activity intention via attitude toward physical activity, subjective norms and perceived behavioral control. The subjects' attitude toward physical activity, subjective norms and perceived behavioral control had a positive direct influence on their physical activity intention. In addition, the modified model explained 21% (R^2 = 0.21) of the variance with respect to intention.

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Introduction

Physical activity is a varied, unstable and complex behavior that is classified by the context in which it occurs (i.e. leisure time, occupation, housework or transportation).[1,2] Since lack of physical activity has been recognized as leading to a risk for global mortality, regular physical activity has been recommended by the Centers for Disease Control and

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Prevention and the American College of Sports Medicine (CDC-ACSM).[3] Regular physical activity not only establishes a range of physical and mental health benefits, but also reduces the risk of some chronic illnesses, i.e. diabetes mellitus, hypertension, cardiovascular diseases, obesity and depression.[4-6] Despite recognizing the benefits of participation, many women, including those who are pregnant, fail to engage in a sufficient amount of physical activity.[7-9]

Among Thais, physical activity participation increased from 21.3%, in 1987, to 30.7%, in 1999, but decreased to 24.2%, in 2001.[10] In 2007, less than 30% of Thais were found to participate in physical activity,[11] with only 23.04% of women, in Bangkok, taking part in physical exercise.[12] In addition, the prevalence rate of females, 11 years of age and older, participating in physical exercise reportedly increased from 25.4 %, in 2004, to 26.7%, in 2007, but decreased to 25.0%, in 2011.[13]

Review of Literature

Pregnancy has been recognized as a unique time for anatomical and physiological changes, and viewed as a state of confinement during which a woman often is encouraged not to engage in physical activities, due to concerns that exercise-induced injuries may precipitate adverse maternal and fetal outcomes.[3,14] Thus, among pregnant women who are physically active, performance of physical activity seems lower with respect to duration, frequency and intensity when compared with their respective pre-pregnancy levels.[15] In this regard, Rutkowska and Lepecka-Klusek[16] found most Polish women, prior to pregnancy, willingly spent their free time in active recreational activities, but significantly reduced their physical activity during pregnancy. In addition, Ning et.al.[8] found that up to 23% of previously active American women discontinued participation in exercise during pregnancy. Clarke, et al.[17] also found that the mean of self-reported daily activity level of pregnant British women, between 16 to 34 weeks gestation, significantly declined. Similarly, the physical activity levels of pregnant women, in the UK, have been found to decrease significantly from the second to third trimester.[9] Within Thailand, the proportion of pregnant women who are sedentary appears to be similar to those in Western countries, with only 58% of pregnant Thais, in a major hospital in Bangkok, reporting participation in physical exercise while pregnant.[18]

However, prior studies have confirmed that physical activity during pregnancy is safe and beneficial for most women.[3,19,20] Thus, the CDC-ACSM has recommended that pregnant women, who do not have obstetric or medical problems, engage in a daily accumulation of 30 minutes or more of moderately intensity physical activity, and that those who have been inactive before pregnancy follow a gradual progression of up to 30 minutes of daily physical activity.[3]

The benefits associated with physical activity during pregnancy have been shown to include a(an): greater sense of well-being;[21,22] improvement in self-image and self-esteem;[23, 24] increase in energy;[25] improvement in sleep;[21] decrease in depression;[23,24] decrease in backaches;[22,25] sustainment in weight control;[25] improvement in appearance and posture;[21, 24] enhancement in strength and endurance;[21,25] and, shortened length of labor.[21] Furthermore, prior studies have reported physical activity during pregnancy, especially among obese women: reduces the risk of gestational diabetes mellitus;[26,27] improves glycemic control associated with gestational diabetes mellitus;[15, 25] and, reduces the risk of hypertension and preterm delivery.[28,29]

Numerous factors are known to be associated with discontinuing or declining physical activity during pregnancy, including: physical limitations;[22,30] fear of harming self and the fetus;[31] lack of motivation;[30] tiredness and fatigue;[30,31] time limitation;[30,31] caring

for other children;[31] and, inclement weather.[30] Furthermore, many female Thais believe that some activities (i.e. lifting heavy objects or doing farm work) are harmful to one's pregnancy. Since driving is seen as placing exertion on the fetus, they also believe that driving a car while pregnant may lead to a miscarriage.[32]

Thus, one's participation in regular physical activity, as part of daily life, seems to be dependent on various personal and social factors. Therefore, it appears essential to gain an understanding of pregnant women's thoughts, feelings and beliefs regarding all aspects of physical activity, especially during their second trimester of pregnancy. Such an understanding is necessary so as to facilitate development of effective programs and interventions to increase pregnant women's physical activity.

Various theories have been utilized when examining factors that influence one's physical activity behavior.[33-36] One such theory, which has been used in prior investigations of women's physical activity intentions and behaviors,[35,36] is the Theory of Planned Behavior (TPB).[37-39] The TPB is based on people's intentions to perform or not perform a behavior and postulates three conceptually independent determinants (predictors) of intention: attitude toward the behavior; subjective norm; and, perceived behavioral control. In addition, attitude, subjective norm and perceived behavioral control have been recognized as antecedents of behavioral intention.

According to the TPB,[37-39] attitude toward a behavior is: the degree to which a person has a favorable or unfavorable evaluation of a behavior; determined by one's beliefs about outcomes of behavior; and, multiplied by corresponding evaluations of those beliefs. On the other hand, subjective norm refers to a person's perception that another person or persons want the performance or nonperformance of a specific behavior carried out. Additionally, one's subjective norm is believed to be determined by his/her normative beliefs, whether important referent individuals approve or disapprove of performance of the behavior, and the person's motivation to comply with those referents. The third predictor of intention, perceived behavioral control, has been defined as a person's perception of the ease or difficulty of performing the behavior of interest. This intention is believed to be determined by control beliefs regarding the presence or absence of facilitations and barriers to behavioral performance, and weighted by the perceived power or impact of each factor to facilitate or inhibit the behavior.

In addition, intention is assumed to be the immediate antecedent of behavior and refers to an individual's subjective likelihood of engaging in a given behavior. 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.[40] In this respect, measurement of behavior should include four elements: action, target, context and time. However, intention can: alter over time; be taken prior to the observation of a behavior; and, differ from the intention at the time the behavior was observed. The longer the interval of time, between measurement of intention and observation of behavior, the less accurate the prediction of behavior. Consequently, the main TPB propositions are that people will: intend to perform a behavior when they evaluate it positively (attitude); believe that significant others want them to participate in the behavior (subjective norms); and, perceive the behavior to be under their control (perceived behavioral control).[37-39]

Although the TPB has been tested among pregnant Western women, and the literature clearly explains physical activity,[35,36] a lack of knowledge exists regarding explanation of physical activity intention among Thai pregnant women. Thus, this study was conducted to determine the capability of the TPB constructs (i.e. attitude toward physical activity,

subjective norms and perceived behavioral control) to predict physical activity intention among pregnant Thais during their second trimester of pregnancy. Based on this conceptual framework, it was hypothesized that: all indirect measures (indirect attitude, indirect subjective norms and indirect perceived behavioral control) have significantly positive direct influence on attitude toward physical activity, subjective norms and perceived behavioral control, respectively; all indirect measures (indirect attitude, indirect subjective norms and indirect perceived behavioral control) have positive indirect influence on physical activity intention, via attitude toward physical activity, subjective norms, and perceived behavioral control, respectively; and, attitude toward physical activity, subjective norms and perceived behavioral control have positive direct influence on physical activity intention.

Method

Design: A descriptive, cross-sectional, survey design was used.

Ethical considerations: Permission to conduct the study was obtained from the Institutional Ethics Review Boards of Mahidol University and Chiang Mai University, as well as the Directors of the two hospitals used as study sites. Potential subjects received information regarding: the purpose of the study; anonymity and confidentiality issues; what participation in the study would entail; the right to refuse participation or withdraw from the study at any time; and, the lack of risks during participation. Subjects consenting to take part in the study were requested to sign a consent form. Confidentiality of the respondents' answers was assured via use of code numbers on the questionnaires, as well as all responses being analyzed as group data without identification of individual responses.

Setting: The antenatal clinics of two hospitals, in northern Thailand, provided the setting for the study. The hospitals were selected because they provide obstetrical care, on an annual basis, to a large number of pregnant Thais.

Sample: The sample size was calculated based on the number of subjects related to the number of independent variables in the model. Since the hypothesized model had seven variables, a sample of at least 210 was required. Due to potential attrition of subjects, the sample size was increased by 20%, resulting in a sample size of at least 252. All subjects were obtained through purposive random sampling. After consent to conduct the study was granted, the names of potential subjects were obtained from the head nurses of the two selected antenatal clinics. Inclusion criteria were healthy pregnant Thais, who were 18 years of age or older and had a gestational age of 16 to 25 weeks. The sample consisted of 272 pregnant Thais, in their second trimester. As shown in **Table 1**, the majority of women: were 21 - 30 years of age (mean = 27.51 years); were married; had either a secondary or high school education; had a family income of 10,000 to 19,999 baht per month; were employees outside their home; were experiencing their first pregnancy; had a gestational age of 15- 20 weeks; and, did not have other children.

Instruments: Data were obtained via: a Demographic Data Questionnaire and a modified version of Ajen's Theory of Planned Behavior Questionnaire.[38] The Demographic Data Questionnaire, developed by the primary investigator (PI), requested information about each subject's: age; marital status; level of education; monthly family income; occupation; gravida; gestational age; and, number of children.

Table 1 Demographic Characteristics (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		
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's degree	92	33.80
Master's degree	7	2.60
Family income (per month)		
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	0.40
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
Number of children		
0	173	63.60
1	92	33.80
2	7	2.60

A modified version of Ajen's Planned Behavior Questionnaire,[38] developed by the PI, was used to predict physical activity intention among the women. Modifications to the original questionnaire were based upon the outcomes of seven focus group discussions involving 52 pregnant Thais. Each focus group addressed: salient behavioral, normative and control beliefs; attitude toward physical activity; subjective norms; perceived behavioral control; and, intention to engage in physical activity during pregnancy. The results of the focus group lead to creation of a 132-item questionnaire that consisted of four major constructs, including: attitude toward physical activity (25 behavioral beliefs & 25 outcomes indirect measure items, and 11 direct measure items); subjective norm (7 normative beliefs & 7 motivation to comply indirect measure items, and 2 direct measure items); perceived behavioral control (20 control beliefs & 20 perceived power indirect measures items and 3 direct measure items); and, intention (12 items). Content validity of the questionnaire was evaluated by a panel of seven experts (three nurse educators, one obstetrician and one physician specializing in physical activity, and two educators knowledgeable about the TPB and physical activity). The computed content validity index ranged from 0.61 to 0.97. Based upon the experts' evaluations, items that were unclear were eliminated (i.e., "Walking helps me meet new friends") or reworded/expanded to improve clarity of content (i.e., "Walking every day helps with good digestion" and "Walking every day helps with normal defecation" were combined into "Walking every day helps with normal digestion and defecation."). After revisions were made, the questionnaire consisted of a total of 90 items within the four constructs, including: attitude toward physical activity (12 behavioral beliefs & 12 outcomes indirect measure items, and 9 direct measure items); subjective norm (6 normative beliefs & 6 motivation to comply indirect measure items, and 4 direct measure items); perceived behavioral control (15 control beliefs & 15 perceived power indirect measure items, and 3 direct measure items); and, intention (8 items).

The revised, modified, version of the Theory of Planned Behavior Questionnaire was pilot-tested with 34 pregnant Thais who were similar to the study subjects. All components of the instrument had good reliabilities, with Cronbach's alpha coefficients ranging from 0.68 to 0.92. The revised, modified, questionnaire, used in the study, consisted of the following 4 constructs:

1. Attitude toward physical activity behavior, which was measured both indirectly and directly. Indirect attitude was assessed in terms of two aspects: 12 behavioral beliefs about physical activity (i.e., "Doing physical activity every day makes me healthy.") and, 12 corresponding outcome evaluations of physical activity (i.e., "A healthy consequence of doing physical activity every day, during pregnancy, is..."). The belief items had possible responses ranging from 1 = "very unlikely" to 5 = "very likely," while the corresponding evaluation outcome items had possible responses ranging from 1 = "very unimportant" to 5 = "very important." The score for the assessment of indirect attitude was calculated by multiplying the numerical value of each of the behavioral beliefs items by the numerical value of its corresponding outcome evaluation item, and then summing the multiplied scores across all items. Total scores could range from 12 to 300, with higher scores indicating positive beliefs and outcome evaluations with regard to physical activity during pregnancy. Direct attitude toward physical activity (i.e., "Doing physical activity is...." was assessed via 9 items that consisted of bipolar-adjective pairs (i.e. unpleasant-pleasant, harmful-beneficial, bad-good, unhealthy-healthy). Each item was assessed using a 5-point semantic differential response range (i.e. 1 = "extremely negative direction" to 5 = "extremely positive direction"). A total score for direct attitude, ranging from 9 to 45, was obtained by summing

across all items. Higher scores indicated a more positive attitude toward physical activity during pregnancy.

2. Subjective norms, which were measured both indirectly and directly. Indirect subjective norms were assessed in terms of two components: six normative beliefs (i.e., "My husband thinks I should perform physical activity during pregnancy."); and, six motivations to comply (i.e., "If my husband wants me to perform physical activity, I will comply with his opinion to this extent."). Subjects were asked to rate their perceptions of the strength of significant others beliefs (husband, parents, relatives, friends and physicians/nurses) regarding whether they should perform physical activity during pregnancy, and their motivation to comply with these significant referents. Possible responses for the normative beliefs items ranged from 1 = "definitely not true" to 5 = "definitely true", while possible responses for the motivations to comply items ranged from 1 = "not at all" to 5 = "very much." To obtain a score for the indirect subjective norm, the numerical value of each normative belief item was multiplied by the numerical value of its corresponding motivation to comply item, and then the multiplied scores across all items were summed. Total scores could range from 6 to 150, with higher scores reflecting greater influence by significant others regarding whether women should perform physical activity during pregnancy, and their motivation to comply with these significant referents. Direct subjective norms were measured via four items which assessed the influence of significant others on the pregnant woman's performance of physical activity. (i.e., "Family members, such as my husband, parents, sister, brother and relatives, think I should perform physical activity during pregnancy."). Each item had possible responses ranging from 1 = "strongly disagree" to 5 = "strongly agree." A total score, which could range from 4 to 20, was obtained by summing the numerical responses across all items. Higher scores indicated greater influence of significant others on the woman's performance of physical activity during pregnancy.

3. Perceived behavioral control, which was measured both indirectly and directly. Indirect perceived behavioral control was assessed in regards to two aspects: control beliefs (15 items; i.e., "Because of hearing about exercise from the media, I will find performing a physical activity....") and, perceived power (15 items; i.e., " If I hear about exercise from media, the likelihood that I will perform physical activity will be...."). Each control belief item had possible responses ranging from 1 = "very difficult" to 5 = "very easy," while each perceived power item had possible responses ranging from 1 = "very unlikely" to 5 = "very likely." Eight of the items were stated negatively and, thus, required reverse scoring prior to calculation of the total score. Calculation of the total score for the indirect perceived behavioral control items, which could range from 15 to 375, involved multiplication of the numerical score for each control belief item by its corresponding perceived power item, and then summing the multiplied scores across all items. Higher total scores suggested greater perceived behavioral control over performing physical activity during pregnancy. Direct perceived behavioral control was measured by three items that focused on control over performing physical activity during pregnancy (i.e., "For me, to perform physical activity during pregnancy would be...; and "If I wanted to, I could easily perform physical activity during pregnancy.") Possible responses to the items, depending upon how the item was stated, ranged from 1 = "very difficult" to 5 = "very easy" or 1 = "strongly disagree" to 5 = "strongly agree." Calculation of the total score for direct perceived behavioral control, which could range from 3 to 15, was obtained by summing the response values across the three items. Higher scores indicated higher perceived behavioral control over performing physical activity during pregnancy.

4. Intention, which was determined by eight items that focused on one's intent to perform specific activities during pregnancy. The items addressed household/caregiving, transportation, exercise and occupation (i.e., "I intend to engage in physical activity while I am doing housework or caregiving in the forthcoming month", and "I will try to engage in physical activity while I am doing housework or caregiving in the forthcoming month."). Each item, depending upon how it was stated, had possible responses ranging from 1 = "definitely do not" to 5 = "definitely do" or 1 = "definitely not true" to 5 = "definitely true." The total score for intention, which could range from 8 to 40, was calculated by summing the response values across the eight items. Higher scores indicated greater intention to perform specific physical activities during pregnancy.

Procedure: Women meeting the inclusion criteria and consenting to participate in the study were instructed about and then administered, by the PI, the Demographic Data Questionnaire and the modified Theory of Planned Behavior Questionnaire. Information concerning gravida and gestational age were obtained, by the PI, from the subjects' medical records. Both questionnaires were administered, which took approximately 30 minutes, while the women were waiting to be seen, in the antenatal clinics, by their respective physician. The PI was available, at all times, to respond to questions the subjects had about responding to each questionnaire. Upon completion of the questionnaires, they were retrieved by the PI who then checked them for completeness. Incomplete questionnaires were excluded from the study. In keeping with Thai traditions, all subjects received a small gift (container of baby powder) as a token of appreciation.

Data analysis: Descriptive statistics were performed to assess the subjects' demographic characteristics and to calculate scores on the various components of the modified version of the TPB. Pearson's Product Moment correlation was used to determine relationships among the variables. The Linear Structural Relationship program (LISREL) was used to perform preliminary analysis and principle analysis for model testing. Path analysis was performed to test the causal relationships among the variables, within the revised modified TPB model, predicting physical activity intention.

Results

Correlation coefficients for the variables measured are shown in **Table 2.** All direct measures (attitude toward physical activity, subjective norms and perceived behavioral control) were found to be positively correlated with intention to perform physical activity. Similarly, all indirect measures (indirect attitude, indirect subjective norms and indirect perceived behavioral control) were found to be positively correlated with intention to perform physical activity. Positive correlations were found between: indirect attitude and attitude toward physical activity; indirect subjective norms and subjective norms; and, indirect perceived behavioral control and perceived behavioral control. The modified TPB causal model was tested and revised until a theoretically meaningful and statistically acceptable model was fitted to predict physical activity intention.

Data testing met the theoretical and statistical assumptions for path analysis. As shown in **Figure 1**, path analysis validated the causal model of physical activity intention, while LISREL revealed a significant fit with a chi-square. The final model showed that all goodness-of-fit indices of physical activity intention, predicted by the modified TPB model, concurred with the empirical data. As shown in **Table 3**, the findings indicated that indirect attitude (TBB), indirect subjective norms (TNM), and indirect perceived behavioral control (TCP) had significant positive direct influence on attitude toward physical activity,

subjective norms and perceived behavioral control, respectively. Additionally, attitude toward physical activity, subjective norms and perceived behavioral control had significantly positive direct influence on intention.

Table 2 Correlation Matrix of the Study Variables (n = 272)

Variables	*TBB*	*TNM*	*TCP*	*ATT*	*SN*	*PBC*	*INT*
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	
INT	.336**	.432**	.368**	.387**	.368**	.431**	1.000

Note: *p ≤ 0.05; **p ≤ 0.01

TBB = Indirect attitude (behavioral beliefs x outcome evaluations); TNM = Indirect subjective norms (normative beliefs x motivation to comply); TCP = Indirect perceived behavioral control (control beliefs x perceived powers); ATT = Attitude toward physical activity; SN = Subjective norms; PBC = Perceived behavioral control; INT = Intention

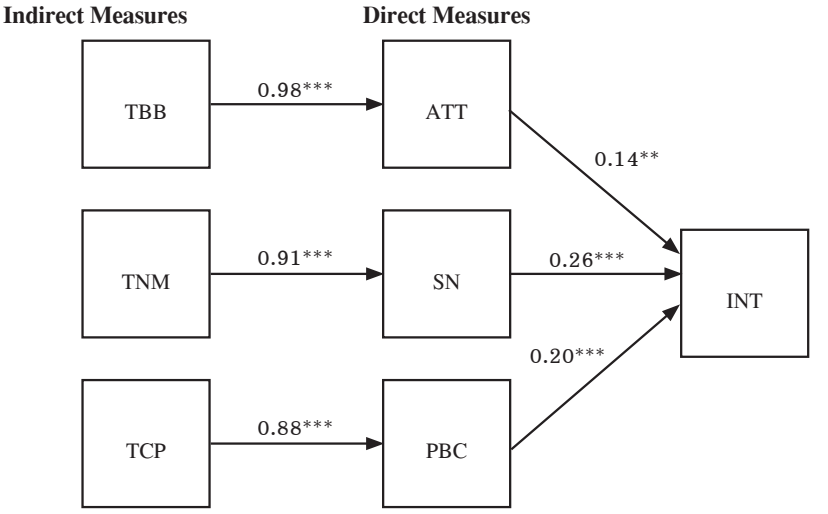

Figure 1 Modified Model of Pregant Thais Physical Activity during the 2nd Trimester

Note: **$p \leq .01$; ***$p \leq .001$

TBB = Indirect attitude (behavioral beliefs x outcome evaluations); TNM = Indirect subjective norms (normative beliefs x motivation to comply); TCP = Indirect perceived behavioral control (control beliefs x perceived powers); ATT = Attitude toward physical activity; SN = Subjective norms; PBC = Perceived behavioral control; INT = Intention

Table 3 Effects Decomposition of Predictive Factors in the Modified Model (n= 272)

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

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

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

TBB = Indirect attitude (behavioral beliefs x outcome evaluations); TNM = Indirect subjective norms (normative beliefs x motivation to comply); TCP = Indirect perceived behavioral control (control beliefs x perceived powers);

ATT = Attitude toward physical activity; SN = Subjective norms; PBC = Perceived behavioral control; INT = Intention

Among three indirect measures (indirect attitude, indirect subjective norms and indirect perceived behavioral control), three paths indicated indirect relationships between the causal variables and intention, via attitude toward physical activity, subjective norms and perceived behavioral control, respectively. The statistical analysis showed that indirect attitude had a significant positive indirect effect on intention via attitude toward physical activity and indirect subjective norms had a significant positive indirect effect on intention via subjective norms, while indirect perceived behavioral control had a significant positive indirect effect on intention via perceived behavioral control. The modified model accounted for and explained 21% (R^2 = 0.21) of the variance on intention.

Discussion

Consistent with prior research,[35,36] the findings supported the ability of the TPB constructs to have both direct and indirect effects on physical activity. All direct measures (attitude toward physical activity, subjective norms and perceived behavioral control)

and all indirect measure (indirect attitude, indirect subjective norms, indirect perceived behavioral control) were correlated with each other, respectively. In addition, all direct measures and all of the indirect measures were found to be positively correlated with intention to perform physical activity.

The study findings illustrated that both direct and indirect measures had influence on physical activity intention. However, since there was not a direct link between indirect measures and physical activity intention, direct measures (attitude toward physical activity, subjective norms and perceived behavioral control) appeared to have more influence on physical activity intention than all indirect measures (indirect attitude, indirect subjective norms and indirect perceived behavioral control). Indirect measures directly influenced attitude toward physical activity, subjective norms and perceived behavioral control. Subsequently, these three constructs indirectly influenced physical activity intention. The effects of indirect measures on physical activity intention, thus, were mediated by all direct measures.

Congruent with previous findings,[20,38-40] attitude was found to be the degree to which the pregnant women had a favorable or unfavorable evaluation of performing physical activity. It can be presumed that the women, who held strong beliefs regarding the positive outcomes of performing physical activity (i.e. improvement in health, shorter labor and better weight control), tended to engage in physical activity during their pregnancy. In contrast, the subjects who believed performing physical activity might be harmful to their bodies or fetuses, tended to decrease or stop participation in physical activities during their pregnancy. As a result, the women with a more positive attitude toward physical activity had higher levels of intention to engage in physical activity behavior compared to the women who had less positive attitudes toward physical activity.

The results confirmed the proposition that both direct and indirect subjective norms were significant predictors of physical activity intention. In forming subjective norms, the subjects took into account the normative expectations of important others in performing their physical activity. They considered whether specific individuals or groups thought they should or should not engage in physical activity, and they utilized this information to arrive at their subjective norms. With regard to the TPB, intention is determined by subjective norms.[35,37] Thus, the women may have intended to engage in physical activity when they believed that significant referents (i.e. husband, mother, and physicians/nurses) wanted them to perform this behavior. Conversely, if the subjects believed significant referents did not want them to perform physical activity, they would not intend to engage in such behavior. Moreover, subjective norms were found, in this study, to be the strongest determinant of physical activity intention.

The fact that the findings demonstrated that indirect perceived behavioral control had a significant positive indirect effect on intention, via perceived behavioral control, was consistent with the TPB[37] (i.e. perceived behavioral control is predicted by control beliefs). Control beliefs could have been developed from the pregnant women's evaluations of whether performing physical activity could be difficult or easy and from their perceived power over opportunities/resources available for performing the behavior. It can be supposed that some of the women believed certain factors (e.g., physical limitations, tiredness, and fear of harming self and/or fetus) would obstruct physical activity, while others believed performing physical activity would improve their health and, thus, easily engaged in physical activity during their pregnancy.

In summary, the findings showed the pregnant Thais had a strong intention to engage in physical activity when they: evaluated it positively (attitude); believed significant others (e.g., husband, mother and physicians/nurses) desired for them to participate in the behavior (subjective norms); and, perceived it to be under their control (perceived behavioral control).

The modified model supported the theoretical propositions of the TPB and the findings supported the proposed hypotheses.

Limitations and Recommendations

There are some limitations, in this study, that need to be taken into consideration when utilizing the results. First, because of the use of purposive sampling, the results cannot be generalized to the entire pregnant Thai population. Next, the major measure (modified version of Ajen's Theory of Planned Behavior Questionnaire[38]) used was developed, by the PI, based on the TPB. It was, however, evaluated, prior to use, for content validity by a panel of experts. In the future, this measure needs to be assessed for construct validity. Lastly, the method of self-report was used for completion of all measures. Thus, one has to assume the responses given were truthful and did not reflect bias.

Replication of the study is needed using a sample that is more diverse and from multiple geographic areas throughout Thailand. In addition, since it may prove to be more beneficial for drawing conclusions regarding the causal relationships among the constructs of the TPB, the use of a longitudinal design is recommended.

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การใช้ทฤษฎีพฤติกรรมตามแผนทำนายความตั้งใจในการทำกิจกรรมทางกายของสตรีมีครรภ์ไทย

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บทคัดย่อ: การวิจัยเชิงบรรยายครั้งนี้มีวัตถุประสงค์เพื่อศึกษาปัจจัยที่มีอิทธิพลทำนายความตั้งใจที่จะทำกิจกรรมทางกายของสตรีที่อยู่ในระยะไตรมาสที่สองของการตั้งครรภ์โดยใช้ทฤษฎีพฤติกรรมที่มีการวางแผน (The Theory of Planned Behavior) เป็นกรอบแนวคิดในการศึกษาวิเคราะห์อิทธิพลโดยหาความสัมพันธ์เชิงสาเหตุของอิทธิพลโดยอ้อมและโดยตรงระหว่างตัวแปร ความเชื่อเกี่ยวกับการทำกิจกรรมทางกาย ความเชื่อในบรรทัดฐานของบุคคลสำคัญ ความเชื่อในความสามารถควบคุมให้ทำพฤติกรรม ทัศนคติ บรรทัดฐานของบุคคลสำคัญ การรับรู้ความสามารถในการควบคุมพฤติกรรม (Perceived Behavioral Control) และความตั้งใจที่จะทำกิจกรรมทางกาย (Intention) ในระยะไตรมาสที่สองของการตั้งครรภ์ กลุ่มตัวอย่างที่ทำการศึกษาได้แก่ สตรีตั้งครรภ์ที่อยู่ในระยะไตรมาสที่สองที่มาฝากครรภ์ที่โรงพยาบาลมหาราชนครเชียงใหม่และโรงพยาบาลส่งเสริมสุขภาพเชียงใหม่ จำนวน 272 ราย ผู้วิจัยทำการสุ่มตัวอย่างด้วยวิธีการสุ่มแบบเจาะจงเครื่องมือที่ใช้ในการวิจัยได้แก่ แบบสอบถามข้อมูลส่วนบุคคล แบบวัดทัศนคติ แบบวัดบรรทัดฐานของบุคคลสำคัญ แบบวัดการรับรู้ความสามารถในการควบคุมพฤติกรรม และแบบวัดความตั้งใจที่จะทำกิจกรรมทางกาย

ผลการศึกษาพบว่า โมเดลที่เสนอมีความสอดคล้องกับข้อมูลเชิงประจักษ์ และสนับสนุนทฤษฎีพฤติกรรมที่มีการวางแผนกล่าวคือ ความเชื่อเกี่ยวกับการทำกิจกรรมทางกายมีอิทธิพลทางบวกต่อทัศนคติ ความเชื่อในบรรทัดฐานของบุคคลสำคัญมีอิทธิพลทางบวกต่อบรรทัดฐานของบุคคลสำคัญ และความเชื่อในความสามารถควบคุมให้ทำพฤติกรรมมีอิทธิพลทางบวกต่อการรับรู้ความสามารถในการควบคุมพฤติกรรม สำหรับปัจจัยที่มีอิทธิพลโดยอ้อมทางบวกต่อความตั้งใจที่จะทำกิจกรรมทางกายได้แก่ ความเชื่อเกี่ยวกับการทำกิจกรรมทางกาย ความเชื่อในบรรทัดฐานของบุคคลสำคัญ และความเชื่อในความสามารถควบคุมให้ทำพฤติกรรม สำหรับปัจจัยที่มีอิทธิพลโดยตรงทางบวกต่อความตั้งใจที่จะทำกิจกรรมทางกายได้แก่ ทัศนคติ บรรทัดฐานของบุคคลสำคัญและการรับรู้ความสามารถในการควบคุมพฤติกรรม และพบว่าโมเดลที่ปรับแล้วสามารถอธิบายความแปรปรวนของความตั้งใจที่จะทำกิจกรรมทางกายได้ร้อยละ 21

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