University of San Diego
Digital USD

Dissertations | Theses and Dissertations

2011-09-01

Associations among Perceived Benefits, Barriers, Cues, and Physical Activity in Thai Primary Students

Sireewat Ar-yuwat PhD, MPH, RN
University of San Diego

Follow this and additional works at: https://digital.sandiego.edu/dissertations

 Part of the Nursing Commons

Digital USD Citation

Ar-yuwat, Sireewat PhD, MPH, RN, "Associations among Perceived Benefits, Barriers, Cues, and Physical Activity in Thai Primary Students" (2011). *Dissertations*. 398.
https://digital.sandiego.edu/dissertations/398

This Dissertation: Open Access is brought to you for free and open access by the Theses and Dissertations at Digital USD. It has been accepted for inclusion in Dissertations by an authorized administrator of Digital USD. For more information, please contact digital@sandiego.edu.

www.manaraa.com

UNIVERSITY OF SAN DIEGO

Hahn School of Nursing and Health Science

DOCTOR OF PHILOSOPHY IN NURSING

ASSOCIATIONS AMONG PERCEIVED BENEFITS, BARRIERS, CUES, AND PHYSICAL ACTIVITY IN THAI PRIMARY STUDENTS

by

Sireewat Ar-yuwat, MPH, RN

A dissertation presented to the

FACULTY OF THE HAHN SCHOOL OF NURSING AND HEALTH SCIENCE

UNIVERSITY OF SAN DIEGO

In partial fulfillment of the

requirements for the degree

DOCTOR OF PHILOSOPHY IN NURSING

September, 2011

Dissertation Committee

Mary Jo Clark, PhD, RN, Chairperson

Anita Hunter, PhD, RN, CPNP, FAAN

Kathy Shadle James, DNSc, APRN

Copyright © 2011

by

Sireewat Ar-yuwat

All Rights Reserved

Abstract

The purpose of this study is to examine the relationships between perceived benefits, perceived barriers, and cues to action and levels of physical activity in Thai fourth grade students. The Health Belief Model was used as the theoretical framework of the study to investigate students' beliefs related to physical activity.

The participants in this cross-sectional study were fourth grade students selected by a simple random sampling method. A sample of 123 students was recruited from primary schools in Muang district, Phitsanulok province. The sample schools were selected by stratified random sampling. For data collection, the study utilized two instruments: the Physical Activity Questionnaire for Older Children (PAQ-C), and the Cues, Perceived Benefits, and Barriers to Physical Activity Questionnaire. The PAQ-C was translated into Thai and then back translated to English. Both instruments were validated by experts and tested for reliability. The Cronbach's alpha coefficient for the PAQ-C was .911, and .847, .837, and .915 for the perceived benefits, perceived barriers, and cues to action subscales, respectively. Pearson correlation, independent *t*-test, and one-way ANOVA were used to analyze data.

The participants had a mean age of 9.87 years, had friends or parents that exercise, and received encouragement to exercise from parents. The mean score on the levels of physical activity questionnaire indicated a moderate level of physical activity;

boys more often engaged in physical activity than girls. The top physical activities ranked by boys included bicycling, skipping and soccer, while the activities of girls were using a hula hoop, bicycling, and skipping. The findings of this study did not illustrate statistically significant relationships among independent variables and level of physical activity. However, the perceived barriers variable was inversely related to levels of physical activity. The perceived benefits, perceived barriers, and cues to physical activity did not differ by gender or type of school. The findings of this study are useful for developing programs that help students reduce barriers to physical activity and programs that promote gender-specific physical activity. Nurses should advocate for school policy and for sufficient physical activity within school curricula.

Dedication

I would like to specially dedicate this dissertation to my father, Supee Ar-yuwat. The loss of my father during this endeavor was very emotional and difficult for me. While the incident drained energy out of me and made me want to give up, it was my father's voice of encouragement echoed in my heart and his expectation to see his daughter's success that pulled me up and pushed me to soar. He inspired me to finish my dissertation.

In addition, I would like to dedicate this dissertation to my mother, Munlika Ar-yuwat, and sister, Pichayawat Ar-yuwat. Both of them always encouraged me and believed in me to pursue the degree. They have given me both financial and mental support while I was studying in the United States. More importantly, it is their unconditional love that keeps me strong and intact. I truly love and deeply appreciate both of you.

Acknowledgements

My dissertation has been successfully completed because of great help from many special persons. First of all, I would like to thank the Royal Thai Government for giving me scholarships to study for Master's and Doctoral degrees in the United States.

I would like to deeply thank my dissertation chairperson, Dr. Mary Jo Clark, who encouraged me to continue the whole process when I faced obstacles. Dr. Clark always gave me excellent guidance, caring support, and research knowledge. I would also like to thank my dissertation committee, Dr. Anita Hunter and Dr. Kathy Shadle James for their practical suggestions and feedback to make the dissertation stronger. In addition, I am very grateful to Dr. Patricia Roth, my academic advisor, for accepting me into the doctoral program of the Hahn School of Nursing and Health Science. She believed in me and also gave me a chance to pursue my dream.

I would like to thank the principals of the primary schools, teachers, and parents for giving me a permission to collect data. Thanks to the little ones who were my research participants. I truly enjoyed my time spent with all of you during the data collection process.

I am grateful to the experts, Dr. Supaporn Wannasuntad, Mr. Keerati Kittirawutiwong, and Mr. Surasak Supsri, who validated the instruments. I appreciate Dr. Sangjan Rungruangkonkit's and Dr. Nareerut Pudpong's efforts in translating the

instruments. I would also like to thank statisticians, Dr. Andrea Hazen and Dr. Katechan Jampachaisri, for giving me helpful suggestions for the data analysis.

Finally, I would like to thank my friends who give me their love and support. Special thanks to Dr. Anantachai Panjamapirom. Without his continuing support and his encouragement, I would have not come this far.

Table of Contents

List of Tables

Page

List of Figures

Chapter 1

Introduction

In the last several years, there has been growing worldwide concern over excess weight and obesity. In the specific case of Thailand, the percentage of obesity has gradually increased overall, with the percentage of overweight adults increasing from 18% of the population in 1991 to 28% in 2004. In the same time period, the percentage of obesity rose from 3.5% of the adult population in 1991 to nearly 7% in 2004 (Aekplakorn & Mo-suwan, 2009). Unfortunately, Thailand currently has the highest rate of adult obesity in Asia (Macan-Marker, 2006). Similarly, childhood obesity in Thailand reflects global trends (Aekplakorn & Mo-suwan, 2009). From 2001 to 2005, childhood obesity in Thailand increased from 12% to 17%. The Thai Ministry of Public Health estimated that within the next 10 years, one in five children will become obese (Ministry of Public Health, 2007; Nutrition Division, 2005), and the Ministry is most interested in finding viable solutions to this epidemic.

Obesity is becoming a major concern in primary school students, grades 1 through 6. A retrospective study of primary school students from three provinces found the percentage of obese children dramatically increased during a 6-year period.

In the first examination, the percentages of obese students in grade 1 in Bangkok, Saraburi, and Sakolnakhon provinces, were 16%, 23%, and 4%, respectively. Five years later, obesity among these students, now in grade 6, rose to 31%, 30%, and 9%, respectively (Jirapinyo, Densupsoontorn, Kontragoolpitak, Wongarn, & Thamonsiri, 2005). Among students in 16 primary schools in Muang district, Phitsanulok province in 2010, the percentage of overweight and obese students was approximately 10% (Public Health and Environment Office, 2010). According to Kosulwat (2002), the prevalence of overweight and obese children aged 6 to 12 years was higher in urban than rural areas of Thailand.

For many children, obesity is obvious from their overt physical appearance. In others, however, obesity can be more a subtle condition, revealed only through the use of scientific measurements such as Body Mass Index (BMI.). Children 2 to 19 years of age who have a BMI between the 85^{th} and 94^{th} percentile are designated overweight; those with a BMI equal to or greater than the 95^{th} percentile are considered obese (Centers for Disease Control and Prevention [CDC], 2009; Ogden & Flegal, 2010). It is well documented that obesity is a leading risk factor for many health problems, including cardiovascular disease, diabetes, asthma, and orthopedic problems. Moreover, obesity affects a person's psychological well being and becomes a social issue with increased health care costs (Kim et al., 2005; Underwood, 2006). According to Underwood, obese children are ten times more likely to have hypertension than normal weight children, and 85% of obese children have type 2 diabetes. In addition, increases in the number of vitamin deficiencies, cancers, sleep disorders, and orthopedic problems are noted in obese children.

The prevalence of these conditions has also been noted in Thailand where the prevalence rates of both childhood obesity and type-2 diabetes have increased among children and adolescents. The prevalence rate for obesity among male children increased by 9% from 1992 to 1997; similarly, the percentage of children having type 2 diabetes increased from 5% to 18% from 1986 to 1999 (Aekplakorn & Mo-suwan, 2009).

Socioculture structures have changed in many countries around the world, and many individuals began to reduce physical activity and consume more unhealthy foods. This situation causes an increase in the problem of obesity (Hill, King, & Armstrong, 2007). Recently, pediatricians have seen childhood obesity become the most frequent chronic pediatric condition. Many factors have been shown to contribute to overweight and obese children. These factors will be discussed in detail in Chapter 2.

As in all developed and developing nations, the cause of obesity in Thailand is related to an increasingly sedentary lifestyle among children who watch television, play video games, use computers, and ride in cars rather than walk. Children from higher socioeconomic levels are more likely to have sedentary lives and have a higher prevalence of overweight (Dollman, Norton, & Norton, 2005).

These findings are supported by studies in primary schools in Thailand. For example, a study conducted among primary school students in Nakorn Pathom province, Thailand, showed that almost nine in ten children (86%) went to school by car, and only one in ten children spent more than 3 hours a day playing outdoors (Usman, 2004). Similarly, in urban Phitsanulok province, factors contributing to obesity in primary school children included attending after-school tutorial programs

rather than engaging in physical activity (Thingchin, 2009). In addition, according to the Child Watch Report of Phitsanulok province, primary school students' involvement with sports activities decreased from 70% of students in 2006 to 54% in 2007; whereas, time spent watching TV increased from 145 minutes per day in 2006 to 150 minutes in 2007 (Ramajitti Institute, 2006, 2007).

Recent reviews of childhood obesity interventions have demonstrated that treatment and prevention programs for younger children were more successful than those designed for adolescents and adults. Although obesity prevention should be promoted in diverse settings, such as home, school, and community, the school setting has been found to be a successful arena for facilitating behavior change because it is viewed by both parents and children as a setting to learn and grow (Council on Sports Medicine, 2006; Sharma, 2006). For these reasons, health promotion to reduce unhealthy behaviors should be addressed in primary school settings. It has become apparent that something needs to be done to halt the growing epidemic of childhood obesity in Thailand.

Problem Statement

People gain weight if energy intake exceeds energy expenditure (Hill et al., 2007). Reducing physical activity and increasing unhealthy food consumption result in an imbalance of energy expenditure and intake. Therefore, eating behaviors and physical activity levels are significantly associated with obesity. In order for overweight or obese people to manage their excessive weight, they should simultaneously reduce energy intake and increase energy expenditure. To reduce energy intake, people should change unhealthy eating behaviors, consume more fruits

and vegetables, and reduce fat and sugar consumption. On the other hand, to increase energy expenditure, people should increase physical activity because research indicates this is an important factor for long-term weight loss (Driskell, Dyment, Mauriello, Castle, & Sherman, 2008).

Decreasing energy expenditure is a significant cause of obesity (Kamtsios & Digelidis, 2008); therefore, enhancing physical activity and reducing sedentary lifestyle are major components of public health strategies to prevent obesity (Kamtsios & Digelidis; Saris et al., 2003). Based on a systematic review in the Cochrane Database, however, many interventions, including both dietary education and physical activity, have not resulted in participants losing weight; one physical activity intervention showed a modest decrease in overweight (Council on Sports Medicine, 2006).

Several quantitative and qualitative studies of obese children have focused on factors influencing physical activity (De Vries, Bakker, van Mechelen, & Hopman-Rock, 2007; Lee, Lai, Chou, Chang, & Chang, 2009; Moore et al., 2010; Tergerson & King, 2002; Zabinski, Saelens, Stein, Hayden-Wade, & Wilfley, 2003). These factors included neighborhood characteristics, supportive factors, and perceived benefits and barriers to physical activity.

Some studies of factors influencing childhood obesity have been conducted in Thailand (Sanamthong, 2005; Wannasuntad, 2007; Wongiu, 2007). The factors identified included biosocial factors, knowledge, perceived susceptibility, benefits, barriers, and environment. However, there are limited childhood obesity studies among primary school students in Thailand that focus on factors influencing physical

activity. In addition, few theory-based studies regarding barriers to and benefits of physical activity have been conducted in primary school students. Because of this gap in the literature, this study employed the Health Belief Model as a theoretical framework to examine factors affecting eating behaviors and physical activities among fourth grade students.

Physicians, school nurses, and health policy makers in Thailand should lead the way in preventing childhood obesity in urban primary schools. The purpose of this study was to assess the relationships between physical activity and cues to action, perceived benefits, and perceived barriers among primary school children in Phitsanulok province, Thailand.

Significance of the Study

The study targeted fourth grade students because obese children are more likely to become obese adults (Jirapinyo, Densupsoontorn, Chinrungrueng, Wongarn, & Thamonsiri, 2005) and have higher risks for many diseases. Younger children, however, have a greater potential for changing their behaviors than older children. They are also more likely to respond to parental encouragement of physical activity. Policy makers, health educators, school administrators and teachers, and school nurses will be able to apply information from this study to the creation of theory-based prevention programs among different groups of children. This research project has the potential to help Thai schools integrate physical activity programs that could help develop physically active and health-conscious students, eventually involving parents and the community at large.

Purpose and Aims

The purpose of this study was to investigate the role of cues, perceived benefits, and perceived barriers in promoting physical activity in fourth grade students in primary school settings in Phitsanulok province, Thailand. The findings from this study provide the information for future development of health promotion programs for childhood obesity.

Specific aims of the study included the following:

1. To examine relationships between the levels of physical activity and perceived benefits, perceived barriers, and cues to action among primary school students.
2. To compare the effects of cues, perceived benefits, and perceived barriers on physical activity among male and female primary school students.
3. To compare the effects of cues, perceived benefits, and perceived barriers on physical activity among types of schools.

Specific Research Questions

The following research questions were addressed in the study:

1. What are the relationships between participants' levels of physical activity and perceived benefits, perceived barriers, and cues to action?
2. What are the relationships between levels of physical activity and perceived benefits, perceived barriers, and cues to action among boys?
3. What are the relationships between levels of physical activity and perceived benefits, perceived barriers, and cues to action among girls?
4. Do perceived benefits of physical activity subscale scores differ between girls and boys?

5. Do perceived barriers to physical activity subscale scores differ between girls and boys?
6. Do cues to action for physical activity subscale scores differ between girls and boys?
7. Do perceived benefits, perceived barriers, and cues to action differ among types of schools?

Conceptual Framework

In order to develop an effective approach for promoting physical activity among children, researchers need to understand determinants of physical activity. Theory is an important tool to assist professionals to organize an effective intervention for a specific target audience (Rimer & Glanz, 2005). Thus, health promotion and prevention programs based on theory are meaningful and allow in-depth understanding of the phenomenon as well as the characteristics of a particular population (Hildebrand & Shriver, 2010). A number of health behavior theories, such as the Health Belief Model (HBM), Social Cognitive Theory (SCT), the Theory of Reasoned Action (TRA), and the Transtheoretical Model (TTM), aim to predict and understand a diversity of health behaviors (Cropley, Ayers, & Nokes, 2003). However, no evidence suggests which of these theories is most applicable to the study of childhood obesity.

The HBM has been widely applied to a variety of health-related behaviors including: (a) preventive health behavior, such as physical activity, eating behavior, smoking cessation, immunization, and contraceptive practices; (b) sick role behaviors; and (c) use of health services, such as physician visits (Conner & Norman, 2005). This

theory has helped investigators examine factors encouraging or discouraging people from participating in healthy behaviors. People are ready to change their behaviors if they believe they are susceptible to a particular condition, believe the condition is serious, and believe taking action would be beneficial. They believe that benefits of physical activity outweigh the costs of taking action, and they encounter cues to action which cause them to behave in certain ways. Finally, they believe they are able to effectively change their behaviors (Rimer & Glanz, 2005).

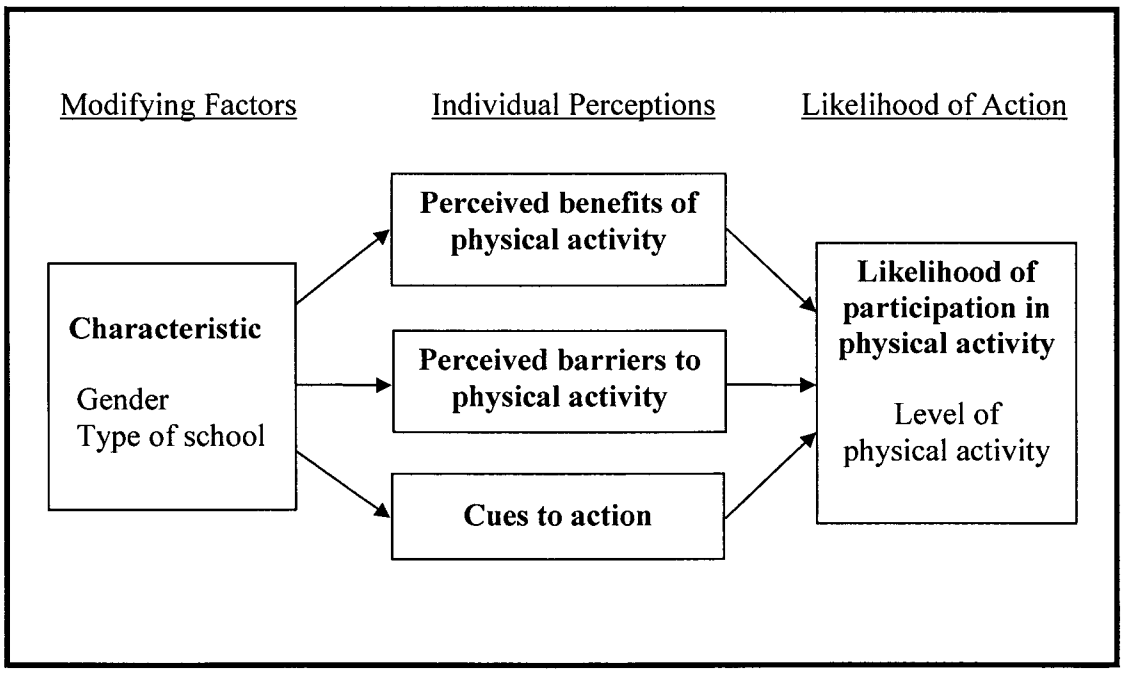
The conceptual framework for this study is the Health Belief Model (HBM). The HBM was one of the first theories of health behavior, and remains one of the most widely recognized in the field. The HBM is a good fit for addressing problem behaviors with health consequences because it provides a useful framework for designing both short-term and long-term behavior change strategies (Rimer & Glanz, 2005).

The focus of the HBM is on an individual's desire to avoid illness and his or her belief that a specific behavioral change will help prevent illnesses. The main constructs of the framework include perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy. Perceived susceptibility is the individual's belief about his or her chances of developing a particular condition. Perceived severity is the individual's belief in the seriousness of a health-related problem. Perceived benefit reflects the individual's belief in the usefulness of changing unhealthy behaviors or adopting healthy behaviors, while perceived barriers involve the individual's evaluation of the obstacles to changing such behaviors. Cues to action are factors that encourage people to start changing their

behaviors. Finally, self-efficacy is an individual's belief in his or her ability to change behaviors (Hayden, 2009).

This study examined three major elements of the theory: (a) perceived benefits, (b) perceived barriers, and (c) cues to action as they relate to physical activity. The HBM was used to identify students' beliefs regarding engaging in physical activity. This theory helped the investigator determine why the students did or did not participate in physical activity. In addition, the study was designed to examine the relationship of gender and type of school setting to the three major elements of the HBM (see Figure 1).

Figure 1. Conceptual Framework for the Study



In this framework, girls and boys may have different perceived benefits, perceived barriers, and cues to action, leading to different physical activity levels. Perceived benefits and cues to action would encourage students to engage in physical

activity; whereas, perceived barriers may discourage students from doing physical activity. For example, seeing physical activity as a way of being accepted by friends is a perceived benefit. Parental encouragement to go out and play would be a cue to action. A belief that physical activity is not enjoyable is a perceived barrier.

Summary

Childhood obesity is becoming an epidemic in Thailand. Obese children are more likely than normal weight children to have a number of physical, psychological, and social problems. Factors that influence childhood obesity include eating behaviors, physical activity, and social influences. Several studies on Thai children have found a significant decrease in physical activity; however, there are limited theory-based studies of factors contributing to decreased physical activity among primary school students in Thailand. As a result, this study applied important concepts of the Health Belief Model to examine cues to action and children's perceived benefits of and barriers to physical activity in relation to their current levels of physical activity. This study was designed to identify factors influencing physical activity that can be used to develop interventions to help prevent childhood obesity among primary school students in Phitsanulok province. The findings of this theory-based study may assist the government, policy makers, school nurses, and researchers in developing effective health promotion and prevention programs for childhood obesity. Such programs can have long-lasting positive effects on the health of the children and the community as a whole.

Chapter 2

Literature Review

This chapter will review the literature to understand the extent of problems related to physical activity in Thai students. It provides an overview of research on physical activity and the variables related to physical activity. The purpose of this chapter is to critically review literature related to factors influencing physical activity in primary school students. The chapter addresses the method of literature review, patterns and determinants of physical activity in school children, factors influencing physical activity, the Health Belief Model, and a summary of the literature. Variables in this study include gender, type of school, level of physical activity, perceived benefits, perceived barriers, and cues to action.

Method of Literature Review

The literature search began with computer-based searches in PubMed, ERIC, Ovid, PsycINFO, Health Source Plus Nursing, and CINAHL. Search terms used were "obesity or overweight and middle school," "childhood obesity and middle school," "physical activity and children," "factors and physical activity," and "benefit or barrier or cue or Health Belief Model". With these terms, the author narrowed the search using the following criteria: English language, full text, and articles published within

the last 10 years. Articles that were relevant to the topic of childhood obesity and physical activity in middle school students were selected. In addition, several Thai websites were reviewed to identify relevant research reports, data bases, and theses and dissertations. The author manually searched for theses and dissertations at the universities in Thailand. Several articles were excluded because they were not research studies in school settings, studied overweight or obese children with diseases, or included physical activity interventions.

Factors Contributing to Childhood Obesity

The demographics of obese students 6 to 12 years of age show great variability. Kosulwat (2002) reported that the prevalence of overweight and obesity among Thai children aged 6 to12 years was higher in urban areas than rural areas. Moreover, the obesity rate of middle-to-high income families was greater than middle-to-low income families (27% and 11% respectively). A number of other categories of factors have also been identified as contributing to the growing prevalence of childhood obesity. The major categories of contributing factors are societal factors, eating behavior, and physical inactivity (Harper, 2006).

Societal factors. Social, environmental, technological, and biological factors contribute to a decrease in physical activity among children and adolescents (Hill et al., 2007). Increasing sedentary leisure time behavior, especially in children from higher socioeconomic groups, leads to a higher prevalence of childhood obesity (Dollman et al., 2005; Hill et al.). Societal factors contributing to obesity among children are an unsafe environment and the absence of environments that support physical activity (Harper, 2006). When children enter adolescence, they change their interests from

physical activity and exercise to other interesting activities. In addition, children are more likely to spend long periods of time seated while studying at school (Hill et al., 2007).

Haas, Lee, Kaplan, Phillips, and Liang (2003) conducted an observational cohort study in 6- to 17-year-old children and adolescents and their families. This study focused on factors associated with the prevalence of overweight in children and adolescents and the rates of overweight among non-Latino White, non-Latino Black, Latino, and Asian/Pacific Islander youth. The purposes of this study were to examine the effect of race, socioeconomic status, and health insurance status on the prevalence of overweight in children. They used the Medical Expenditure Panel Survey (MEPS) to obtain data. The results showed boys had a significantly greater risk of being overweight than girls. In terms of race or ethnicity, among children aged 6 to 11 years, Black and Latino children had a greater likelihood of being overweight than White children. Likewise, among adolescents aged 12 to 17 years, Asians and Latinos had a higher likelihood of being overweight than Whites. In terms of socioeconomic status, children from families with lower parental educational attainment and from households with low incomes had a greater risk of being overweight than those from affluent families. Health insurance status was not associated with being overweight among children. However, adolescents who had private health insurance showed a protective association with overweight.

Eating behavior. The major factor influencing childhood obesity is eating behavior. Families prepare meals for children often including fast food or restaurant food high in fat and calories and low in fruits and vegetables (Harper, 2006). Many

studies of eating behaviors of children show that children increasingly consume high calorie foods and soft drinks (Adair & Popkin, 2005; Davy, Harrell, Stewart, & King, 2004; Matheson et al., 2004)

Adair and Popkin (2005) studied the eating patterns of children 2 to 19 years of age. This survey study focused on changes in dietary patterns among youth in Russia, China, and the Philippines compared with the United States. The study addressed the limited information on children outside of the United States and Europe and the lack of comparative findings in other parts of the world. The instruments used were the Nationwide Food Consumption Survey (NFCS77) and Continuing Survey of Food Intake by Individuals (CSFII96). The results indicated that caloric intake consumed away from home increased significantly from 1977 to 1996. In 1996, 93% of children consumed snack foods. In addition, there was a marked increase in the use of soft drinks, fruit drinks, fast food, and salty snacks. Children in urban areas consumed soft drinks more than those in rural areas.

Davy, Harrell, Stewart, and King (2004) conducted an investigation to address health disparities among children in rural southeastern areas in the United States where obesity and cardiovascular diseases were more prevalent than other regions. The authors collected data from middle-school children from Scott County, Mississippi by using scale-mounted stadiometer, a physician's balance scale, and growth charts. The purposes of this study were to determine the risk of overweight and obesity in a racially diverse rural community and to identify the dietary and physical activity habits of these students. The authors reported that males had protein intake significantly different from females. Compared with females, males consumed diets

significantly higher in sodium and calcium. In terms of race, African-American children had significantly less fiber intake than White children, but significantly more fruit intake. There was no difference in vegetable intake between the two groups. White children had significantly more soft drink intake than did the African-American children. Furthermore, children who were breakfast eaters consumed more fruits and vegetables than non-breakfast-eating children.

Matheson et al. (2004) studied dietary intake while watching television among African-American girls. The participants were recruited from four field centers, which included: the Baylor College of Medicine, Houston, TX; University of, Memphis, Memphis, TN; University of Minnesota, Minneapolis, MN; and Stanford University, Palo Alto, CA. Since prior studies had not assessed what children consumed while watching television, this study focused on the foods that children ate while watching television and videotapes and during other times of the day. The purposes were to describe the amount and types of foods that African-American girls consumed while watching television and to examine the associations between African-American girls' BMIs and foods consumed while watching television.

The authors hypothesized that girls would consume more high-fat foods and energy-dense foods while watching television and videotapes than at other times during the day. They further hypothesized that girls' energy intake, consumption of high-fat foods, and consumption of energy-dense foods while watching television would be positively associated with the girls' BMIs. Measurements included nonconsecutive 24-hour dietary recalls and height and weight records used to calculate BMI. The findings indicated that the daily consumption of energy intake while

watching television among African-American girls ranged from 27% to 35% of total energy intake. The fat content and energy density of foods consumed while watching television were not significantly different from foods consumed at other times during the day. In addition, the girls' BMIs were not statistically significantly associated with the amount and type of foods consumed while watching television or at other times during the day.

Physical inactivity. A reduction of physical activity results in an increase in obesity in developed and developing countries (Saris et al., 2003). Obese children may have decreased physical activity due to their environment. A study by Harper (2006) found that, on average, children spent 4 hours a day watching television, using a computer, or playing video games. These sedentary behaviors were associated with a higher BMI in children and adolescents. Although lack of physical activity does not directly result from watching TV or playing video games, it is a sedentary behavior, which affects the energy balance because it decreases energy expenditure. Factors associated with physical inactivity in children include gender, age, ethnicity, and BMI. While girls tend to spend more time listening to music or talking on the telephone, boys spend more time playing computer games (Nowicka & Flodmark, 2006).

Felton et al. (2002) conducted a study focusing on physical activity programs at school because schools were well-suited to provide the programs that could help all children. The authors examined differences in physical, behavioral, psychosocial, and environmental factors associated with physical activity among Black and White adolescent girls in rural and urban areas in South Carolina. They also examined the television viewing habits of these girls. The findings showed that Black girls did less

vigorous and moderate-to-vigorous physical activity than White girls. Black girls in rural areas were more vigorously active than those in urban areas; whereas, White girls in urban areas were more vigorously active than those in rural areas. Furthermore, both Black and White girls in rural areas held greater value for participation in physical activity than those in urban areas. White girls had more sports equipment in their homes and had safer places to walk than did Black girls.

Similarly in Australia, children aged 5 to 14 years spent approximately 22 hours over two weeks watching television or videos. Children who had a television in their bedroom spent more time watching it (at least 38 minutes a day), than those without a bedroom television. In addition, 9% of children spent more than 20 hours in two weeks playing computer games. Older boys had the highest rates of computer gaming (Dollman et al., 2005).

In the United Kingdom, children also frequently have a TV and/or computer in their bedrooms. In one study, 75% of these children watched TV at least two hours per day and 27% more than four hours per day. Watching television is part of a sedentary lifestyle. In addition, the percentage of primary school children who were taken to school by car increased from 16% in the mid 1980s to 38% in 1997, and the percentage of children attending at least two hours per week of physical education decreased from 46% in 1994 to 33% in 1999 (Fox, 2003).

Physical inactivity is a major factor contributing to the rising problem of childhood obesity (Harper, 2006). Public health practitioners have developed strategies to promote physical activity (Nowicka & Flodmark, 2006; Saris et al., 2003). Such strategies, however, must be based on factors that contribute to the lack of

physical activity in the population. Therefore, the present study was designed to address the determinants of physical activity among Thai children as a precursor to developing effective interventions. Moreover, levels and types of physical activity among girls and boys are different, and factors that influence activity may also differ; therefore, this study also addressed the relationship of gender to physical activity.

Several cross-sectional studies of factors contributing to childhood obesity, such as eating behavior, physical inactivity, and environment have been conducted in Thailand (see Table 1). For example, Usman (2004) studied factors associated with obesity in primary school students in Nakorn Pathom province, Thailand. This study showed that older children, boys, students with obese fathers, and those who consumed more fried food were more likely to be obese. Moreover, almost nine in ten children (86%) went to school by car and more than half of the children (52%) spent 2 to 3 hours per day playing indoors. Only one in ten children spent more than 3 hours a day playing outdoors.

Similarly, Pichayasakulkarn (2006) found that factors influencing childhood obesity among primary schools in urban Pichit province included being male, having parents with BMIs of more than 23 kg/m^2, and eating foods while watching television more than three days a week. Such sedentary behaviors decreased the time for children to engage in vigorous physical activities. Yamborisut, Kosulwat, Chittchang, Wimonpeerapattana, and Suthutvoravut (2006) also examined factors related to obesity in primary school students aged 6 to10 years in Nakhon Pathom province and Bangkok. They found four factors that were significantly associated with the risk of childhood obesity. These factors included mothers who were overweight prior to

pregnancy, a child with high birth weight, high caloric food intake, and large amounts of food consumed by children. According to the Ministry of Public Health (2007), more than 100,000 children aged 6 to 14 years consumed fast food everyday. In addition, Yongwanichakorn and Chanbang (2003) explored primary school students' snack consumption in Nonthaburi province and estimated students' consumption of sugar per day. They found that 81% of snacks contained sugar and starch. Children preferred crispy foods (45%), followed by ice cream and candies (35% and 11%, respectively).

Central Thailand ranks highest in childhood obesity, followed by northern Thailand (Nutrition Division, 2005). There are several studies of childhood obesity in Bangkok, central Thailand, and southern Thailand. Conversely, in northern Thailand, there is a lack of studies about childhood obesity in primary school students. Hence, based on the lack of prior studies, the current study took place among primary school students in Phitsanulok province, in the northern part of Thailand. Table 1 summarizes findings of studies of factors influencing obesity among school-aged children conducted in Thailand.

Table 1. Studies of Factors Influencing Childhood Obesity in School-aged Children in Thailand

Author/ Year of Publication	**Pichayasakulkarn (2006)**	**Yongwanichakorn & Chanbang (2003)**	**Usman (2004)**
Source	Master's thesis	Journal Article	Master's thesis
Design	Cross sectional	Quick Survey	Cross sectional
Setting	Pichit	Nonthaburi	Nakorn Pathom
Age (grade)	Grade 4-6	Primary school	Grade 1-6
Sample size	1,374	Not specified	200
Factors influencing childhood obesity	1. Being boys 2. Parents with a Body Mass Index of more than 23 kg/m^2 3. Eating foods while watching television equal to or more than 3 days per week	Primary school children's snack consumption 1. Crispy snacks were the highest preference (45%) 2. Ice-cream (35%) 3. Candies (11%)	1. Older age 2. Male gender 3. Father's obesity 4. More frequent meals 5. More frequent snack consumption 6. More frequent fried food consumption 7. 86% of children went to school by car 8. 48% spent more than 2 hours per day watching TV

Table 1. Continued

Author/ Year of Publication	Pichayasakulkarn (2006)	Yongwanichakorn & Chanbang (2003)	Usman (2004)
			9. 51% of children spent 2-3 hours per day playing indoors 10. 9% spent more than 3 hours per day playing outdoors

Physical Activity

As noted earlier, physical inactivity causes weight gain among children. A key strategy to combat rising levels of obesity is to discover the major determinants of physical activity so that health care programmers can use this knowledge to develop health promotion programs for both the general public and the individual to maintain a healthy body weight (Saris et al., 2003).

Definition. Physical activity is defined as body movement that induces muscle contraction (Nowicka & Flodmark, 2006). This body movement increases energy expenditure resulting in a metabolic rate higher than that at rest (Maibach, 2007; Nowicka & Flodmark, 2006). Therefore, energy expenditure is associated with body mass (Saris et al., 2003). Types of physical activity include purposive exercise, leisure-time physical activity, occupation-related activity, transportation-related activity, and household-related activity (Maibach, 2007). Children can participate in physical activities during school and nonschool hours. These activities include active

transportation, outdoor play, personal fitness activities, and sports (Council on Sports Medicine, 2006).

Many people think that physical activity refers to exercise (Maibach, 2007). In fact, exercise is a subgroup of physical activity that promotes physical, psychological, and social health. Exercise includes voluntary, planned, organized, and repetitive activities (Nowicka & Flodmark, 2006).

Energy expenditure is usually measured as a metabolic equivalent (MET) unit. MET provides an estimation of the metabolic rate during physical activity (Nowicka & Flodmark, 2006; Saris et al., 2003). Because the MET was based on normal weight people, it is less accurate in obese people who expend less energy per kilogram of body mass than normal weight people (Saris et al.). One MET represents 3.5 ml O_2/kg per minute, which is the energy expenditure for a resting metabolic rate (CDC, n.d.; Nowicka & Flodmark, 2006).

Patterns of physical activity. The range of physical activity includes physical inactivity, light activity, moderate physical activity, and vigorous physical activity. Physical inactivity refers to low levels of physical activity that require energy expenditure equal to the resting metabolic rate. Light activity refers to an activity that involves energy expenditure of less than three METs (e.g., slow walking) (Nowicka & Flodmark, 2006). Moderate physical activity refers to an activity that uses energy expenditure of three to six METs (e.g., walking 3-4.5 mph, bicycling 5-9 mph, playing on a school playground, and jumping on a trampoline). Finally, vigorous physical activity is defined as an activity that uses energy expenditure of more than six METs

(e.g., walking more than 5 mph, bicycling more than 10 mph, jogging, aerobic dancing, and competitive sports) (CDC, n.d.; Nowicka & Flodmark, 2006).

Recommendations for physical activity among children. Recommendations for physical activity for children vary in different countries such as the United States, the United Kingdom, Australia, and Canada. The World Health Organization [WHO] (2010) recommends that children 5 to 17 years of age engage in at least 60 minutes of moderate to vigorous physical activity every day. In order to gain more health benefits, children should engage in physical activity for more than 60 minutes. Recommended types of physical activity include aerobic and vigorous-intensity activities. In addition, children should perform muscle and bone strengthening activities at least three times a week.

Similarly, in the United States, the Centers for Disease Control and Prevention (CDC, 2010) recommends that children aged 6 to 17 years should participate in physical activity for at least 60 minutes each day. Children should do all three types of activities including aerobic activity, muscle strengthening, and bone strengthening. The National Association of State Boards of Education recommends that elementary students should attend physical education (PE) 150 minutes per week, whereas middle and high school students should attend physical education 225 minutes per week. In order to reduce sedentary activity, the American Academy of Pediatrics (AAP) recommends that children over the age of two should not watch television more than two hours per day (Council on Sports Medicine, 2006).

The United Kingdom Health Education Authority also recommends that children spend at least 60 minutes per day in moderate to vigorous physical activities

that include various individual or group activities (Council on Sports Medicine, 2006). In Australia, South Australian children are recommended to attend 100 minutes of physical education classes per week (Dollman et al., 2005).

In Canada, there is a recommendation for increasing the level of physical activity to more than the current level. This can be achieved by adding additional minutes for exercise per day. At the same time, children should decrease sedentary activity by the same amount of time per day. Moreover, the Age-Appropriate Recommendations for Physical Activity (AAP) suggest types of physical activities for children 10 to 12 years of age. These activities include enjoyable activities that involve participation by family members and friends, skill development, tactic and strategy activities, and complex sports such as football, basketball, and ice hockey (Council on Sports Medicine, 2006).

Benefits of physical activity. Regular physical activity promotes both physical and mental health among children. Physical activity promotes normal growth and development, muscle strength, flexibility, motor skill, and quick movement. In addition, aerobic activity helps decrease risk of cardiovascular disease (Hill et al., 2007; Nowicka & Flodmark, 2006), reduces weight, and improves insulin sensitivity in children with type 2 diabetes (Council on Sports Medicine, 2006). With respect to psychological benefit, regular physical activity leads to an increase of self-esteem (Nowicka & Flodmark). Moreover, it improves self-concept, self-confidence, sleep quality, and the ability to concentrate. Participation in physical activity helps reduce anxiety, stress, and depression in children and adolescents (Council on Sports Medicine; Hill et al.).

Factors Influencing Physical Activity among Children

Factors that affect the levels of physical activity in children include age, gender, family, peers, and the environment. With respect to age and gender, the results from a meta-analysis examining physical cardiorespiratory fitness showed that children aged 6 to 7 years spent more time in moderate to vigorous physical activity than children aged 10 to 16 years. The average level of physical activity decreased each year as the children grew older. While the level of physical activity decreased by nearly 3% per year in boys, in girls it decreased by more than 7%. In addition, boys in general had higher levels of physical activity than girls. Physical inactivity is associated with inactive role models, time pressure, unsafe environments, lack of recreation equipment, and insufficient physical education (Council on Sports Medicine, 2006).

Family is another factor that affects levels of physical activity. According to Hill et al. (2007), parents' inactive lifestyles, the cost of recreation facilities, and being overweight were factors that inhibited children from participating in physical activity. Another barrier to physical activity includes advances in technologies, such as electronic entertainment. These technologies make the home more attractive and comfortable for children. Consequently, children prefer to play indoors rather than outdoors. Moreover, in general, parents do not allow children to play or travel by themselves. They have to play outdoors, or ride a bike with parental supervision; therefore, this circumstance reduces children's physical activity and produces an energy imbalance (Fox, 2003).

Overweight and obese children may not feel confident participating in sports because they think that they are unable to perform well (Hill et al, 2007). These

children receive negative comments either from their peers or physical education teachers and coaches. During physical activity, they may be teased about their bodies, skills, and capacities. The weight-related teasing may push the children into a cycle of physical inactivity, additional weight gain, low self-esteem, and depression. Being teased about their weight is one of the barriers to participating in physical activity and maintaining an active life (Rukavina & Li, 2008).

Many studies support the relationships between these factors and physical activity. For example, Wu and Pender (2005) conducted a prospective study based on a theoretical model. The purpose of the study was to explore causal relationships between individual characteristics, interpersonal influences, and cognitions that predicted physical activity in Taiwanese adolescents. They noted that gender was a factor influencing physical activity in both 8th and 9th graders; males were more active than females.

Similarly, according Kitzman-Ulrich (2010), positive family support was related to physical activity for healthy weight boys. In addition, levels of physical activity were associated with gender and BMI. The level of physical activity in boys was significantly higher than in girls, and the level of physical activity in normal-weight children was higher than in overweight children.

Environmental factors contributing to physical activity were described in a study by Frank, Kerr, Chapman, and Sallis (2007). The purpose of the study was to demonstrate the relationship among multiple urban characteristics, ages, and walking in youth 5 to 20 years of age. The findings showed that factors contributing to any walking and walking a half mile among children ages 9 to 11 years of age included

residential density and living near recreation or open space. However, only 14% of all age groups in the study walked at least once a day.

Driskell, Dyment, Mauriello, Castle, and Sherman (2008) conducted a study to examine the interrelationships of physical activity (PA), fruit and vegetable consumption (FV), and limiting television time (TV) among elementary, middle, and high school students. The authors reported that overweight students were more likely to be at risk for physical inactivity than normal weight and underweight students. Elementary school students consumed more fruits and vegetables than high school students. They also engaged in exercise more days than middle and high school students. High school students reported lower levels of physical activity and fruit and vegetable consumption and more television time than elementary and middle school students. The authors concluded that younger students were more active than older students. A strength of this study was the use of a theoretical framework, the Transtheoretical Model of Change.

Kamtsios and Digelidis (2008) conducted a study to examine the differences among elementary school pupils with different body mass indexes (BMIs) in attitudes towards exercise, self-perception, lesson satisfaction in physical education, and participation in physical activity. Participants were 5th and 6th grade students aged 11 to 12 years in suburban and urban areas of west and northwest Greece. The results indicated that overweight and obese children had negative body images, lower satisfaction scores related to participation in physical education lessons, and lower physical activity scores than children with normal BMIs. In addition, overweight

children spent more time participating in sedentary activities, such as watching TV and playing video games.

According to the literature, various factors contributing to physical activity among children include age, gender, parental behavior, BMI, peer pressure, technology, and environmental factors. Some barriers to physical activity were identified, including inactive parents, being overweight, weight-related criticism, advanced technologies, and cost of recreation facilities. The studies showed that levels of physical activity between boys and girls are different, and younger students are more active than older students. Moreover, many studies have reported a variety of barriers to physical activity among children. Therefore, this study addressed 4th grade students' because they will soon be adolescents. Study of perceptions of physical activity among this target group helps the researcher better understand the determinants of physical activity, including perceived benefits, perceived barriers, and cues to action.

Studies Related to Variables and Conceptual Framework

This section discusses perceived benefits, perceived barriers, and cues to action among primary school students. These variables are the key components of the Health Belief Model, which provides the conceptual framework for this study. The section includes both quantitative and qualitative studies that explored the effects of these variables on levels of physical activity.

Quantitative studies in many regions. Several studies of obese children have focused on factors influencing physical activity. For example, Tergerson and King (2002) examined whether perceived cues, benefits, and barriers to physical activity

differed between male and female high school students in Ohio. They applied three components of the Health Belief Model as a study framework. The authors used a four-page survey to measure students' perceptions of and cues for physical activity. The results illustrated that the most helpful cue to physical activity for both males and females was having a friend to exercise with. Other cues included parental encouragement and having a parent who exercised. Female students were heavily influenced by encouragement from their friends as a cue for physical activity, more so than male students. For males, physical activities outside of school promoted activity.

The greatest perceived benefit of exercise for female students was staying in shape; among male students, being strong was perceived as the greatest benefit of exercise. While females stated physical activity helped them increase energy levels, reduce stress, and promote self-esteem, males believed that it helped them be competitive, build strength, and increase energy (Tergerson & King, 2002).

Finally, barriers to exercise among female students included lack of time to exercise, while male students wanted to do other things (Tergerson & King, 2002). The strengths of this study included the use of health behavior theory and the strong reliability of the questionnaires (Cronbach's alphas ranging from 0.80 to 0.90). However, this study employed a self-report survey; therefore, students might have been motivated to mark more desirable responses. Another limitation included the lack of generalizability of this study. The participants were from two private high schools and most of them were Caucasian.

Zabinski et al. (2003) also conducted a study to explore how perceived barriers to or perceived benefits of physical activity differed across children's weight status.

The participants were overweight children from a summer fitness camp in southern California and a university-based weight loss clinic in San Diego and nonoverweight children aged 10 to 14 years from elementary and middle schools in California or New York. The authors measured BMI and developed questionnaires to examine barriers and supportive factors for physical activity.

The findings illustrated that body-related barriers were a major impediment to exercise among overweight children. Overweight girls had higher body-related, resource, and social barriers to physical activity than nonoverweight girls. Body-related factors included girls being self-conscious about their looks and bodies when they engaged physical activities. Resource barriers referred to a lack of convenient places to do physical activity, lack of interest in physical activity, lack of skill, lack of equipment, and lack of knowledge of how to do physical activity. Finally, social barriers included the absence of anyone to do physical activity with, being chosen last on teams, lack of a person at the same skill level to do physical activity with, having friends who do not like to do physical activity, and being teased by friends during physical activity or sports. Overweight girls had lower levels of adult support than those who were not overweight (Zabinski et al., 2003).

Strengths of this study included the moderate to strong reliability of questionnaires and the inclusion of both nonoverweight and overweight children. Limitations included a cross-sectional design that solicited data from White children aged 8 to 16 years at a summer fitness camp and a university. Therefore, this study cannot be generalized to other ethnic groups or to different settings.

De Vries and associates (2007) conducted a cross-sectional study to examine the association between children's physical activity and elements of activity-friendly environments. The authors obtained data from children 6 to 11 years of age from 20 elementary schools in the Netherlands. A 7-day activity diary was used to measure the amount of time that children engaged in moderate intensity physical activity (> 3 METs). In addition, a checklist including 54-items was used to determine type of residence; availability of sports facilities, recreation facilities and playgrounds, green space and water; safe walking and cycling conditions; garbage and dirt in the environment; traffic safety, and general impressions of the activity-friendliness of a neighborhood. Intraclass correlation coefficients ranged from 0.58 to 0.80. The authors found that the number of parallel parking spaces in the neighborhood and the general impression of activity-friendliness of the neighborhood predicted physical activity among children. The limitations of this study included a low response rate (51%), cross-sectional design, and lack of generalizability.

Qualitative studies in many regions. Qualitative research related to perceived benefits, barriers, and cues to physical activity has also been conducted. An early qualitative study was conducted by Lee et al. (2009). Two focus groups were used to explore perceptions of exercise and reasons for not exercising among 11 obese students 11 to 13 years of age. The findings effectively demonstrated benefits and barriers to physical activity. Children identified benefits of doing exercise, such as relaxation, prevention of unhealthy effects, friendship fostering, skill development, and physical improvement. The children also mentioned barriers to physical activity,

such as feelings of discomfort after exercise, having false beliefs about exercise, and making excuses for not doing exercise.

Robbins, Talley, Wu, and Wilbur (2010) conducted qualitative research to explore perceived benefits, barriers, self-efficacy, enjoyment or activity preferences, and environmental influences related to physical activity among 6th grade boys. Seven focus groups identified perceived benefits of physical activity, such as physical health, healthy body weight, level of development, emerging sexuality, having fun, being popular, being with friends, being more confident, having more energy, being happy, taking out aggression, and being active. Perceived barriers to physical activity included being unmotivated, being too lazy, lacking the skill or fitness to do physical activity well, lacking equipment and good places for physical activity, lacking a safe environment to play, having some bad eating habits, and preferring computer or video games or watching TV to physical activity. Additional barriers included being embarrassed about engaging in physical activity in front of others; being too busy; lacking encouragement, transportation, and others to do physical activity with; having a bad day; and feeling pain as a result of physical activity. The participants, especially boys, felt they lacked opportunities for physical activity in school. A strength of the study included a racially diverse sample. A limitation of the research was the inability to generalize the findings to other age groups.

Moore et al. (2010) conducted 13 focus groups with middle school students and their parents to assess perceived barriers and facilitators of physical activity. The children mentioned barriers to physical activity, such as school policies related to physical activity, crime or danger, distance, cost, and watching television. The

children's perceptions of physical activity facilitators included social or peer interaction and facilities available. The strengths of the study included sampling and analysis. This study elicited data from diverse children from both rural and urban areas. In addition, the findings were confirmed with focus groups with children and their parents. The weaknesses of the study included the data collection method and the use of a question guideline that might have limited the determination of influencing factors.

Protudjer, Marchessault, Kozyrskyj, and Becker (2010) conducted semi-structured, in-depth interviews with Canadian children ages 11 to 12 years to better understand how children perceive healthy eating and physical activity. The 45 participants described a variety of organized and unorganized recreational activities, such as running up and down the stairs, playing, or sports. Most of the children were excited to engage in a sports group. Boys mentioned homework and watching television or playing computer games as barriers to physical activity. Girls mentioned other barriers to physical activity, such as conflicts with social commitments (e.g., holidays or parties), inactive parents, being overweight, or lack of fitness. The limitations of this study include the middle class status of students' families and easy access to sport organizations and equipment. Therefore, the students experienced few barriers to physical activity and the findings cannot be generalized.

Based on the literature review of qualitative studies related to the study variables, three of the four studies used focus groups to gain the perceptions of the children. One study utilized an in-depth interview to explore types of physical activity and the barriers to physical activity among the children. Although, most of the

qualitative studies addressed barriers to physical activity, two of these studies focused on benefits of physical activity. Unfortunately, there was only one study that addressed factors that promoted physical activity.

Studies of Physical Activity among Children in Thailand

Several studies of factors influencing childhood obesity have been conducted in Thailand. These studies differ somewhat in the variables addressed. For example, Wongiu (2007) studied factors influencing food consumption and exercise behaviors among 4th to 6th grade students and their parents. The setting for this study was a primary school in Nong Prue District, Kanchanaburi Province, central Thailand. This study used the Health Belief Model and social support as a framework. The author developed questionnaires to measure the perceptions of physical activity and eating behaviors. The reliability of the instruments showed Cronbach's alphas ranging from 0.67 to 0.84. The results indicated that biosocial factors related to exercise behaviors included age, gender, number of siblings, family members, and social class. Factors that had a positive association with exercise behaviors included: (a) knowledge about food consumption, nutritional status, and exercise, (b) perceived susceptibility to unhealthy food consumption and physical inactivity, (c) perceived benefits of healthy food consumption and exercise, (d) social support, and (e) parental child rearing. The strengths of the study included a relatively large sample size (n = 309), high response rate (97%), and use of questionnaires with moderate-to-strong reliability coefficients.

Sanamthong (2005) also studied eating and exercise behaviors among obese children ages 1 to 18 years and their parents. The purpose of this study was to explore food consumption, exercise, and the role of parents. This study applied two theories to

develop the conceptual framework, the Health Belief Model for predicting and explaining sick role behaviors and the Model-A multidimensional approach to food habits. The author interviewed participants at the Pediatric Nutritional Clinic in Srinagarind Hospital in Khon Kaen Province in northeastern Thailand. The findings demonstrated that the children did not like to eat vegetables, but preferred to consume high-calorie foods, oil, snacks, very sweet fruits, milk, and soft drinks. These children spent only 41 minutes a day in exercise, which they performed approximately four times a week. Types of exercise included running, football, Yoga, badminton, and table tennis. The children participated in exercise during lunch time, physical education classes, and in the evening. The barriers to physical activity included feeling tired after school, not being interested in exercise, not enjoying exercise, having no time, and a preference for other activities (e.g., watching televisions or playing video games). These children mentioned benefits of exercise including a desire to lose weight, being healthy, and having fun. The strength of the study was the theoretical framework. Although these findings are important, they are not generalizable to the overall primary school population, but only to obese students.

Wannasuntad (2007) conducted a study of factors predicting physical activity of 4th grade students in Bangkok. The instruments used in this study included a pedometer, the Family and Child Demographic Questionnaire, the Child's Perceived Barriers to Play Actively Scale, Child's Perceived Self-Efficacy to Play Actively Scale, Child's Perceived Physical Activity Enjoyment Scale, Child Perceived Social and Physical Environment for Physical Activity, and a Previous Day Physical Activity Recall Checklist. After testing for the quality of the questionnaires, most of

instruments showed acceptable validity and reliability (Cronbach's alpha 0.44 to 0.90). The study adapted the Health Promotion Theory as a study framework.

The authors reported that boys were significantly more active than girls. A main outcome of the study was that 31% of the variance in physical activity was explained by nine variables (gender, BMI, number of hours watching television, number of hours playing outside, sibling or other child support, parental permission to play actively outside, number of physical activity items or equipment available at home, school policy promoting physical activity, and children's self-efficacy in overcoming general barriers). Among these variables, gender was the strongest predictor of physical activity. The strengths of this study were a relatively large sample size (n = 398) and primary data on BMI and step counts, as well as the theoretical framework.

Amini et al. (2009) conducted a case-control study of primary school students aged 10 to 12 years in an urban area of Nakhon Pathom province, central Thailand. The purpose of this study was to assess childhood obesity and physical activity patterns among 4^{th} to 6^{th} graders. The researchers conducted anthropometric measurements and interviews and used a routine activity checklist, but did not present validity or reliability figures for the tools. Findings indicated that obese children spent more hours on light activities on weekends than normal weight children. Regarding levels of physical activity, both groups of children reported only light to moderate activity; vigorous activity was not reported by participants. There are several limitations of the study, including lack of validation of instruments, a small sample

size and failure to control for confounding variables, such as eating behavior in obese children and normal weight children.

According to the literature review, two of four studies in Thailand focused on eating behaviors and physical activity, the other studies addressed factors influencing physical activity and physical activity patterns among groups with differing BMIs. There was only one study that examined the perceived barriers to and benefits of physical activity. However, the participants of this study were obese children. There were limited childhood obesity studies among primary school students in Thailand that addressed children's perceptions of benefits, barriers, and cues that support or inhibit physical activity. Further, there was a lack of studies about the relationship between factors contributing to physical activity and levels of physical activity in northern Thailand. Because of this gap in the literature, this study employed the HBM as a theoretical framework to examine perceived barriers, benefits, cues to action, and physical activity levels among 4th grade students in Phitsanulok Province, northern Thailand.

Health Belief Model

The conceptual framework for this study is the Health Belief Model (HBM). The Health Belief Model was developed in the 1950s by a group of social psychologists (Rosenstock, 1974) to explain why so few people participated in screening programs that provided free x-rays and mobile x-ray units to detect tuberculosis (Rimer & Glanz, 2005; Rosenstock, Strecher, & Becker, 1994). In 1952, Hochbaum conducted surveys to assess readiness to participate in the x-ray clinics with 1,200 adults in three cities that provided the screening programs. Readiness

referred to the individuals' beliefs that they were likely to get sick from tuberculosis and the beliefs that they would benefit from early detection (Rosenstock et al., 1994). Many years later, Hochbaum, Leventhal, Kegeles, and Rosenstock developed the Health Belief Model (Maiman, & Becker, 1974) to clarify and to extend the model to encompass preventive and sick-role behaviors. For example, the model encouraged persons to recognize their symptoms, and go for early diagnosis and treatment (Rosenstock et al.).

The HBM was one of the first theories of health behavior and remains one of the most widely recognized in the psychosocial fields. This theory has been used to explain a variety of health-related behaviors (Rimer & Glanz, 2005; Rosenstock et al., 1994). The dimensions to health action include: (a) habitual behaviors such as smoking and dental care; (b) health-related behaviors such as eating and physical activity; and (c) economic or environmental factors such as pollution or unsafe environments (Clark & Houle, 2009). In addition, the HBM is appropriate for problem behaviors with health consequences, because it provides a useful framework for designing both short-term and long-term behavior change strategies (Rimer & Glanz, 2005).

The HBM is a value-expectancy theory that frames the context of health-related behaviors. This theory explains decision-making regarding an individual's health condition (Maiman & Becker, 1974). The value aspect of the model refers to the desire to prevent illness or to be healthy. The expectancy is the belief that if an individual performs a particular action, it will help prevent illness (Rosenstock et al., 1994).

The initial components of the HBM suggested that individuals would perform preventive behaviors if they believed that (a) they were individually susceptible to the illness, (b) the severity of the illness would affect their lives, and (c) their actions would be beneficial in decreasing susceptibility and severity of the health problems as well as conquering barriers. Other determinants that were later deemed necessary to the model included cues to action and other variables, such as demographic, socio-psychological, and structural variables (Rosenstock, 1974). In 1977, Clark and colleagues added self-efficacy to the model because they believed that this concept helped increase its explanatory power (Clark & Houle, 2009; Rosenstock et al., 1994). Consequently, the current main constructs of the framework include perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy.

Perceived susceptibility. Perceived susceptibility is an individual's belief about his or her chances of developing a particular condition. People will take action to screen for illness, to obtain diagnostic tests, or to prevent health problems if they consider themselves at risk for the conditions (Rosenstock, 1974; Rosenstock et al., 1994).

Perceived severity. Perceived severity is the individual's belief in the seriousness of a health-related problem. People will take action if they recognize that a health condition causes potentially serious effects. These effects may include clinical consequences, such as death or disability, and financial or social consequences, such as changes in family life or social relations. When perceived susceptibility combines with perceived severity, the condition becomes a perceived threat (Rosenstock et al.,

1994). However, both low and high perceptions of seriousness of contracting the illness affect the motivation for required action. For example, individuals may not take action if they have a low perception of seriousness; on the other hand, they may restrain their actions if they have extremely high perceptions of seriousness because they see it as futile to take action (Clark & Houle, 2009).

Perceived benefits. Perceived benefits reflect the individual's belief in the usefulness of changing unhealthy behaviors. Individuals will take action if they perceive particular actions as helping to decrease the threat (Clark & Houle, 2009; Rosenstock et al., 1994).

Perceived barriers. Perceived barriers involve the individual's evaluation of the obstacles to changing health-related behaviors (Hayden, 2009). Individuals perform a cost-benefit analysis by weighing the perceived effectiveness of the actions against the cost of taking those actions. The barriers refer to beliefs that the action is expensive, dangerous, inconvenient, unpleasant, painful, or time-consuming (Rosenstock, 1974; Rosenstock et al., 1994).

Cues to action. Cues to action are factors that encourage people to start changing their behaviors (Hayden, 2009). This determinant refers to stimuli that trigger a decision to perform a desired action (Clark & Houle, 2009; Rosenstock, 1974). Cues to action include internal triggers, such as a personal view of physical status, and external triggers, such as interpersonal interactions, communication media, or messages from a health care provider (Rosenstock, 1974).

Self-efficacy. The concept of self-efficacy was first introduced by Bandura (Rosenstock et al., 1994). Self-efficacy refers to the confidence one has that he or she is able to carry out the required behaviors (Hayden, 2009; Rosenstock et al., 1994).

Other factors. Demographic, socio-psychological, and structural variables may influence the individual's perceptions and health behaviors (Rosenstock et al., 1994). These factors may affect both perceived benefits and perceived barriers (Rosenstock, 1974).

Summary

Childhood obesity is becoming a significant health problem in Thailand. Obese children are more likely than normal weight children to suffer from physical, psychological, and social problems. Factors influencing childhood obesity include societal factors, eating behavior, and physical activity. Several studies combined both eating behavior and physical activity factors that contributed to childhood obesity. Many studies regarding physical activity reported that children have become less physically active today than in previous years. However, only one study in Thailand obtained data from obese children examining perceived benefits and perceived barriers to physical activity.

While both quantitative and qualitative studies were available on factors influencing physical activity, studies examining the relationship between those factors and levels of physical activity were limited. In addition, most studies overlooked some important variables, especially children's perceptions about potential factors influencing their levels of physical activity. Future studies will be more informative if children recognize the problems of childhood obesity and physical inactivity.

Noticeably, study of children's perceptions was limited in the literature. Therefore, other issues such as perceived benefits, perceived barriers, and cues to physical activity should be included in future study related to childhood obesity.

As noted above, there are limited studies of perceptions of physical activity among primary school children. It is still unclear what the benefits, barriers, and cues to physical activity are and whether these factors relate to levels of physical activity. The need to specifically understand and address perceived benefits, barriers, and cues to physical activity among children cannot be overlooked. Thus, a quantitative study was conducted to examine the associations among these variables. Through identifying these aspects, several audiences will benefit. Policy makers, health educators, administrators and teachers will gain clear information on children's perceptions in order to develop effective obesity prevention programs. Moreover, parents or parent organizations can better understand these issues so as to cooperate with the prevention programs. The purpose of the present study was to investigate the role of cues to action, perceived benefits, and perceived barriers in promoting physical activity in 4^{th} grade students in primary school settings in Phitsanulok province, Thailand.

Chapter 3

Methods

This chapter describes the research methodology used to answer the research questions posed in this study. These questions included:

1. What are the relationships between participants' levels of physical activity and perceived benefits, perceived barriers, and cues to action?
2. What are the relationships between levels of physical activity and perceived benefits, perceived barriers, and cues to action among boys?
3. What are the relationships between levels of physical activity and perceived benefits, perceived barriers, and cues to action among girls?
4. Do perceived benefits of physical activity subscale scores differ between girls and boys?
5. Do perceived barriers to physical activity subscale scores differ between girls and boys?
6. Do cues to action for physical activity subscale scores differ between girls and boys?

7. Do perceived benefits, perceived barriers, and cues to action differ among types of schools?

The research design, setting, sample and sampling techniques, ethical considerations, measures, data collection plan and procedures, and data analysis plan are presented.

Research Design

A cross-sectional descriptive design was used to investigate the relationship of perceived benefits, perceived barriers, and cues to action to levels of physical activity in 4th grade students in primary school settings in Phitsanulok province, Thailand. The independent variables in this study included gender, type of school, perceived benefits, perceived barriers, and cues to action. The dependent variable was the level of physical activity reported by the students.

Setting

This study was conducted in three primary schools in Muang district, Phitsanulok province in the northern part of Thailand. The total number of primary schools in Muang district was 16, with a population of 2,244 fourth grade students. Thai primary schools are administered by three types of organizations, the Ministry of Interior, the Ministry of Education, and private education organizations. Because the socioeconomic status of students' families varies among these educational organizations, three schools, one of each type, were selected through simple stratified random sampling to represent primary schools in the Phitsanulok province (see Table 2).

Table 2. Number of Schools, 4th Grade Classrooms, and Students in Muang District, Phitsanulok Province

Type of Educational Organization	Schools (N)	Classrooms (N)	Students (N)
Ministry of Interior	4	9	285
Ministry of Education	5	15	548
Private Education	7	32	1,411
Total	16	56	2,244

Sample

The specific population in this study was 4th grade students, who were approximately 10 years of age. This age group was chosen because children 5 to 12 years of age are capable of using new knowledge in reasoning, thinking, problem solving, and action (Collins, Madsen, & Susman-Stillman, 2002). Fourth grade students are able to independently answer the self-administered questionnaire. The inclusion criteria were students enrolled in the 4th grade during the 2010-2011 academic year, who had parental permission to participate in the study. Participants were excluded when their parents did not give permission to participate in the study. Both obese and overweight and normal weight students were included.

Sample size determination. The sample size was estimated using a power analysis for multiple regression and ANOVA statistics. There are five independent variables in this study including gender, type of school, perceived benefits, perceived barriers, and cues to action. However, only three independent variables were calculated in planned multiple linear regression analyses: perceived benefits, perceived barriers, and cues to action. According to rule of thumb, a sample size for multiple regression needs 20 participants per independent variable (Katz, 2010). The

effect size was set for medium effect based on a significance level of 0.05 and an estimated power of 0.80. Therefore, with three independent variables and one dependent variable, the total number of participants needed for this study was 76 (Cohen, 1992). To account for missing data, the sample size was increased by 15% bringing the total N to 87 students, an average of 29 from each school.

Sample recruitment. This study applied stratified random sampling to select the schools and the classes within the selected schools. All students in the selected classrooms were invited to participate. First, simple random sampling was applied to choose three schools in Muang district, Phitsanulok province. These schools represented a diversity of schools from three organizational types, one school for each type of educational organization. Second, an information letter was sent to the directors of the primary schools selected to request permission to conduct the study and collect data (Appendix A).

The investigator met the director at each of the selected schools to explain the research procedures and ask for their cooperation in the data collection process. After getting permission from the directors (see letters of support in Appendix B), the investigator met the head of 4^{th} grade teachers at each school to provide information regarding the study. One class from each school chosen was randomly selected to participate. The investigator sent the cover letter (Appendix C) and the consent form (Appendix D) to parents of all the students in the selected classes. Finally, all students whose parents agreed to their participation and who met the inclusion criteria completed the questionnaires. Before the survey, the investigator read through the assent form and asked the participants if they were willing to participate in the study.

The participants who agreed to participate in this study signed the assent form. No permitted children refused to participate in the study.

Ethical Considerations

Prior to conducting the study, the proposal was reviewed by the Institutional Review Board of the University of San Diego. Moreover, the investigator needed to solicit permission from each of the participating schools to conduct this study as described above. Informed consent from the parents and assent from the students were obtained. Cover letters and consent forms were provided to the students to take home to their parents (Appendices C and D). These explained the purpose of the study, estimated time commitment, minimal risks, and benefits to the students and their parents.

All study data were kept confidential in a secured location. Participation was voluntary, and the participants had the right to withdraw from the study at anytime without effects on their schooling. This study did not cause physical, economic, or legal harm to the participants. However, minimal risks for these participants might include loss of time and slight emotional distress. No participants experienced distress; therefore, no referrals for counseling were required during the study. The students were asked to bring the consent form back to the investigator the next day. Before distributing surveys to the participating students, the investigator explained the study and read an assent form (Appendix E), and then asked the participants to sign the form. IRB approval for the study is included in Appendix F.

Data Collection Instruments

Data were collected by the investigator using two instruments. One was an existing instrument that has been translated into Thai, and one was developed by the investigator. Details regarding the tools and their development or translation are provided below.

Variables and measures. Two instruments were used to collect data related to the study variables of gender, type of school, level of physical activity, perceived benefits, perceived barriers, and cues to action (see Table 3). Each of these variables and the corresponding instruments are discussed below.

Physical activity. Physical activity measures included the types and frequency of physical activity performed by the 4th grade students during the prior seven days. Physical activity during one's spare time was defined as activity that caused the children to sweat, to breathe hard, or to make their legs feel tired. This variable was measured by the Physical Activity Questionnaire for Older Children (PAQ-C) (Kowalski, Crocker, & Donen, 2004). The PAQ-C is a self-administered survey and is used to assess general moderate to vigorous physical activity levels within the past seven days. This questionnaire is designed for students in grades 4 to 8, aged 8 to 14 years. The PAQ-C is a low-cost, reliable, and valid instrument.

The PAQ-C has been tested for validity and reliability in several studies (Kowalski, Crocker, & Donen, 2004). For example, Crocker, Bailey, Faulkner, Kowalski, and McGrath (1997) examined the test-retest reliability and internal consistency of the PAQ-C with 84 students aged 9 to 14 years. The students were tested twice; the second test was conducted one week after the first test, both at school.

The authors reported the test-retest reliability for males was 0.75, and for females was 0.82. The internal consistency for the first week was 0.79; for the second week it was 0.89.

Kowalski, Crocker, and Faulkner (1997) conducted another study to validate the PAQ-C with 89 students aged 8 to 13 years. The authors illustrated convergent validity with a moderate relationship with an activity rating scale ($r = 0.63$), 24-hour activity recall ($r = 0.53$), and teacher ratings of physical activity ($r = 0.45$). For construct validity, the tool also had a moderate correlation with perceptions of athletic competence ($r = 0.48$). In sum, the validity and reliability of the PAQ-C from these studies showed acceptable support for the measure.

Some questions from this public domain questionnaire were adapted in this study to be suitable for Thai students. Some types of physical activities were changed because of environmental and social differences. The revised instrument (Appendix G) consisted of ten items. The demographic questions dealt with gender and the name of the school. The first item examined spare time activities in the past week on a 5-point scale (1 = no activity, 5 = seven times or more). Items 2 to 8 examined the type and frequency of activities during physical education class, recess, lunch, after school, evenings, and weekends. The response choices for these items ranged from 1 – the lowest activity response to 5 – the highest activity response. Item 9 examined the frequency of physical activity for each day of the previous week (1 = none, 5 = very often). The last item examined illness and obstacles that made students unable to engage in their usual physical activity during the prior week. The final score was calculated as the mean of items 1 to 9; the range of possible scores was 1 to 9. A score

of 1 indicated low physical activity, while a score of 9 indicated a high level of physical activity. The reliability coefficient for the PAQ-C in this study was .911.

The strengths of the PAQ-C include the level of support as a valid and reliable measure for physical activity levels, the use of memory cues to boost recall of physical activity, and its ease of administration. However, there are some limitations to using the PAQ-C. For example, this questionnaire was created to assess general levels of physical activity instead of measuring caloric expenditure or specifying frequency, duration, and intensity information. It does not classify moderate and vigorous activities, but provides a general level of physical activity (Kowalski, Crocker, & Donen, 2004).

Perceived benefits, barriers, and cues to action. Perceived benefits of, barriers to, and cues to action related to physical activity were measured using the Cues, Perceived Benefits, and Barriers to Physical Activity Questionnaire. Perceived benefits of physical activity are defined as positive reasons that the children give for exercising or for considering exercising. These reasons include staying in shape, losing weight, controlling weight, reducing stress, being healthy, enjoyment, becoming strong, being with friends, having fun, protecting one's heart, receiving a compliment from parents, and getting a reward from parents.

Perceived barriers are defined as the reasons that the children do not exercise or would not consider exercising. These reasons include factors that the children perceive as problems or difficulties related to exercise, such as lack of time to exercise, wanting to do other things with their time, being too tired, not having a place to exercise, not being interested in exercise, not enjoying exercise, thinking that exercise

is too hard, not knowing how to exercise, not thinking exercise is important, not having clothes or shoes to wear when exercising, not having equipment needed, having no one to play with, not having parental permission, bad weather, having too much homework, and feeling discomfort after exercise

Cues to action are defined as factors that help or would help children exercise. These factors consist of having a friend to exercise with, having a friend encourage exercise, having a parent encourage exercise, having a parent who exercises, having parents to exercise with, reading about exercise in magazines, watching exercise on TV, having nearby sports fields or free spaces to play, having necessary equipment at home, taking a physical education class in school, being told that physical activity is good for health, and having a recreation center available.

The Cues, Perceived Benefits and Barriers to Physical Activity Questionnaire was used to examine cues to action, and perceived benefits and barriers to physical activity in primary school students (Appendix H). This questionnaire was based on an instrument used by Tergerson and King (2002) with adaptations based on findings of other qualitative and quantitative studies, particularly those conducted in Thailand. The scale included 47 items divided into three subscales to assess the perceived cues to, benefits of, and barriers to physical activity among male and female 4th grade students. The questions were created to address three components of the HBM. The mean of students' responses to items on each subscale were used to interpret the data. Higher mean scores reflected greater beliefs. For example, a higher mean score on the perceived benefits subscale indicated greater perceived benefits. A higher value on the

perceived barriers subscale corresponded with a higher level of perceived barriers. A higher mean score on the cues to action subscale indicated greater cues to action.

Each of the three variables of interest was measured by a subscale of the Cues, Perceived Benefits and Barriers to Physical Activity Questionnaire. The perceived benefits of physical activity subscale and the perceived barriers to physical activity subscale consisted of 17 items each, and the cues to action subscale consisted of 13 items. The responses to all subscale items were made on a 4-point scale with 1 indicating strong disagreement with the statement and 4 indicating strong agreement. The last section of the instrument consisted of 6 demographic and background questions with yes/no responses. The reliability of the perceived benefits, perceived barriers, and cues to action subscales were .847, .837, and .915, respectively.

Perceived benefits. This variable was measured by the subscale of perceived benefits in the Cues, Perceived Benefits and Barriers to Physical Activity Questionnaire. The possible mean score on the perceived benefits of physical activity subscale ranges from 17 to 68. A high score indicates strong perceived benefits of physical activity, whereas a low score indicates few perceived benefits of physical activity.

Perceived barriers. This variable was measured by the subscale of perceived barriers in the Cues, Perceived Benefits and Barriers to Physical Activity Questionnaire. The possible mean score on the perceived barriers to physical activity subscale ranges from 17 to 68. A high score indicates many perceived barriers to physical activity, whereas a low score indicates few perceived barriers to physical activity.

Cues to action. This variable was measured by the cues to action subscale of the Cues, Perceived Benefits and Barriers to Physical Activity Questionnaire. The possible mean score on the cues to action subscale ranges from 13 to 52. A high score indicates many cues to action, whereas a low score indicates few cues to action.

Establishing measurement equivalence in Thai versions. The Physical Activity Questionnaire for Older Children (PAQ-C) was originally developed in English. This study was conducted in Thailand. Therefore, the instrument was translated into Thai by the investigator. The instrument was then back translated to English by an experienced translator. The English version derived from the Thai version of this instrument was compared to the original English version.

The Cues, Perceived Benefits and Barriers to Physical Activity Questionnaire was developed in Thai. Therefore, this instrument was translated into English by the investigator in order to get approval from the IRB.

Content validity was established through review of the tool by at least three experts in the area to determine if the specific items were relevant, sufficient, and clear in representing the concepts to be measured (Waltz, Strickland, & Lenz, 2010). Three experts in nursing, health education, or physical activity, who were proficient in both English and Thai, validated the instrument. After content validity was assessed, the instruments were revised based on suggestions made by the reviewers.

Pilot testing. Before actual data collection for the study began, the revised instruments were tested in a convenience sample of 4th grade students who were not involved in the study. These students were from other classes in the selected schools (fifteen 4th grade students per school were invited to participate). Reliability in the

Thai population was determined based on the internal consistency of the instrument (Cronbach's alpha coefficient). Internal consistency reliability is a cognitive measurement that evaluates the consistency of the response of a group of participants on the items. The alpha coefficient determines whether the performance of any item accurately indicates the performance of other items in the same instrument (Waltz et al., 2010).

Data Collection Procedures

Self-administered questionnaires were used to gather the data at the primary schools in Phitsanulok province, Thailand. The following steps were taken to conduct the study. First, after setting a schedule with teachers and obtaining parental consent and student assent, the investigator asked the participating students to complete the Physical Activity Questionnaires for Older Children (PAQ-C) during a homeroom class. This survey was done in a meeting room available at the school.

The investigator explained to students what the questionnaire asked and how to respond to the items. If they had a question during the survey, they could ask the investigator to clarify the question but every attempt was made not to influence the choice of an answer. The investigator checked for completeness of answers. If some answers were missing, the investigator asked the students whether they did not understand the question or they did not want to answer. If they needed clarification, the investigator provided the explanations and then asked them to complete those questions. This survey took approximately 10 minutes. After taking the first survey, the investigator asked the students to complete the Perceived Benefits Subscale, which

is the first part of the Cues, Perceived Benefits and Barriers to Physical Activity Questionnaire. This survey took approximately 5 minutes.

On the next day, the investigator asked the students to complete the last two parts of the Cues, Perceived Benefits and Barriers to Physical Activity Questionnaire, which included the Perceived Barriers and Cues to Action subscales. The process was the same as for the first day. Completing the questionnaires took approximately 10 minutes. The students received an inexpensive gift that promotes physical activity in appreciation of their participation.

Data Analysis Plan

Statistical analyses were conducted using the Statistical Package for the Social Sciences/ Personal Computer (SPSS/PC). Descriptive statistics of mean, standard deviation, frequency, and percentage were used to describe sample characteristics and demographic data such as gender and type of school. Inferential statistics were used to analyze data to answer each of the research questions as described below (see Table 3).

Research questions 1 to 3. (1) What is the relationship between participants' levels of physical activity and perceived benefits, perceived barriers, and cues to action? (2) What are the relationships between level of physical activity and perceived benefits, perceived barriers, and cues to action among boys? (3) What are the relationships between level of physical activity and perceived benefits, perceived barriers, and cues to action among girls? Multiple linear regression was planned to examine the relationship between level of physical activity and each of three HBM variables (perceived benefits, perceived barriers, and cues to action). The level of statistical significance was set at .05. Multiple regression is a statistic used to examine

relationships between multiple independent variables and one dependent variable. This statistic requires that all variables be measured on an interval scale (Spicer, 2005).

Prior to doing multiple regression, the bivariate correlations among all the variables were tested. Only the variables with acceptable levels of correlation ($p < 0.05$) with physical activity were to be entered into the regression equation. The results of model testing were not significant; therefore, the Pearson correlation statistic was used to analyze the relationship between the independent variables and dependent variable.

Research questions 4 to 6. (4) Do perceived benefits of physical activity subscale scores differ between girls and boys? (5) Do perceived barriers to physical activity subscale scores differ between girls and boys? (6) Do cues to action for physical activity subscale scores differ between girls and boys? Independent *t*-tests were used to examine any gender differences for each of the three variables (perceived benefits, perceived barriers, and cues to action). The level of statistical significance was set at 0.05. Independent *t*-test is a statistic used to compare the means of the two groups (Katz, 2010). However, all of these statistical tests depend upon cumulative scores for each variable.

Research question 7. (7) Do perceived benefits, perceived barriers, and cues to action differ by type of school? One-way analysis of variance (ANOVA) was used to examine any differences among types of school for each of the three variables (perceived benefits, perceived barriers, and cues to action). The level of statistical significance was set at 0.05.

Table 3. Summary of Instrument Characteristics and Planned Statistical Analyses

Variables	Measure	Data Source	Level of Data	Descriptive Statistical Tests	Tests of Association
1. Levels of physical activity	The Physical Activity Questionnaire for Older Children (PAQ-C)	Participant self-report	Interval, ordinal	- Mean - Standard deviation - Percent	- Pearson correlation - Multiple regression
2. Perceived benefits	The Cues, Perceived Benefits and Barriers to Physical Activity Questionnaire	Participant self-report	Interval	- Mean - Standard deviation	- Pearson correlation - Multiple regression - Independent *t*-test - One-way ANOVA
3. Perceived barriers	The Cues, Perceived Benefits and Barriers to Physical Activity Questionnaire	Participant self-report	Interval	- Mean - Standard deviation	- Pearson correlation - Multiple regression - Independent *t*-test - One-way ANOVA
4. Cues to action	The Cues, Perceived Benefits and Barriers to Physical Activity Questionnaire	Participant self-report	Interval	- Mean - Standard deviation	- Pearson correlation - Multiple regression - Independent *t*-test - One-way ANOVA
Participant characteristics	Demographic Variables - Gender - Type of school	Participant self-report	Nominal	- Percent	- Independent *t*-test - One-way ANOVA

Summary

This study was a descriptive study designed to examine the relationships among participants' level of physical activity, perceived benefits, perceived barriers,

and cues to action. The sample for this study included 4th grade students in Muang District, Phitsanulok province, Thailand. A stratified random sampling approach was used to select the schools and classes for participation. The study used two instruments to measure the variables: the Physical Activity Questionnaire for Older Children (PAQ-C) and the Cues, Perceived Benefits and Barriers to Physical Activity Questionnaire. The research questions included: What is the relationship between participants' levels of physical activity and perceived benefits, perceived barriers, and cues to action? What are the relationships between participants' levels of physical activity and perceived benefits, perceived barriers, and cues to action among boys? What are the relationships between participants' levels of physical activity and perceived benefits, perceived barriers, and cues to action among girls? Do perceived benefits of physical activity differ between girls and boys? Do perceived barriers to physical activity differ between girls and boys? Do cues to action for physical activity differ between girls and boys? Do perceived benefits, perceived barriers, and cues to action differ among the types of school? Pearson correlation, independent *t*-tests, and one-way ANOVA were used to analyze data.

Chapter 4

Study Findings

This chapter presents the findings from data analysis in five sections. The first section reports pilot testing, including a description and characteristics of the sample. The second section describes an item analysis and the reliability of the instruments. Sample characteristics for the main study are presented in the third section. The fourth section describes results related to individual variables including physical activity, perceived benefits, perceived barriers, and cues to physical activity. In the last section, data analyses related to each of the seven stated research questions are presented.

Pilot Testing

A pilot test was conducted to test two instruments with a convenience sample of forty 4th grade students who were not participants in the main study. These students were recruited from three schools in Phitsanulok province randomly selected for participation. Fifteen 4th grade students per school were invited to participate in the pilot test, and forty students agreed to participation: 13 from School A, 12 from School B, and 15 from School C.

To conduct the pilot study the investigator first established a schedule with teachers and obtained parental consent and student assent. The testing procedure was exactly the same as the procedure used for the actual study (first day the participating students completed the PAQ-C and the Perceived Benefits Subscale; on the second day they completed the last two parts of the Cues, Perceived Benefits and Barriers to Physical Activity Questionnaire). Questionnaires were answered during a homeroom class or study hall depending on the school. In the pilot, the investigator explained to students what the questionnaire asked and how to respond to the items. Some students had questions regarding the open-ended questions and the investigator explained the questions and gave examples of possible answers.

After students turned in the questionnaires, the investigator found some answers were missing and asked the students whether they did not understand the question or just did not choose to answer. Most of the students had forgotten to answer those questions, so they went back and completed them. Total testing time on day one was 15 minutes and day two was 10 minutes. The students received pedometers as a gift for their participation. The investigator asked the students whether the questions were hard to understand. Most of them understood both questions and rating scales. One student did not know what gymnastics was, and another student explained to her that it was a sport in the Olympic Games. The findings from the pilot test are presented in a following section of this chapter.

Most of the participants (72.5%) included in the pilot test were girls, and their average age was 9.75 years (SD = .436). More than half of the students had friends or parents that exercised (61.5% and 70%, respectively), and seven out of ten students

had parents who encouraged them to exercise. Half of the sample had attempted to lose weight, and 52.5% of the students took extra classes. Only 35% of the participants were members of a sports team, and one fourth of them indicated being ill during the prior week possibly affecting their usual physical activity level. Table 4 illustrates participants' characteristics and descriptions of their physical activity levels derived from pilot test of the PAQ-C.

Table 4. Pilot Test Participants' Characteristics and Physical Activity Descriptors (N = 40)

Participants' Characteristics	**Category**	**Frequency (%)**	**Mean, Standard Deviation**
Age (yr)	9	10 (25)	Mean = 9.75
	10	30 (75)	S.D. = .436
Gender	Male	11 (27.5)	
	Female	29 (72.5)	
School	A	13 (32.5)	
	B	12 (30.0)	
	C	15 (37.5)	
Were you sick last week?	Yes	10 (25)	
	No	30 (75)	
Do you have a friend that exercises?	Yes	24 (61.5)	
	No	15 (38.5)	
Do you have a parent that exercises?	Yes	28 (70)	
	No	12 (30)	
Do you have a parent that encourages you to exercise?	Yes	29 (72.5)	
	No	11 (27.5)	
Are you currently trying to lose weight?	Yes	20 (50)	
	No	20 (50)	
Are you a member of any kind of sports team?	Yes	14 (35.0)	
	No	26 (65.0)	
Do you take extra classes?	Yes	21 (52.5)	
	No	19 (47.5)	

Item Analysis and Reliability of Instruments

This study utilized two instruments, the Physical Activity Questionnaire for Children (PAQ-C) and the Cues, Perceived Benefits and Barriers to Physical Activity Questionnaire. The validity of the two questionnaires had been previously established with Thai students. In the pilot study, these instruments were subjected to item analysis and internal consistency reliability testing. Item analysis examines corrected item-total correlations and Cronbach's alpha if an item were to be deleted. An item that has a corrected item-total correlation less than 0.3 may be considered for deletion. However, the deletion of that item should improve the total value of the Cronbach's alpha (Field, 2006). The determinations of internal consistency reliability provided by George and Mallery (2007) were as follows: $\alpha > .9$ = excellent, $\alpha > .8$ = good, $\alpha > .7$ = acceptable, $\alpha > .6$ = questionable, $\alpha > .5$ = poor, and $\alpha < .5$ = unacceptable.

The Physical Activity Questionnaire for Older Children (PAQ-C). Four items of the PAQ-C (item 3, 9, 19, and 21) had corrected item-total correlations less than 0.3, but the deletion of these four items only increased the Chronbach's alpha from .911 to .912. Therefore, none of these items were omitted. However, in the revised questionnaire, one additional item regarding spare time activities (*Takraw*) was included based on the suggestion of students on the open-ended question at the end of the part 1. *Takraw* is a native sport unique to the Thai-Malay Peninsula. The corrected item-total correlations for the PAQ-C ranged from 0.193 to 0.677. Table 5 displays the results of the item analysis of the PAQ-C including the corrected item-total correlations and Cronbach's alpha if each item was to be deleted. The overall

Cronbach's alpha coefficient for internal consistency reliability for the revised PAQ-C was .911.

Table 5. Item Analysis for the PAQ-C

Items	Corrected Item-total Correlation	Cronbach's Alpha if Item Deleted
1. Skipping	.458	.908
2. Playing tag	.326	.910
3. Walking	.270	.911
4. Bicycling	.573	.906
5. Jogging, Running	.582	.906
6. Aerobic dance	.460	.908
7. Swimming	.462	.909
8. Exercise	.370	.910
9. Soccer	.281	.912
10. Badminton	.628	.905
11. Tennis	.608	.907
12. Table-tennis	.360	.911
13. Basketball	.375	.910
14. Volleyball	.424	.909
15. Karate, Judo, Tae kwon do	.671	.906
16. Gymnastics	.520	.908
17. Outdoor Play	.356	.910
18. Hula Hoop	.472	.908
19. PE Class	.193	.911
20. Recess	.410	.909
21. Lunch	.236	.912
22. After school	.677	.905
23. Evening	.677	.905
24. Weekend	.397	.909
25. Which one of the following describes you best	.637	.906
26. Monday	.582	.907
27. Tuesday	.597	.907
28. Wednesday	.523	.907
29. Thursday	.428	.909
30. Friday	.610	.906
31. Saturday	.561	.907
32. Sunday	.557	.907

The cues, perceived benefits and barriers to physical activity questionnaire. Corrected item-total correlations were calculated for the items in each

of the subscales of the Cues, Perceived Benefits and Barriers to Physical Activity Questionnaire. Results for each of the subscales are presented below.

Perceived benefits of physical activity subscale. The corrected item-total correlations for all items in the perceived benefits subscale were greater than 0.3. Thus, no items were deleted because their item-total correlations were appropriate. The participants provided some additional reasons to engage in physical activity not addressed in the original questionnaire. The investigator decided to add the most frequent reason suggested by the students to the revised questionnaire - "To improve my immunity to illness." The corrected item-total correlations for the perceived benefits subscale ranged from 0.305 to 0.654. Table 6 presents the item analysis for the perceived benefits of physical activity subscale.

Table 6. Item Analysis for the Perceived Benefits of Physical Activity Subscale

Items	Corrected Item-total Correlation	Cronbach's Alpha if Item Deleted
1. To stay in shape	.598	.831
2. To lose weight	.429	.841
3. To control excess weight	.536	.835
4. To reduce stress	.382	.844
5. To be healthy	.470	.840
6. To make me happy	.654	.830
7. To become strong	.418	.842
8. To be with friends	.512	.836
9. To have fun	.636	.832
10. To protect my heart	.597	.831
11. To receive a compliment from my parents	.433	.841
12. To get a reward from parents	.389	.843
13. To have more energy	.556	.834
14. To feel refreshed	.356	.844
15. To be an athlete or be well known	.323	.848
16. To sleep better	.305	.848

Perceived barriers to physical activity subscale. The results of item analysis for the perceived barriers subscale indicated that items 2 and 18 should be deleted because the corrected item-total correlations for these items were less than 0.3. The deletion of these two items increased the total Cronbach's alpha from .820 to .837. The corrected item-total correlations for the perceived barriers subscale ranged from 0.056 to 0.608. The item analysis for the perceived barriers to physical activity subscale is summarized in Table 7.

Table 7. Item Analysis for the Perceived Barriers to Physical Activity Subscale

Items	Corrected Item-total Correlation	Cronbach's Alpha if Item Deleted
1. I do not have time to exercise	.429	.810
2. I want to do other things with my time	.214	.822
3. I am too tired	.562	.804
4. I do not have a safe place to go and exercise	.326	.818
5. I do not enjoy exercising	.380	.814
6. I am not interested in exercising	.608	.802
7. I think that exercise is too hard	.544	.808
8. I do not know how to exercise	.500	.807
9. I do not think exercise is important	.312	.817
10. I do not have clothes or shoes to wear when I exercise	.381	.813
11. I do not have equipment to play with	.349	.814
12. I do not have anyone to play with	.425	.811
13. I do not have my parent's permission	.499	.806
14. The weather is too bad	.403	.812
15. I have too much homework	.493	.806
16. I felt discomfort after exercise	.490	.807
17. I am worried about strangers when I play outside	.497	.806
18. I have to take extra classes	.056	.835
19. I have a health problem	.337	.815

Cues to action subscale. Based on the results of the item analysis for the cues to physical activity subscale, item 10 was omitted because its corrected item-total correlation was less than 0.3. Elimination of this item increased the total Cronbach's alpha from .911 to .915. The corrected item-total correlations for the cues to physical activity subscale ranged from 0.253 to 0.779. Table 8 displays the item analysis for the cues to action subscale.

Table 8. Item Analysis for the Cues to Action Subscale

Items	Corrected Item-total Correlation	Cronbach's Alpha if Item Deleted
1. Having a friend to exercise with	.730	.901
2. Having a friend tell or encourage me to exercise	.729	.901
3. Having my parent(s) encourage me to exercise	.703	.902
4. Having a parent who exercises	.846	.897
5. Having parents to exercise with	.779	.899
6. Reading about exercise in magazines	.480	.910
7. Watching exercise on TV	.396	.914
8. Having a sports field or free space to play	.573	.907
9. Having the right equipment	.669	.903
10. Taking a physical education class in school	.253	.915
11. Being told that physical activity is good for my health	.708	.902
12. Having a recreation center close by	.675	.903
13. Being told by parents that I should exercise	.478	.910
14. Being taken by parents to play sports or exercise	.636	.904

The Cronbach's alpha coefficients for the perceived benefits, perceived barriers, and cues to physical activity subscales were .847, .820, and .911, respectively. The resulting number of items, reliability, and item analysis results for the two instruments are summarized in Table 9.

Table 9. Reliability of the PAQ-C and Cues, Perceived Benefits and Barriers to Physical Activity Questionnaires

Questionnaires	Number of Items	Cronbach's Alpha Coefficient	Corrected Item-Total Correlation Range
1. PAQ-C	32	0.911	0.193 – 0.677
2. Perceived benefits of physical activity subscale	16	0.847	0.305 – 0.654
3. Perceived barriers to physical activity subscale	17	0.837	0.312 – 0.608
4. Cues to action subscale	13	0.915	0.396 – 0.779

In the pilot study, the students responded to all questions. However, some students had questions while answering the open-ended questions. Their questions included "if I were not sick last week, do I need to answer the section about medical history?", or "do I need to add an activity if my activity is not on the list?", or "what should I write for the reasons to do or not to do physical activity?" The investigator clarified questions for the participants and they understood the questions without difficulty. The results of the pilot study showed the good to excellent reliability of the instruments. The Physical Activity Questionnaire for Children (PAQ-C) and the cues to action subscales exhibited excellent reliability (α = .911 and .915, respectively). The perceived benefits and perceived barriers subscales showed the good reliability (α = .847 and .837, respectively). Based on the results of the pilot test, the one item regarding a sport was added to the PAQ-C, and one item related to reasons to exercise was added to the perceived benefits subscale. On the other hand, two items were

deleted from the perceived barriers subscale, and one item was deleted from the cues to action subscale.

Formal Research Study

Description of the formal study sample. The school settings used in the formal study were recruited from three types of organizations, the Ministry of Interior, the Ministry of Education, and private education organizations. Among these educational organizations, the socioeconomic status of students' families is somewhat different. The schools of the Ministry of Education are mostly comprised of students from middle-class families. The majority of students in the schools of the Ministry of Interior were from middle-to-low socioeconomic families. The middle-to-high socioeconomic families generally enrolled in private schools. Stratified random sampling was used to select one school of each type. As a result, three schools represented primary schools in Phitsanulok province. School A was selected from the Ministry of Interior organization. Schools B and C represented the Ministry of Education and private education organizations, respectively.

One hundred and thirty parents of fourth grade students were asked to consent to their children's participation in the study. A total of 123 students (94.6%) agreed to participate. These students were recruited from three schools located in the Muang district, Phitsanulok province (School A, School B, and School C). Fifty-one percent of the participants were girls and 49% were boys. Table 10 summarizes the number and percentage of the participants categorized by gender and school.

Table 10. Participants' Demographic Characteristics, by Gender and School

School	Gender		Total
	Boys	Girls	
School A	19 (31.7%)	17 (27.0%)	36 (29.3%)
School B	19 (31.7%)	23 (36.5%)	42 (34.1%)
School C	22 (36.7%)	23 (36.5%)	45 (36.6%)
Total	60 (48.8%)	63 (51.2%)	123 (100.0%)

As indicated in Table 11, the ages of students ranged from nine to eleven years. Both boys and girls had similar mean age of 9.87 years (SD = .425).

Table 11. Ages of Participants, by Gender

Age (years)	Gender		Total
	Boys	Girls	
9	8 (6.6%)	12 (9.8%)	20 (16.4%)
10	50 (41.0%)	48 (39.3%)	98 (80.3%)
11	2 (1.6%)	2 (1.6%)	4 (3.3%)
Total	60 (49.2%)	62 (50.8%)	122 (100.0%)
			Missing = 1, Mean = 9.87, SD = .425

Eight of ten participants had friends or parents that exercise (79.7% and 85.4%, respectively) and had parents who encourage them to exercise (79.7%). About 60% of the participants were trying to lose weight. Most of the participants were not members of sports teams (67.5%). Half of them took extra classes (51.2%). The majority of the participants (79.7%) had not been sick within the week prior to the study. Those students who were sick reported headaches, fevers, being weak, and getting a cold. Participants' characteristics related to physical activity are presented in Table 12.

Table 12. Participants' Characteristics Related to Physical Activity

Participants' Characteristics	Category	Frequency (%)
Do you have friend that exercises?	Yes	98 (79.7)
	No	25 (20.3)
Do you have a parent that exercises?	Yes	105 (85.4)
	No	18 (14.6)
Do you have a parent that encourages you to exercise?	Yes	98 (79.7)
	No	25 (20.3)
Are you currently trying to lose weight?	Yes	76 (61.8)
	No	47 (38.2)
Are you a member of any kind of sports team?	Yes	40 (32.5)
	No	83 (67.5)
Do you take extra classes?	Yes	63 (51.2)
	No	60 (48.8)
Were you sick last week?	Yes	25 (20.3)
	No	98 (79.7)

Findings Related to Study Variables

Frequency of physical activity. The frequency of physical activity during the participants' spare time in the prior week was rated on a scale from 1 to 5, with 1 indicating no physical activity, 2 indicating 1-2 times, 3 indicating 3-4 times, 4 indicating 5-6 times, and 5 indicating 7 or more times during the week. Table 13 displays the types and frequency of physical activity reported for the prior 7 days. This table demonstrates that the activity that most students (n = 51) engaged in most often (seven or more times) in the week before the study was bicycling, Other activities reported seven or more times in the week by several students included skipping (n = 35), using a hula hoop (n = 31), outdoor play (n = 25), and walking (n = 24). However,

no single activity was reported seven or more times in the week by at least half of the students.

Activities reported with a moderate level of frequency (3-4 times a week) were skipping, walking, jogging or running, outdoor play, tag or traditional Thai children's games, and using a hula hoop. Activities least likely to be reported by the students included gymnastics, karate and similar activities, tennis, and basketball. In general, the activities reported most often by the participants tended to be those that require minimal equipment or specialized training. The only exception was the frequent mention of bicycle riding, which requires a bicycle.

Table 13. Type and Frequency of Participants' Physical Activity in Their Spare Time in the Prior Week (N = 123)

Physical activity during the prior 7 days	**None**	**1-2 times**	**3-4 times**	**5-6 times**	**7 or more times**
1. Bicycling	14	18	19	20	51
2. Skipping	5	36	34	13	35
3. Hula Hoop	18	29	24	19	31
4. Walking for exercise	15	39	31	14	24
5. Jogging or running	16	45	29	15	18
6. Outdoor play	29	32	26	9	25
7. Badminton	39	33	24	10	17
8. Soccer	48	24	23	7	21
9. Exercise (push-ups, jumping jacks)	32	49	17	10	15
10. Playing tag or traditional Thai children's games	30	47	25	9	12
11. Swimming	54	30	20	7	12
12. Table-tennis	63	29	13	9	9
13. *Takraw* (Kick volleyball)	60	32	16	8	7
14. Basketball	75	22	11	8	7
15. Aerobic dance	76	35	8	3	1
16. Volleyball	87	24	4	5	3
17. Tennis	100	11	6	1	5
18. Karate, Judo, Tae kwon do	104	9	4	1	5
19. Gymnastics	111	10	1	0	1

Table 14 presents the frequency of physical activities reported by boys for the week prior to the study. According to the figures in this table, boys engaged in bicycling (n = 31), skipping (n = 21), outdoor play (n = 18) and soccer (n = 17) seven times or more during the 7-day period. Moderate frequency activities (3-4 times a

week) included soccer, skipping, jogging or running, and swimming. The activities that boys were least likely to report were gymnastics, tennis, karate and similar pursuits, volleyball, and aerobic dancing, all activities that require formal training or are traditionally perceived as activities for girls.

Table 14. Type and Frequency of Boys' Physical Activity in Their Spare Time in the Prior Week (N = 60)

Physical activity during the prior 7 days	**None**	**1-2 times**	**3-4 times**	**5-6 times**	**7 or more times**
1. Bicycling	9	5	9	6	31
2. Skipping	4	14	15	6	21
3. Soccer	11	11	15	6	17
4. Outdoor play	12	15	11	4	18
5. Jogging or running	9	19	12	9	11
6. Walking for exercise	7	24	11	8	10
7. Hula Hoop	16	16	11	5	12
8. Swimming	19	16	12	5	8
9. Exercise (push-ups, jumping jacks)	15	25	6	7	7
10. Playing tag or traditional Thai children's games	20	17	11	6	6
11. Table-tennis	26	16	8	6	4
12. *Takraw* (Kick volleyball)	23	20	10	4	3
13. Badminton	29	13	11	1	6
14. Basketball	34	13	5	3	5
15. Karate, Judo, Tae kwon do	49	5	2	1	3
16. Volleyball	43	13	3	1	0
17. Aerobic dance	42	16	1	1	0
18. Tennis	51	4	1	1	3
19. Gymnastics	56	3	1	0	0

Table 15 displays the frequency of physical activities reported by girls in their spare time during the prior week. As indicated in the table, no activity was reported occurring seven or more times during the week by more than one third of the girls. The top four physical activities for girls included: bicycling (n = 20), using a hula hoop (n = 19), skipping (n = 14), and walking (n = 14). Activities reported with moderate frequency (3-4 times per week) were walking, skipping, jogging or running, outdoor play, and tag or traditional Thai children's games. The activities that girls were least likely to engage in were gymnastics, karate, tennis, volleyball, and basketball (n = 41). Like the boys, girls tended to report activities that required minimal equipment or training.

Table 15. Type and Frequency of Girls' Physical Activities in Their Spare Time in the Prior Week (N = 63)

Physical activity during the prior 7 days	**None**	**1-2 times**	**3-4 times**	**5-6 times**	**7 or more times**
1. Hula Hoop	2	13	13	14	19
2. Bicycling	5	13	10	14	20
3. Skipping	1	22	19	7	14
4. Walking for exercise	8	15	20	6	14
5. Badminton	10	20	13	9	11
6. Jogging or running	7	26	17	6	7
7. Outdoor play	18	17	15	5	7
8. Playing tag or traditional Thai children's games	10	30	14	3	6
9. Exercise (push-ups, jumping jacks)	17	24	11	3	8
10. Swimming	34	14	8	2	4
11. Table-tennis	37	13	5	3	5
12. *Takraw* (Kick volleyball)	37	12	6	4	4
13. Soccer	37	13	8	1	4
14. Basketball	41	9	6	5	2
15. Aerobic dance	34	19	7	2	1
16. Volleyball	44	11	1	4	3
17. Tennis	49	7	5	0	2
18. Karate, Judo, Tae kwon do	55	4	2	0	2
19. Gymnastics	55	7	0	0	1

Average frequencies for each type of physical activity during participants' spare time during the prior are presented in Figure 2. Findings are presented for the total sample and comparisons made for girls and boys. The physical activities with the highest mean frequency ratings were bicycling, skipping, and using a hula hoop with

mean ratings of 3.62, 3.30, and 3.13, respectively. As indicated in Figure 2, the most frequent physical activity for boys was bicycling, followed by skipping and soccer. For girls, the rank order for types of physical activities were using a hula hoop, then bicycling and skipping.

Figure 2. Mean Scores for Types of Physical Activity in Students' Spare Time in the Prior Week, Total Sample, Boys, and Girls

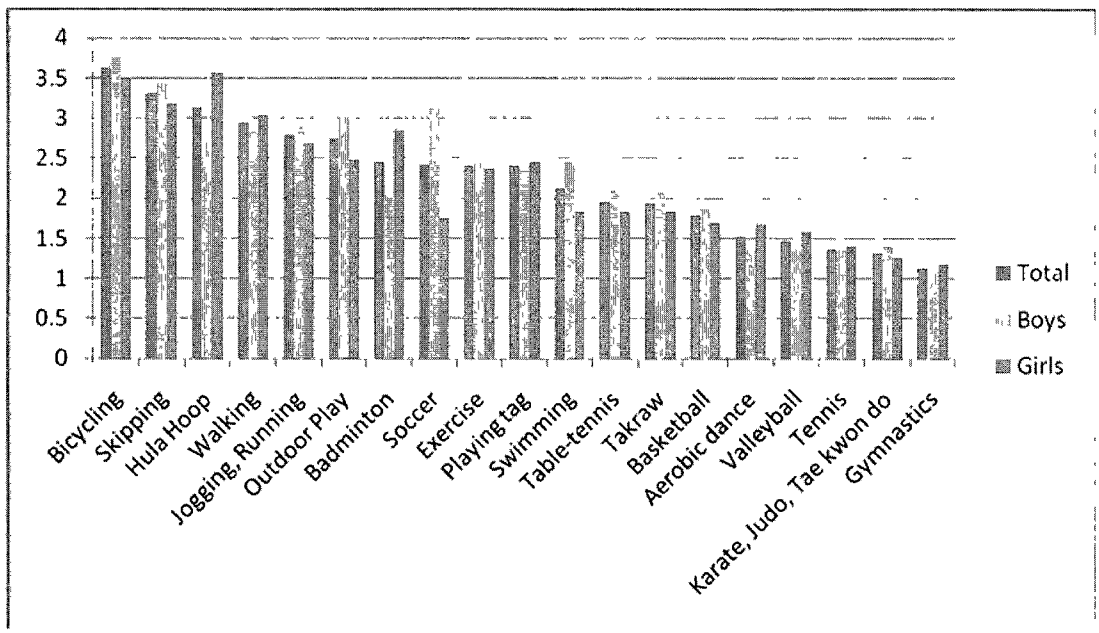


Table 16 presents the frequency of physical activities over the course of the 7-day period, categorized in terms of time periods and days of the week. Responses were made on a 5-point scale with 1 indicating a low activity level and 5 indicating a high activity level. Table 16 indicates the mean physical activity rating for each selected time period. As shown in Table 16, the highest mean rating was provided for activity during physical education classes with nearly 62% of participants indicating they always or quite often engaged in physical activity during physical education classes. At recess time, less than a third of the students reported running and playing quite a bit

or most of the time, while more than 40% sat or stood or walked around. A similar lack of activity was displayed by more than half of the students during lunch. Nearly 80% of participants engaged in physical activities at least two to three times right after school, roughly two-thirds in the evening, and 83% during the weekend. On the item asking "which one of the following describes you best for the last 7 days?," the largest percentage of participants (39.8%) reported that they did physical activities three to four times in their free time, 13% indicated engaging in physical activities five to six time, and nearly 27% reported physical activity seven or more times in the prior week.

Table 16. Participants' Physical Activity in the Prior Week (N = 123)

Physical activity in the prior 7 days	N	%	Mean	S.D.
1. Activity during physical education class	123		3.96	.936
I didn't do physical education	1	.80		
Hardly ever	2	1.6		
Sometimes	44	35.8		
Quite often	30	24.4		
Always	46	37.4		
2. Activity at recess time	123		2.80	1.448
Sat down	34	27.6		
Stood or walked around	16	13.0		
Ran or played a little bit	39	31.7		
Ran and played quite a bit	9	7.3		
Ran and played hard most of the time	25	20.3		
3. Activity at lunch time	123		2.35	1.337
Sat down	50	40.7		
Stood or walked around	12	9.8		
Ran or played a little bit	42	34.1		
Ran and played quite a bit	6	4.9		
Ran and played hard most of the time	13	10.6		
4. Activity after school	123		3.37	1.244
None	11	8.9		
1 time last week	14	11.4		
2 or 3 times last week	49	39.8		
4 times last week	16	13.0		
5 times last week	33	26.8		
5. Activity in the evening	123		3.06	1.314
None	20	16.3		
1 time last week	20	16.3		
2 or 3 times last week	38	30.9		
4 times last week	23	18.7		
5 times last week	22	17.9		
6. Activity during weekend	123		3.47	1.155
None	6	4.9		
1 time last week	15	12.2		
2 or 3 times last week	50	40.7		
4 times last week	19	15.4		
5 times last week	33	26.8		

Table 16. Continued

Physical activity in the prior 7 days	N	%	Mean	S.D.
7. Which one of the following describes you best for the last 7 days?	123		2.69	1.313
All or most of my free time was spent doing things that involve little physical effort	22	17.9		
I sometimes (1 - 2 times last week) did physical things in my free time	14	11.4		
I often (3 - 4 times last week) did physical things in my free time	49	39.8		
I quite often (5 - 6 times last week) did physical things in my free time	16	13.0		
I very often (7 or more times last week) did physical things in my free time	33	26.8		

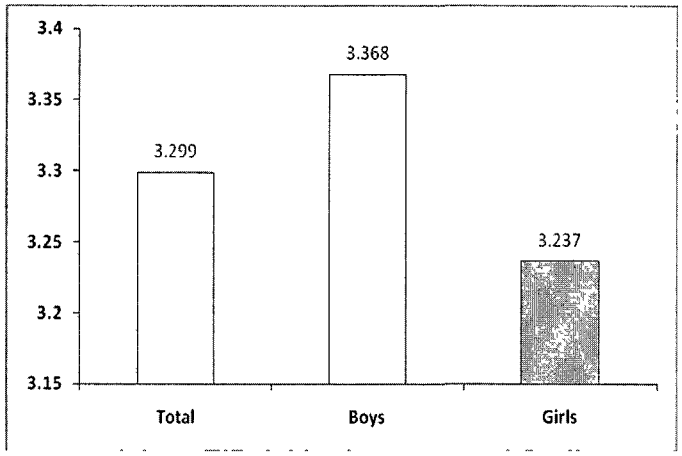
Participants engaged in physical activity most frequently on the Saturday and Sunday of the 7-day period. Approximately 69% of participants engaged in physical activity "often" or "very often" on Saturday and 68% on Sunday, and an additional 12% and 13% of the students, respectively, engaged in physical activity at a medium level. Fridays also saw greater physical activity levels than the other days of the school week, possibly due to the pressure of homework on other week days (see Table 17).

Table 17. Level of Physical Activity for Each Day of the Prior Week (N = 123)

Physical activity during the prior 7 days	**None** **1**	**A little bit** **2**	**Medium** **3**	**Often** **4**	**Very often** **5**	**Mean**	**S.D.**
1. Monday	8	30	44	21	20	3.12	1.149
	(6.5%)	(24.4%)	(35.8%)	(17.1%)	(16.3%)		
2. Tuesday	16	37	36	24	10	2.80	1.448
	(13.0%)	(30.1%)	(29.3%)	(19.5%)	(8.1%)		
3. Wednesday	14	30	41	29	9	2.91	1.109
	(11.4%)	(24.4%)	(33.3%)	(23.6%)	(7.3%)		
4. Thursday	12	31	35	34	10	2.99	1.124
	(9.8%)	(25.2%)	(28.5%)	(27.6%)	(8.1%)		
5. Friday	8	23	45	25	22	3.24	1.148
	(6.5%)	(18.7%)	(36.6%)	(20.3%)	(17.9%)		
6. Saturday	9	14	15	27	58	3.90	1.308
	(7.3%)	(11.4%)	(12.2%)	(22.0%)	(47.2%)		
7. Sunday	13	10	16	28	56	3.85	1.361
	(10.6%)	(8.1%)	(13.0%)	(22.8%)	(45.5%)		

The mean level of physical activity for items 1 to 9, was 3.299 (SD = .565), which indicates that overall the participants engaged in a moderate level of physical activity. Boys engaged in physical activity more often than girls (means of 3.368 and 3.237, respectively) (see Figure 3).

Figure 3. Mean Physical Activity Levels in the Prior Week, Total Sample, Boys, and Girls



Perceived benefits of physical activity. Participants responded to items on the perceived benefits subscale on a scale of 1 to 4, with 4 indicating the greatest perceived benefit and 1 indicating the least perceived benefit. The possible perceived benefits score ranged from 17 to 68, and the average score for the subscale was 54.3 (SD = 6.432), which suggests that the participants had strong perceptions regarding the benefits of physical activity. The perceived benefits of doing physical activity that received the highest ratings were "to be healthy" (3.76), "to become strong" (3.70), "to make me happy" (3.60), "to improve my immunity to illness" (3.54), and "to feel refreshed" (3.50). The participants also provided other reasons for participating in physical activity in responding to the open-ended question, such as "to increase my height" (n =5), "to help me focus on studying" (n = 3), "to help me be smart" (n = 2), and "to receive a compliment from my neighbor" (n = 2). Table 18 presents results related to participants' perceived benefits of physical activity.

Table 18. Perceived Benefits of Physical Activity

Perceived Benefits	Strongly disagree 1	Disagree 2	Agree 3	Strongly agree 4	N	Mean	S.D.
1. To stay in shape	10 (8.1%)	17 (13.8%)	63 (51.2%)	33 (26.8%)	123	2.97	.858
2. To lose weight	1 (0.8%)	7 (5.7%)	54 (43.9%)	61 (49.6%)	123	3.42	.640
3. To control excess weight	8 (6.5%)	14 (11.4%)	57 (46.3%)	44 (35.8%)	123	3.11	.851
4. To reduce stress	6 (4.9%)	15 (12.3%)	50 (41.0%)	51 (41.8%)	122	3.20	.840
5. To be healthy	0 (0%)	2 (1.6%)	26 (21.1%)	95 (77.2%)	123	3.76	.468
6. To make me happy	0 (0%)	7 (5.7%)	35 (28.5%)	81 (65.9%)	123	3.60	.597
7. To become strong	0 (0%)	2 (1.6%)	32 (26.2%)	88 (72.1%)	122	3.70	.493
8. To be with friends	11 (8.9%)	37 (30.1%)	54 (43.9%)	21 (17.1%)	123	2.69	.860
9. To have fun	1 (0.8%)	10 (8.1%)	51 (41.5%)	61 (49.6%)	123	3.40	.674
10. To protect my heart	11 (8.9%)	10 (8.1%)	40 (32.5%)	62 (50.4%)	123	3.24	.944
11. To receive a compliment from my parents	10 (8.1%)	26 (21.1%)	52 (42.3%)	35 (28.5%)	123	2.91	.905
12. To get a reward from my parents	14 (11.6%)	33 (27.3%)	42 (34.7%)	32 (26.4%)	121	2.76	.975
13. To have more energy	6 (4.9%)	13 (10.6%)	55 (44.7%)	49 (39.8%)	123	3.20	.816
14. To feel refreshed	1 (0.8%)	8 (6.5%)	42 (34.1%)	72 (58.5%)	123	3.50	.658
15. To be an athlete or be well known	18 (14.6%)	36 (29.3%)	42 (34.1%)	27 (22.0%)	123	2.63	.986
16. To sleep better	18 (14.6%)	30 (24.4%)	45 (36.6%)	30 (24.4%)	123	2.71	.998
17. To improve my immunity to illness	3 (2.4%)	9 (7.3%)	29 (23.6%)	82 (66.7%)	123	3.54	.738

Perceived barriers to physical activity. The response scale for the perceived barriers subscale also ranged from 1 to 4, with 1 indicating strong disagreement and 4 strong agreement with perceived barriers. Like the perceived benefits scores, the possible perceived barriers score ranged from 17 to 68. The average score for the perceived barriers subscale was 34.31 (SD = 7.494), suggesting that the participants perceived a moderate level of barriers to physical activity. Barriers with the highest mean ratings included: worry about strangers when playing outside (2.68), bad weather (2.60), too much homework (2.51), discomfort after exercise (2.35), and being too tired for physical activity (2.28). The participants reported some additional conditions that impeded physical activity, including: "I'm too lazy" (n = 5), "I don't want to go out" (n = 3), "I have extra classes" (n = 3), and "I'm scared of having an accident" (n =2). Table 19 presents participants' perceived barriers to physical activity.

Table 19. Perceived Barriers to Physical Activity

Perceived Barriers	Strongly disagree 1	Disagree 2	Agree 3	Strongly agree 4	N	Mean	S.D.
1. I do not have time to exercise	38 (30.9%)	41 (33.3%)	32 (26.0%)	12 (9.8%)	123	2.15	.972
2. I am too tired	31 (25.2%)	40 (32.5%)	39 (31.7%)	13 (10.6%)	123	2.28	.961
3. I do not have a safe place to go and exercise	49 (39.8%)	44 (35.8%)	18 (14.6%)	12 (9.8%)	123	1.94	.969
4. I do not enjoy exercising	75 (61.0%)	39 (31.7%)	3 (2.4%)	6 (4.9%)	123	1.51	.772
5. I am not interested in exercising	58 (47.2%)	47 (38.2%)	7 (5.7%)	11 (8.9%)	123	1.76	.915
6. I think that exercise is too hard	60 (48.8%)	38 (30.9%)	17 (13.8%)	8 (6.5%)	123	1.78	.919
7. I do not know how to exercise	46 (37.4%)	50 (40.7%)	22 (17.9%)	5 (4.1%)	123	1.89	.842
8. I do not think exercise is important	84 (68.3%)	29 (23.6%)	2 (1.6%)	8 (6.5%)	123	1.46	.823
9. I do not have clothes or shoes to wear when I exercise	57 (46.7%)	49 (40.2%)	9 (7.4%)	7 (5.7%)	122	1.72	.836
10. I do not have equipment to play with	43 (35.0%)	52 (42.3%)	20 (16.3%)	8 (6.5%)	123	1.94	.881
11. I do not have anyone to play with	43 (35.0%)	44 (35.8%)	26 (21.1%)	10 (8.1%)	123	2.02	.945
12. I do not have my parent's permission	55 (44.7%)	45 (36.6%)	16 (13.0%)	7 (5.7%)	123	1.80	.877
13. The weather is too bad	30 (24.4%)	22 (17.9%)	38 (30.9%)	33 (26.8%)	123	2.60	1.129
14. I have too much homework	27 (22.0%)	31 (25.2%)	40 (32.5%)	25 (20.3%)	123	2.51	1.051

Table 19. Continued

Perceived Barriers	Strongly disagree 1	Disagree 2	Agree 3	Strongly agree 4	N	Mean	S.D.
15. I feel discomfort after exercise (tired, sweating)	32 (26.0%)	36 (29.3%)	35 (28.5%)	20 (16.3%)	123	2.35	1.040
16. I am worried about strangers when I play outside	27 (22.0%)	23 (18.7%)	35 (28.5%)	38 (30.9%)	123	2.68	1.133
17. I have a health problem that makes it hard for me to do physical activity	49 (39.8%)	34 (27.6%)	24 (19.5%)	16 (13.0%)	123	2.06	1.058

Cues to action. Possible responses on the cues to action subscales also ranged from one to four. The possible total scores ranged from 13 to 52. The average score for the overall subscale was 41.24 (SD = 6.058), which showed that the participants experienced several cues to motivate physical activity. The rank order of factors that strongly encouraged participants to engage in physical activities included: being told that physical activity is good for health (3.65), being taken by parents to play sports or exercise (3.37), having a sports field or free space nearby (3.29), and being encouraged to exercise by parents (3.28). Some participants reported additional cues to action in the open-ended question section of the questionnaire, such as the fact that they like to exercise (n = 3), nice weather (n = 3), and being taken by siblings to exercise (n =2). Table 20 displays the participants' cues to action for physical activity.

Table 20. Cues to Action for Physical Activity

Cue to Action	Strongly disagree 1	Disagree 2	Agree 3	Strongly agree 4	N	Mean	S.D.
1. Having a friend to exercise with	10 (8.1%)	5 (4.1%)	58 (47.2%)	50 (40.7%)	123	3.20	.859
2. Having a friend tell or encourage me to exercise	11 (8.9%)	6 (4.9%)	57 (46.3%)	49 (39.8%)	123	3.17	.884
3. Having my parent(s) encourage me to exercise	5 (4.1%)	3 (2.4%)	67 (54.5%)	48 (39.0%)	123	3.28	.707
4. Having a parent who exercises	13 (10.6%)	13 (10.6%)	50 (40.7%)	47 (38.2%)	123	3.07	.956
5. Having parents to exercise with	12 (9.8%)	8 (6.5%)	61 (49.6%)	42 (34.1%)	123	3.08	.893
6. Reading about exercise in magazines	22 (17.9%)	24 (19.5%)	50 (40.7%)	27 (22.0%)	123	2.67	1.014
7. Watching exercise on TV	16 (13.0%)	17 (13.8%)	50 (40.7%)	40 (32.5%)	123	2.93	.993
8. Having a sports field or free space to play	8 (6.5%)	8 (6.5%)	47 (38.2%)	60 (48.8%)	123	3.29	.856
9. Having the right equipment	8 (6.5%)	12 (9.8%)	48 (39.0%)	55 (44.7%)	123	3.22	.873
10. Being told that physical activity is good for my health	4 (3.3%)	2 (1.6%)	27 (22.0%)	90 (73.2%)	123	3.65	.677
11. Having a recreation center close by	11 (8.9%)	6 (4.9%)	54 (43.9%)	52 (42.3%)	123	3.20	.893
12. Being told by parents that I should exercise	11 (8.9%)	16 (13.0%)	44 (35.8%)	52 (42.3%)	123	3.11	.951
13. Being taken by parents to play sports or exercise	7 (5.7%)	6 (4.9%)	44 (35.8%)	66 (53.7%)	123	3.37	.824

Analysis of Data Related to Research Questions

The purpose of this study was to investigate the role of cues, perceived benefits, and perceived barriers in promoting physical activity in 4th grade students in primary school settings in Phitsanulok province, Thailand. Questionnaires utilized in this study were scored and calculated in the data analysis only when 100% of the items were completed. Four questionnaires were omitted because there were duplicated answers for some items or incomplete responses. A final total of 123 questionnaires was analyzed. The following sections present the findings related to each research question.

Research question 1. What are the relationships between participants' level of physical activity and their perceived benefits, perceived barriers, and cues to action?

Among three independent variables, only the perceived barriers variable had a significant inverse relationship with the level of physical activity ($r = -.197$, $p < .05$). The perceived benefits variable was significantly related to the cues to action variable ($r = .496$, $p < .01$), but neither variable was significantly related to physical activity. Table 21 presents the Pearson correlations among the three independent variables and the level of physical activity.

Regression analyses were planned to determine the extent of the contribution of each of the three independent variables to variance in physical activity. However, since only one of the three variables was significantly related to physical activity levels, no regression analyses were conducted for this or subsequent research questions.

Table 21. Correlation Coefficients for Variables Related to Physical Activity

Variables	Physical Activity	Perceived Benefits	Perceived Barriers	Cues to Action
Physical Activity	1	.082	-.197*	.018
Perceived Benefits		1	-.152	.496**
Perceived Barriers			1	-.017
Cues to Action				1

* Correlation is significant at the 0.05 level (2-tailed)

** Correlation is significant at the 0.01 level (2-tailed)

Research question 2. What are the relationships between level of physical activity and perceived benefits, perceived barriers, and cues to action among boys?

Pearson correlations identified no variable significantly correlated with the level of physical activity among boys. Similar to the results for the total sample, the perceived benefits variable was significantly related to the cues to action variable ($r = .590$, $p < .01$). Table 22 presents correlations of the three independent variables with the level of physical activity among boys.

Table 22. Correlation Coefficients for Variables Related to Physical Activity in Boys

Variables	Physical Activity	Perceived Benefits	Perceived Barriers	Cues to Action
Physical Activity	1	.093	-.191	.038
Perceived Benefits		1	-.207	.590**
Perceived Barriers			1	-.131
Cues to Action				1

** Correlation is significant at the 0.01 level (2-tailed)

Research question 3. What are the relationships between level of physical activity and perceived benefits, perceived barriers, and cues to action among girls?

For girls, perceived barriers had an inverse relationship with levels of physical activity (r = -.288, p < .05). Again, the perceived benefits variable was also significantly related to the cues to action variable (r = .395, p < .01). Table 23 illustrates the Pearson correlations of the three independent variables with the level of physical activity among girls.

Table 23. Correlation Coefficients for Variables Related to Physical Activity in Girls

Variables	Physical Activity	Perceived Benefits	Perceived Barriers	Cues to Action
Physical Activity	1	.066	- .212*	.015
Perceived Benefits		1	- .096	.395**
Perceived Barriers			1	.116
Cues to Action				1

* Correlation is significant at the 0.05 level (2-tailed)

** Correlation is significant at the 0.01 level (2-tailed)

Research question 4. Do perceived benefits of physical activity subscale scores differ between girls and boys?

An independent t-test was calculated to compare the mean scores on the perceived benefits scales between boys and girls. As indicated in Table 24, the 58 boys had a mean total score of 54.397 on the perceived benefits of physical activity subscale; the 62 girls had a mean total score of 54.177. However, the top three perceived benefits of physical activity were the same for boys and girls: "to be happy," "to become strong," and "to make me happy." As indicated in Table 24, the means did not differ significantly by gender (t = .186, p .853).

Table 24. Gender Differences in Perceived Benefits Scores

Gender	N	Mean	S.D.	*t*-Value	P-Value
Boys	58	54.397	6.673	.186	.853
Girls	62	54.177	6.250		

Research question 5. Do perceived barriers to physical activity subscale scores differ between girls and boys?

An independent *t*-test was also used to compare the mean scores of boys and girls on the perceived barriers subscale. As presented in Table 25, boys perceived more barriers to physical activity than girls but the difference was not significant (*t* = .176, p .861). The ranking of perceived barriers to physical activity for boys included: "I am worried about strangers when I play outside," "The weather is too bad," and "I am too tired". Whereas, the top three perceived barriers to physical activity for girls included: "I have too much homework," "the weather is too bad," and "I am worried about strangers".

Table 25. Gender Differences in Perceived Barriers Scores

Gender	N	Mean	S.D.	*t*-Value	P-Value
Boys	60	34.433	7.716	.176	.861
Girls	62	34.194	7.335		

Research question 6. Do cues to action for physical activity scores differ between girls and boys?

Mean scores on the cues to action subscale were compared between boys and girls using an independent *t*-test. Girls perceived more cues to physical activity than

boys. Again, no significant difference was noted for boys and girls with respect to cues to action for physical activity (t = -.912, p .364). The first ranked cue to action for boys was similar to girls, "being told that physical activity is good for my health". The following rank of cues to action was noted for boys: "having a sports field or free space to play" and "having my parents encourage me to exercise". For girls, the second ranked cue to action was "being taken by parents to play sports or exercise, and the third ranked cue was "having my parents encourage me to exercise". Table 26 presents the t-test analysis for cues to action by gender.

Table 26. Gender Differences in Cues to Action Scores

Gender	**N**	**Mean**	**S.D.**	***t*-Value**	**P-Value**
Boys	60	40.733	6.433	-.912	.364
Girls	63	41.730	5.686		

Research question 7. Do perceived benefits, perceived barriers, and cues to action differ among the types of schools?

Descriptive statistics related to the three independent variables categorized by school are presented in Table 27. School A students reported the greatest perceived benefits of physical activity, which may be due to the fact that during the study, School A had a sports day event. Students at School B perceived the highest motivation to engage in physical activity, which may be affected by the fact that this school had an exercise program for obese students. School C students perceived more barriers to physical activity than students in the other schools.

Table 27. Descriptive Statistics for Participants' Perceived Benefits, Perceived Barriers, and Cues to Physical Activity by School

Variables	**N**	**Mean**	**S.D.**
Perceived benefits	120		
School A	34	55.514	8.059
School B	41	54.268	4.985
School C	44	53.318	6.148
Perceived barriers	122		
School A	36	33.361	7.415
School B	42	33.381	6.724
School C	44	35.977	8.108
Cues to action	123		
School A	36	40.444	7.065
School B	42	41.762	6.724
School C	45	41.400	8.108

One-way ANOVAs were used to analyze any differences in scores on the perceived benefits, perceived barriers, and cues to action subscales among the three types of schools. As indicated in Table 28, no differences were found (F, 2, 117 = 1.139, p .324).

Table 28. One-way ANOVA of Mean Scores on Three Independent Variables, by School

		Sum of Squares	df	Mean Square	F	Sig
Perceived Benefits	Between Groups	94.030	2	47.015	1.139	.324
	Within Groups	4828.337	117	41.268		
	Total	4922.367	119			
Perceived Barriers	Between Groups	190.976	2	95.488	1.720	.183
	Within Groups	6605.188	119	55.506		
	Total	6796.164	121			
Cues to physical activity	Between Groups	35.375	2	17.687	.478	.621
	Within Groups	4441.308	120	37.011		
	Total	4476.683	122			

Summary

The characteristics of participants included an average age of 9.87 years old, having friends or parents that exercise, and receiving encouragement to exercise from parents. The only variable that seemed to influence activity levels was perceived barriers to physical activity, and there were no differences in outcomes for boys and girls. The perceived benefits, perceived barriers, and cues to physical activity did not differ by gender or type of school. However, the kinds of activities reported differed between boys and girls. Boys preferred to engage in bicycling, skipping, and soccer, while girls liked using a hula hoop, bicycling, and skipping in that order of preference.

Chapter 5

Discussion, Implications, and Recommendations

This chapter addresses four areas. The first section discusses study findings. The second section presents the strengths and limitations of the study. The third section discusses its implications for nursing, and the fourth section provides recommendations for future research.

Discussion of the Findings

The specific aims of this study were: 1) to examine relationships between the levels of physical activity and perceived benefits, perceived barriers, and cues to action among primary school students, and 2) to compare the effects of cues, perceived benefits, and perceived barriers on physical activity among male and female primary school students. This section discusses the descriptive findings and the results regarding the research questions.

Descriptive findings. The demographics of the participants included fourth grade students with a mean age of 9.87 years, comprised of 60 boys (48.8%) and 63 girls (51.2%). The majority of the participants had friends or parents who exercised and had parents who encouraged them to exercise. Most of them were not members of a sports team. Sixty percent of the participants tried to lose weight, and half of them

took extra classes. The mean score on the levels of physical activity questionnaire was 3.299 (SD = .564), which indicated a moderate level of physical activity. Bicycling was the activity most often reported as occurring seven or more times during the week before the study. Other activities reported seven or more times in the week by several students included skipping, using a hula hoop, outdoor play, and walking. Boys engaged in bicycling, skipping, outdoor play, and soccer seven times or more during the 7-day period. More than one third of the girls did not engage in any physical activities seven or more times during the week. The top physical activities most often reported by boys, in rank order, were bicycling, skipping, and soccer; whereas, girls' physical activity more often involved using a hula hoop, bicycling, and skipping. The participants tended to indicate activities that required minimal equipment or training.

The findings of this study are consistent with those of Rodriguez (2009) who reported on two samples of children aged 6 to 8 years old in San Diego County. Rodriquez found that 33% of sample one and 24% of sample two met the physical activity guidelines – engaging in the moderate-to-vigorous physical activity (MVPA) at least 60 minutes on 5 or more days per week. They participated in physical activity at parks and playgrounds more often than at recreation or sport facilities. Similarly, the qualitative study by Protudjer, Marchessault, Kozyrskyj, and Becker (2010) showed that Canadian children aged 11 to 12 years indicated various organized and unorganized recreational activities. These activities included running up and down the stairs, playing, or sports. A few children, who described themselves as not participating in sports, reported that they engaged in fun recreational activities such as jumping rope or using a hula hoop. The other qualitative study of sixth grade girls

aged 10 to 11 years old indicated that many girls engaged in activities that related to free time and unstructured play such as dance and free play (Clark, 2008). In addition, the cohort study by Heitzler (2009) reported boys aged 10 to 17 years old in the metropolitan Minnesota Twin Cities region engaged in more free-time or unstructured physical activity than girls.

The results from the present study support these qualitative studies. The results illustrated that boys were more engaged in physical activity than girls. In addition, boys and girls tended to participate in activities that required less equipment and special training. However, both boys and girls participated in physical activity during a physical education class and during their free-time such as after school and weekends. In Thailand, the study of obese children aged 1 to 18 years reported that participants spent only 41 minutes a day in exercise, which they performed approximately four times a week (Sanamthong, 2005). The results showed that the obese children were engaged in physical activity less than the physical activity guidelines. Although the present study did not measure minutes of physical activity like the study by Sanamthong, the findings of the present study demonstrated similar results, showing a moderate level of physical activity, approximately 3-4 times a week.

However, the findings of the present study are somewhat different from those of Wannasuntad. In that study, the top four physical activities of 4th grade students in Bangkok, Thailand, were running, walking, football (soccer), and badminton. The favorite physical activities that boys generally participated in were running, football (soccer), walking, and bicycling. In girls, the most frequent activities included running, walking, badminton, and bicycling (Wannasuntad, 2007). Only bicycling was found in

common with the findings of the present study. Although the population of Wannasuntad's study was the same age as participants in the present study, the socio-economic status and environment of these studies might be different. Therefore, the ranking of different types of activities was dissimilar.

Regarding gender differences in levels of physical activity, the present study found that boys engaged in more physical activity than girls. Although this finding does not exhibit statistical significance, it is congruent with several other studies. Similar results were found in Australia (Zinviani et al., 2006), United Kingdom (Brockman, Jagoa, & Foxa, 2010; Forbes, Teijlingen, & Clark, 2007), Turkey (Kin-Isler, Asci, Altintas, & Guven-Karahan, 2009), rural and urban regions of the United States (Heitzler, 2009; Kitzman-Ulrich, 2010; Robbins, Sikorskii, Hamel, Wu, & Wilbur, 2009; Rodriguez, 2009), and Thailand (Wannasuntad, 2007).

The present study found that participants reported more physical activities during physical education classes, after school, evenings, and on weekends than at other times. This finding is in agreement with previous studies. For example, Wannasuntad (2007) found that fourth grade students in Bangkok, Thailand were more active on the weekends than during the weekdays. Sanamthong (2005) reported that the children participated in exercise during lunch time, physical education classes, and in the evening.

In this present study, the mean scores on the perceived benefits of physical activity suggest that the participants perceived multiple benefits of physical activity. The perceived benefits of doing physical activity that received the highest ratings were "to be healthy," "to become strong," "to make me happy," "to improve my immunity

to illness," and "to feel refreshed". This finding is consistent with several prior studies. The study of Tergerson and King (2002), for example, demonstrated that the greatest perceived benefit of exercise for female students was staying in shape; while among male students, being strong was perceived as the greatest exercise benefit. Moreover, females stated physical activity helped them increase energy levels, reduce stress, and promote self-esteem. Males believed that it helped them be competitive, build strength, and increase energy. Similar to Lee et al.'s findings (2009), children in this study identified benefits of doing exercise, such as relaxation, prevention of unhealthy effects, friendship fostering, skill development, and physical improvement. In Sanamthong's (2005) study, Thai children mentioned benefits of exercise including a desire to lose weight, being healthy, and having fun. In the United States, sixth grade boys aged 11 to 13 years in the midwest indicated their perceived benefits of physical activity as "to have an average weight," "being healthy," "being strong," and "being fit" (Robbins et al., 2010). Similarly, the qualitative study of sixth grade girls aged 10 to 11 years old by Clark (2008) indicated that girls perceived connections between physical activity, body size, and health.

Based on the findings of this study, the mean score on the perceived barriers subscale suggested that the participants perceived a moderate level of barriers to physical activity. Barriers with the highest mean ratings included: worry about strangers when playing outside, bad weather, too much homework, having discomfort after exercise, and being too tired for physical activity. Conversely, Wannasuntad (2007) reported that students in Bangkok perceived few barriers to participating in physical activity. However, the present study supports other prior investigations. For

example, Lee et al. (2009) showed that children mentioned barriers to physical activity, such as feelings of discomfort after exercise, having false beliefs about exercise, and making excuses for not doing exercise. In another study, boys mentioned homework and watching television or playing computer games as barriers to physical activity; whereas, girls mentioned other barriers to physical activity, such as conflicts with social commitments, inactive parents, being overweight, or lack of fitness (Protudjer et al., 2010). In addition, the major perceived barriers to physical activity of sixth-grade students aged 11 to 13 years in the midwestern United State were being unmotivated and too lazy (Robbins et al., 2010). The Council on Sports Medicine (2006) reported that physical inactivity is associated with time pressure, and unsafe environments.

In terms of the cues to action variable, the average scores on the cues to action subscale showed that the participants experienced a number of cues to motivate physical activity. The rank order of factors that strongly encouraged participants to engage in physical activities included: being told that physical activity is good for health, being taken by parents to play sports or exercise, having a sports field or free space nearby, and being encouraged to exercise by parents. Similar findings were noted by Heitzler et al. (2010) among children and adolescents aged 10 to 17 years. Participants who had higher levels of perceived support from their parents and friends reported higher levels of self-efficacy and enjoyment related to physical activity, and lower levels of perceived barriers. The study by Kitzman-Ulrich (2010) showed that positive family support was related to physical activity for healthy weight boys. Moreover, parents of children in San Diego County generally supported their children's engagement in physical activity and exercise (Rodriguez, 2009). The

qualitative study of sixth grade girls aged 10 to 11 years old reported that parents were an important factor supporting participation in physical activity including enrollment, transportation, and financial support (Clark, 2008). The next section discusses study findings related to each of the research questions.

Research questions. With regard to the first research question, only the perceived barriers variable had a significant inverse relationship with the level of physical activity. Moreover, the perceived benefits variable was significantly related to the cues to action variable. This study did not demonstrate the relationship between the variables and level of physical activity found in other studies. For example, Wannasuntad (2007) reported that 31% of the variance in physical activity was explained by gender, BMI, number of hours watching television, number of hours playing outside, sibling or other child support, parental permission to play activity outside, number of physical activity items or equipment available at home, school policy promoting physical activity, and children's self-efficacy in overcoming general barriers.

Regarding the second research question, the Pearson correlation demonstrated no variable significantly correlated to levels of physical activity among boys. Similar to the Pearson correlation for the total sample, the perceived benefits variable was significantly related to the cues to action variable. In contrast, Heitzler (2009) found that the factors influencing moderate-to-vigorous physical activity (MVPA) among boys aged 10 to 17 years old in the metropolitan Minnesota Twin Cities region included self-efficacy (individual), peer support (social), home physical equipment, and temperature (environment).

With respect to the third research question, girls had an inverse relationship between perceived barriers and levels of physical activity. Again, the perceived benefits variable was also significantly related to the cues to action variable. However, this finding did not support previous studies that found factors related to physical activity. Heitzler (2009) demonstrated that the factors influencing MVPA among girls aged 10 to 17 years old in the metropolitan Minnesota Twin Cities region included individual and environment factors.

In relation to the forth research question, the 58 boys had a mean of 54.397 total score of perceived benefits of physical activity, the 62 girls had a mean of 54.177 total score of perceived benefits, and these means did not differ significantly. This present study did not find significant gender differences in perceived benefits similar to prior studies. For example, the study of middle school students in a rural midwestern area found significantly different perceived benefits of physical activity between boys and girls. Gils had higher perceived benefits than boys on the item of "take care of myself," "stay in shape," and "be healthier" (Robbins et al., 2009).

Based on the findings of the fifth research question, no significant difference was noted by gender. The qualitative study of sixth grade students in Winnipeg found that boys mentioned barriers to physical activity including homework and screen time. However, girls did not report any perceived barriers to physical activity (Protudjer et al., 2010). The qualitative study of sixth grade girls aged 10 to 11 years old showed that girls did not state safety of the environment as a perceived barrier to physical activity (Clark, 2008). Heitzler (2009) reported that girls aged 10 to 17 years old in the metropolitan Minnesota Twin Cities region mentioned more barriers than boys but the

study of middle school students in the rural midwest rural found no difference in perceived barriers to physical activity between boys and girls (Robbins et al., 2009), similar to the findings of the present study.

With regard to the sixth research question, no significant difference was noted for boys and girls with respect to cues to action for physical activity. Limited evidence exists in the literature related to the gender difference and cues to action. Therefore, this finding is possibly the first study to report no significant difference between boys and girls regarding cues to action.

Regarding the last research question, an ANOVA was used to analyze any differences in scores on the perceived benefits, perceived barriers, and cues to action subscales within the three types of schools. There was no difference in these variables among the three schools. The evidence does not support the previous study in Australia in which upper, middle, and lower socioeconomic status influenced physical activity among children (Zinviani et al., 2006). However the findings of this study did indicate that most children chose activities that did not require special equipment or training, so are relatively independent of socioeconomic status.

Contrary to the literature, the present study did not find significant relationships between the three variables and physical activity, except for perceived barriers. In addition, no gender differences were found for independent variables. There are several possible explanations for these findings. First, perceived benefits, perceived barriers, and cues to action may not be major factors influencing levels of physical activity in children. Second, some confounding factors such as BMI or SES

may affect the outcome; and third, the measurements used in the study may not be sensitive enough to accurately identify levels of physical activity.

Strengths and Limitations of the Study

This study utilized stratified random sampling; therefore, the participants better represented characteristics of the population. Sample size was calculated based on the power analysis; therefore, the results of data analysis were strong enough to test the research questions. The PAQ-C and the cues, perceived benefits and barriers to physical activity questionnaire were tested for validity and reliability and the results showed the instrument was acceptable. The study tested the instruments for internal consistency reliability. The investigator looked at which items were the weakest and looked at the data associated with those items, seeing what happened to the Cronbach's alpha if the item was deleted from the scale. The Cronbach's alpha of both questionnaires demonstrated good or excellent reliability, which indicated that they were appropriate instruments for use in the study.

There are some limitations in this study in need of discussion. This study is a cross-sectional study and does not provide any information about causal relationships. Moreover, although the sample size was calculated based on the power analysis, increasing the number of participants might have resulted in different findings. The study recruited fourth grade students in urban Phitsanulok province, Thailand; therefore, it cannot be generalized to other populations. In addition, a self-administered survey might motivate participants to provide more desirable responses. Although the investigator helped the students when they needed clarification of the questions, some students might not ask for clarification when they did not understand some questions.

Implications for Nursing

The findings of the present study showed an inverse relationship between physical activity and perceived barriers. This finding has practical implication for community nurses, pediatric nurses, and school nurses, to develop programs that help students reduce barriers to physical activity. For example, in order to prevent childhood obesity prevalence, school nurses should help students find strategies to conquer their barriers to physical activity. Community health nurses, school nurses, and health educators should develop health communication programs to tailor the proper messages for promoting physical activity. School nurses should work with parents in order to find the solutions to reduce the barriers to physical activity. Nurses may also need to advocate for school policy and for sufficient physical activity within the school curriculum and assist in the development of physical activities during recess and lunch periods when many students reported limited physical activity.

In addition, the present study showed differences in preferred activities between boys and girls. Nurses and others need to plan activities that appeal to each gender. School nurses can cooperate with physical education teachers to develop interventions to promote physical activity specific to particular target groups, such as an exercise program that does not need too much equipment for girls. On the other hand, an exercise program for boys might emphasize sports or activities that need physical activity equipment. Furthermore, the reliabilities of the instruments in this study were high. As a result, program administrators, health educators, or school nurses are able to use the instruments in developing health promotion programs to foster physical activity.

Recommendations for Future Research

The findings of the present study may have added to the current literature the concept that the three variables in this study may not be the major factors related to physical activity. The findings of this study showed that future research is needed. Based on the results of the present study, it is possible that there are more important factors influencing physical activity that should be identified. Consequently, future study of physical activity should consider some factors that may be important influences on levels of physical activity such as friends, family, environment, school policy, or the other components of the Health Belief Model. At the same time, future study of physical activity should control some important variables that could affect the relationship between independent variables and physical activity such as BMI, SES, or school policy. Future study in this area should include various measures to collect more specific and accurate data such as an accelerometer or observation. A longitudinal study should be done to examine the levels of physical activity over the long-term to track the physical activity of children and investigate the beliefs that affect their activities. Mixed-method or qualitative studies are recommended to explore the perceptions of physical activity and actual activities of primary school students. Furthermore, study samples should be recruited from broader age groups (i.e., first to sixth graders) in order to be generalizable.

References

Adair, L., & Popkin, B. M. (2005). Are child eating patterns being transformed globally? *Obesity Research, 13*, 1281-1299.

Aekplakorn, W., & Mo-suwan, L. (2009). National prevalence of obesity. *Obesity Reviews, 10*, 589-592. doi: 10.1111/j.1467-789x.2009.00626.x

Amini, M., Alavi-Naini, A., Doustmohammadian, A., Karajibani, M., Khalilian, A., Nouri-Saeedloo, S. . . Shafaghi, K. (2009). Childhood obesity and physical activity in an urban primary school in Thailand. *Rawal Medical Journal, 34*, 203-206.

Brockman, R. Jagoa, R., & Foxa, K. R. (2010). The contribution of active play to the physical activity of primary school children. *Preventive Medicine, 51*, 144-147. doi: 10.1016/j.ypmed.2010.05.012

Centers for Disease Control and Prevention. (n.d.). *General physical activities defined by level of intensity*. Retrieved from http://www.cdc.gov/physicalactivity/downloads/PA_Intensity_table_2_1.pdf

Centers for Disease Control and Prevention. (2009). *About BMI for children and teens*. Retrieved from http://www.cdc.gov/healthyweight/assessing/bmi/childrens_BMI/about_childrens_BMI.html#What is BMI

Centers for Disease Control and Prevention. (2010). *How much physical activity do children need?* Retrieved from http://www.cdc.gov/physicalactivity/everyone/guidelines/children.html

Clark, M. I. (2008). In their shoes: Understanding the physical activity experiences of young adolescent girls. (Master's thesis). Retrieved from ProQuest. (UMI No. MR46954).

Clark, N. M., & Houle, C. R. (2009). Theoretical models and strategies for improving disease management by patients. In S. A. Shumaker, J. K. Ockene, & K. A. Riekert (Eds.), *Handbook of health behavior change* (3nd ed., pp. 19-23). New York, NY: Springer.

Cohen, J. (1992). Quantitative methods in psychology: A power primer. *Psychological Bulletin, 112*, 155-159.

Collins, W. A., Madsen, S. D., & Susman-Stillman, A. (2002). Parenting during middle childhood. In M. H. Bornstein (Ed.), *Handbook of parenting: Volume 1, Children and parenting* (2nd ed., pp. 74-79). London, England: Lawrence Erlbaum Associates.

Conner, M., & Norman, P. (Eds.). (2005). *Predicting health behaviour: Research and practice with social cognition models* (2nd ed.) New York, NY: Open University Press.

Council on Sports Medicine and Fitness & Council on School Health. (2006). Active healthy living: Prevention of childhood obesity through increased physical activity. *American Academy of Pediatrics. 117*, 1834-1841. doi: 10.1542/peds2006-0472

Crocker, P. R., Bailey, D. A., Faulkner, R. A, Kowalski, K. C., & McGrath, R. (1997). Measuring general levels of physical activity: Preliminary evidence for the

Physical Activity Questionnaire for Older Children. *Medicine and Science in Sports and Exercise, 29*, 1344-1349.

Cropley, M., Ayers, S., & Nokes, L. (2003). People don't exercise because they can't think of reasons to exercise: An examination of causal reasoning within the Transtheoretical Model. *Psychology, Health & Medicine, 8*, 409-414. doi: 10.1080/1354850031000160454O

Davy, B. M., Harrell, K., Stewart, J., & King, D. S. (2004). Body weight status, dietary habits, and physical activity levels of middle school-aged children in rural Mississippi. *Southern Medical Journal, 97*, 571-577.

De Vries, S. I., Bakker, I., van Mechelen, W., & Hopman-Rock, M. (2007). Determinants of activity-friendly neighborhoods for children: Results from the SPACE study. *American Journal of Health Promotion. 21*, 312-316.

Dollman, J., Norton, K., & Norton, L. (2005). Evidence for secular trends in children's physical activity behavior. *British Journal of Sports Medicine, 39*, 892-897. doi: 10.1136/bjsm.2004.016675

Driskell, M., Dyment, S., Mauriello, L., Castle, P., & Sherman, K. (2008). Relationships among multiple behaviors for childhood and adolescent obesity prevention. *Preventive Medicine, 46*, 209-215. doi: 10.1016/j.ypmed.2007.07.028

Felton, G. M., Dowda, M., Ward, D. S., Dishman, R. K., Trost, S. G., Saunders, R., & Pate, R. R. (2002). Differences in physical activity between Black and White girls living in rural and urban areas. *Journal of School Health, 72*, 250-255.

Field, A. (2006). *Reliability analysis*. Retrieved from http://www.statisticshell.com/reliability.pdf

Forbes, S., Teijlingen, E., & Clark, T. (2007). Behaviours and attitudes towards physical activity and lifestyle factors: A questionnaire survey of school-aged children. *International Journal of Health Promotion & Education, 45*, 125-130.

Fox, K. R. (2003). Childhood obesity and the role of physical activity. *The Journal of the Royal Society for the Promotion of Health, 124*(1), 34-39.

Frank, L., Kerr, J., Chapman, J., & Sallis, J. (2007). Urban form relationships with walk trip frequency and distance among youth. *American Journal of Health Promotion, 21*(4 Supplement), 305-311.

George, D. & Mallery, P. (2007). *SPSS for Windows step by step: A simple guide and reference 14.0 Update* (7th ed.). Boston, MA: Pearson Education.

Haas, J. S., Lee, L. B., Kaplan, C. P., Phillips, K. A., & Liang, S. (2003). The association of race, socioeconomic status, and health insurance status with the prevalence of overweight among children and adolescents. *American Journal of Public Health, 93*, 2105-2110.

Harper, M. G. (2006). Childhood obesity: Strategies for prevention. *Childhood Obesity, 29*, 288-298.

Hayden, J. (2009). *Introduction to health behavior theory*. Sudbury, MA: Jones and Bartlett.

Heitzler, C. D. (2009). *Patterns and correlates of physical activity among children and adolescents*. (Doctoral dissertation). Retrieved from ProQuset. (UMI No. 3373397).

Heitzler, C. D., Lytle, L. A., Erickson, D. J., Barr-Anderson, D., Sirard, J. R., & Story, M. (2010). Evaluating a model of youth physical activity. *American Journal of Health Behavior, 34*, 593-606.

Hildebrand, D. A., & Shriver, L. K. (2010). A quantitative and qualitative approach to understanding fruit and vegetable availability in low-income African-American families with children enrolled in an urban Head Start program. *Journal of the American Dietetic Association, 110*, 710-718. doi: 10.1016/j.jada.2010.02.012

Hill, A. P., King, N. A., & Armstrong, T. P. (2007). The contribution of physical activity and sedentary behaviors to the growth and development of children and adolescents. *Sports Medicine, 37*, 533-545.

Jirapinyo, P., Densupsoontorn, N., Chinrungrueng, D., Wongarn, R., & Thamonsiri, N. (2005). Relative risks of becoming overweight and obese in children after 6 years in secondary school. *Journal of the Medical Association of Thailand, 88*, 651-654.

Jirapinyo, P., Densupsoontorn, N., Kontragoolpitak, S., Wongarn, R., & Thamonsiri, N. (2005). Increasing risks of becoming obese after 6 years in primary school: Comparing the relative risks among some schools in Bangkok, Saraburi and Sakolnakorn. *Journal of the Medical Association of Thailand, 88*, 829-832.

Kamtsios, S., & Digelidis, N. (2008). Physical activity levels, exercise attitudes, self-perceptions and BMI type of 11 to 12-year-old children. *Journal of Child Health Care, 12*, 232-240. doi: 10.1177/1367493508092510

Katz, M. H. (2010). *Study design and statistical analysis: A practical guide for clinicians*. Cambridge, UK: Cambridge University Press.

Kim, J., Must, A., Fitzmaurice, G. M., Gillman, M. W., Chomitz, V., Kramer, E. . . . Peterson, K. E. (2005). Relationship of physical fitness to prevalence and incidence of overweight among school children. *Obesity Research, 13*, 1246-1253.

Kin-Isler, A., Asci, H., Altintas, A., & Guven-Karahan, B. (2009). Physical activity levels and patterns of 11-14 year-old Turkish adolescents. *Adolescence, 44*, 1005-1014.

Kitzman-Ulrich, H. (2010). Relationship of body mass index and psychosocial factors on physical activity in underserved adolescent boys and girls. *Health Psychology, 29*, 506-513. doi: 10.1037/a0020853

Kosulwat, V. (2002). The nutrition and health transition in Thailand. *Public Health Nutrition, 5*, 183-189. doi: 10.1079/PHN2001292

Kowalski, K. C., Crocker, P. R., & Donen, R. M. (2004). *The Physical Activity Questionnaire for Older Children (PAQ-C) and Adolescents (PAQ-A) manual.* Retrieved from http://www.hkin.educ.ubc.ca/behavioural/PAQ%20manual.pdf

Kowalski, K. C., Crocker, P. R., & Faulkner, R. A. (1997). Validation of the Physical Activity Questionnaire for Older Children. *Pediatric Exercise Science, 9*, 174-186.

Lee, P., Lai, H., Chou, Y., Chang, L., & Chang, W. (2009). Perceptions of exercise in obese school-aged children. *Journal of Nursing Research, 17*, 170-176.

Macan-Marker, M. (2006). *Asia: Diabetes soars as Asians devour sugar-laden junk food.* Retrieved from http://www.globalinfo.org

Maibach, E. (2007). The influence of the media environment on physical activity: Looking for the big picture. *American Journal of Health Promotion, 21*, 353-362.

Maiman, L. A., & Becker, M. H. (1974). The Health Belief Model: Origins and correlates in psychological theory. In M. H. Becker (Ed.), *The Health Belief Model and personal health behavior* (pp. 9-26). Thorofare, NJ: Charles B. Slack.

Matheson, D. M., Wang, Y., Klesges, L. M., Beech, B. M., Kraemer, H. C., & Robinson, T. N. (2004). African-American girls' dietary intake while watching television. *Obesity Research, 12*, 32S-37S.

Ministry of Public Health. (2007). แผนพัฒนาสุขภาพแห่งชาติ ฉบับที่ 10. [The Tenth National Health Development Plan]. Retrieved from http://bps.ops.moph.go.th/Plan10/Plan10-50.pdf

Moore, J. B., Jilcott, S. B., Shores, K. A., Evenson, K. R., Brownson, R. C., & Novick, L. F. (2010). A qualitative examination of perceived barriers and facilitators of physical activity for urban and rural youth. *Health Education Research, 25*, 355-367. doi: 10.1093/her/cyq004

Nowicka, P., & Flodmark, C.-E. (2006). Physical activity: Key issues in treatment of childhood obesity. *Acta Paediatrica*, 96, 39-45. doi: 10.1111/j.1651-22272007.2007.00169.x

Nutrition Division of the Ministry of Public Health. (2005). สถาณการณ์ภาวะโภชนาการของประเทศไทย [Nutrition status of Thailand]. Retrieved from http://nutrition.anamai.moph.go.th/newpage3.htm

Ogden, C. L., & Flegal, K. M. (2010). Changes in terminology for childhood overweight and obesity. *National health statistics reports (HCHS), 25*, 1-5.

Pichayasakulkarn, P. (2006). Prevalence and risk factors for overweight among school children in urban areas, Pichit province (Unpublished master's thesis). Mahidol University, Bangkok, Thailand.

Protudjer, J. L.P, Marchessault, G., Kozyrskyj, A. L., & Becker, A. B. (2010). Children's perceptions of healthful eating and physical activity. *Canadian Journal of Dietetic Practice and Research, 71*, 19-23. doi: 10.3148/71.1.2010.19

Public Health and Environment Office, Phitsanulok Municipality. (2010). แบบสรุปรายงานภาวะการเจริญในเด็กวัยเรียนทุกสังกัด ในเขตรับผิดชอบ (อร.2) ปรับปรุง 7 พ.ศ. 2553. [Growth development report of students in Muang district, Phitsanulok province: Revised on May 7, 2010.]. Unpublished raw data.

Ramajitti Institute. (2006). รายงานสภาวการณ์เด็กและเยาวชนปี 2548-2549. สมุดข้อมูลรายตัวบ่งชี้/รายจังหวัด [*Child Watch 2005-2006: Data by indicators/provinces*]. กรุงเทพมหานคร: โรงพิมพ์แห่งจุฬาลงกรณ์มหาวิทยาลัย. [Bangkok: Chulalonkorn University].

Ramajitti Institute. (2007). รายงานสภาวการณ์เด็กและเยาวชนจังหวัดพิษณุโลก [*Child Watch 2005-2006: Data by indicators/provinces*]. Unpublished raw data.

Rimer, B. K., & Glanz, K. (2005). *Theory at a glance: A guide for health promotion practice* (2nd ed.). Retrieved from http://www.cancer.gov/theory.pdf

Robbins, L. B., Sikorskii, A., Hamel, L. M., Wu, T., & Wilbur, J. (2009). Gender comparisons of perceived benefits of and barriers to physical activity in middle school youth. *Research in Nursing & Health, 32*, 163-176. Doi: 10.1002/nur.20311

Robbins, L. B., Talley, H. C., Wu, T., & Wilbur, J. (2010). Sixth-grade boys' perceived benefits of and barriers to physical activity and suggestions for increasing physical activity. *The Journal of School Nursing, 26*, 65-77. doi: 10.1177/1059840509351020

Rodriguez, N. C. C. (2009). *An examination of behavioral, psychological, socio-cultural and environmental factors that may explain gender differences in children's physical activity.* (Doctoral dissertation). Retrieved from ProQuest. (UMI No. 3386765).

Rosenstock, I. M. (1974). Historical origins of the Health Belief Model. In M. H. Becker (Ed.), *The Health Belief Model and personal health behavior* (pp. 1-8). Thorofare, NJ: Charles B. Slack.

Rosenstock, I. M., Strecher, V. J., & Becker, M. H. (1994). The Health Belief Model and HIV risk behavior change. In R. J. Diclemente & J. L. Peterson (Eds), *Preventing AIDS: Theories and methods of behavioral interventions* (pp. 5-24). New York, NY: Plenum Press.

Rukavina, P. B., & Li, W. (2008). School physical activity interventions: Do not forget about obesity bias. *Obesity Review, 9*, 67-75. doi: 10.1111/j.1467-789x.2007.00403.x

Sanamthong, B. (2005). Food consumption and exercise behaviors of obese children attending a weight-control program (Unpublished master's thesis). Khon Kaen University, Khon Kaen, Thailand.

Saris, W. H. M., Blair, S. N., Baak, M. A., Eaton, S. B., Davies, P. S. W., Di Pietro, L. . . . Wyatt, H. (2003). How much physical activity is enough to prevent unhealthy weight gain? Outcome of the IASO 1st Stock Conference and Consensus Statement. *Obesity Review. 4*, 101-114.

Sharma, M. (2006). School-based interventions for childhood and adolescent obesity. *Obesity Review, 7*, 261-269.

Spicer, J. (2005). *Making sense of multivariate data analysis*. Thousand Oaks, CA: Sage.

Tergerson, J. L., & King, K. A. (2002). Do perceived cues, benefits, and barriers to physical activity differ between male and female adolescents? *Journal of School Health, 72*, 374-380.

Thingchin, O. (2009). Selected factors related to overweight level among overweight elementary school children, grade 4-6, urban area, Phitsanulok province (Unpublished master's thesis). Naresuan University, Phitsanulok, Thailand.

Underwood, J. (2006). Joining clean-plate club not always good for kids. Retrieved from http://www.montgomeryadvertiser.com/apps/pbcs.dll/article?AID=/20060919/LIFESTYLE/609190309

Usman, Y. (2004). Factors related to obesity in primary school children: A case study of Nakorn Pathom Province, Thailand (Unpublished master's thesis). Mahidol University, Bangkok, Thailand.

Waltz, C. F., Strickland, O. L., & Lenz, E. R. (2010). *Measurement in nursing and health research* (4th ed.). New York, NY: Springer.

Wannasuntad, S. (2007). *Factors predicting Thai children's physical activity* (Unpublished doctoral dissertation). University of California, San Francisco, CA.

Wongiu, A. (2007). *Factors related to food consumption behaviors and exercise behaviors of students in upper elementary school in Nong Prue District, Kanchanaburi Province* (Unpublished master's thesis). Kasetsart University, Bangkok, Thailand.

World Health Organization. (2010). *Global recommendations on physical activity for health.* Retrieved from http://www.who.int/dietphysicalactivity/factsheet_recommendations/en/index.html

Wu, T., & Pender, N. (2005). A panel study of physical activity in Taiwanese youth: Testing the revised Health Promotion Model. *Family & Community Health, 28*, 113-124.

Yamborisut, U., Kosulwat, V., Chittchang, U., Wimonpeerapattana, W., & Suthutvoravut, U. (2006). Factors associated with dual form of malnutrition in school children in Nakhon Pathom and Bangkok. *Journal of the Medical Association of Thailand, 89*, 1012-1023.

Yongwanichakorn, B., & Chanbang. P. (2003). Sweet consumption of primary school children in Nonthaburi Province (in Thai). Retrieved April 26, 2010, from http://dental.anamai.moph.go.th/sweet2/StockData/Survey02.pdf

Zabinski, M. F., Saelens, B. E., Stein, R. I. Hayden-Wade, H. A., & Wilfley, D. E. (2003). Overweight children's barriers to and support for physical activity. *Obesity Research, 11*, 238-246.

Ziviani, J., Macdonald, D., Jenkins, D., Rodger, S., Batch, J., & Cerin, E. (2006). Physical activity of young children. *OTJR: Occupation, Participation and Health, 26*, 4-14.

Appendix A

Request for Permission to Conduct Research

November 2, 2010

Director
NAME School
NAME Road, Amphur Muang
Phitsanulok province, Thailand
65000

Dear Director,

I am Sireewat Ar-yuwat, a professional nurse and a doctoral student at the Hahn School of Nursing and Health Science, University of San Diego. I am currently developing a research study entitled, "Associations among perceived benefits, barriers, cues, and physical activity in Thai primary students." This research study is conducted under the supervision of Dr. Mary Jo Clark, Professor of the Hahn School of Nursing and Health Science, University of San Diego. The purpose of this study is to investigate the role of cues, perceived benefits, and perceived barriers in promoting physical activity in fourth grade students in primary school settings in Phitsanulok province, Thailand.

In order to complete this research study, I need your help with two aspects of the project. First, to evaluate my questionnaires, the Physical Activity Questionnaire for Older Children (PAQ-C) (10 items) and the Cues, Perceived Benefits and Barriers to Physical Activity Questionnaire (51 items) I would like to have 15 fourth grade students from your school complete the tools. My plan is to recruit a total of 45 students (fifteen from each of three different schools) who are studying in the fourth grade to answer these two questionnaires. In addition, after testing and revising the questionnaires, I would like to collect data from 30-40 other fourth grade students from your school who were not involved in the pilot testing.

Therefore, I am seeking your permission to contact fourth grade teachers, parents, and students to first test the questionnaires and then participate in the study itself. The pilot testing will recruit 15 fourth grade students from your school from December 15, 2010 to January 15, 2011. The data collection for the actual study will recruit 40 fourth grade students from your school from February 1 to March 31, 2011. Completion of the two questionnaires by both groups of students will take approximately 30 minutes with a short break between completing the first questionnaire and the second one. The survey will be conducted during the homeroom class.

I would very much appreciate receiving your permission to conduct the pilot testing and actual study data collection, which are essential to my doctoral research. If you have any questions, please feel free to contact me or Dr. Mary Jo Clark, chairperson of my dissertation committee, at clark@sandiego.edu or (619)260-4574. Thank you for your consideration of this request.

I have included a sample of a letter granting permission for the pilot test and to conduct the actual study. You may use it as a template or draft your own letter as you desire.

Sincerely,

Sireewat Ar-yuwat, MPH, RN
Hahn School of Nursing and Health Science
University of San Diego
5998 Alcala Park
San Diego, CA 92110
sireewata@sandiego.edu
(619)507-3861

Appendix B

Letters of Support from Participating Schools

Letters of Support from Participating Schools

[redacted]

November 10, 2010

USD Institutional Review Board (IRB)
Hughes Center 328
University of San Diego
5998 Alcala Park
San Diego, CA 92110
U.S.A.

To USD IRB

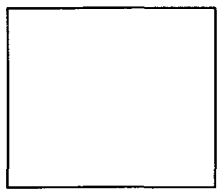
I am pleased to support Sireewat Ar-yuwat for her research study "Association among perceived benefits, perceived barriers, cues, and physical activity in primary school students in Thailand" at the University of San Diego. I understand that the program is looking for important factors influencing physical activity among primary school students. We will be happy to permit her to recruit 10 fourth grade students for the pilot test of her questionnaires and an additional 20 fourth grade students for the actual study.

As director of [redacted] School, I am excited that this study affords us an opportunity to bring together the school's long history of school-based research with a health care professional to address the levels of physical activity of children in Thailand. This effort represents expansive health practice activities in the school's history. I look forward to working with Sireewat and wish she the best in this vital effort.

Sincerely,

[redacted]

Letters of Support from Participating Schools



November 10, 2010

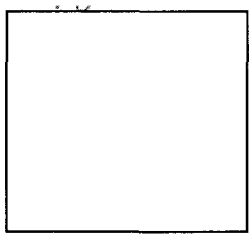
USD Institutional Review Board (IRB)
Hughes Center 328
University of San Diego
5998 Alcala Park
San Diego, CA 92110
U.S.A.

To USD IRB

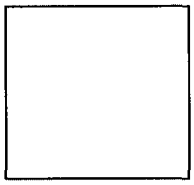
I am pleased to support Sireewat Ar-Yuwat for her research study "Association among perceived benefits, perceived barriers, cues, and physical activity in primary school students in Thailand" at the University of San Diego. I understand that the program is looking for important factors influencing physical activity among primary school students. We will be happy to permit her to recruit 10 fourth grade students for the pilot test of her questionnaires and an additional 20 fourth grade students for the actual study.

As director of [redacted] School, I am excited that this study affords us an opportunity to bring together the school's long history of school-based research with a health care professional to address the levels of physical activity of children in Thailand. This effort represents expansive health practice activities in the school's history. I look forward to working with Sireewat and wish she the best in this vital effort.

Sincerely,



Letters of Support from Participating Schools



November 10, 2010

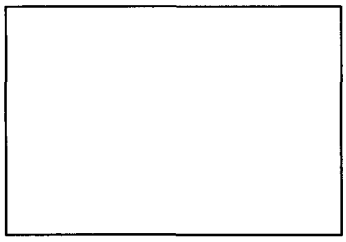
IRB Institutional Review Board (IRB)
Hughes Center 328
University of San Diego
5998 Alcala Park
San Diego, CA 92110
USA

To USD IRB

I am pleased to support Sireewat Ar-ruwat for her research study "Association among perceived benefits, perceived barriers, cues, and physical activity in primary school students in Thailand" at the University of San Diego. I understand that the program is looking for important factors influencing physical activity among primary school students. We will be happy to permit her to recruit 10 fourth grade students for the pilot test of her questionnaires and an additional 20 fourth grade students for the actual study.

As director of [redacted] School, I am excited that this study affords us an opportunity to bring together the school's long history of school based research with a health care professional to address the levels of physical activity of children in Thailand. This effort represents expansive health practice activities in the school's history. I look forward to working with Sireewat and wish her the best in this vital effort.

Sincerely,



Appendix C

Cover Letter to Parents

December 1, 2010

Dear parent(s)/guardian(s),

My name is Sireewat Ar-yuwat. I am a professional nurse and a doctoral student at the Hahn School of Nursing and Health Science, University of San Diego. I am asking for your permission to let your child participate in a research study to determine why children do or do not engage in physical activity. Your child will answer two questionnaires: the Physical Activity Questionnaire for Older Children (PAQ-C) (10 items), and the Cues, Perceived Benefits and Barriers to Physical Activity Questionnaire, which includes 3 parts (total 53 items). The surveys will be completed during home room on two days from December 15, 2010 to January 15, 2011. On the first day, your child will answer the PAQ-C questionnaire and the first part of the Cues, Perceived Benefits and Barriers to Physical Activity Questionnaire. This survey will take approximately 15 minutes. On the second day, your child will answer the second and third parts of the Cues, Perceived Benefits and Barriers to Physical Activity Questionnaire, which will take approximately 10 minutes.

Attached to this letter is a consent form. This form gives your permission as a parent/guardian for your child to participate in this research study. If you would like your child to participate, please sign and date the form, returning it in the envelope provided. Please return it as soon as possible. If you do not wish your child to participate there is nothing you need to do or return. Your child's participation is voluntary and your decision to participate or not, will not affect your child's education at ___School___. Please be aware that:

- Participation is voluntary: your child can end participation at any time.
- Information collected will be presented in any reports, presentations or publications as grouped data. Your child's name will not be used at any time.

Children in this study can gain information about themselves and their physical activity, which can help them to lead healthier lives. The findings may also provide useful information for understanding physical activity and childhood obesity among primary school students that can help experts develop more effective prevention programs. Your child will receive an inexpensive gift that promotes physical activity after answering the questionnaires. The slight risks in this study are those that are involved in participating in a survey. These include feeling tired and experiencing emotional discomfort. Referrals to counseling will be made for any students who experience emotional distress while completing the questionnaires. Furthermore, the children can stop the surveys at any time, if they feel tired or for any other reason.

If you agree that your child may participate in the study, I will explain the study to your child and ask him or her if he/she would like to participate. If your child wants to participate, I will have him or her sign a form similar to this one agreeing to be a participant in the study.

Neither you nor your child will be agreeing to anything other than what is described in this letter.

I would like to thank you for taking the time to read and think about this letter. If you have any questions about this letter or the research study, please do not hesitate to call me at (619) 507-3861. I am happy to answer any of your questions.

Sincerely,

Sireewat Ar-yuwat, MPH, RN
Hahn School of Nursing and Health Science
University of San Diego
5998 Alcala Park
San Diego, CA 92110
sireewata@sandiego.edu
(619)507-3861
(055)252-477

Appendix D

Consent Form for Parents

University of San Diego
Institutional Review Board

Research Participant Consent Form

Associations among Perceived Benefits, Barriers, Cues, and Physical Activity in Thai Primary Students

I. Purpose of the research study

Sireewat Ar-yuwat is a student at the University of San Diego. You are invited to participate in a research study she is conducting. The purpose of this research study is to understand why children do or do not participate in physical activity.

II. What your child will be asked to do

If you decide to permit your child to be in this study, your child will be asked to:

1) Answer questions about the amount of physical activity they perform. This survey will take about 10 minutes on Day 1.
2) Answer questions about the positive reasons why he or she does participate in physical activity. This survey will take about 5 minutes on Day 1.
3) Answer questions about reasons why he or she does not participate in physical activity, and what encourages your child to exercise. These surveys will take about 10 minutes on Day 2.
4) The surveys will be done during the homeroom class at the meeting room.
5) All information collected during the study is confidential. Personal identification numbers will be used in place of names on all surveys.
6) There will be no cost to your child except for his/her time in completing questionnaires.

Your child's participation in this study will take 2 days. The surveys will take 15 minutes on the first day, and 10 minutes on the second day.

III. Foreseeable risks or discomforts

This study involves no more risk than the risks your child encounters in daily life. The risks in this study are those that are involved in participating in any questionnaire about physical activity or factors influencing physical activity. These include feeling tired and experiencing emotional discomfort because the questionnaires have a lot of questions. Your child can stop the survey at any time, if he or she feels tired or for any

other reason. The researcher may stop your child from participating in the study if answering the questions appears to be upsetting him/her. Referrals to counseling will be made for those students who seem to be upset by the questions.

IV. Benefits

While there may be no direct benefit to your child from participating in this study, the indirect benefit of participating will be knowing that your child helped researchers better understand physical activity among primary school students and keeping children from gaining too much weight. It is possible that you and your child may become more aware of the need for physical activity and your child may become more active, leading to better health.

V. Confidentiality

Any information provided and/or identifying records will remain confidential and kept in a locked file and/or password-protected computer file in the researcher's office for a minimum of five years. All data collected from your child will be coded with a number or pseudonym (fake name). Your child's real name will not be used. The results of this research project may be made public and information quoted in professional journals and meetings, but information from this study will only be reported as a group, and not individually.

VI. Compensation

If your child participates in the study, the researcher will give your child an inexpensive gift that promotes physical activity for participation.

VII. Voluntary Nature of this Research

Participation in this study is entirely voluntary. Your child does not have to do this, and your child can refuse to answer any question or quit at any time. Deciding not to participate or not answering any of the questions will have no effect on any benefits your child is entitled to at school. **You child can withdraw from this study at any time without penalty.**

VIII. Contact Information

If you have any questions about this research, you may contact either:

1) Sireewat Ar-yuwat
Email: sireewata@sandiego.edu
Phone: (619) 507-3861, (055)252-477

2) Dr. Mary Jo Clark, chair person of my dissertation
Email: clark@sandiego.edu

Phone: (619) 260-4574

I have read and understand this form, and consent to my child participating in the research it describes to me. I have received a copy of this consent form for my records.

Signature of Parent/Guardian Date

Name of Parent/Guardian (**Printed**)

Signature of Investigator Date

Appendix E

Assent Form for Children

My name is Sireewat Ar-yuwat. I am a nurse. I am doing a project at my school. It is a research study. A research study means that new things are studied. I want to find out why children are active and do things like walk and run. You can be in my study if you want to, but you don't have to. If you decide you want to be in my study, you will answer some questions on a paper about physical activity- that means things like walking and running.

I will ask you to answer the questions on the papers 2 times: today and tomorrow during a homeroom class. It takes about 10 to 15 minutes each time to answer these questions. That's about as long as a cartoon show on TV.

Sometimes kids feel a little tired when they answer questions on a paper. You can stop anytime to rest, or decide not to do it anymore. Also, sometimes kids feel sad when they think about stuff about their health. If you feel this way, please tell your parent or guardian. He or she can contact the school nurse. You can also tell the school nurse yourself if you feel this way.

If you participate in the study, I will give you a small gift called a pedometer. It's a little box that tells you how many steps you take every day. You will get this gift even if you decide not to finish everything.

Everything you say will be a secret. Your name will never go on the paper. I will share what I find out with other nurses and doctors, but nobody will know that it's you.

Your parent or guardian has said it's OK for you to be in the study. But you get to choose if you want to do it. If you don't want to be in the study, no one will be mad at you. If you want to be in the study now and change your mind later, that's OK. You can stop at any time. It will not affect your grades at school or anything else.

My telephone number is (055)252-477. You can call me if you have questions about the study or if you decide you don't want to be in the study any more. You can also have your parent or guardian call my teacher, Dr. Mary Jo Clark, at the University of San Diego in the United States. Her number is (619) 260-4574 if you have questions.

I will give you a copy of this paper in case you want to ask questions later.

By printing my name below, I am saying it's OK for me to do this.

_____ _____

Printed Name of Child Date

_____ _____

Signature of Researcher Date

Appendix G

ID _____

Physical Activity Questionnaire for Older Children (PAQ-C)

Name:_____

Age:_____

Sex: M_____ F_____ School: _____

We are trying to find out about your level of physical activity in the last 7 days (in the last week). This includes sports or dance activities that make you sweat or make your legs feel tired, or games that make you breathe hard, like tag, skipping, running, climbing, and others.

Remember:

1. There are no right or wrong answers – this is not a test.
2. Please answer all the questions as honestly and accurately as you can – this is very important

1. Physical activity in your spare time: Have you done any of the following activities in the past 7 days (last week)? If yes, how many times? (Mark only one circle per row.)

Physical activity in your spare time during the past 7 days (last week).	**No**	**1-2 times**	**3-4 times**	**5-6 times**	**7 times or more**
1.1 Skipping	○	○	○	○	○
1.2 Playing tag or traditional Thai children games.....	○	○	○	○	○
1.3 Walking for exercise	○	○	○	○	○
1.4 Bicycling	○	○	○	○	○
1.5 Jogging or running	○	○	○	○	○
1.6 Aerobic dance	○	○	○	○	○
1.7 Swimming	○	○	○	○	○
1.8 Exercise (push-ups, jumping jacks)	○	○	○	○	○
1.9 Soccer	○	○	○	○	○
1.10 Badminton	○	○	○	○	○
1.11 Tennis	○	○	○	○	○
1.12 Table -tennis	○	○	○	○	○
1.13 Basketball	○	○	○	○	○
1.14 Volleyball	○	○	○	○	○
1.15 Karate, Judo, Tae kwon do	○	○	○	○	○
1.16 Gymnastics	○	○	○	○	○
1.17 Outdoor play	○	○	○	○	○
1.18 Hula Hoop	○	○	○	○	○
1.19 Takraw (Kick Volleyball)	○	○	○	○	○
1.20 Other activities: (please write them in below)	○	○	○	○	○

_____

2. In the last 7 days, during your physical education classes, how often were you very active (playing hard, running, jumping, throwing)? Please circle only one choice that is most like you.

a. I didn't do physical education
b. Hardly ever
c. Sometimes
d. Quite often
e. Always

3. In the last 7 days, what did you do most of the time *at recess*? Please circle only one choice that is most like you.

a. Sat down (talking, reading, doing school work)
b. Stood around or walked around
c. Ran or played a little bit
d. Ran around and played quite a bit
e. Ran and played hard most of the time

4. In the last 7 days, what did you normally do *at lunch*? Please circle only one choice that is most like you.

a. Sat down (talking, reading, doing school work)
b. Stood around or walked around
c. Ran or played a little bit
d. Ran around and played quite a bit
e. Ran and played hard most of the time

5. In the last 7 days, on how many days *right after school,* did you do sports, dance, or play games in which you were very active? Please circle only one choice that is most like you.

a. None
b. 1 time last week
c. 2 or 3 times last week
d. 4 times last week
e. 5 times last week

6. In the last 7 days, on how many *evenings* did you do sports, dance, or play games in which you were very active? Please circle only one choice that is most like you.

a. None
b. 1 time last week
c. 2 or 3 times last week
d. 4 times last week
e. 5 times last week

7. *On the last weekend*, how many times did you do sports, dance, or play games in which you were very active? Please circle only one choice that is most like you.

a. None
b. 1 time last week
c. 2 or 3 times last week
d. 4 times last week
e. 5 times last week

8. Which one of the following describes you best for the last 7 days? Read all five statements before deciding on the one answer that describes you. (Circle only one)

a. All or most of my free time was spent doing things that involve little physical effort
b. I sometimes (1-2 times last week) did physical things in my free time (e.g. played sports, went running, swimming, bike riding, did aerobics)
c. I often (3-4 times last week) did physical things in my free time
d. I quite often (5-6 times last week) did physical things in my free time
e. I very often (7 or more times last week) did physical things in my free time

9. Mark how often you did physical activity (like playing sports, games, doing dance, or any other physical activity) for each day last week.

DAY	**None**	**Little bit**	**Medium**	**Often**	**Very often**
Monday	○	○	○	○	○
Tuesday.....	○	○	○	○	○
Wednesday	○	○	○	○	○
Thursday	○	○	○	○	○
Friday	○	○	○	○	○
Saturday	○	○	○	○	○
Sunday	○	○	○	○	○

10. Were you sick last week, or did anything keep you from doing your normal physical activities? (Circle one.)

a. Yes
b. No

If yes, what kept you from doing your usual activities?

_____

Appendix H

ID _____

Cues, Perceived Benefits and Barriers to Physical Activity Questionnaire

Perceived Benefits of Physical Activity Subscale

Please tell us about the reasons you exercise or would consider exercising by putting a √ in the box that is true for you.

I do physical activities because I want ...	**Strongly disagree**	**Disagree**	**Agree**	**Strongly Agree**
1. To stay in shape				
2. To lose weight				
3. To control excess weight				
4. To reduce stress				
5. To be healthy				
6. To make me happy				
7. To become strong				
8. To be with friends				
9. To have fun				
10. To protect my heart				
11. To receive a compliment from my parents				
12. To get a reward from my parents				
13. To have more energy				
14. To feel refreshed				
15. To be an athlete or be well known				
16. To sleep better				
17. To improve my immunity to illness				
18. Other reasons (write other reasons here): _____				

Perceived Barriers to Physical Activity Subscale

Please tell us about things that make it difficult for you to play actively or exercise by putting a √ in the box that is true for you.

I do not do physical activity because ...	**Strongly disagree**	**Disagree**	**Agree**	**Strongly Agree**
1. I do not have time to exercise				
2. I am too tired				
3. I do not have a safe place to go and exercise				
4. I do not enjoy exercising				
5. I am not interested in exercising				
6. I think that exercise is too hard				
7. I do not know how to exercise				
8. I do not think exercise is important				
9. I do not have clothes or shoes to wear when I exercise				
10. I do not have equipment to play with				
11. I do not have anyone to play with				
12. I do not have my parent's permission				
13. The weather is too bad				
14. I have too much homework				
15. I felt discomfort after exercise (tired, sweating)				
16. I am worried about strangers when I play outside				
17. I have a health problem that makes it hard for me to do physical activity				
18. Other reasons (write other reasons here): ----------				

Perceived Cues to Physical Activity Subscale

Please tell us about things that help or would help you to exercise by putting a √ in the box that is true for you.

Things that help me exercise	Strongly disagree	Disagree	Agree	Strongly Agree
1. Having a friend to exercise with				
2. Having a friend tell or encourage me to exercise				
3. Having my parent(s) encourage me to exercise				
4. Having a parent who exercises				
5. Having parents to exercise with				
6. Reading about exercise in magazines				
7. Watching exercise on TV				
8. Having a sports field or free space to play				
9. Having the right equipment				
10. Being told that physical activity is good for my health				
11. Having a recreation center close by				
12. Being told by parents that I should exercise				
13. Being taken by parents to play sports or exercise				
14. Other reasons (write other reasons here): _____				

Background and Characteristics of Primary School Students

Please answer questions by marking an X in the box by your answer.

1. Do you have a friend that exercises?

   ☐ Yes ☐ No

2. Do you have a parent that exercises?

   ☐ Yes ☐ No

3. Do you have a parent that encourages you to exercise?

   ☐ Yes ☐ No

4. Are you currently trying to lose weight?

   ☐ Yes ☐ No

5. Are you a member of any kind of sports team?

   ☐ Yes ☐ No

6. Do you take extra classes at school or outside the school?

   ☐ Yes ☐ No