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Parents' perceptions of children's physical activities

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Parents' Perceptions of Children's Physical Activities

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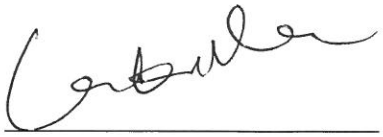
DECLARATION

I hereby declare that this thesis represents my own work which has been done after registration for the degree of PhD at Hong Kong Baptist University, and has not been previously included in a thesis, dissertation submitted to this or other institution for a degree, diploma or other qualification.



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ABSTRACT

In reviewing the existing literature, not many researchers have examined children's physical activity (PA) from the parents' perspectives. No study has investigated parents' perceptions on children's PA in Hong Kong. Furthermore, information of parents' perceptions on children's PA was generated mainly in the USA or European countries. Similar studies should be conducted in China or in Hong Kong so to obtain more information on this subject by using Chinese as the research samples.

Purpose of the study: This study aims to: a) examine the associations between parents' perceptions on children's competences, neighborhood safety, exercise benefits and exercise barriers, parental support, and children's PA, and b) determine which socio-demographic variables significantly differ from the above studied constructs.

Methods: Parents of 625 children aged 6 to 9 years old participated in the study. Parents were asked to complete a questionnaire assessing parental support for their children's PA, perceived children competence, neighborhood safety, and benefit and barriers of PA. Parents were also asked to report their children' PA outside school time over seven days using the modified Physical Activity Questionnaires for Children (MPAQ-C). Structural Equation Modeling and multiple ANOVA were used to examine the relationship between parents' perceptions and reported children's PA.

Results: (1) Only parental support could predict children's PA; (2) Both parents' perceived competence of their children and perceived exercise benefits of their children could predict parental support and, in turn, increase children's PA; (3) Parents' education

and income levels were found different from their perceived exercise benefits and barriers, perceived neighborhood safety, and parent's perceived competence of children; (4) Single parents tend to have lower perceived neighborhood safety; and (5) Parents of sons are likely to have higher perceived children exercise benefits, parental support, exercise competence as well as more active sons. PA interventions in Hong Kong children should focus on increasing parental support, enhancing parents' confidence and motivation to promote their children's PA by giving positive feedback, acting as active role model, and facilitating participation in PA.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF SYMBOLS

ANOVA	Analysis of variance
B	Beta
X^2	Chi square
CFI	Comparative fit index
CR	Composite reliability
D^2	Distance
F	Fixation indices
RMSEA	Root mean square error of approximation
M	Mean
n	Number of case in sample
NNFI	Non-normed fit index
p	Probability
R^2	Squared multiple correlation
SD	Standard deviation
SFL	Standardized factor loadings

LIST OF ABBREVAIATIONS

BAR	Parent's Perceived Children Exercise Barriers
BEN	Parent's Perceived Children Exercise Benefits
BMI	Body Mass Index
CFA	Confirmatory Factor Analysis
CLASS	Children's Leisure Activity Study Survey
COMP	Parent's Perceived Competence of Children
EM	Exercise Milieu
FD	Family Discouragement
LE	Life Enhancement
MPAQ-C	Modified Physical Activity Questionnaires for Children
PA	Physical Activity
PE	Physical Exertion
PH	Preventive Health
PO	Psychological Outlook
PP	Physical Performance
SAFETY	Parent's Perceived Neighborhood safety

SEM	Structural Equation Modeling
SI	Social Interaction
SUPPORT	Parental Support
TE	Time Expenditure
USDHHS	United States Department of Health and Human Services

CHAPTER 1

INTRODUCTION

Background of the study

The role that Physical Activity (PA) plays in health promotion and prevention of lifestyle-related diseases is well established. For children, PA enhances the development of motor skills and energy usage (Alton, Arab, & Barrett, 2007), relieves stress (Batch, 2005), increases muscle and bone strengths (including lean muscle mass), decreases body fat, and aids in weight control (USDHHS, 2000). Moreover, children need weight-bearing exercise for normal skeletal development (USDHHS, 2000). Psychosocially, PA increases children's social acceptance (Weiss & Duncan, 1997) as well as self-esteem (Martinsen & Stephens, 1994). The element of social interaction provided by PA also decreases children's levels of depression and anxiety (Batch, 2005; USDHHS, 2000).

While it is generally accepted that PA benefits health, children's participation in PA is not encouraging in Hong Kong. In 2009, the Leisure and Cultural Services Department analyzed the pattern of PA in a sample of Hong Kong citizens. In young children aged 7-12 years old, even including the PA in Physical Education class, about 34% of them met the age-specific PA recommendation (i.e., engaged in moderate-to-vigorous PA for at least 60 minutes, 5 days a week) (National Association for Sport and Physical Education, 2004). However, if the PA in Physical Education class was not included, only 21% of

young children would meet the above PA recommendation. In studying sedentary behaviors in Hong Kong children, Lam and Sit (2010) revealed that children tended to adopt a sedentary lifestyle. They spent an average of 2.6 hours per day on watching TV and playing video or other non-electronic games in a seated position.

The consequences of physical inactivity in children are far-reaching as it was proven that physical inactivity was associated with a sedentary lifestyle such as watching television and snacking. Studies (Epstein, Paluch, Coleman, Vrro, & Anderson, 1996; Gortmaker et al., 1996) explaining this association stem from the increase in time that children watch television, where the habit to snack replaces healthier pursuits (Waller, Du, & Popkin, 2003). This inactive and sedentary lifestyle contributes to childhood obesity. The complications of childhood obesity range from cardiovascular to metabolic as well as orthopedic problems, in addition to sleep apnea syndrome and negative psychological issues.

Most importantly, it was demonstrated that 30–70% of obese children and adolescents would remain obese adults (Kotani et al., 1997; Whitaker, Wright, Pepe, Seidel, & Dietz, 1997). All of these studies suggested a massive financial loss and human cost from inactivity in the future. The estimated hospitalization costs for obesity and related conditions in Hong Kong public hospitals increased by 47%, from HK$2.29 billion in 1998 to HK$3.36 billion in 2002 (Ko, 2008). In fact, other than the direct cost to the community, including the costs of healthcare services, physicians, and other healthcare professionals, obesity might induce indirect costs, such as loss of productivity caused by absenteeism, disability, and premature death. The Centers for Disease Control and Prevention estimated that if all physically inactive Americans became active, it

would save US$77 billion in annual medical costs (Pratt, Macera, & Wang, 2000). The World Health Organization also stated that the direct economic cost of obesity assessed in some developed countries was around 2-7% of total health costs (World Health Organization, 2000).

Therefore, the PA pattern found in Hong Kong children is a real cause of concern, being that it may impose a high financial burden to the Hong Kong Government in the future. The importance of understanding children's PA was further underpinned by Bouchard (2001), who suggested that PA "should be [the] cornerstone of contemporary public health" (p. 347). All of these provide a strong rationale for promoting children's PA through intervention programs. It also supports the importance of increasing our understanding about the factors that motivate children's PA.

Outside school, parents are the most influential people to their children's PA as children spend large amounts of free time with their family. Parent's roles in children's PA are diverse, ranging from the role of financiers to fans (Fredricks & Eccles, 2004). Parents' influence is at its peak in the earliest stages of their children's socialization process and diminishes through adolescence (Partridge, Brustad, & Babkes Stellino, 2008).

According to Eccles' Expectancy-Value Theory (Eccles et al., 1983), parents' beliefs about the value of PA (i.e., *children's exercise benefits)*, perception of their children's physical competence *(children's competence)* and its likelihood of success (i.e., *children's exercise barriers*) results in socialization and influences children's involvement in PA. Specifically, parents may *support* their children to exercise more

through encouragement, facilitation, and setting an example with their own lifestyles. Favorable socialization environments are supported by high levels of encouragement or facilitation, where children's PA translates into higher self-esteem, which increases parents' expectations about their children's success. These positive beliefs about the likelihood of success in PA increase children's participation, since their parents' belief in PA significantly influences children's belief systems.

In addition to Eccles' Expectancy-Value Theory, the ecological model explains that one's PA participation level is determined by the interaction between an individual and his or her environment (Sallis & Owen, 1999). National Playing Fields Association (2000) pointed out that almost 80% of parents would not let children play unsupervised in parks for safety reasons. In other words, children's participation in PA was not only affected by the availability of facilities, but also affected by parents' fears about their safety (e.g., *perceived neighborhood safety*) (McNerish & Roberts, 1995). Children's PA is, thus, much more circumscribed. The safety of neighborhood environments may play an essential role in children's opportunities to participate in PA. Among the studies applying ecological models in physical activity, most of them focused on understudied build environment attributes (Glanz, Rime, & Viswanath, 2008) such as accessibility to facilities, and aesthetics (Burdette & Whitaker, 2005; Pang & Ha, 2009). Only few of them (e.g., Burton, Turrell, Oldenburg, & Sallis, 20005) examine the correlates and interactions across multiple levels such as intrapersonal and environmental levels. In this study, children's physical activity is examined at multiple levels, including intrapersonal (e.g., psychological), interpersonal/cultural (e.g. parental support), organizational and environmental (e.g., neighborhood safety).

Statement of Problem

Specifically, this study examined parents' perceived competence of their children, neighborhood safety, exercise barriers and benefits, parental support for their children's PA and their children's PA; additionally, it evaluated the relationships among these constructs. Next, it examined how the studied constructs of parents' perceptions about PA (i.e., Parents' Perceived Competence of Children, Parents' Perceived Neighborhood Safety, Parents' Perceived Children Exercise Benefits and Parents' Perceived Children Exercise Barriers, Parental Support and Children's PA) differ by the socio-demographic characteristics of parents' age, gender, education level, income, work status, parenting status and children's gender. A conceptual map for the study is presented in Figure 1.

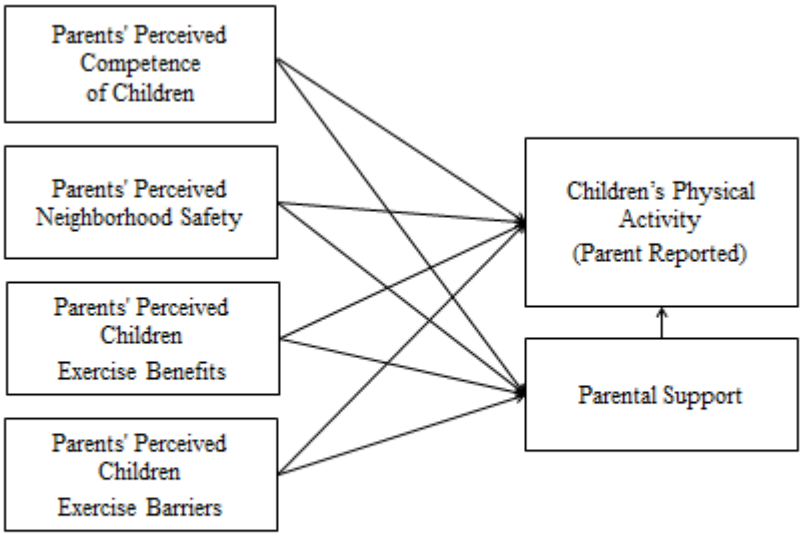


Figure 1. Conceptual Map of the Study

Research Hypothesis

In specific, the research hypotheses were as follows:

1. There would be positive relationship between parents' perceived competence of children and their children's PA.
2. There would be positive relationship between parents' perceived neighborhood safety and children's PA.
3. There would be significant relationships between parents' perceived children exercise barriers and benefits with regard to children's PA, respectively.
4. There would be positive relationship between parental support and children's PA.
5. There would be no significant differences among parents' age, gender, education level, income, work status, parenting status, and children's gender on parents' perceived children exercise barriers and benefits with regard to children's PA.
6. There would be no significant differences among parents' age, gender, education level, income, work status, parenting status, and children's gender on parents' perceived neighborhood safety.
7. There would be no significant differences among parents' age, gender, education level, income level, work status, parenting status, and children's gender on parents' perceived competence of children on PA.
8. There would be no significant differences among parents' age, gender, education level, income level, work status, parenting status, and children's gender on parental support of children's PA.
9. There would be no significant differences among parents' age, gender, education level, income level, work status, parenting status, and children's gender on

children's PA.

Significance of the Study

Physical inactivity is a well-studied risk factor of some chronic illnesses, such as cardiovascular disease. Since activity pattern developed in childhood may transfer to adulthood (Whitaker et al., 1997), regular PA during childhood is critical in the prevention of chronic disease in the later life.

Parents' perceptions would directly affect children's PA behaviors. The environments that parents encounter, and their level of comfort, determine children's exposure to PA. If parents suspect the environment is not safe, they would prohibit their children's access to PA in the environments such as playgrounds (Haughes, 2001; Matthews & Limb, 2000). Therefore, spreading awareness about the influence of parents' perceptions on their children's PA may provide some insight to recreation managers, and even government officials, who can work to improve children's PA behaviors. Corresponding intervention may then be adopted to tackle the parents' perceived children exercise barriers so as to enhance their children's PA. It may also provide tips or information on implementing or planning a PA intervention program in the future.

In the review of the literature, there are numerous studies examining factors that determine why children's participation in PA (Garcia, Broda, Frenn, & Coviak, 1995, Sallis & Owen, 1999; Sallis et al., 1992); however, less effort has been invested in examining parents' perceptions on children's PA. Even when considerable progress has increased our understanding about parents' influence on children's PA, there remain many unresolved problems. Since each researcher makes use of different instruments and

research designs, the development of research looking at parental-specific issues has not been found systematically. Some studies have proved that there is a relationship between parents' perceptions and their children's PA; the precipitating factors that might affect the degree of parental support in the process such as perceived children competence, however, remains unclear (Fredricks & Eccles, 2004).

In Hong Kong, studies had been conducted to examine the determinants of children's PA (Lindner, 1998; Sport Development Board, 2001), though only a few actually highlighted parents' influential factors (Cheung, 2004; Cheung, 2006; Lau & Leung, 2003). These studies examined children's PA from the perspectives of children or both children and their parents, but no study specialized in studying children's PA from the parents' perspective. The research need which studies children's PA from parents' perspective is identified by Greendorfor (1992), who suggested that critical areas of future work would be held accountable by parents' roles in their children's socialization through participation in sports. Herein, we see a small, but growing, concern about parents' influence on children's PA. Future studies are suggested to precisely investigate the varying contexts (i.e., from Eastern and Western countries) in which parental decisions are related to children's PA (Pugliese & Tinsley, 2007), and the indirect influence of parents' perceptions on children's PA, such as parental support (Fredricks & Eccles, 2004). What's more, information about parents' perceptions on children's PA has mainly been generated in the European-American population; whereas, studies from the East are needed for more diverse samples.

Delimitations

The following delimitations were acknowledged for this study:

1. Only parents of children who were 9 years of age or younger, studying in primary schools in Hong Kong, were invited to participate in this study.
2. All the data were obtained by means of a self-reporting paper-pencil instrument.
3. Only children's PA outside school time was investigated.

Limitations

It was acknowledged that the following limitations and appropriate procedures were undertaken to minimize their effects:

1. The results of the study might not be generalized to represent all primary school students in Hong Kong due to small sample size and the use of convenience sampling.
2. Although two pilot studies for the Chinese-translated-instruments were conducted to confirm potential recipients of the questionnaires understood the text, the translation might not be perfectly comparable to the English version.
3. Since most of the instruments were initially developed in urban or suburban areas in the U.S.A., two pilot studies were conducted to gauge if they were applicable in the context of Hong Kong.

Definition of Terms

Terms used in the study were operationally defined as follows:

Body Mass Index (BMI)

BMI is an index to classify students into underweight, overweight, and obese categories. It is calculated as weight in kilograms, divided by height in meters squared. In this study, BMI categories include: underweight (BMI below 18.5); healthy weight (BMI ranging 18.5 – 24.9); overweight (BMI ranging 25- 29.9); and obese (BMI at and above).

Children

Referring to the meta-analysis of PA of children and adolescents conducted by Sallis and his colleagues (1999), children were defined as being aged 3 to 12 years old. In this study, primary school students aged 6 to 9 years old are targeted.

Parenting Status

This term refers to the categories of parenting conditions in a family (i.e., single parent or dual parent households).

Physical Activity

Physical activity is defined as "any bodily movement produced by skeletal muscles that result in energy expenditure" (Caspersen, Powell, & Christenson, 1985, p.126). Therefore, play, games, leisure activity, exercise, and sports are classified in this category. However, since parents were not present and could not observe their children's

participation in PA during school, PA is organized as all children's physical movement regardless of their structure engaged *outside school time.*

Perceived Children Competence

This term reflects the definition established by Harter (1982), in which perceived children competence is focused on children's physical abilities in sports, PA, and games.

Perceived Neighborhood Safety

This term refers to the level of perceived safety by parents in their neighborhoods. It is also used as the dimension of "Disorder" based on perceptions of deleterious conditions in neighborhoods, such as loitering, suggested by Coulton, Korbin, and Su (1996).

Obesity

Obesity is defined as excessive fat accumulation and it may impair people's health (World Health Organization, 2000). In the study, obesity is defined as a cut-off-point on the body mass index (i.e., a body mass index at and above 30).

CHAPTER 2

LITERATURE REVIEW

The contents of this chapter include: (a) Physical inactivity and children obesity in Hong Kong; (b) Theoretical background for understanding PA; (c) Parents' influence on children's PA; (d) Theoretical background for understanding parents' influence on children's PA; (e) Socio-demographic variables; and (f) Measurements of children's PA.

Physical Inactivity and Children Obesity in Hong Kong

Despite the major health benefits of children's participating in PA, Hong Kong children are generally inactive and sedentary. In 2005-2006, a Children Health Survey (Department of Health, 2009) was conducted to understand the health status of Hong Kong children aged 14 or below. A sizeable population of 7,393 children participated in this survey. The survey revealed that only 15.7% of children aged 6 to 14 met the PA recommendation (i.e., children and youth between 5–17 years old should accumulate at least 60 minutes of moderate to vigorous PA on a daily basis) as suggested by the World Health Organization (2011). Another Hong Kong population-based survey was conducted in 2009. In this survey, the Leisure and Cultural Services Department analyzed the patterns of Hong Kong citizens' participation in PA. Once the PA in physical education classes were included in the sample for children 7-12 years old, about 34% of them met the age-specific PA recommendation (i.e., engaged in at least 60 minutes of accumulated

moderate-to-vigorous activity, 5 days a week) (National Association for Sport and Physical Education, 2004). However, if physical education class was not included, only 21% of young children met the above PA recommendation. Moreover, children reported spending an average of 2.6 hours per day on sedentary activities, watching TV and playing video or other non-electronic games in a seated position (Lam & Sit, 2010). The overwhelming prevalence of sedentary lifestyles among Hong Kong children is, in fact, supported by the previous local studies (Fu & Hao, 2002; Fu, Nie, & Tong, 2004; Johns & Ha, 1999).

Such a high rate of physical inactivity and sedentary lifestyles contributes to the risk of obesity in Hong Kong. A longitudinal study on a cohort of Hong Kong babies, born in 1984, showed that the prevalence of obesity of 7-year-old children in 1991 was estimated at 5% (Leung, Ng, Lam, & Lee, 1994). A 1993 nationwide growth survey on children and teenagers 6-18 years old (Leung, 1994) indicated that 13.4 % of boys and 10.5% of girls—an average of 12.0%—were obese. By 2005, the overall prevalence of childhood obesity was 17.8%. This shows an approximate 1.5 times increase over 10 years in Hong Kong (Ebbeling, Pawlak, & Ludwig, 2002). A current figure from Student Health Services showed that the obesity rate among primary school students was 20.9% in the 2011-2012 school year (Department of Health, 2013); even the obesity rate from the prior school year was lower. Overall, the obesity rate was found to have increased by 74% between the 1990s and today.

It is important to note that inactive children may remain inactive as adults in the future. Craigie, Lake, Kelly, Adamson, and Mathers (2011) reviewed 27 papers tracking PA from childhood to adulthood from 1993 to 2011. In longitudinal studies, evidence

supports the assertion that childhood PA levels significantly predict adults' PA participation. Persistent PA during childhood tends to increase the probability that children will be active in adulthood. Alarmingly, this similar tendency is found in those who are overweight and obese. Singh, Mulder, Twisk, Van Mechelen, and Chinapaw (2008) synthesized 25 articles studying the longitudinal development of overweight children and obesity; their findings suggest that upon transitioning from childhood to adulthood, the proportion of becoming overweight in adulthood was moderate for overweight and obese children.

Theoretical Background for Understanding Physical Activity

In order to understand PA comprehensively, we must comprehend sound PA theory. In the following section, three of the most common theories in behavioral PA research are introduced.

Theory of Planned Behavior

The theory of planned behavior was initially developed from the Theory of Reasoned Action (Fishbein & Ajzen, 1975). They postulated that people's behavior was predicted by their intentions. These intentions, in turn, were influenced by their attitudes toward certain actions, subjective norms, and perceived behavioral control. The Theory of Planned Behavior was successfully applied to predict a wide range of behaviors, such as PA (Symons Downs & Hausenblas, 2005).

Behavioral intention is viewed as one's subjective perceptions and report on the probability that he or she will perform the behaviors (Fishbein & Ajzen, 1975). According to the Theory of Reasoned Action, attitudes toward one's behaviors and

subjective norms affect one's intentions to perform certain behaviors. Underlying attitudes toward behaviors are individuals' bel iefs about the outcomes and attributes of performing the behaviors. For example, a person performs a PA based upon his or her sense of what is meaningful. Subjective norm is the social pressure to perform or not perform the behavior (Ajzen, 1985). An example of a positive subjective norm is when a student sees his or her parents as important references, with the belief that his or her parents provide encouragement to participate in PA.

The Theory of Reasoned Action was developed to study the determining factors of people's behaviors that were under volitional control. For example, children participate in certain sports because they believe that they are beneficial to their health; however, in reality, there are many behaviors that are out of people's volitional control, such as time constraints, that may impede people's behavior. The Theory of Reasoned Action is therefore limited to a relatively small range of behaviors (Fishbein & Ajzen, 1975).

Ajzen (1985, 1991) thus expanded the Theory of Reasoned Action to the Theory of Planned Behavior by including a variable called "perceived behavioral control" to explain both volitional and non-volitional behaviors. Perceived behavioral control refers to the perceived ease and difficulty of performing the behavior and it reflects the individual's past experiences, as well as anticipated impediments and obstacles (Ajzen, 1991). In conclusion, a person has greater intentions to perform a behavior when he or she has a more favorable attitude in alignment with the subjective norms, along with higher perceived behavioral control of the specific behavior.

However, there are arguments that there are other variables, such as personality (Rhodes & Smith, 2006), which can predict PA outside the scope of the Theory of Planned Behavior. Additionally, the increasingly-used environmental model argues that the Theory of Planned Behavior focuses on individual factors that may not fully encompass PA.

Transtheoretical Model

The Transtheoretical Model (Prochaska, 1979) uses stages of change to explain the processes and principles underlying people's shift toward health behaviors. The model's constructs include stage of change, processes of change, decisional balance, self-efficacy, and temptation to not behave. In the model, people go through a series of 6 stages of change in a temporal dimension: pre-contemplation; contemplation; preparation; action; maintenance; and termination. These 6 stages are dynamic, and people may relapse to a previous stage or move forward. According to each stage of behavior, there are 10 processes of change, which encompass the covert and overt activities that people process between stages. Examples of processes of change are self-reevaluation and dramatic relief. Different processes of change were found to be useful in specific stages of change (Prochaska, Redding, & Evers, 2008). Finally, people decide their behavior by weighing the pros and cons of the behavioral change (i.e., decisional balance), self-confidence (i.e., self-efficacy), and frequency and urgency of barriers (i.e., temptation).

Spencer, Adams, Malone, Roy, and Yost (2006) reviewed 150 studies applying the Transtheoretical Model to exercise. In general, evidence supports the usage of the

Transtheoretical Model, which explains physical-activity related interventions. Moreover, valid and reliable measures of the Transtheoretical Model developed.

However, limitations were found in the model's generalizations. Most of the studies applying the Transtheoretical Model were conducted on women, older people and Caucasians; therefore, the theory's applicability for understanding people's PA behaviors in diverse populations (e.g., children, adolescents, and other ethnicities) is inconclusive. Furthermore, instead of merely using the membership stage (found in the models of previous studies), comprehensive use of the whole Transtheoretical Model in PA is required (Spencer et al., 2006). Lastly, the "termination" stage was not found to be applicable to PA (Courneya & Bobick, 2000).

Self-Efficacy Theory

Self-Efficacy Theory (Bandura, 1977) is within the scope of Social Cognitive Theory. In Social Cognitive Theory, Bandura identified three factors which interactively influence people's behaviors. These three factors are personal, behavioral, and environmental factors, embodied in the Triadic Reciprocal Determinism model (Wood & Bandura, 1989). Social Cognitive Theory assumes that people are logical and rationally engaging in self-regulation to shape their environment.

In terms of personal factors, self-efficacy refers to the "belief in one's capability to organize and execute the courses of action required to produce given attainments" (Bandura, 1977, p.3). Self-Efficacy Theory is dynamic and situational, and there are four sources of information that people may use to evaluate their self-efficacy: performance outcomes (e.g., past performance accomplishments), vicarious experiences (e.g.,

watching others' performances through mental comparisons with his or her own), verbal persuasion (e.g., verbal encouragement or discouragement), and physiological feedback (e.g., emotional arousal). In general, people may perform a behavior if they believe that they have the capability of doing it successfully.

Another key construct of Self-Efficacy Theory is outcome consequences. Bandura (1977) delineates between self-efficacy and outcome expectation such that self-efficacy is one's belief in his or her ability to complete a specific performance (e.g., working out at a gym three times per week), while an outcome expectation is one's belief about the likely consequences derived from the performance (e.g., someone can either have fun or feel bored through regular exercise routines). Outcome expectation and self-efficacy influence people's performance and participation in PA.

Rather than using the entire Social Cognitive Theory, Self-Efficacy Theory has been the focus in literature surrounding PA. Self-efficacy was found to be an important factor in PA (Bauman et al., 2012). Hagger, Chatzisarantis, and Biddle (2001) studied 1,152 students aged 12-14 years old, specifically to investigate the influence of self-efficacy and past experiences on their intentions to perform certain PA. Findings of structural equation modeling showed that young students with higher self-efficacy and positive attitudes toward PA tended to have higher PA intentions. Even when controlling for the effect of past experience, the significant effect of self-efficacy did not alter students' PA intentions.

Instead of solely focusing upon self-efficacy, the entire Social Cognitive Theory can be used to examine people's PA intentions in the future. In fact, another construct of

Social Cognitive Theory, self-regulation, has been shown to be a significant determinant in the success of exercise-related interventions (Rhodes & Pfaeffli, 2010).

Parents' Influence on Children's Physical Activity

In 1999, Sallis and his colleagues summarized studies that examined the determinants of PA in children aged 3-12 years old. The studied variables were categorized into demographic and biological factors: psychological, cognitive, and emotional factors; behavioral attributes and skills; social and cultural factors; and physical/environmental factors. Parents' influence on children's PA was included in the category of social and cultural factors (Sallis, Prochaska, Taylor, Hill, & Geracia, 1999).

Recently, Pugliese and Tinsley (2007) conducted a meta-analysis to integrate studies that investigated the relationship between parental socialization behavior, and children and adolescent PA levels. The unweighted mean and median effect sizes (as indexed by *r*) were .17 and .13, respectively, indicating that a moderate, positive relationship existed between parental socialization behavior and children's PA levels.

Based on the difference between the children's age and developmental stage, each social group's influence differs. Early studies on sport participation found that the influence of family, peers, and school authorities vary in regard to the children's participation in them (Horn, 2004; Horn & Weiss, 1991). Younger children tend to rely on family members when evaluating their own ability and competence in sports (Horn, 2004; Horn & Weiss, 1991). Alderman, Benham-Deal and Jenkins (2010) made use of the developmental approach to investigate parents' influence on children's PA over time. The amount of time parents engaged with their children reduced from 60 minutes per

week during preschool school to 40 minutes per week as the children grew; in other words, parents' influence reduces as children grow older. Horn (2004) suggested that parents' influence on children's PA is strongest for children aged 10 or younger. With such a strong influence, it makes sense that children spend the bulk of their time with their families prior to becoming teenagers when there is typically a struggle with families for identity and independence.

Theoretical Background for Understanding Parents' Perceptions on Children's PA

Eccles' Expectancy-Value Model

When studying parents' perceptions on children's PA, the model generated by Eccles and Harold (1991) provides a conceptual framework (see Figure 2). The model is based on the assumption that an individual's decision to participate in activities is made up in the context of a variety of choices, and it is important to understand how significantly others influence one's decisions. This Expectancy-Value Model was extensively utilized while studying parental socialization of human motivations. Parents' beliefs about their children's competence were largely found to predict children's own abilities and interests in studying mathematics and English (Eccles, Wigfield, Harold, & Blumenfield, 1993; Frome & Eccles, 1998).

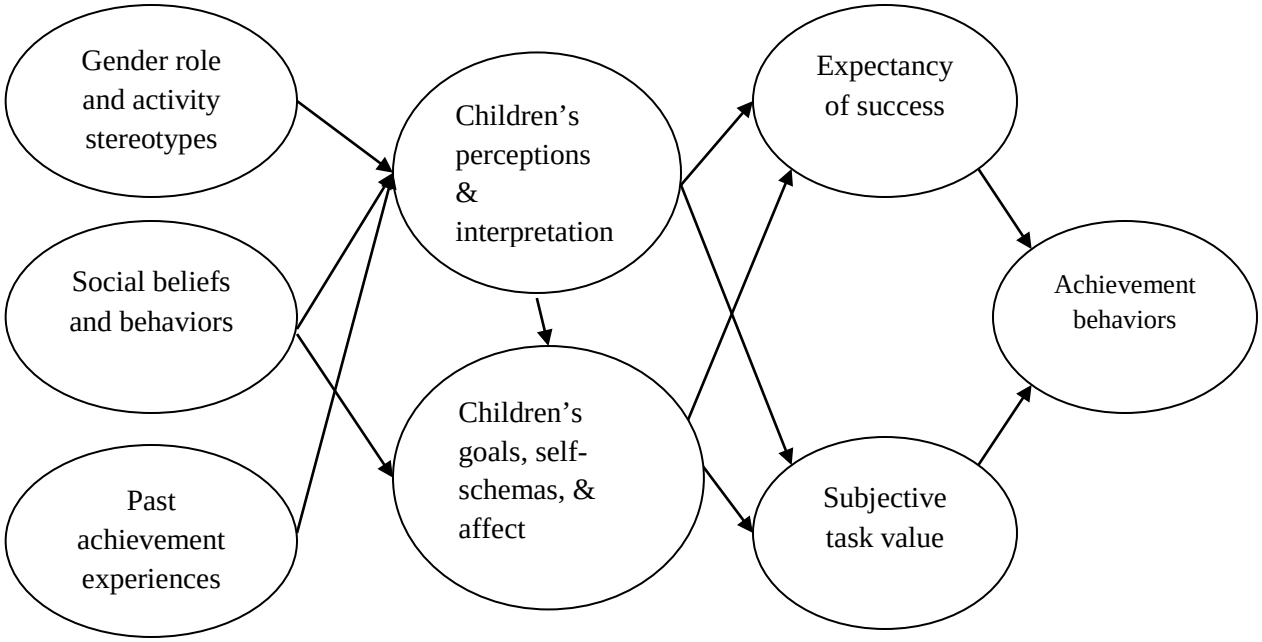


Figure 2. Eccles' Expectancy-value Model of Activity Behaviors

Essentially, the works of Eccles and her colleagues expound upon the work of Atkinson's Expectancy-Value Model (1964). The Eccles' Expectancy-Value Model posited that one's successful choices and behaviors were linked to his or her expectations of success and subjective task value. Successful choices and behaviors refer to the amount of effort that one devotes to the activity (i.e., performance), the decision making challenge (i.e., task choice), and the duration that one commits to the activity (i.e., persistence).

Expectancy of success is defined as "children's beliefs about how well they will do on upcoming tasks, either in the immediate or long-term future" (Eccles, 1983, p. 94). Such a concept is analogous to Bandura's (1977) personal efficacy expectation, which refers to the perceived probability of success in a specific domain, such as a sport. Another concept that is closely related to the expectancy of success is one's own perception of ability. This is defined as "individuals' evaluations of their competence in

different areas" (Eccles, 1983, p.94). Moreover, it assesses one's competence at performing specific tasks. In empirical work, children and adolescents were found incapable of distinguishing between these two concepts (i.e., expectancy of success and perception of ability) (Eccles & Wigfield, 1995); hence, these two concepts were inseparable in research (Eccles & Wigfield, 1995; Fredricks & Eccles, 2005). In fact, researchers sometimes combined these two concepts into one construct measurement.

Subjective task value refers to how a task meets the different needs of individuals (Eccles' et al., 1983); it consists of four components: attainment value, interest value, utility value, and cost (Eccles, 2005). In all four components, value refers to the importance of developing one's self-esteem, such as a heightened sense of competence. Attainment value is defined as the importance of doing well on a given task; interest value is defined as the fulfillment that one feels from doing a specific task; utility value is the perceived usefulness of the actions that link the working task to the future plan, such as how PA may enhance one's quality of life or lifespan; and cost refers to the value of an opportunity that is lost when one chooses, instead, to engage in another task or activity. In short, expectancy of success helps us to answer the question, "Can I do this PA?" On the other hand, subject task value helps us to answer the question, "Do I want to do this PA and, if so, why?" (Eccles, Wigfield, & Schiefele, 1998).

Researchers (Fredricks & Eccles, 2002; Wigfield, 1994; Xiang, McBride, & Bruene, 2004) found that expectancy of success and subjective task values were positively correlated. Xiang et al. (2004) used the Expectancy-Value Model of successful choice and Goal Achievement Theory as theoretical frameworks to examine the relationship between 125 4th graders' expectancy-related beliefs and subjective task

values in a 1 mile run. The study demonstrated positive association between expectancy-related beliefs and the three studied task values (i.e., attainment value, interest value, and utility value). Similar results were found in children's playground choices. Children perceived higher self-competence in activities that they viewed as important (Spencer-Cavaliere, Causgrove Dunn, & Watkinson, 2009). These results reinforced the data of a previous study by Wigfield (1994), which explained that, from a developmental perspective, children attached more value to tasks in which they felt that they were likely to succeed.

Recently, this model has been applied to measure children's motivation for participating in sports, along with other PA (Trost et al., 2003; Sabiston & Crocker, 2008; Watkinson, Dwyer, & Nielsen, 2005). Sabiston and Crocker (2008) examined the efficacy of Eccles' Expectancy-Value Model through examining PA in adolescents. Results supported the applicability of Eccles' Expectancy-Value Model, which explained the 49% variance in adolescent PA. Congruent to Eccles' Expectancy-Value Model, the result of structural equation modeling confirmed that one's belief in his or her competence and the value of the action was significantly associated with PA. Parents and close friends were the main sources of influence, specifically pertaining to adolescents' beliefs in their personal abilities, as well as the value that they would gain from the PA. Therefore, Watkinson, Dwyer, and Nielsen (2005) applied Eccles' Expectancy-Value Theory when interviewing school children (grades 1-4) to better understand their decisions prior to engaging in recess activities. Not surprisingly, 4 components of subject task values were salient to children's decision-making processes; their expectations and values were significantly linked to their activity choices. More recently, Chiang, Byrd,

and Molin (2011) examined the utility of Eccles' expectancy-value paradigm; they asked 220 children about their competence, values, perceived importance, interest, and cost of exercise; all of these constructs were found to be related to the children's PA. Overall, the results supported the application of the Expectancy-Value Model in elementary schools.

Both expectations of success and subjective task values are influenced by self-perception, perceived task difficulty, experiences of past successes and failures, and one's personal goals. In a broader scope, these variables reflect one's social group's influence. Social influencers, such as parents and friends, mold children's sense of value and expectations, competence in their personal abilities, the value of various achievement domains, and gender-related stereotypes about the achievement domains—all affecting children's successful choices and behaviors.

Parental value measures the perceived relative importance that one parent has in contrast to another, based upon differing achievement domains. According to the model, parents provide more support if they place a high value on the particular PA. As mentioned, this task value combines attainment value, interest value, utility value, and cost. Pang and Ha (2010) applied Eccles' Expectancy-Value Model to examine the subjective task value of PA participation in Hong Kong school children. A total of 335 primary school students answered to what degree they valued participation in a PA. The results indicated that the three subjective task values (i.e., attainment value, interest value, and utility value) played important roles, as suggested by Eccles et al. (1983), with the exception of cost.

Parents' expectations define their perceptions about the likelihood of their children succeeding in a given domain. With parents' observation on children's previous performance, parents provide unequaled support to their children in different domains. For instance, if parents perceive that their children are better at playing volleyball than singing, they will provide more support for their children to develop volleyball skills (e.g., enrolling them in volleyball lessons vs. vocal lessons) while devote less at nurturing their children to sing.

Trost et al. (2003) tested a model in which parental support and children's self-efficacy toward certain PA increased the relationship between parents' and children's value of the common PA. Parental orientation, including the perceived importance and enjoyment of the PA, positively encouraged parental support toward children's participation in said the particular PA. Loprinzi and Trost (2010) evaluated a similar model linking parental orientation with the PA to parental support for children's participating in the PA. Parents' expectations (e.g., parents' perceptions about their children's physical competence) were positively linked to children's participation in activities; whereas, self-efficacy was indirectly stimulated through parental support.

However, parental values and expectations differ in degree of support in each different achievement domain. Parents' belief in their children contributes to how children interpret experiences; this, in turn, influences the ways that children value PA, as well as how children value their expectations of success. Specifically, parents encourage, facilitate, and model their children to do more PA according to their own sense of value and their belief in their children's competence.

In addition to parental support for children's PA, parents' beliefs about the value of PA, the perception of their children's physical competence, and the likelihood of their children's success is adopted by their children. Bois, Sarrazin, Brustad, Chanal, and Trouilloud (2005) examined the role of the reflected appraisal process between parents and children on the ontogeny of children's perceived physical competence. Results supported their hypothesis that parental appraisal of their children's physical competence reflects the comparative competence perceived by their children. Therefore, favorable parental encouragement and facilitation lead to children's increased participation and ability to perform in PA. This translates into successful experiences, positive self-esteem, and greater expectations for success. As a result, positive beliefs surrounding any PA increase children's participation and performance in PA.

Fredrick and Eccles (2005) used both cross-sectional and longitudinal data to address the relationship between parental socialization and children's participation in sports. Positive relationships between parents' perceived value of sports and children's perceived competence, value, and participation in sports was found over time. It was demonstrated that children perceive greater personal competence, value, and willingness to become more involved in PA when their parents hold positive beliefs about their children's abilities, a sense of value for their activities, and support them through associated behaviors. Another study (Anderson, Hughes, & Fuemmeler, 2009) examined parent/children attitudes on the value of PA through a sample of 681 parents and 433 children. Similarly, parents' value toward vigorous PA affected children's attitudes and, in turn, these attitudes impacted children's involvement in PA. Parents thus expressed

their perceived importance of PA to their children, and it increased the children's participation levels.

Last, but not least, an important element of parental socialization in Eccles' Expectancy-Value Model is the gender-related parental belief system. In children's early years of school (Parsons, Adler, & Kazala, 1982), young boys and girls performed equally well in mathematics; this changed when their parents expressed different gender-related perceptions about their children's abilities in this subject. Comparatively, girls tended to adopt their parents' beliefs about their lack of competence; they thought that mathematics was more difficult and less important to them. A similar gender stereotype was generally found in sports, except in the studies of Bois, Sarrazin, Brustad, Trouilloud, and Cury (2005), as well as Dempsey, Kimiecik, and Horn (1993). Mothers and fathers with sons rated their children higher in physical abilities, as parents placed higher importance on sports (or PA) for their sons instead of daughters (Eccles & Harold, 1991; Fredricks & Eccles, 2005; Jacobs & Eccles, 1992). Fewer studies have investigated the impact of parents' genders on these gender stereotypes, relating to PA. The multivariate analysis of the study (Fredrick & Eccles, 2005) found that both fathers and mothers perceived higher competency and importance of PA in their sons. In this regard, they provided more support for sons than daughters. Both the mothers and fathers had gender stereotypes in their beliefs about their children's PA.

Limitations of Eccles' Expectancy-Value Model

In conclusion, Eccles' Expectancy-Value Model provides a sound understanding of how parental socialization relates to children's participation and performance in PA.

However, among the constructs in the model, most of the previous researchers have concentrated their efforts on studying parents' or children's expectations of success, such as perceived competence. The four components of subjective task value in the model are only infrequently studied in limited research; among the four components of task value, cost of PA tends to be omitted (Chiang, Byrd, & Molin, 2011). In addition, future research is warranted to identify the implications of changes in social contexts (e.g., classroom climate or cultural background), as well as changes in developmental transitions (e.g., primary school to senior secondary school). As most of the related studies were conducted in Western countries, similar studies are necessary to be conducted in Eastern countries (e.g., Hong Kong) so as to increase the knowledge in this subject area. Additionally, direct information from parents (Brustad, 1992) is needed while examining parental socialization in children's PA. According to Eccles' Expectancy-Value Model, parents may influence children's PA in three ways, namely: role models, interpreters of experiences, and providers of experience. In the following paragraphs, role models, interpreters of experiences, and providers of experience would be examined.

Parents as Role Models

Similar to the Social Learning Theory (Bandura, 1986), Eccles' Expectancy-Value Theory postulated that children may imitate and internalize parents' behaviors and attitudes (or those of any role model); in other words, this means that children may be active if their parents are physically active. While reviewing the literature, there were mixed findings regarding whether parents' PA was correlated with their children's PA. Studies supporting a correlation between these variables found that children from

families with both active parents were active were almost 6 times more likely to be active than children whose parents were inactive, and the effects were more obvious in boys than girls (Moore et al., 1991; Welk, Wood, & Morss, 2003). Moore and colleagues (1991) used a Caltrac accelerometer to track PA among parents and children. The results documented a positive relationship between parents' and children's amount of PA. Equivocal results were found in studies using self-report measures of parents' role modeling (Babkes & Weiss, 1999; Lau & Leung, 2003; Welk et al., 2003), while others found no relationship at all (Fredricks, 1999; Dempsey, Kimiecik, & Horn, 1993). In 1999, Babkes and Weiss revealed that athletes whose mothers and fathers were good role models for PA reported a higher perception of competence and fulfillment. The higher athletes' perception of competence and fulfillment then further increases their overall participation in sports. Bois and colleagues (2005) studied the influence of mothers' involvement in PA, as well as their perceptions about their children's physical competence; the results of the structural equation indicated that mothers' behaviors had a direct impact on their children's participation in PA. Later, Welk, Wood, and Morss (2003) reported that children of physically active parents had higher scores on parents' influence including parents' participation in PA. In contrast, another study indicated that parents' PA did not relate to children's self-perceptions or participation in PA (Dempsey et al., 1993; Fredrick, 1999).

Some of these studies have been found to lack standardization or validity based on unsuitable measures. As previously mentioned, the population of these studies mainly comes from Western countries, or nations of high socioeconomic status; as a result, the generalization of these findings is limited accordingly.

Parents as Interpreters of Experience

Parents are not only children's role models but also influence children's perceptions about their abilities through parental beliefs and values. This influence is, in fact, well established in educational literature (Eccles, Wigfield, & Schiefele, 1998). Parents' beliefs may affect children's affective development in elite sports. For example, a higher level of parental pressure lowers children's enjoyment about their involvement in sports (Babkes & Weiss, 1999). Another research topic of increasing interest has focused on parents' beliefs in children's abilities. Fredricks and Eccles (2002) conducted a longitudinal study investigating the impact of parents' influence on the development of children's sense of competence. Over time, children had fewer declines in their self-esteem if parents perceived that their children were highly competent. Dempsey and his colleagues (1993) found that children's activity levels increased if parents held greater perceptions of children competence. Kimiecik and his colleagues (1996) expanded the research to determine that if children perceived that their parents valued fitness and held higher beliefs in their personal competence, they were more active. Similar results were also found in Hong Kong study (Cheung, 2004). Parents' beliefs about their children's physical competence could shape their children's activity choices indirectly through the children's personal perceptions of competence and the relative value of various activities.

Conversely, in the majority of studies supporting the importance of parents' beliefs in children's PA, the samples are composed entirely of mothers. Mothers' perceptions may be particularly important in shaping children's beliefs and behaviors (Jacobs & Eccles, 1992); however, little is known about how fathers' perceptions of their children's competence influence their engagement in PA. Few studies have been conducted to

differentiate each gender's influence (Bois, Sarrazin, Brustad, Trouilloud, & Cury, 2002). Much research is needed to identify the difference of perceived children competence between fathers and mothers, being that each parent may not share similar appraisals of their children's aptitudes and abilities.

Perceived Benefits and Barriers of Physical Activity in Children

The perceived benefits and barriers of PA are a construct of the Health Promotion Model (Pender, 1996), Health Belief Model (Rosenstock, 1966), and Theory of Planned Behavior (Ajzen, 1985). They all relate to the concept of Expectancy-Value Theory (Eccles, 1983) and Social Cognitive Theory (Bandura, 1986). Behaviors, environments, and personal factors all operate together to affect one's perception of his or her skills and abilities. They determine whether a person acts effectively and competently when performing a specific behavior to produce a desirable outcome (i.e., self-efficacy). The assumption of Expectancy-Value Theory is based on the concept that people will economically and rationally take action if the outcomes are positive, and if they have the personal resources to satisfy the cost. Therefore, people will not work toward goals that are of little or no personal value; people will also not work toward goals that they perceive to be impossible, regardless of their potential high value.

Perceptions about the benefits and barriers of PA are significantly related to children's and adolescents' specific activities (Garcia, Pender, Antonakos, & Ronis, 1998; Wu & Pender, 2002). Anticipated barriers have been empirically shown in studies to negatively affect children's engagement in PA (Tsai, 1996; Zakarian, Hovell, Hofstetter, Sallis, & Keating, 1994). Although children may possess positive views concerning the

benefits of being active, individuals may not actually perform an activity if they perceive barriers. Garcia and his colleagues (1995) found that the benefits/barriers differential was a direct determinant of participants' level of PA among more than 300 elementary and middle school students. This benefit-to-barrier differential score approach was utilized because only removing the barriers to exercise may not result in children's readiness to be physically active, especially without corresponding awareness of the perceived benefits (Marcus, Rakowski, & Rossi, 1992).

In addition to children's perceived benefits and barriers of PA, researchers have examined how parents' perceived benefits and barriers toward children affect their exercise or PA (Stucky-Ropp & Dilorenzo, 1993; McMurray et al., 1993; Ransdell et al., 2005). Some studies found no relationship between parents' attitudes and children's PA engagement (McMurray et al., 1993; Mota & Queiros, 1996). Yet, Dempsey, Kimiecik, and Horn (1993) disagreed; they found that parents' belief in PA demonstrated a moderate relationship with children's participation in sports. With this information, they asserted that parents might communicate the value that they attach to PA by expressing positive or negative messages regarding various activities. Furthermore, parents also convey their value toward PA through encouragement and facilitation. These results were consistent with those of Eccles and Harold (1991). Children's perceptions of their parents' beliefs significantly influenced children's beliefs about their sport involvement which, in turn, predicted levels of their PA involvement.

Parents as Providers of Experience

Parents' encouragement and facilitation influence their children's PA. Parents' encouragement can be obvious, and verbal or nonverbal. Encouragement in early childhood is a critical factor in continued involvement in sports or PA. Families stimulate children to be active by developing their interest in sports (Brustad, 1992). Brustad (1996) found that parents' encouragement was related to children's attraction to PA, as well as their perceived physical competence. The above results were supported by Lau, Lee, and Ransdell (2007) in Hong Kong, which demonstrated that mothers' encouragement was positively related to their overweight children's interest in PA. Additionally, parents' encouragement might even counteract the negative effect of gender stereotypes on girls' involvement in sports; a positive relationship was found between girls' participation in sports and parents' encouragement (Higginson, 1985).

Apart from parents' encouragement, parents can also enhance children's PA by providing positive experiences, such as providing access to facilities and programs (Hoefer, McKenzier, Sallis, Marshall, & Conway, 2001; Trost et al., 1997), along with appropriate equipment and services (Eccles, Jacobs, & Harold, 1990; Green & Chalip, 1998). Sallis and his colleagues (1992, 1999) stated that parental transportation was the family variable that most strongly affected the children's PA level and health; in specific, parental transportation also accounted for a significant variance in children's PA over 20 months. The results were later supported by Hoefer and his colleagues (2001).

Even so, parental concerns regarding their children's safety in PA may contribute to inactivity. To understand the association between parents' anxiety about children's safety

and children's PA, researchers have begun to study their perceived neighborhood safety. Some studies have looked at children's perception of their surroundings, and the results are conflicting. For instance, Romero and his colleagues (2001) reported a positive relationship between 4th grade students' perceptions of neighborhood hazards and their self-reported PA. Interestingly, no significant relationship was found between neighborhood safety and PA (Lee & Cubbin, 2002).

A parental perception of neighborhood safety is another highlight in the study of children's PA. A study conducted by Burdette and Whitaker (2005) examined if preschool children spent less time playing outdoors, and more time watching television, when they lived in neighborhoods that their mothers perceived as "unsafe." Mothers' perceptions of neighborhood safety were related to the time children spent watching TV; however, it did not affect their outdoor play time. Recently, Pang and Ha (2009) adopted a qualitative approach to study parents' concerns about facilitating children's PA. They found that parents' safety concerns are among the main reasons why parents in Hong Kong consciously discourage their children from participating in potentially dangerous PA. They typically believe that their children are too young to make decisions regarding their own safety. Specifically, they found that mothers tend to focus on the safety of the environments, while fathers focus on the type of PA that is suitable and safe for their children.

Ecological Model

In fact, increasing awareness of parents' perceived neighborhood safety is congruent with increasing research on ecological models of health behaviors. Ecological

models highlight the importance of people's connection with their physical and socio-cultural surroundings and environments (Stokols, 1992). These models are different from behavioral models, such as Theory of Planned Behaviors, which emphasize individual factors (e.g., age and skills) and assume that physical activity are linear process whereby the individual decisions are planned and actions ensuing. Instead, ecological models believe physical activity is complex phenomenon and it occurs because of the interaction between multiple levels of factors. The multiple levels of factors affecting PA which include intrapersonal (e.g., biological, psychological), interpersonal/cultural, organizational, environmental (e.g., built, natural), and political (e.g., laws and rules). Importantly, ecological models can incorporate other constructs in different theories, taking environments and policies in the broader community into consideration. Among the studies applying ecological models in physical activity, most of them were focused on understudied build environment attributes (e.g. facility attractiveness) (Glanz, Rime, & Viswanath, 2008). A wide array of structured environments was found to be correlated with restrictions or promotion of PA, pending perceived neighborhood safety, accessibility to facilities, and aesthetics (Burdette & Whitaker, 2005; Pang & Ha, 2009). Only few of them (e.g., Burton, Turrell, Oldenburg, & Sallis, 20005) examined the correlates and interactions across multiple levels such as intrapersonal and environmental levels. In this study, children's physical activity is examined at multiple levels, including intrapersonal (e.g., psychological), interpersonal/cultural (e.g. parental support), organizational and environmental (e.g., neighborhood safety).

Socio-demographic Variables

It is suggested that discrepancies in values and perceptions about PA may be found among people of different socioeconomic status (Taylor, Baranowski, & Sallis, 1994). However, the association between parents' socio-demographic variables and children's PA has not been widely studied, and the results of the available studies are inconsistent.

Parents' Education Levels

Studies examining the relationship between PA and parents' education levels (Guillame, Lapidus, Bjontorp, & Lambert, 1997; Hesketh, Crawford, & Salmon, 2006; Yang, Telama, & Laakso, 1996) have shown that education levels are a determining factor in children's PA. In 1996, Yang and his colleagues found that 9-year-old boys with fathers who attained higher education degrees tended to participate more in sports than children with less educated fathers; Hesketh, Crawford, and Salmon (2006) found similar results. Maternal education was also positively related to children's moderate to vigorous participation in PA. The explanation for this association might be provided in a study of Cameron and his colleagues (2003). Parents with a post-secondary school education were found to be more likely than parents with less than a secondary school education to recognize the health benefits of participating in PA, in part because they value the exercise prescription. On the contrary, the Hong Kong Institute of Certificated Public Accountants and Playright Children's Play Association (2006) commissioned a survey to discover Hong Kong parents' views on their children's play habits; the results revealed the opposite. Parents without a university education were found to be more likely to say that their children spend too much time watching entertainment; whereas parents with a

secondary school education were less concerned about their children's time spending at watching entertainment. Children whose parents have lower education levels spent more time participating in physical play, compared to children of parents with a university education. This most likely was related to Hong Kong's culture, being that Hong Kong parents value children's academic achievements far more than children's PA, especially under the influence of Confucianism. However, other studies, such as Sallies et al. (1992), found no significant relationship between parents' educational level and children's PA.

Parents' Work Status

In regard to parents' work status, the results are varied. Students whose fathers were managers or skilled workers showed a significantly higher level of extra-curricular PA than students whose fathers were non-skilled workers, unemployed, or retired (La Torre et al., 2006). Conversely, Sallis and his colleagues (1992) found no significant relationship between parents' occupations and children's PA.

Parents' Income Level

In general, the likelihood of participating in adequate PA is low for families with lower income (Lowry, Kann, Collins, & Kolbe, 1996). Children who come from families with lower incomes perceive higher barriers to participating in PA since they have fewer opportunities than their peers from higher income families to participate in these organized PA (Centers for Disease Control and Prevention, 2003).

Parenting Status

Studies have shown that the amount of PA among children differed between single-parent and dual-parent households. Few studies have actually examined the above incongruity; even so, inconsistent findings are found. Profiles of single parent families tended to have lower education levels and incomes (Cairney & Wade, 2002). Such family backgrounds induced greater exercise barriers for their children related to poorer neighborhood safety. These increasing barriers lowered their PA participation levels (Azar, Naughon, & Joseph, 2009). On the other hand, Sallis and colleagues (1992) found that boys from single-parent families were more active than boys from dual-parent households. The researchers suggested that this might be due to less supervision, for children are forced to find alternative methods of transportation. Brodersen, Steptoe, Williamson, and Wardle (2005) found similar results supporting Sallis et al. (1992). Children were found to be more active in single-parent families. Either way, more studies on how parenting status influences children's PA are needed.

Children's Gender

Gender differences have been noted when studying PA patterns in children. Compared to girls, boys demonstrated higher levels of daily PA (Sallis, Prochaska, & Taylor, 2000) and, in general, preferred more vigorous intensity (Pate, Long, & Heath, 1994). Researchers contended that these differences are socio-cultural gender differences. It appeared that there was more parental support for vigorous PA for boys (Taylor et al., 1994); therefore, a powerful message is sent to girls that it is socially acceptance for boys

to be more physically active than girls. Overall, more research, especially from Eastern countries, is needed to understand how parents may affect these perceived gender issues.

Measurements of Children's Physical Activity

In this study, we examined the relationship between parents' perceptions and children's PA and to provide an accurate measurement of children's PA. Without a valid and reliable measurement of PA, identifying how parents' perceptions relate to their children's PA becomes meaningless. Unlike PA in adults, measuring children's PA proves more challenging because children's PA is short-lived and intermittent (Baquet, Stratton, Van Praagh, & Berthoin, 2007). In this section, common PA measurements for children are briefly reviewed.

Direct Observation

In this measurement, observers are trained, and formal observation is used, to record children's PA for set periods of time. Other than recoding the time, type, and intensity of children's PA, this type of measurement provides additional advantages in gathering other information related to PA (e.g., social or environmental factors). However, it can be time- and labor-consuming, depending on the time that it takes to observe, and the number of trained observers that are involved. As a result, the cost of using direct observation may not be affordable in studies with large sample sizes. It would be critical for the observers to reliably determine the effectiveness or utility of their measurements. Studies (Brown et al., 2006; Mckenzie, Cohen, Sahgal, Williamson, & Golinelli, 2006) have shown that the direct observation method is valid and reliable in

measuring children's PA. An example of a widely-used observatory system is the SOFIT (System for Observing Play and Leisure Activity in Youth).

Heart Rate Monitoring

Heart rate monitoring is an objective andan inexpensive way to measure PA. Renewed development of heart rate monitors has increased their usage by reducing their physical size and weight. Its measurement is based on the linear relationship between heart rate and energy consumption. However, their accuracy may be altered by other factors, such as the participant's body size, emotional status, and temperature (Loprinzi & Cardinal 2011). Most notably, due to the sporadic nature of children's PA and delayed elevation of heart rate after PA, children's PA may be underestimated. Additionally, most children's PA is light in intensity, and it was found that the linear relationship between heart rate and energy consumption becomes weak in light exercise intensity. Since this results in errors, the usage of heart rate monitors may prove to be problematic in accurately measuring the fitness of children (Riddoch et al., 2007). Researchers thus addressed these problems by calibrating monitors to measure individual heart rate oxygen consumption; thereby controlling the individual's resting heart rate. However, in controlling individual heart rate oxygen consumption, difficulties were found when at operationalizing the term "resting heart rate" and standardizing the protocol measuring resting heart rate" (Logan, Reilly, Grant, & Paton, 2000).

Alternatively, FLEX HR (Spurr et al., 1988) is a common method used to calibrate an individual's heart rate oxygen consumption curve, which estimates energy expenditure. Nonetheless, Livestrong and colleagues (1992) compared the usage of

FLEX HR to the doubly-labeled water method. Results have shown that the FLEX HR method appeared to be accurate when predicting estimated habitual total energy expenditure in groups of healthy, free-living children. However, in an individual level, its estimated total energy expenditure might differ, ranging from -16.7 to 18.8%.

Accelerometers

Accelerometers are lightweight, small mechanical devices that measure the frequency and intensity of bodily movement. When the body accelerates, movements are generated into an activity count. Using the information from the activity count, intensity of PA and energy expenditure are calculated. It can also measure acceleration in different planes (e.g., uniaxial or triaxial). Both uniaxial and triaxial accelerometers provide acceptable evidence when measuring children's PA (Eston, Rowlands, & Ingledew,1998; Trost, Mciver, & Pate, 2005). Some researchers even found that using triaxial accelerometers was more valid than uniaxial accelerometers (Ott, Pate, Trost, Ward, & Saunders, 2000). Additional studies are needed to confirm these results.

Pedometers

A pedometer is also a lightweight, small electronic device that measures the number of steps over a period of time, and it is targeted at measuring overall PA levels rather than the intensity or pattern of PA. Compared to accelerometers, it is less expensive and, therefore, becomes more feasible to use in larger sample studies. However, similar to accelerometers, it is insensitive to some activities, such as cycling (Loprinzi & Cardinal, 2011). In 2005, Beets, Patton, and Edwards examined the accuracy of pedometers when measuring children's self-paced and treadmill walking in children. A

higher agreement (i.e., intraclass correlation coefficient > .90) was found between observed steps and pedometer steps; however, such an agreement decreased in slower walking pace. Previous studies also found significant correlations between number of steps, monitoring heart rates, and using accelerometers in children (Eston et al., 1998). To better capture information about children's PA, parents may help their children to record pedometer data in a log book every day.

Self-report Questionnaires

This category includes interviews, diaries, and proxy reports on children's PA. These measurements are mostly used in large sample studies because they are inexpensive, easier to administer, and have the ability to gather different types of activity-related information, such as time, type, and intensity. Conversely, different reviews (Loprinzi & Cardinal, 2011; Sallis, 1991; Trost, 2007), which summarized the measurements of PA in children, contended that using self-administered questionnaires in children might induce measurement errors. Children under age of 10 years old could not recall their PA, or understand the questionnaires accurately. Trost et al. (2000) evaluated 4th grade students' understanding of PA by asking them to evaluate an activity-related checklist. Without video and verbal descriptions, 35.6% of the students could not complete the checklist correctly. Another option for measuring children's PA would then be to administer proxy reports with the aid of parents and teachers.

In 2001, Sirard and Pate reviewed the accuracy of proxy-reports for children's PA and concluded that evidence of their validity was limited. Possible reasons for this conclusion may be the additional bias from the proxy respondents, such as social

desirability. In addition, the accuracy of the proxy report may be subject to the time proxy that respondents have after being observed. Telford, Salmon, Jolley, and Crawford (2004) examined the validity and reliability of the Children's Leisure Activity Study Survey (CLASS) for children aged 5-6 and 10-12, alongside their parents. The parent proxy reports that CLASS provided highly reliable estimates of children's PA in children, both for 5-6 and 10-12 years old. The low and insignificant correlations between proxy report and self-report questionnaires indicated that their validity was poor. Parents reported that they had difficulties reporting children's PA when their children were at school.

In other studies, there were some fair-to-moderate agreements among parents' and children's proxy-reports (Garcia, George, Coviak, Antonakos, & Pender, 1997; Sithole & Veugelers, 2008), where most of the information was accurate (Dowda et al., 2007). Sithole and Veugelers (2008) compared children's reports on their PA with those of their parents; the kappa score between children's and parents' reports of organized and leisure sport participation was .41 and .11, respectively. Parental proxy reports thereby achieved a certain degree of accurate estimates about their children's PA output. Without explanation, additional research efforts are warranted to confirm if parent proxy reports are valid and reliable in measuring children's PA, especially for children's PA outside of school.

In Hong Kong, the Children's Leisure Activities Study Survey (CLASS) (Telford et al., 2004) and PA Questionnaires for Children (PAQ-C) (Crocker, Bailey, Faulkner, Kowalski, & McGrath, 1997) are the common PA questionnaires used in PA measurement.

CLASS (Telford et al., 2004) is a checklist of 30 PA that ask respondents if they are involved with the corresponding activity during a typical week (e.g., Monday through Friday; and during a typical weekend, Saturday and Sunday). An example of an activity on these checklists is travel by cycling to school. Overall, it was found to be a reliable measurement in both older and younger children; however, its validity was less than satisfactory (Telford et al., 2004). Later, Huang, Wong, and Salmon (2009) translated it into Chinese and examined its reliability and validity in Hong Kong children aged 9-12 years old (boys = 94; girls = 136). It was modified to consist of 31 PA relatable to Hong Kong. Higher test-retest reliability coefficients for moderate to vigorous PA (ICC = .71) and vigorous PA (ICC = .73) were found over a week interval. Its validity was examined by comparing the self-report, CLASS, and accelerometer. There was a moderate correlation between CLASS and the accelerometer in weekly PA for girls. Researchers explained that the insignificant correlation between CLASS and accelerometer in boys was due to the small sample size. A modified version of CLASS was later used to examine the reliability and validity of other psychosocial and environmental similarities in measurements of Hong Kong children by revising those measures to self-report CLASS (Huang, Wong, Salon, & Hui, 2011).

PAQ-C (Crocker et al., 1997) is a 9-item questionnaire, structured to ask about moderate to vigorous PA during the past 7 days. Respondents are asked how frequently they perform a PA in different situations and times, such as recess or immediately after school. It is targeted to assess general levels of PA in children between 8-14 years old, especially for children who are studying in school systems and have recess time on a regular basis. Its reliability and validity were found to be acceptable (Crocker et al., 1997;

Kowalski, Crocker, & Faulkner, 1997). Crocker et al. (1997) examined the reliability of PAQ-C for elementary school children. In the first study (N = 215), the item's scale correlations were all above 0.30, and the scale reliability was acceptable for both girls (α = 0.83) and boys (α = 0.80). In the second study (N = 84), test-retest reliability was good (*r* =.75) in a one-week interval for both boys and girls. The validity of PAQ-C was studied in Kowalski et al. (1997). In the first study (N = 89), its convergent validity was supported, given the relationship of PAQ-C to the activity rating (*r* = 0.63), the week summation of 24-hr moderate-to-vigorous activity recalls (*r* = 0.53), and because the teacher's rating of PA (*r* = 0.45) was moderate. In the second study (N = 97), the PAQ-C was further found to be related to Caltrac (*r* = 0.39) and the step test of fitness (*r* = 0.28). Construct validity of PAQ-C was also supported. PAQ-C was used as a measurement of children's PA in different, previous studies in Hong Kong (Chu, 2005; Lau, 2008; Pang & Ha, 2010; Yu, Chan, Cheng, Sung, & Hau, 2006). Thus, usage of PAQ-C has a longer history than CLASS in Hong Kong Chinese children. However, the reliability and validity of PAQ-C in children younger than 9 years old is yet to be determined.

After reviewing these measurements of children's PA, no single measure is perfect to encompass all situations, populations, and research questions. The selection of PA measurement in children thus depends upon the characteristics of respondents (e.g., age), availability of resources (e.g., manpower, administrative cost), assessment time duration, method/delivery style, types of information gathered (e.g., intensity, pattern, and time of PA, etc.), and size of sample (Dollman et al., 2009).

Upon review, a problem of physical inactivity in Hong Kong children has been identified. Among the many factors contributing to children's PA, parents' perceptions

on their children's PA is critical, especially in younger children. While reviewing the theoretical background of understanding parents' influence on children's PA, Eccles' Expectancy-Value Model provides a sound background for this topic of study. However, in Eccles' Expectancy-Value Model, the cost of PA requires more research attention, in addition to the four components of subjective task value. Other than Eccles' Model, the ecological model recommends studying people's connections with their PA, as well as their socio-cultural environments. In addition to parents' perceptions of children's PA, perceived neighborhood safety should be included to investigate how parents perceive their children's PA. Based on this review, Figure 3 presents the proposed theoretical framework studying parents' perceptions about their children's PA.

In order to measure children's PA, different measurements' strengths and limitations are discussed. Proxy reports on children's PA, using PAQ-C, is often preferable for measuring younger children's PA in Hong Kong because questionnaires are easier to administer in larger sample studies; they have also been used in Hong Kong for the past decade. Moreover, parent proxy reports on their children's PA may be an option to increase report accuracy. Proper examination of the validity and reliability of proxy reports on children's PA is required.

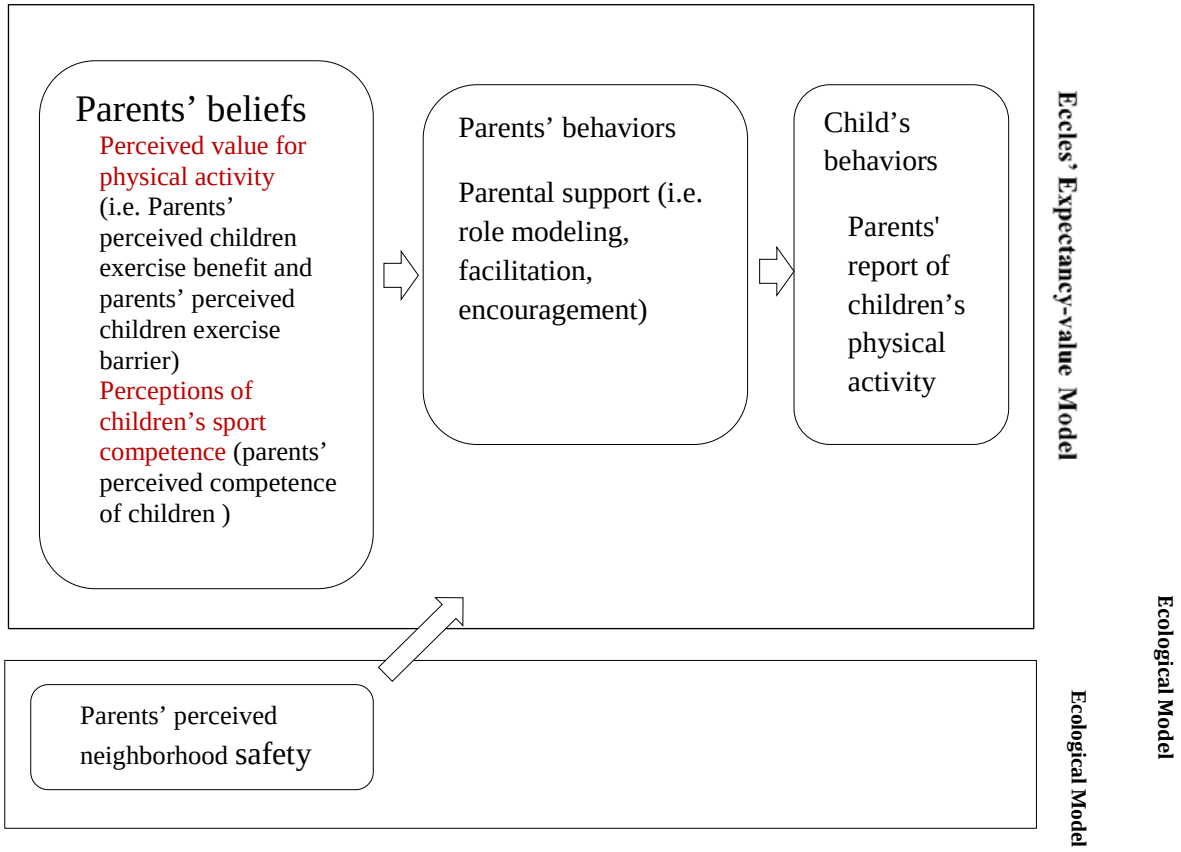


Figure 3. Proposed Theoretical Framework in this Study

CHAPTER 3

METHODS

This chapter aims at explaining the details of how the study would be conducted to explore the research questions stated in Chapter 1. Details of the chapter include: (1) Instruments, (2) Statistical analysis, (3) Sample, (4) Procedures.

Instruments

The instruments of the study are divided into three parts: (1) Parents' perceptions on children's PA; (2) Parents' report on children engaging in PA; and (3) Socio-demographic characteristics.

Parents' Perceptions on Children's PA

Parents' Perceived Competence of Children. Seven items of Harter's Perceived Competence Scale (1982) was used to assess parents' perception of children competence at physical domain. Dempsey, Kimiecik and Horn (1993) reported an alpha coefficient of .81 of this 7-item scale, which utilized Harter's structured alternative format designed to reduce the possibility of recording socially desirable answers. This scale has been used in Chinese children (Cheung, 2004) and in Ireland and Australia. An example of the items used in this scale was "Some kids are good at sports but some kids are not good at sports." The respondent was first asked to read the two halves of the question and decide whether he or she was more like the children described on the left or the one on the right.

After narrowing the choice in this way, the respondent decided whether the statement was "really true for my children" or only "sort of true for my children". On this scale, “1” reflected a low level of parents’ perceived competence of children and “4” reflected a high level of parents’ perceived competence of children, with “2” and “3” indicated intermediate levels of parents’ perceived competence of children (See Appendix A).

Parents’ Perceived Neighborhood safety. Parents’ perceived neighborhood safety was measured by using disorder dimension of the Neighborhood Environment for Children Rating Scales (Coulton, Korbin, & Su, 1996). This scale measures neighborhood environments using the perception of caregivers of young children sampled from high and low risk block groups. Reliability coefficients for individual level (Cronbach’s alpha = .96) and aggregate level (generalizability coefficient = .84) was acceptable. In the scale, dimension of “Disorder” taped perceptions of deleterious conditions in neighborhood such as loitering. There were totally 8 items asking parents how often they found some disorders in their surroundings such as gang activity and misbehaving groups of youths or adults. The respondent’s answers ranged from 1 = “never” (very safe) to 4 = “frequently” (not safe) (See Appendix A).

Parents’ Perceived Children Exercise Barriers and Parents’ Perceived Children Exercise Benefits. The parents’ perceived children exercise barriers and parents’ perceived children exercise benefits were assessed by the Exercise Benefits/Barriers Scale (Sechrist, Walker, & Pender, 1987) with 43 items in total. Items for the scale were obtained inductively from interviews (Sechrist et al., 1987) and from the literature. Among the 43 items, 29 items measured parents’ perceived children exercise benefits and 14 items measured parents’ perceived children exercise barriers. In

the 29-item Benefit Scale, there were 5 factors, named life enhancement (8 items), physical performance (8 Items), psychological outlook (6 items), social interaction (4 items), and preventive health (3 items). Example of benefit item was "Exercising makes my children feel relaxed". In the 14-item Barrier Scale, there were 4 subfactors, including exercise milieu (6 items), time expenditure (3 items), physical exertion (3 items), and family discouragement (2 items). Example of barrier item was "Exercise facilities do not have convenient schedules for my children." Test-retest reliability accomplished in the original study of Sechrist, Walker and Pender (1987) with a sample of 66 health adults at a two-week interval. Test-retest reliability was found to be .89 on the total instrument, .89 on the Benefits Scale and .77 of the Barriers Scale. Since parents' perceived children exercise benefits and barrier were asked, items were change from "Exercising takes too much of my time" to "Exercising takes too much of *my children's* time." The instrument had a four-response, forced-choice Likert format from 4 = "strongly agree" to 1 = "strongly disagree" (See Appendix A).

Parental Support. Parental support was measured using Parental Support Scale (Trost et al., 2003). The 5-item scale assessed parents' encouragement, parents' involvement and parents' facilitation. It was reported to have acceptable internal consistency (e.g., Cronbach alpha = .78) (Trost et al., 2003). Examples of item were "how often do you encourage your children to do PA" and "how often do you provided transportation so your children could go to a place where he or she can do PA or sport." A five-point Likert-type scale with a range from 1= "none" to 5 = "daily" was used to gauge responses (See Appendix A).

Parents' Report on Children Engaging in PA

Modified Physical Activity Questionnaires for Children (MPAQ-C) was used to assess parents' reported on children taking PA outside school time during the past seven days (Crocker, Bailey, Faulkner, Kowalski, & McGrath, 1997). This measurement of dependent variable, children's engagement in PA originally consisted of 9 items in total measuring the frequency children do PA in various situations and time (e.g., school, recess, after school, evening, evening, etc.). However, 3 items were removed in this study since parents could not observe children's PA in some circumstances. The removed items were "In the last 7 days, what did you do most of the time *at recess*?", " In the last 7 days, during your physical education (PE) classes, how often were you very active (playing hard, running, jumping, throwing)?" and "In the last 7 days, what did you normally do *at lunch* (besides eating lunch)?" Each item was scored on a five-point Likert-type scale ranging from 1 = "none" to 5 = "6 or 7 times last week". The original 9-item PAQ-C has been shown to have moderate to high test-retest reliability in children aged 9 to 14 years ($r = 0.75$ for males and $r = 0.82$ for females) (Crocker et al., 1997). The reliability and validity of the PAQ-C with children under the age of nine has not been established. However, it was suggested by Bates (2006) that parents or caregivers could act as proxies for their younger children in completing the questionnaire.

Since there might be intra-day and inter-day activity variability reported by parents, it was suggested that previous-day recalls might need to be performed on multiple occasions over a short period of time to capture habitual PA (Trost, Pate, Freedson, Sallis, & Taylor, 2000). Therefore, parents in the study were asked to complete the related question of the questionnaire everyday relating to their children's PA at the previous 7

days. Since the score of questionnaires did not provide information relating to the time and calories spent in the activity, the main purpose using this scale was to examine children's general level of PA (See Appendix A)..

Socio-demographic Characteristics

Parents' characteristics in the study included parents' age (i.e., below 20 years old, 21-30 years old, 31-40 years old, 41-50 years old, 51 years old or above), gender (i.e., father or mother), education level (i.e., no schooling and primary education, secondary school education, tertiary education or above), income (i.e., monthly income - HK$50000 or above, HK$30000- 49999, HK$10000- 29999, HK$5000- 9999, HK$4999 or below), work status (i.e., full time, part time/ temporary job, searching of job or retired, housewife), and parenting status (i.e., single parent or both parent), children's gender were asked as well (see Appendix A and B).

With referring to the guidelines suggested by Hambleton and Kanjee (1993, 1995), a translation procedure (i.e., forward translation and back translation) was followed for the developing the Chinese version of the instruments. In the forward translation, the original instruments were translated into Chinese by a staff of the Centre for Translation in Hong Kong Baptist University. The staff has received a Bachelor degree in Translation and engaged in public service, consultancy and collaborative work with the community in providing quality Chinese and English translation services for many years. When the Chinese translated version was completed, it was then discussed and modified by a panel that consisted of statistical experts, and parents of primary school students (See Appendix B). By comparing original instruments with Chinese translated instruments, ambiguous

items were spotted out and fined tune. In the back-translation, the Chinese translated instruments were translated back to English by another 2 translators who were not involved in the previous forward translation. These 2 translators were also from the Centre for translation in Hong Kong Baptist University. The translators in the back-translation procedures were blinded to the original instruments. The final Chinese version of the instruments was then established after the identified discrepancies of the instrument versions were resolved by consensus. In order to ensure that the questionnaires were valid and reliable, two pilot studies were condcuted and more details of the pilot study would be presented in subsequent section.

Statistical Analysis

This study examined parents' perceptions about children's competence of children, neighborhood safety, exercise benefits and exercise barriers and parental support to their children's PA, and the relationships among these constructs. Specifically, the hypotheses of the study are: "What would be the relationships among parents' perceptions about children's competence of children, neighborhood safety, exercise benefits and exercise barriers, parental support, and children's PA?" and "To what extent would the studied constructs of parents' perceptions about PA (i.e., Parents' Perceived Competence of Children, Parents' Perceived Neighborhood Safety, Parents' Perceived Children Exercise Benefits and Parents' Perceived Children Exercise Barriers, Parental Support and Children's PA) differ by the socio-demographic characteristics of parents' age, gender, education level, income, work status, parenting status and children's gender?" Both pilot studies and a main study were conducted.

Pilot Studies

In both pilot studies, data analyses were conducted using SPSS (Version 21.0) with *p* value set to .05. In pilot study I, the psychometric properties of parent proxy reported MPAQ-C was examined. To assess the individual-level validity of the MPAQ-C, relationships between the children's PA level reported by parents (i.e., MPAQ-C) and actual level of PA measuring by pedometer-recorded step count were examined by Pearson correlation. Correlation coefficients less than .45 are considered to be fair or little relationship, .5 to.75 as moderate to good relationship, and greater than .8 as excellent agreement (Field, 2009).

In pilot study II, the reliabilities of all measurements used for the main study were examined. Reliability refers to the consistency of scores obtained by the same persons and it is used to determine how well the answers to the same question on different occasions or with different sets of equivalent sets of items (Anastasi, 1988). Regarding test-retest method, intra-class correlation coefficient was used to assess the repeatability of answers across respondents twice in a 2-week interval.

Next, item reliability refers to the degree which indicators that represent the construct being associated (Nunnally & Bernstein, 1994) and it is usually measured by Cronbach's alpha. Generally, higher the Cronbach's alpha coefficient (i.e., closer to 1) indicated that the items in a scale measured the same construct. A widely-accepted cut-off value of .70 was suggested in the literature (Nunnally, 1978). Therefore, Cronbach's alpha in this study was used to measure the item-reliability of each measurement.

Main Study

In the main study, data analyses were performed using both maximum-likelihood estimation in using the LISREL 9.1 (Jöreskog & Sörbom, 1993) and SPSS (Version 21.0). In order to answer research question 1: "What would be the relationships among parents' perceived competence of children, parents' perceived neighborhood safety, parents' perceived children exercise benefits and parents' perceived children exercise barriers, parental support, and children's PA?", structural equation modeling (SEM) was used to assess the relationships among the dependent variable (i.e., children's PA) and associated constructs (i.e., parents' perceived children exercise benefit, parents' perceived children exercise barriers, parents' perceived neighborhood safety, and perceived children competence). SEM not only examined the hypothesized causation among a set of constructs (i.e., the structural model) but also evaluated factor loadings of items in a measurement on related latent construct (i.e., the measurement model). SEM was acquired in this study because it allowed analyzing the measurement errors of the observed variables as an integral part of the model. Also, it provided a special analysis that simultaneously assessed the quality of measurement models and examined the predictive relationships among studied constructs. It even helped examining the meditational relationship among constructs (Jöreskog and Sörbom, 1989).

Model specification. The two-step procedure suggested by Anderson and Gerbing (1988) was used to test the theoretically based relationships among the latent variables shown in Figure 1. The first step involved using confirmatory factor analysis (CFA) to test each individual measurement model as well as an overall measurement model. The second step was structured model testing the proposed relationships among

the studied constructs (i.e., parents' perceived competence of children, parents' perceived neighborhood safety, parents' perceived children exercise benefits and parents' perceived children exercise barriers, parental support and children's PA).

Measurement Model

A measurement model is the pattern of relationship between each measured variables (i.e., items) and its latent variables that it is theoretically reflected, measurement errors and the relationship among the latent factors. To establish a good-fitting measurement models to use for test the structural model in the main study, a series of confirmatory factor analysis in LISREL 9.1 were conducted. In the other word, confirmatory factor analysis in this study was to examine the psychometric evaluation of each individual used measurement in the main study. Before conducting confirmatory factor analysis, a commom factor analysis with varimax rotation was conducted to confirm the factor structure of the underlying construct (i.e., measurements).

Model fit. In general, chi-square statistic tests the absolute fit of the model to the data in confirmatory factor analysis. However, since chi-square may vary according to sample size. Such chi-square variations may induce Type 1 error for the detection of small and potentially meaningless differences in nested models (Jöreskog, 1993; Jöreskog & Sörbom, 1996). One way to minimize the effect of sample size, relative chi-square (chi square /df) was recommended. Value of this ratio which ranges from 2.0 to 5.0 are sometimes considered desirable (Wheaton, Muthen, Alwin, & Summers, 1977; Tabachnick & Fidell, 1989).

In line with the recommendations of Kline (1998), multiple fit indices were used to assess the model fit. The root-mean-square error of approximation (RMSEA) was related to the residual of the model, and Hu and Bentler (1999) suggested that values below 0.06 a very good fit to the date. Values in the range of .08 and .10 indicated mediocre fit. Similar to RMSEA, standardized root mean residual (SRMR) is the standardized difference between the observed correlation and the predicted correlation. It is then the mean of the (squared) standardized residual. A well fit fitting model obtains a SRMS value less than .50 (Bryne, 1998) while a value of SRMS which is less than .80 is generally regarded as an acceptable fit (Hu & Bentler, 1999).

Relative fit indices were used. Non-normed fit index (NNFI) and comparative fit index (CFI) indicated the percentage improvement in fit over the baseline independence model. Both of them ranged between 0 to 1, with value above 0.90 indicating a good fit to the data. Also, standardized factor loadings (SFL), standardized error, squared multiple Correlation (R^2), and *t* values were inspected (Bollen, 1989; Jöreskog, 1993) . Squared multiple correlation is a value representing the amount of variance explained by the model, including the exogenous (i.e., independent) and endogenous (i.e., dependent) variables.

Measurement invariance evaluation (i.e., Factorial invariance evaluation). After examining factor structure of the measurement model using confirmatory factor analysis, its factorial invariance was to be addressed next. Factorial invariance means the invariance of a factor model among different population. It examined the assumption that the latent structure of the measurements shall be valid for making inferences among

different population in a sample. Forward approach of factorial invariance (i.e., sequential constraint imposition) was used in this study.

For factorial invariance analysis in this study, a baseline model of each measurement (i.e., configural invariance) was established for fathers and mothers at the beginning. If these baseline models for fathers and mothers were not the same, no further factorial invariance analysis was needed. On the contrary, if these models were the same, restrictive constraints would be imposed to the model. Firstly, factor loadings were constrained to be equal among fathers and mothers to ensure equivalent relationship between a latent factor and its indicators in the confirmatory factor analysis model (weak measurement invariance). Secondly, if the factor loadings constrained model was accepted, factor loadings and error variances and covariance were constrained to be equal among groups (strict measurement invariance). Thirdly, factor variances and covariance was constrained to be equal among fathers and mothers (structural invariance).

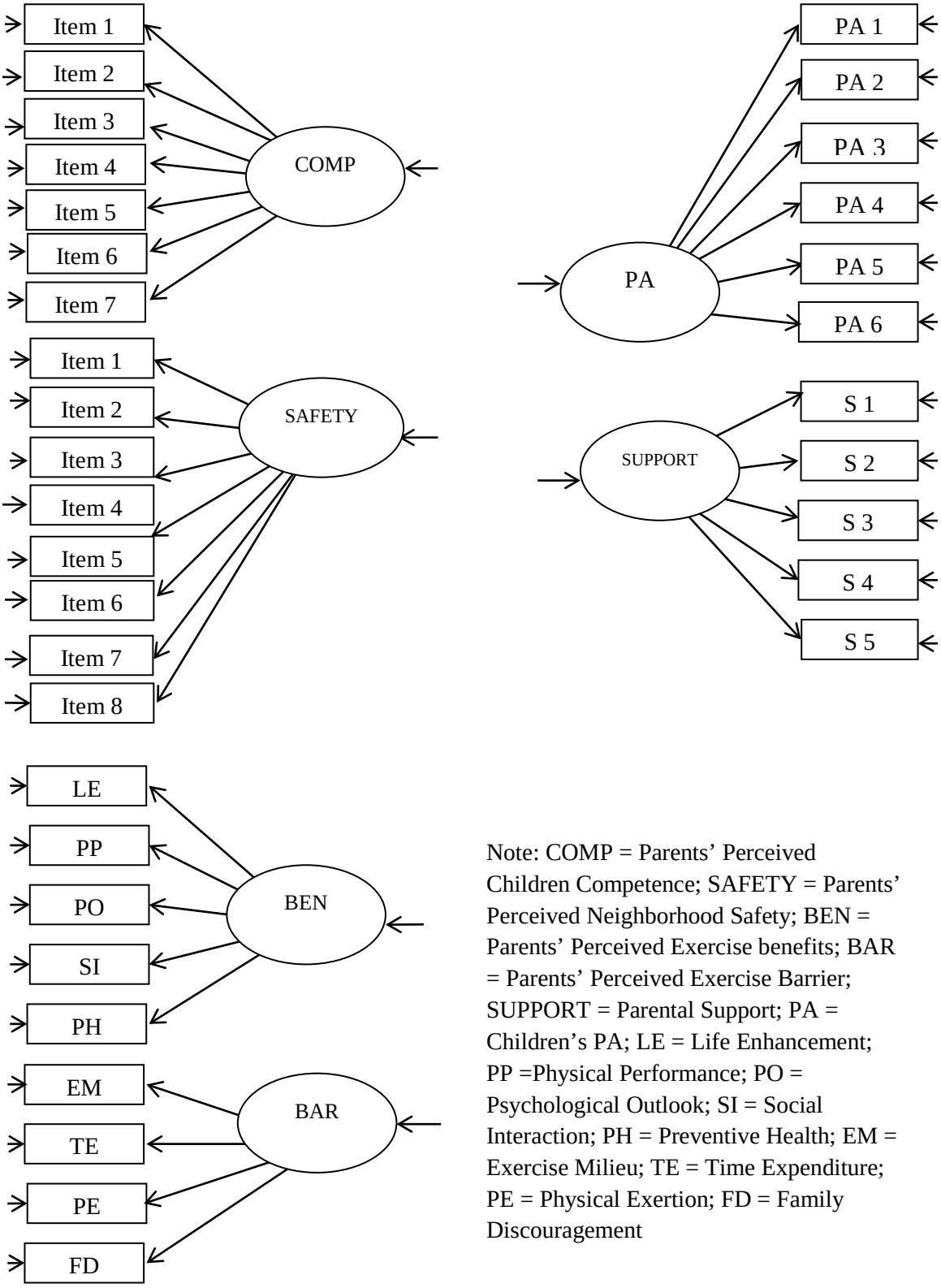
Similar to the goodness-of-fit statistics in confirmatory factor analysis, chi-square was sensitive to sample size and so other fit indices were used to compare the models with different constraints such as RMSEA, NNFI, and CFI. Next, chi-square difference test for nested models was used. If a non-significant chi-square difference test was resulted, it indicated invariance of two nested models. Also, CFI difference was suggested to be reported for factorial invariance (Cheung & Rensvold, 2002). A difference of less than .01 in the CFI would indicate that invariance should not be rejected. In fact, chi square difference test was found to be sensitive to the sample size, therefore, Cheung & Rensvold (2002) suggested examining another fit indices accompanying with chi square difference test.

Equally important, reliability that refers the precision or consistency large of measurement was examined by standardized factor loadings (SFL) and composite reliability. In structural equation modeling, reliability of an indicator is the variance in that indicator that is not accounted for by measurement error. Squared multiple correlation in fact shows the proportion of variance that is explained by the observed variable. An item is considered to be reliable if its squared multiple correlation equals to .50 or above (Chin & Todd, 1995). Composite reliability examines the extent to which items in the construct relates to the studied construct. In general, a scale is considered to be reliable if composite reliability is 0.7 or (Hair, Anderson, Tatham, & Black, 1998).

Overall Measurement Model

Before analyzing the structural model, an overall measurement model displayed in Figure 4, consisted of all constructs (i.e., parents' perceived competence of children, parents' perceived neighborhood safety, parents' perceived children exercise benefits and parents' perceived children exercise barriers, parental support and children's PA), were examined. Circles represented latent variables and rectangles represented measure variables. In parents' perceived children exercise benefit and parents' perceived children exercise barrier, rectangles were the composite score of items in each subfactor of construct. More details would be given in the Results session. This overall measurement model ensured that all significant results in the forecoming structural equation modeling were not caused by the result of inadequate measures (Anderson & Gerbing, 1988; Hayduk & Glaser, 2000). In other words, it served as a baseline model for the structural model.

Figure 4. Overall Measurement Model



Note: COMP = Parents' Perceived Children Competence; SAFETY = Parents' Perceived Neighborhood Safety; BEN = Parents' Perceived Exercise benefits; BAR = Parents' Perceived Exercise Barrier; SUPPORT = Parental Support; PA = Children's PA; LE = Life Enhancement; PP =Physical Performance; PO = Psychological Outlook; SI = Social Interaction; PH = Preventive Health; EM = Exercise Milieu; TE = Time Expenditure; PE = Physical Exertion; FD = Family Discouragement

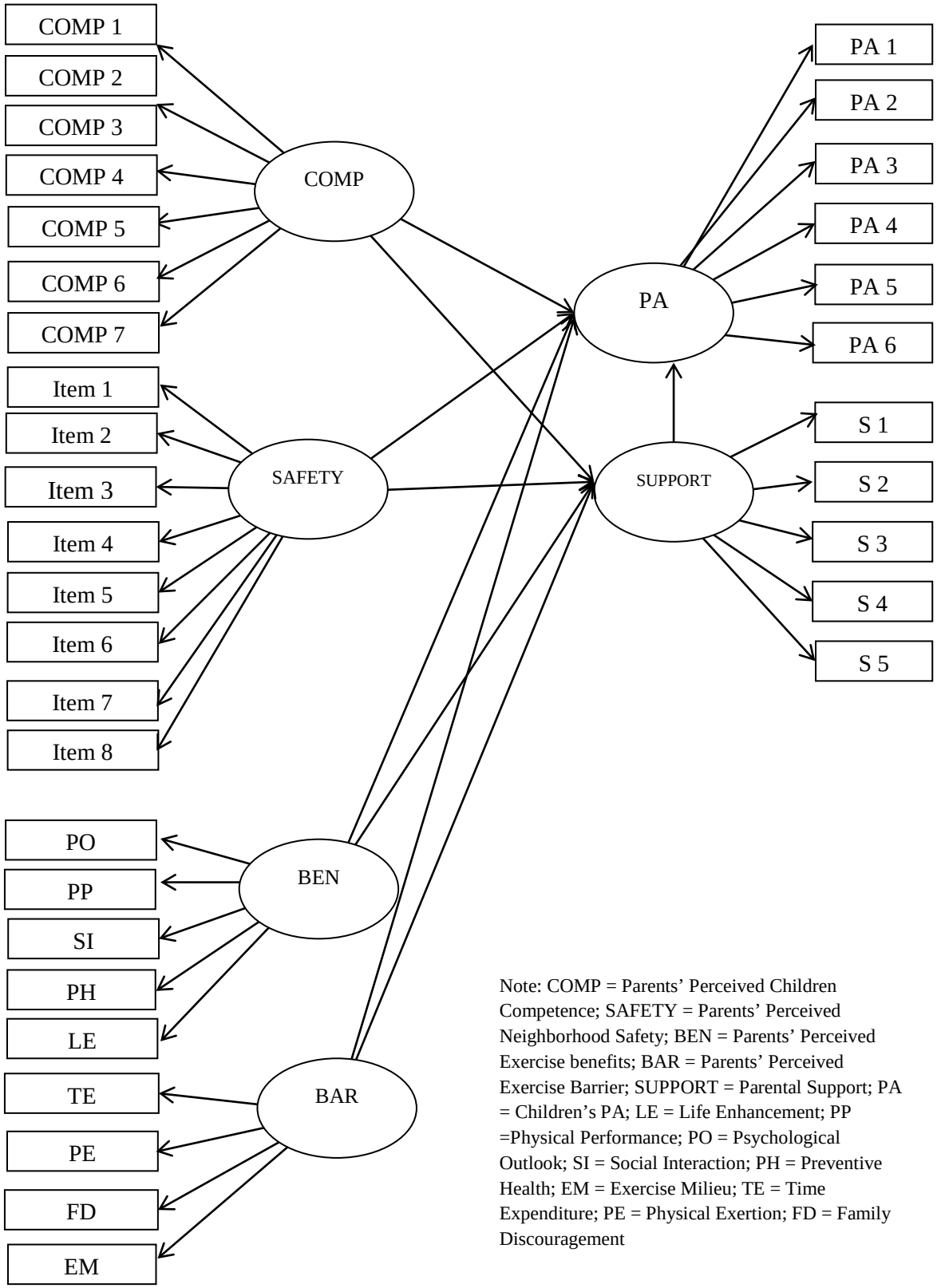
Structural Model

With this model, it aimed at testing the theory-driven hypothesized structural model. The structural model proposed the relationships of parents' perceptions (i.e., parents' perceived competence of children, parents' perceived neighborhood safety, parents' perceived children exercise benefits and parents' perceived children exercise barriers, parental support) and parents' report on children's PA. Specifically, the hypothesized model was depicted in Figure 5. In fact, it was the same as Figure 1. However, it was drawn in details with both measurement model and structural model as a whole. The usage of goodness-to-fit statistics was similar to confirmatory factor analysis. If the data was found not fit the hypothesized structural model, a model modification would be employed within a theoretical articulation and guidance from the modification indices, standardized residuals, standardized loading, etc. Significant and non-significant coefficients were identified. Direct and indirect efforts of the constructs were also examined. Putting together, all measurement models, overall measurement model, and structural model were conducted to answer the research question #1 "What would be the relationships among parents' perceptions about children's competence of children, neighborhood safety, exercise benefits and exercise barriers, parental support, and children's PA?"

For research question #2, "To what extent would the studied constructs of parents' perceptions about PA (i.e., Parents' Perceived Competence of Children, Parents' Perceived Neighborhood Safety, Parents' Perceived Children Exercise Benefits and Parents' Perceived Children Exercise Barriers, Parental Support and Children's PA) differ by the socio-demographic characteristics of parents' age, gender, education level,

income, work status, parenting status and children's gender", multiple ANOVAs were performed by using SPSS program (version 21.0) in order to compare the differences of parents' perceived children exercise barriers and parents' perceived children exercise benefits, parents' perceived neighborhood safety, parents' perceived competence of children, parental support and children's PA among different socio-demographic variables. Those socio-demographic variables included parents' current work status (i.e., full time, part time/ temporary job, searching of job or retired, housewife), parents' income (HK$50000 or above, HK$30000- 49999, HK$10000- 29999, HK$5000- 9999, HK$4999 or below), parents' education level (no schooling and primary education, secondary school education, tertiary education or above), parents' gender (i.e., father or mother), parenting status (i.e., single parent or both parent), and parents' age (i.e., below 20years old, 21-30 years old, 31-40 years old, 41-50 years old, 51 years old or above), children's gender (i.e., boy and girl). Finally, to examine the socio-demographic variables and describe the sample, descriptive statistics such as frequency, mean, and standard deviation were provided.

Figure 5. Proposed Structural Model



Note: COMP = Parents' Perceived Children Competence; SAFETY = Parents' Perceived Neighborhood Safety; BEN = Parents' Perceived Exercise benefits; BAR = Parents' Perceived Exercise Barrier; SUPPORT = Parental Support; PA = Children's PA; LE = Life Enhancement; PP =Physical Performance; PO = Psychological Outlook; SI = Social Interaction; PH = Preventive Health; EM = Exercise Milieu; TE = Time Expenditure; PE = Physical Exertion; FD = Family Discouragement

Sample

The target population of the study was the parents with primary school children aged from 6 to 9 years old. The expected sample size was 500 so as to maintain an adequate sample–size–to-parameter ratio for LISREL and sampling size to item ratios for factor analysis (Costello, & Osborne, 2005). Researchers have suggested that the ratio of sample size to estimated parameters of at least 10:1 is appropriate for LISREL (Bentler & Chou, 1987).

As it was impossible to assess all primary students in Hong Kong, schools were chosen based on the school banding and locations to ensure a representative sample of parents from different socio-demographic backgrounds.

Procedures

Pilot study I

Before distributing questionnaires to participants in the main study, two pilot studies were conducted. In pilot study I, its purpose was to examine the psychometric properties of parent proxy reported Modified Physical Activity Questionnaires for Children (MPAQ-C) by comparing the data from pedometer and proxy reported MPAQ-C. A pilot study using convenience samples of 40 students and one of their parents from a primary school in Hong Kong was conducted in March 2010. A cover letter was given to school principals and asked their agreement to participate in that pilot study. Upon his or her agreement, site visits were arranged to conduct the pilot study. Date of site visits was avoided before and during examination period and school or public holidays. On the date of site visits, a pack of study material was given to students. The content of the study

pack included cover letter of study, consent form, pedometer and step record sheet. Meanwhile, procedure of study was introduced and the usages of pedometer were taught. A total 50 students were invited to participate in the pilot study and 40 students and one of their parents agreed to take part in the study by returning the signed consent forms.

Students were instructed to clip the pedometer to a waist band or belt at the waist above their knee and placed it parallel to the ground. Students were required to put the pedometer on the waist during the whole day, except bathing, swimming and sleeping, from Monday to Sunday consecutively for a week. Before the pilot study, students were given one day practice about the usage of pedometer. Pedometers with detected and reported errors were replaced by another pedometer in good condition.

On the following seven days, students measured their walking steps by wearing pedometers. Parents then assisted in recording their children's the step count on step record sheet at the end of every day for these seven days. On the seventh day, parents were asked to complete the MPAQ-C. This questionnaire took approximately 5 minutes to complete.

Pilot study II

Pilot study II aimed to evaluate the reliability of all measurements used in the later main study. These measurements were Perceived Competence Scale (Harter, 1982), disorder dimension of the Neighborhood Environment for Children Rating Scales (Coulton et al., 1996), Exercise Benefits/Barriers Scale (Sechrist, Walker, & Pender, 1987), Parental Support Scale (Trost et al., 2003) and the MPAQ-C (Crocker et al., 1997).

The procedure of pilot study II was very similar to that of pilot study I, except that students were not required to put the pedometer on during the study period. Again, a cover letter stating the purpose of study was sent to the school's principals. Once he or she agreed to take part in the study, a site visit was arranged in September 2010. Instruction of the study was given in classes during site visit and questionnaires were distributed to students in a class. Afterschool on the same day, students brought the questionnaire to one of their parents and asked them to complete it twice in 2-week interval. Of 40 students in class, 32 students returned the completed questionnaires twice in that 2-week interval in order to check the repeatability of the questionnaires. On average, parents finished the entire questionnaires by 15 minutes.

Main study

In the main study, questionnaires were administrated during site visits at the primary schools. First, principals from primary schools were given a letter of invitation and consent form. With the principal's approval, details of the school visits were confirmed with the schools. Schools were asked to suggest data collection dates so as to ensure children will not be out of school due to some extra-curricular activities or school holidays.

During the school visits, students aged from 6 to 9 years old were asked to participant in the study. Afterwards, their parents were given a letter describing nature of study and asking their willingness participating in the study.

Subsequently, children were given questionnaires for their parents to complete and were asked to return them to their class teacher. Since respondents were not able to return

the questionnaires immediately during the school visit, phone calls were needed to arrange the details of collecting completed questionnaires with the help of class teachers. In the study, a small gift such as pencil, eraser or bookmark was given to students so as to appreciate their contribution in the study.

CHAPTER 4

RESULTS

This chapter presented the results of the statistical analyses so as to accomplish the purposes of this study. This chapter included (a) Results of pilot study I, (b) Results of pilot study II, (c) Results of the main study (including measurement model, overall measurement model and structural model), and (d) Summary of results in regarding to each research hypothesis.

Again, the research questions of this study were:

1. What would be the relationships among parents' perceptions about children's competence of children, neighborhood safety, exercise benefits and exercise barriers, parental support, and children's PA?
2. To what extent would the studied constructs of parents' perceptions about PA (i.e., Parents' Perceived Competence of Children, Parents' Perceived Neighborhood Safety, Parents' Perceived Children Exercise Benefits and Parents' Perceived Children Exercise Barriers, Parental Support and Children' s PA) differ by the socio-demographic characteristics of parents' age, gender, education level, income, work status, parenting status and children's gender?

Results of Pilot Study I

Psychometric Evaluation of Parent Proxy Reported MPAQ-C

The purpose of the pilot study I was to examine the psychometric properties of parent proxy reported Modified Physical Activity Questionnaires for Children (MPAQ-C) by comparing the data from pedometer and proxy reported MPAQ-C.

Participants

Participants were 40 students from a primary school and one of their parents in Hong Kong. Students were studying primary school one, two or three in Hong Kong. The mean BMI of these 40 students was 16.56 (± 3.00). They were averagely 132.42 cm tall (± 5.46 cm) and 29.03kg heavy (± 6.42 kg). The mean age of these students was 6.75 years while most of their parents were in the age category of "31- 40 years old". Eighty percent of proxy reports of MPAQ-C were completed by mothers. Only 22.6% of parents had attained tertiary education level or above.

Measure

Modified Physical Activity Questionnaires for Children (MPAQ-C). It was used to assess parents' reported on children participating in PA outside school time during the past seven days (Crocker et al., 1997). The parent proxy reported MPAQ-C would be calculated in terms of total mean scores of the six items. A score of 1 indicates low PA, whereas a score of 5 indicates high PA (See Appendix A and B).

Pedometer. Children's PA was measured by pedometer (Yamax Digiwalker SW-200). Students measured their walking steps by wearing pedometers every day in the

seven days. Parents then assisted at recording their children's step count on step record sheet at the end of these seven days. The average step count per day was calculated by adding the step count in seven days and dividing by seven days.

Date Management

Regarding data screening, score of the MPAQ-C and total step count were converted into standard scores. Four outliers with a standard score ±2.5 or beyond were detected and they were then deleted. Then, 36 students and their parent were available for further statistical analysis. The managed data set was normally distributed with reasonable skewness (.20 to 1.17) and kurtosis (-.27 to 1.05).

Results

Table 1 presented the correlations between parent proxy report of children's PA (i.e., MPAQ-C) and the step data from the pedometers. Overall, the children's daily step count was 6223.78 (± 3324.33) while mean PAQ-C was 2.14 (±.61). Mean score of MPAQ-C was positively correlated to total step count in a week (r = .63, p = .01), total step count in weekdays (r = .59, p = .006), and total step count in weekend (r = .57, p = .06). However, mean score of the MPAQ-C was not significantly associated to students' BMI (r = -.27, p = .42). The validity of MPAQ-C was about acceptable and this modified PA measure was acquired in the main study later.

Table 1. Descriptive Statistics and Pearson Correlations Between Parent Proxy Report of PA and Step Count from Pedometers

Measures	Mean (±SD)	Mean of MPAQ-C	Total step count in 7 days	Total step count in weekdays	Total step count in weekend
Mean of MPAQ-C	2.14 (±.61)				
Total step count in 7 days	43566.51 (±23270.03)	.63**			
Total step count in weekdays	26347.59 (±14249.34)	.59**	.89**		
Total step count in weekend	17218.94 (±12516.26)	.57**	.85**	.51**	
BMI	16.56 (±3.00)	-.27	-.05	-.09	.02

Note. Standard deviations are in the parentheses

**$p < .01$.

Results of Pilot Study II

Pilot study II aimed to evaluate the reliability of all measurements used in the later main study. These measurements were Perceived Competence Scale (Harter, 1982), disorder dimension of the Neighborhood Environment for Children Rating Scales (Coulton et al., 1996), Exercise Benefits/Barriers Scale (Sechrist, Walker, & Pender, 1987), Parental Support Scale (Trost et al., 2003) and the MPAQ-C (Crocker et al., 1997).

Participants

A total of 32 parents of primary school students from a primary school completed the entire questionnaires twice in 2 weeks. Most of them were 31 to 50 years old (93.3%) and the majority of them were mother (70%). Most of the parents (73.3%) attained at

least secondary or primary school education. About 30% of them were housewife or retired.

Results

Table 2 summarized the test-retest reliability and Cronbach's alpha coefficient of this study. Intra-class correlation coefficients for Perceived Competence Scale (Harter, 1982), Disorder dimension of the Neighborhood Environment for Children Rating Scales (Coulton et al., 1996), Exercise Benefits/Barriers Scale (Sechrist et al., 1987), Parental Support Scale (Trost et al., 2003), and MPAQ-C(Crocker et al., 1997) were .81 (p = .0005), .73 (p = .0005), .85 (p = .0005), .89 (p = .0005), and .94 (p = .0005), respectively. The pretest and posttest of all used measurements were moderately to strongly correlated. These findings provided support for the test-retest stability of the used measurements for the main study.

The Cronbach's alphas were also presented in the Table 2. For Perceived Competence Scale, Cronbach's alpha ranged from .919 to .941 in pretest and posttest. Cronbach's alphas of perceived Neighborhood Safety were .878 and .870 while those of Exercise Benefits/Barriers Scale ere .844 and .878 in pretest and posttest. For Parental Support Scale, Cronbach's alphas for pretest and posttest were .891 and .811, respectively. At last, Cronbach's alpha of MPAQ-C for pretest and posttest were were .785 and .792, respectively. All the above Cronbach's alphas showed that the internal consistency of all used measurements were good.

Table 2. Descriptive Data and test-Retest Reliability of Measurements in the study

Measures	Pretest Mean (±SD)	Protest Mean (±SD)	Test-retest reliability (ICC)	Cronbach's alpha Pretest(Posttest)
Perceived Competence Scale	3.00 (±.90)	2.83 (±.87)	.81**	.92 (.94)
Perceived Neighborhood Safety	1.91 (±.58)	1.77 (±.89)	.73**	.88 (.87)
Exercise Benefits/ Barrier Scale	114.42 (±8.59)	113.00 (±10.41)	.85**	.84 (.88)
Parental Support Scale	2.44 (±.92)	2.46 (±.81)	.89**	.89 (.81)
MPAQ-C	1.95 (±.64)	2.08 (±.68)	.94**	.79 (.79)

Note. ICC = Intra-class correlation coefficients; Standard deviations are the parentheses.

**$p < .01$.

The results of pilot study I and II, good test-retest reliability and internal consistency of all measurements, and acceptable concurrent validity of parent proxy reported MPAQ-C were obtained. All these measurements demonstrated solid psychometric properties and showed promise as a measurement for later main study as well as future related study in Hong Kong context.

Main study: Measurement Models

The main study was mainly divided into two parts: the measurement model and the structural model. The measurement model is used to examine the relationship between the indicators and the measured latent variables (constructs) while the structural model examines the specified relationships among the studied constructs. Prior to analyzing the structural model, the measurement model was first examined to determine its validity by a confirmatory factor analysis.

Participants

A total of 625 parents of students aged 6-9 year old in primary schools were invited to take part in the main study. This sample size marginally met the requirement of sample size suggested by Bentler and Chou (1987) that a ratio of sample size to estimated parameters of at least 10:1 is appropriate for LISREL. The sampling primary schools were the 8 primary Schools located at Kowloon, Hong Kong Island, and the New Territories in Hong Kong. They were from different education bandings and regions in Hong Kong. This main study was conducted between March and April of 2011.

After conducting data management (its details can be found in the next page) of the 595 parents, it was found that most of them were mothers (75.4%) and from both-parent family (93.9%). About 30% of parents had attained tertiary level or even postgraduate education. More than half of them were full time workers (52.3%) while 37.8% of them were housewives or being retired. About 35% (34.7%) of parents reported that their monthly income was HK$ 30000 or above and most of them (46.8%) had monthly parents' income "HK$ 10000- $29999" (See Table 3).

Table 3. Sociodemographic Characteristics of the Parents (N = 595)

	N	*%*
Parents' occupation		
Full time	306	52.3
Part time/ temporary job	49	8.4
Searching for job /retired	17	2.9
Housewife	213	36.4
Parents' age		
Below 20 years old	20	3.4
21- 30 years old	25	4.3
31- 40 years old	296	50.5
41- 50 years old	223	38.1
51 years old or older	22	3.8
Parents' income level		
HK$50000 or above	68	11.9
HK$30000-$49999	130	22.8
HK$10000-$29999	267	46.8
HK$5000-$9999	68	11.9
HK$4999 or below	35	6.7
Gender		
Father	134	24.6
Mother	411	75.4
Level of education		
No schooling and primary school	67	11.5
Secondary school	335	57.4
Tertiary education or above	182	31.2
Parenting status		
Single parent	33	6.1
Both parents	507	93.9
Children's gender		
Boy	344	57.8
Girl	251	42.2

Data Management and Analysis

Data management was done using both SPSS (version 21) and PRELIS in LISREL (version 9.1). Listwise case deletion was acquired because the proportion of missing values in the study was all less than 5%. As suggested by Cohen and Cohen (1983), variables with less than 10% missing data might adopt a listwise case deletion

method. In fact, listwise case deletion was not preferable if the missing values were not Missing Completely at Random (MCAR). Such practice might increase the unbiased estimates and reduce the statistical power in small sample size. However, since the sample size of this study (N = 595) was sufficient and the amount of missing data was low, with around 0.2%- 3.2% of cases containing missing data, listwise case deletion was considered to be appropriate handling missing data.

Univariate outliers were identified 1) visually by histogram with normality curve and box-and-whisker plot and 2) statistically by standard scores. Few outliers were identified with standard score ± 4.0 and they were handled by winsorizing (Bollinger & Chandra, 2005). At the end, all variables' standard score ranged from -3.98 to 3.84.

Multivariate outliers were detected by Malalanobis D^2. Two cases were identified as multivariate outliers and were dropped because their probability associated with Malalanobis D^2 was .0004 and .0006, which were far less than .001 (Tabchnick & Fidell, 1989).

Univariate normality was assessed by histogram with normality curve visually, and skewness and kurtosis. Assessments showed that all variables' skewness and kurtosis were less than 2 and 3, respectively. Accordingly to Byrne (1998), the data distribution was univariate normal. Multivariate normality was assessed by Mardia's statistics. The multivariate normality was assumed to meet if the Mardia's measure of multivariate kurtosis was less than 3.0 (Hutcheson & Sofroniou, 1999). In this data set, Mardia's measure of multivariate kurtosis was 1.134, which was considered to have multivariate normality.

Multivariate collinearity would be a problem if one or more of the independent variables were highly correlated. Therefore, variance inflations factors (VIF) for all items were generated by running multiple linear regressions in SPSS in order to assess the multivariate collinearity. A value of VIF of more than 10 for any variables was indicated as having problem of multivariate collinearity (Kline, 2005). In this study, all the independent variables' VIF were less than 10, ranging from 1.071 to 3.417, indicating that no multicollinearity were found among the variables.

At last, homoscedasticity, which assumed variability of dependent variables should remain the same at all values of independent variables, was checked by residual analysis. Standardized scatterplot of the standardized predicted dependent variables against standardized residuals showed a random pattern and this indicated the homoscedasticity assumption was met. After managing the data, 595 cases were entered into further data analysis. Before conducting confirmatory factor analysis, a common factor analysis with a Varimax (Orthogonal rotation) was conducted to identify the underlying structure of each measurement.

Children's physical activity

Result of exploratory factor analysis confirmed one component factor structure of the parent proxy of MPAQ-C, explaining 49.21% of variance. All items' factor loadings ranged from .62 to .76, which were over .40 as suggested by Costello and Osborne (2005).

Confirmatory factor analysis. Confirmatory factor analysis was used to establish the validity of a single factor model of MPAQ-C as well as assess how well the data fit this measurement model. Figure 6 showed the measurement model of MPAQ-C

while Table 4 showed the result of the confirmatory factor analysis. The model fit the data well (χ^2 (9) = 42.78, $p < .001$; χ^2 /df = 4.753; CFI = .977; NNFI = .962; SRMR = .036; RMSEA= .079 [90% CI = .057 to .104]).

Reliability. Table 5 presented the standardized parameter estimates, squared multiple correlation and composited reliability for the measurement model of MPAQ-C. Using the composite reliability suggested by Fornell and Larcker (1981), composite reliability of the MPAQ-C was .80. In general, an item is considered to be reliable if composite reliability is 0.7 or (Hair et al, 1998). Therefore, it showed that the MPAQ-C had satisfactory construct reliability, which these 6 items in MPAQ-C shared in their measurement of a construct, children's PA. Besides, indicated by the individual item's squared multiple correlation, most of individual items of the MPAQ-C denoted acceptable reliability for the indicator concerned. In this study, items' squared multiple correlation ranged .28-.48. Despite the low squared multiple correlations for some items (e.g., item 3), inclusion of these items did not negatively affect the overall model fit and so it was retained in the model. In sum, six-item MPAQ-C provided reliable measure of parent proxy reported PA.

Figure 6. Measurement Model for the Modified PA Questionnaires for children (MPAQ-C)

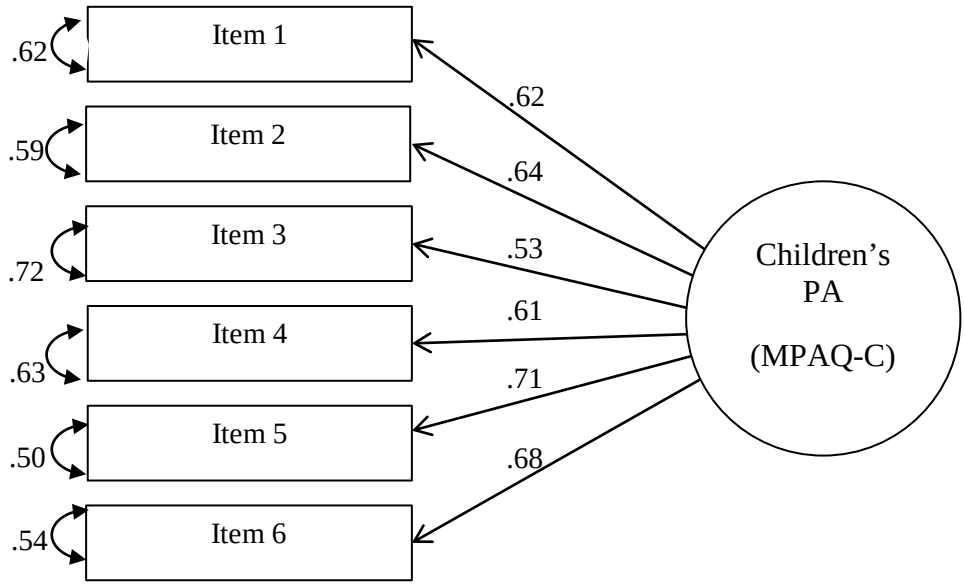


Table 4. Fit Indices for the Models (MPAQ-C)

Model	χ^2	*df*	P	χ^2/df	RMSEA (90%CI)	CFI	NNFI	SRMR
Model 1	42.78	9	.001	4.753	.079 (.057-.104)	.977	.962	.036

Note: RMSEA = Root Mean Square Error of Approximation; CI = Confidence Interval; CFI = Comparative Fit Index; NNFI = Non-Normed Fit Index; SRMR =Standardized Root Mean Residual

Table 5. Completely Standardized factor loadings (SFL), Standardized Error, Squared Multiple Correlation (R2) and Composite Reliability (CR) - MPAQ-C

Items	SFL	Theta	R^2	CR
				.80
Item 1	.62	.62	.38	
Item 2	.64	.59	.41	
Item 3	.53	.72	.28	
Item 4	.61	.62	.38	
Item 5	.71	.50	.50	
Item 6	.68	.54	.46	

Measurement invariance. Table 6 contained the fit indices for each step of the invariance analysis for MPAQ-C. Referring to the results of measurement invariance, the hypothesized measurement model of the MPAQ-C showed good model fit to the data in both fathers and mothers. Multiple group analysis with the unconstrained model showed an acceptable baseline model for both genders (χ^2 (18) = 54.280, $p < .001$; CFI = 1.000). Then, factor loadings were constrained to be equal across genders in order to test the invariance of the factor loadings across fathers and mothers. The result revealed that the change in CFI was less than .01 from the unconstrained model (i.e., Model 1) to constrained model (i.e., Model 2). Also, the chi-square difference test between these two models was not significant (χ^2 (5) = 1.34, $p > .05$), suggesting that the factor loadings of model in both fathers and mothers were invariant. In addition to constraining factor loadings, constraints were put in the model to examine if the groups' item error variances and if the groups' factor variances and covariances were equal across fathers and mothers. Again, combing no change in CFI (i.e., less than .01) with insignificant chi-square change

among models (i.e., models 2, 3 and 4), suggested that other than factor loadings, error variance of each item as well as factor variances and covariances were invariant across fathers and mothers. There was satisfactory level of factorial invariance for the CFA model of the MPAQ-C across fathers and mothers.

Table 6. Testing MPAQ-C for Factorial Invariance Across Father and Mother

Model	χ^2	*df*	*p*	Model comparison	$\Delta\chi^2$	Δdf	CFI	ΔCFI	NNFI
Father	8.54	9	.4806				1.00		1.00
Mother	45.81	9	.0005				.98		.97
1.	54.28	18	.0005				1.00		1.00
2.	55.62	23	.0005	Model 1 – Model 2	1.34	5	1.00	0	1.00
3.	58.27	24	.0001	Model 2 – Model 3	2.65	1	1.00	0	1.00
4.	58.33	25	.0002	Model 3 – Model 4	.06	1	1.00	0	1.00

Note: χ^2 = Maximum Likelihood Ratio Chi-Square; CFI = Comparative Fit Index. Model 1: Configural Invariance (unconstraint); Model 2: Constrained factor loadings; Model 3: Constrainted factor loadings and errors variance; Model 4: Constrained factor loadings, error variance and covariances, and factor variances and covariances

Parents' perceived competence of children

Before conducting confirmatory factor analysis, result of exploratory factor analysis confirmed one component factor structure of parents' perceived competence of children, explaining 49.72% of variance. All items' factor loadings ranged from .64 to .82.

Confirmatory factor analysis. Figure 7 presented the measurement model of parents' perceived competence of children. As shown in Table 7, measurement model fit to the test sample was in fact corresponding to the result of common factor analysis that

single latent factor construct (i.e., parents' perceived competence of children) was posted to fully account for the variation among items. This model provided good fit to the data (χ^2 (14) = 53.068, $p < .05$; χ^2 /df = 3.790; CFI = .989; NNFI = .984; SRMR = .026; RMSEA= .068 [90% CI = .050 to .089]).

Figure 7. Measurement Model of Parents' perceived competence of children

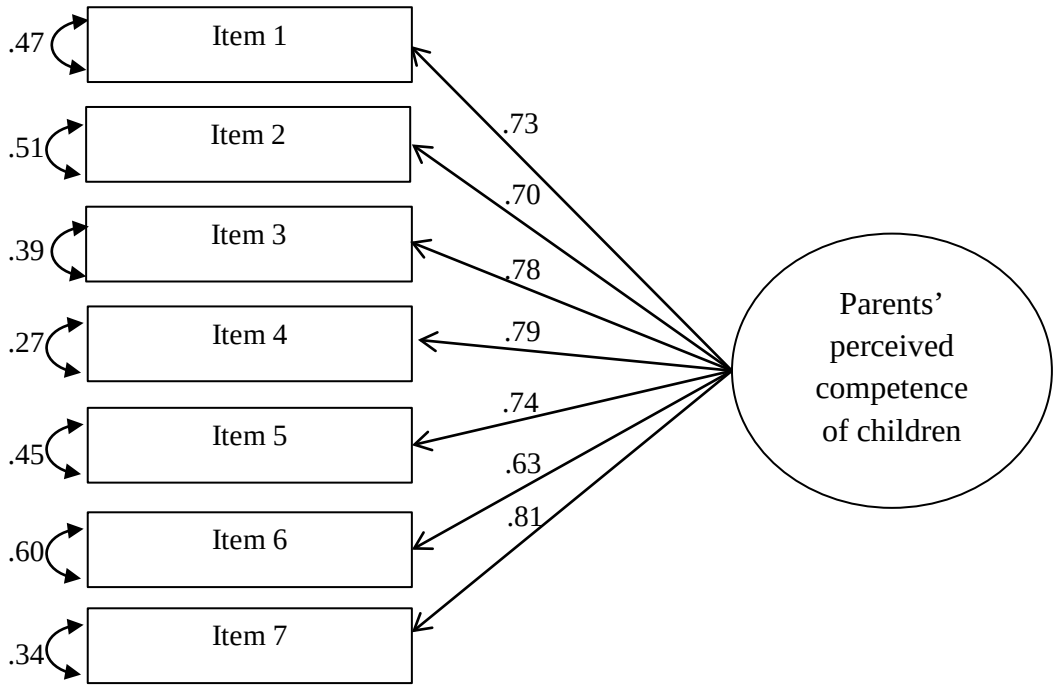


Table 7. Fit Indices for the Model (Parents' perceived competence of children)

Model	χ^2	*df*	*p*	χ^2/df	RMSEA (90%CI)	CFI	NNFI	SRMR
Model 1	53.07	14	.001	3.790	.068 (.050-.089)	.989	.984	.026

Note: RMSEA = Root Mean Square Error of Approximation; CI = Confidence Interval; CFI = Comparative Fit Index; NNFI = Non-Normed Fit Index; SRMR =Standardized Root Mean Residual

Reliability. Table 8 showed the composite reliability of the construct and squared multiple correlation of each item in parents' perceived competence of children. Results indicated that the model of parents' perceived competence of children very well with composite reliability valued .922. Also, all standardized factor loadings were all very high (i.e., above 0.50; ranging from .63 to.81), considering as an indicator of reliable item measuring parents' perceived competence of children.

Table 8. Standardized factor loadings (SFL), Standardized Error, Squared Multiple Correlation (R2) and Composite Reliability (CR) - Parents' perceived competence of children

Items	SFL	Theta	R^2	CR
				.922
Item 1	.73	.47	.53	
Item 2	.70	.51	.49	
Item 3	.78	.39	.61	
Item 4	.79	.27	.63	
Item 5	.74	.45	.56	
Item 6	.63	.60	.40	
Item 7	.81	.34	.66	

Measurement invariance. Table 9 depicted the fit indices for each step of the factorial invariance analysis. Prior to invariance analysis, a one-factor model was acceptable in both fathers (χ^2 (14) = 39.93, p < .001; CFI = .957) and mothers (χ^2 (14) = 17.49, p > .05; CFI = .996). Also, the mutli-group analysis in the unconstrained model (i.e., Model 1) showed an acceptable baseline model for fathers and mothers (χ^2 (28) = 93.313, p < .05; CFI = 1.000). Next, in Model 2, all factor loadings were constrained to be equal among fathers and mothers (χ^2 (34) = 96.765, p < .05; CFI = 1.000). As this level of invariance was nested within Model 1, a chi-square difference test was conducted to compare which model fits the data better (χ^2 difference = .3.44, df = 6). The result was not significant. Also, there was no change to the CFA between Models 1 and 2, it

supported the factor loadings were invariant across fathers and mothers. In Model 3, constraints were put in the model to examine if all factor loadings and the groups' item error variances were equal across fathers and mothers. Again, combing no change in CFI (i.e., less than .01) with insignificant chi-square change between models (i.e., models 2 and 3), suggested that both factor loadings and error variance of each item were invariant across fathers and mothers in Model 3 (χ^2 (41) = 116.221, $p < .05$; CFI = 1.000). Subsequently, Model 4 were found to have a good fit data after adding constraints of factor variances and covariance (χ^2 (42) = 119.303, $p < .05$; CFI = 1.000). Factor variances and covariance invariance was supported by the insignificant chi-square difference and unchanged CFI between Models 3 and 4. Hence, there was satisfactory level of factorial invariance for the CFA model of parents' perceived competence of children across fathers and mothers.

Table 9. Testing for Factorial Invariance Across Father and Mother - Parents' perceived competence of children

Model	χ^2	*df*	P	Model comparison	$\Delta\chi^2$	Δdf	CFI	ΔCFI	NNFI
Father	39.93	14	.001				.957		.936
Mother	17.49	14	.023				.996		.994
1.	93.313	28	.001				1.000		1.000
2.	96.765	34	.001	Model 1 – Model 2	3.44	6	1.000	0	1.000
3.	116.221	41	.001	Model 2 – Model 3	19.46	7	1.000	0	1.000
4.	119.303	42	.001	Model 3 – Model 4	3.08	1	1.000	0	1.000

Note: χ^2 = Maximum Likelihood Ratio Chi-Square; CFI = Comparative Fit Index. Model 1: Configural Invariance (unconstraint); Model 2: Constrained factor loadings; Model 3: Constrainted factor loadings and errors variance; Model 4: Constrained factor loadings, error variance and covariances, and factor variances and covariances

Parental support

Confirmatory factor analysis. Table 10 showed the result of confirmatory factor analysis, initial model was poorly fit to the data (χ^2 (5) = 44.25, $p < .05$; χ^2/df = 8.850; CFI = .974; NNFI = .948; SRMR = .037; RMSEA= .115 [90% CI = .085 to .147]). The CFI and NNFI were about .9 and provided some support to the initial model. However, the RMSEA values exceed .10 which meant a poor model fit. To identify the model misfit, standardized residual might help. Standardized residual is the fitted residual divided by the estimated standard error reflects the difference between the observed sample value and model-implied estimate for each indicator variance and covariance.

Large standardized residuals exceed the value of 2.58 (Jöreskog & Sörbom, 1989) was considered to be large and it indicted that a pair of items were over or under estimated by the model. In parental support, the standardized residual of a pair of items (i.e., Item 1 and item 5) was over 5 and due to their content redundancy, item 5 was removed. Another reason of removing item 5 was its low square multiple correlation (i.e., 42). After this model modification, CFA was rerun. The modified model (i.e., Model 2) resulted in a substantial improvement in model fit, (χ^2 (2) = 10.21, $p < .05$; $\chi^2/df = 5.105$; CFI = .991; NNFI = .973; SRMR = .022; RMSEA= .083 [90% CI = .038 to .137]). The graphic presentation of measurement model was showed in Figure 8. It therefore revealed the hypothesized one-factor model of parental support fitted the data in the study.

Reliability. Table 11 showed the composite reliability of the construct and squared multiple correlation of each item. Results indicated that all standardized factor loadings were all very high (i.e., above 0.50; ranging from .64 to .77). Composite reliability of the construct was .806 which further provided evidence of adequate reliability of this measurement model.

Measurement invariance. Factorial invariance of parental support was further assessed and its result was found in table 12. Firstly, results provided a good model-data fit in fathers (χ^2 (2) = .31, p > .05; CFI = 1.000), mothers (χ^2 (2) = 10.95, $p < .05$; CFI = .986) and in the unconstrained model (i.e., baseline model, Model 1) (χ^2 (4) = 10.89, $p < .05$; CFI = 1.000). Then, factor loading was constrained to be equal among fathers and mothers in Model 2. As it was nested within Model 1, factor loadings of Model 2 were found to be invariant among fathers and mothers, given there was no CFI value changes and insignificant chi-square difference test (χ^2 (7) = 12.24, $p > .05$; CFI = 1.000). The

next model tested whether both factor loadings and error invariances could be constrained to be equal among fathers and mothers, and this was also acceptable (χ^2 (11) = 22.06, p <.05; CFI = 1.000). Even the chi square difference test was significant (χ^2 difference = 9.82, df = 4, p < .05), there was no appreciable difference in fathers and mothers in both factor loadings and error invariances of parental support. The further analysis then put additional constraint and examine if factor loadings, error variances and factor variances and covariance were equal among fathers and mothers. The result was still tenable (χ^2 (12) = 25.89, p <.05; CFI = 1.000). Overall, parental support gained evidence for equivalence in factorial invariance across fathers and mothers.

Figure 8. Measurement Model of Parental support

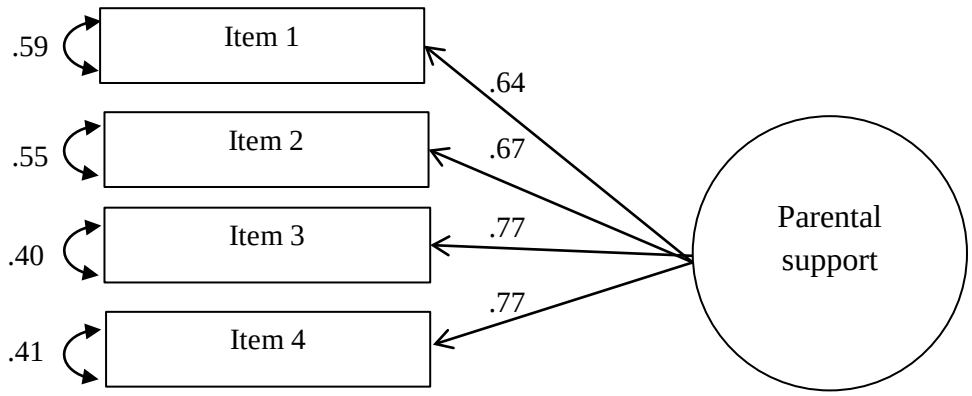


Table 10. Fit Indices for the Models (Parental support)

Model	χ^2	*df*	*p*	χ^2/df	RMSEA (90%CI)	CFI	NNFI	SRMR
Model 1	44.25	5	.001	8.850	.115 (.085-.147)	.974	.948	.037
Model 2 Item 5 was removed	10.21	2	.006	5.105	.083 (.038-.137)	.991	.973	.022

Note: RMSEA = Root Mean Square Error of Approximation; CI = Confidence Interval; CFI = Comparative Fit Index; NNFI = Non-Normed Fit Index; SRMR =Standardized Root Mean Residual

Table 11. Standardized factor loadings (SFL), Standardized Error, Squared Multiple Correlation (R^2) and Composite Reliability (CR) - Parental support

Items	SFL	Theta	R^2	CR
				.806
Item 1	.64	.59	.41	
Item 2	.67	.55	.45	
Item 3	.77	.40	.600	
Item 4	.77	.41	.59	

Table 12. Testing for Factorial Invariance Across Father and Mother - Parental support

Model	χ^2	*df*	*p*	Model comparison	$\Delta\chi^2$	Δdf	CFI	ΔCFI	NNFI
Father	.31	2	.857				1.000		1.000
Mother	10.95	2	.005				.986		.958
1.	10.89	4	.028				1.000		1.000
2.	12.24	7	.093	Model 1 – Model 2	1.35	3	1.000	0	1.000
3.	22.06	11	.024	Model 2 – Model 3	9.82*	4	1.000	0	1.000
4.	25.89	12	.011	Model 3 – Model 4	3.83	1	1.000	0	1.000

*$p < .05$.

Note: χ^2 = Maximum Likelihood Ratio Chi-Square; CFI = Comparative Fit Index. Model 1: Configural Invariance (unconstraint); Model 2: Constrained factor loadings; Model 3: Constrainted factor loadings and errors variance; Model 4: Constrained factor loadings, error variance and covariances, and factor variances and covariances

Parents' Perceived Neighborhood Safety

Confirmatory factor analyses. The results of exploratory and confirmatory factor analysis were agreeable to the one-factor structure of perceived neighborhood safety. The 8 items of perceived neighborhood safety totally explained 59.62% of variance and all factor loadings were ranged from .615 to .870.

Figure 9 presented the measurement model of parents' perceived neighborhood safety. Table 13 showed its fit indices of confirmatory factor analysis, respectively. The initial model showed the room to modify (χ^2 (20) = 382.66, $p < .001$; χ^2/df = 19.133; CFI = .933; NNFI = .930; SRMR = .068; RMSEA= .175 [90% CI = .160 to .190]). Similar

to parental support, the RMSEA values exceed .10 which meant a poor model fit. Due to the large standardized residuals (i.e., -5.76 to 11.12), items 2, 3 and 7 were removed. The modified model (i.e., Model 2) then showed a better model fit, (χ^2 (5) = 18.85, $p < .05$; $\chi^2/df = 3.770$; CFI = .993; NNFI = .986; SRMR = .021; RMSEA= .068 [90% CI = .037 to .102]). It therefore revealed the hypothesized one-factor model of parental support fitted the data in the study.

Reliability. Table 14 showed the composite reliability of the construct and squared multiple correlation of each item in perceived neighborhood safety. Results indicated that the model of perceived neighborhood safety very well with composite reliability valued .846. Also, all standardized factor loadings were all very high (i.e., above 0.50; ranging from .53 to .88). Therefore, the measure of perceived neighborhood safety demonstrated a very good reliability in the study.

Measurement invariance. Results of factorial invariance of perceived neighborhood safety were shown in Table 15. Firstly, a good model-data fit was resulted in fathers (χ^2 (5) = 23.11, $p < .05$; CFI = .964) and in mothers (χ^2 (5) = 1.87, $p > .05$; CFI = 1.000). Also, the model fit was good when conducting simultaneous test of equal form (i.e., unconstrained model; baseline model, Model 1) (χ^2 (10) = 28.70, $p < .05$; CFI = 1.000). Then, factor loading was constrained to be equal among fathers and mothers in Model 2. As it was nested within Model 1, factor loadings of Model 2 were found to be invariant among fathers and mothers, given there was no CFI value changed and insignificant chi-square difference test (χ^2 (14) = 30.60, $p < .05$; CFI = 1.000). Next, model was tested whether both factor loadings and error invariances could be constrained to be equal among fathers and mothers, and this was also acceptable (χ^2 (19) = 45.55, *p*

<.05; CFI = 1.000). The final step of factorial invariance was to examine if factor loadings, error variances and factor variances and covariance were equal among fathers and mothers. The result was again tenable (χ^2 (20) = 49.40, p < .05; CFI = 1.000). Factor loadings, error variances and factor variances and covariance were thus invariant among fathers and mothers in this study. Again, even the chi square difference tests of model comparisons (i.e., Model 2 vs Model 3; Model 3 vs Model 4) were significant, their change in CFI were less than .01 and so factor loadings, error variances and factor variances and covariance were supported to be equal among fathers and mothers. Overall, parents' perceived neighborhood safety gained evidence for equivalence in factorial invariance across fathers and mothers.

Figure 9. Measurement Model of Parents' Perceived Neighborhood Safety

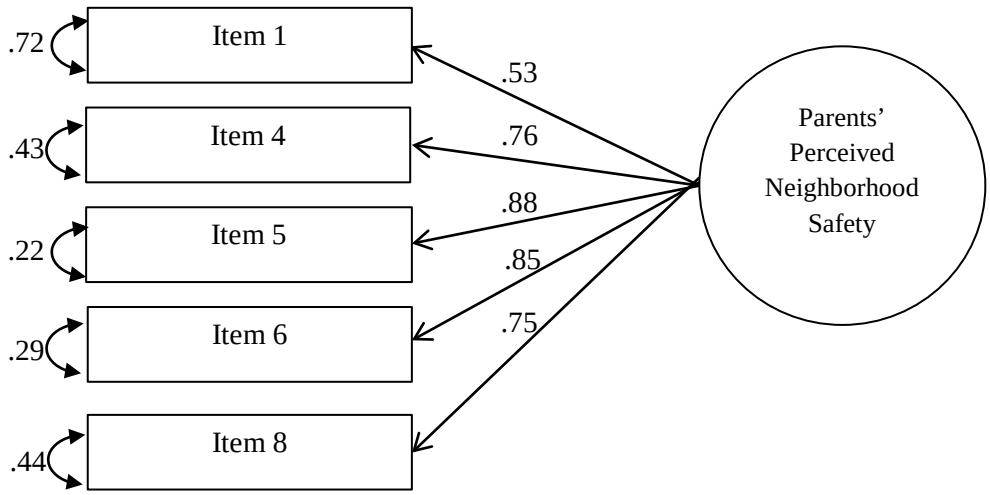


Table 13. Fit Indices for the Models (Parents' Perceived Neighborhood Safety)

Model	χ^2	*df*	*p*	χ^2/df	RMSEA (90%CI)	CFI	NNFI	SRMR
Model 1	382.66	20	.001	19.133	.175 (.160-.190)	.933	.906	.068
Model 2	18.85	5	.002	3.770	.68 (.037-.102)	.993	.986	.021

Note: RMSEA = Root Mean Square Error of Approximation; CI = Confidence Interval; CFI = Comparative Fit Index; NNFI = Non-Normed Fit Index; SRMR =Standardized Root Mean Residual

Table 14. Standardized factor loadings (SFL), Standardized Error, Squared Multiple Correlation (R2) and Composite Reliability (CR) - Parents' Perceived Neighborhood Safety

Items	SFL	Theta	R^2	CR
				.846
Item 1	.53	.72	.28	
Item 4	.76	.43	.58	
Item 5	.88	.22	.78	
Item 6	.85	.29	.72	
Item 6	.75	.44	.56	

Table 15. Testing for Factorial Invariance Across Father and Mother - Parents' Perceived Neighborhood Safety

Model	χ^2	*df*	*p*	Model comparison	$\Delta\chi^2$	Δdf	CFI	ΔCFI	NNFI
Father	23.11	5	.005				.964		.928
Mother	1.87	5	.867				1.000		1.000
1	28.70	10	.001				1.000		1.000
2.	30.60	14	.006	Model 1 – Model 2	1.90	4	1.000	0	1.000
3.	45.55	19	.005	Model 2 – Model 3	14.95*	5	1.000	0	1.000
4	49.40	20	.005	Model 3 – Model 4	3.85*	1	1.000	0	1.000

*$p < .05$.

Note: χ^2 = Maximum Likelihood Ratio Chi-Square; CFI = comparative fit index. Model 1: Configural Invariance (unconstraint); Model 2: Constrained factor loadings; Model 3: Constrained factor loadings and errors variance; Model 4: Constrained factor loadings, error variances and covariances, and factor variances and covariances

Parents' Perceived Exercise Benefits

Confirmatory factor analysis. Based on the factor structure suggested by Sechrist et al. (1987), the measurement model provided reasonable fit and a reasonable representation of the sample (χ^2 (367) = 1510.21, $p < .05$; $\chi^2/df = 4.115$; CFI = .940; NNFI = .934; SRMR = .069; RMSEA= .072 [90% CI = .069 to .076]). Table 16 and 17 showed the items in subfactor of parents' perceived exercise benefits and its model fit indices. Even the RMSEA was over .60, the value of .72 was at the range of mediocre fit. The model of exercise benefits was showed in Figure 10. Exercise benefits consisted of five factors, including Life Enhancement, Physical Performance, Psychological Outlook,

Social Interaction and Preventive health. Therefore, the model provided acceptable model fit indices and this model would be used in the coming structural model.

Reliability. Regarding reliability, the model of parents' perceived exercise benefits was acceptable with composite reliability valued .61 to .75 in all factors. Table 18 showed the composite reliability of the construct and squared multiple correlation of each parcel or items in parents' perceived exercise benefit. All standardized factor loadings were moderate to high, ranging from .40 to .74. Therefore, the measure of parents' perceived exercise benefit demonstrated to have good reliability in the study.

Measurement Invariance. Regarding factorial invariance, results of the series of nested models were shown in Table 19. Firstly, both fathers (χ^2 (367) = 769.14, $p < .05$; CFI = .919) and mothers (χ^2 (367) = 1188.36, $p < .05$; CFI = .945) showed good fit to the data. When conducting simultaneous test of unconstrained model for fathers and mothers (i.e.,; baseline model, Model 1), model fitted data as well (χ^2 (734) = 1952.45, $p < .05$; CFI = 1.000). When comparing the model 2 which factor loading was constrained to be equal among fathers and mothers, change of CFI was less than .01. As it was nested within Model 1, factor loadings of Model 2 were found to be invariant among fathers and mothers (χ^2 (758) = 1988.69, $p < .05$; CFI = 1.000). The next model constrained both factor loadings and error invariances to be equal among fathers and mothers, and this was also acceptable (χ^2 (787) = 2048.12, $p < .05$; CFI = 1.000) with no change in CFI between Model 2 and Model 3. Then, the factorial invariance was to further examine if all factor loadings, error variances and factor variances and covariance were equal among fathers and mothers. The result was again tenable (χ^2 (802) = 2064.94, $p < .05$; CFI = 1.000). Overall, there were no CFI changes between Model 2 vs Model 3and Model 3 vs Model 4,

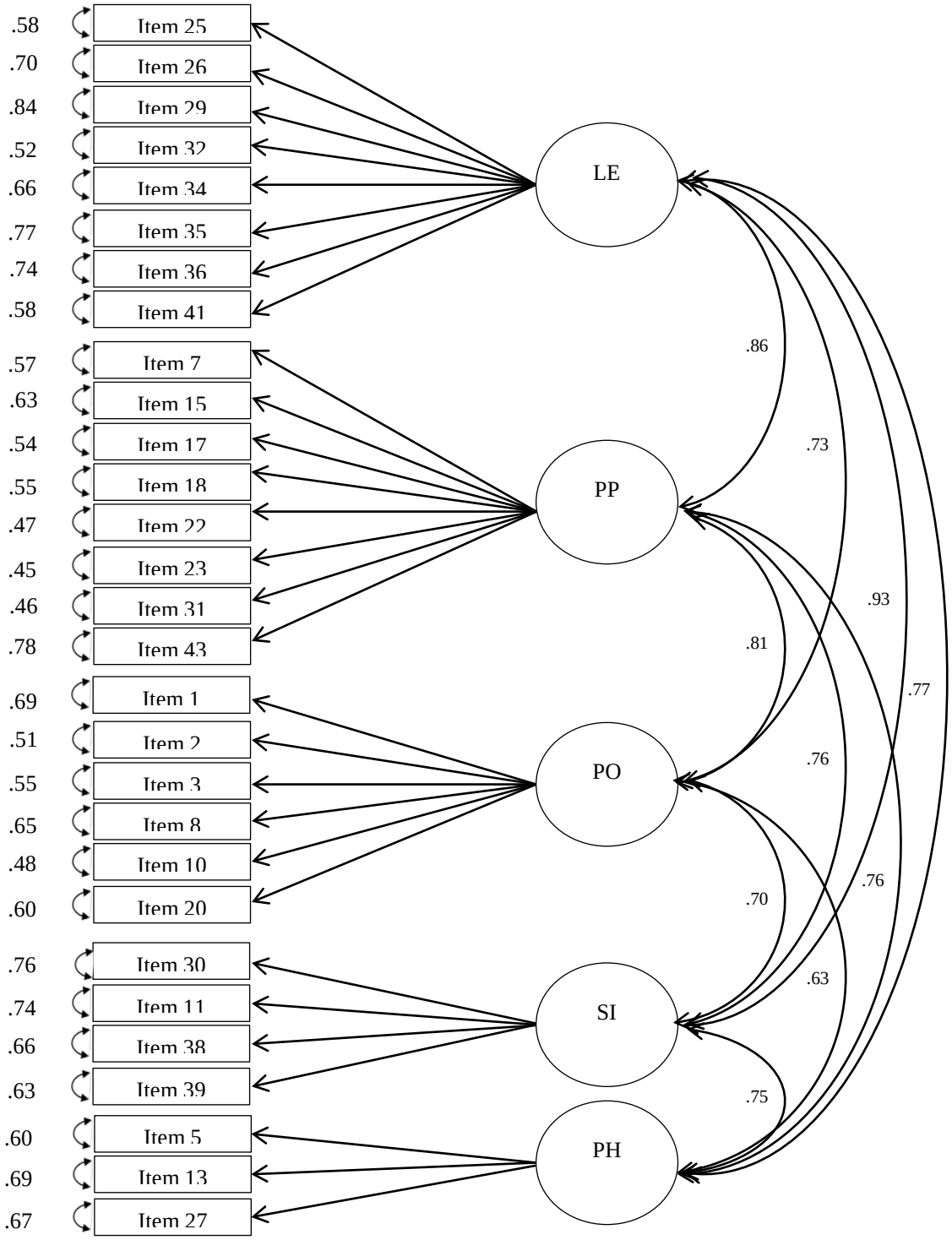
factorial invariance was supported in parents' perceived exercise benefits across fathers and mothers in the study even the chi square difference tests were significant between Model 2 vs Model 3and Model 3 vs Model 4.

Table 16. Items in subfactor - Parents' Perceived Exercise Benefits

Subfactor	Item no.	Item
LE	25	My children's disposition is improved by exercise.
	26	Exercising helps my children sleep better at night.
	29	Exercise helps my children decrease fatigue.
	32	Exercising improves my children's self-concept.
	34	Exercising increases my children's mental alertness.
	35	Exercise allows my children to carry out normal activities without becoming tired.
	36	Exercise improves the quality of my children's work.
	41	Exercise improves overall body functioning for my children.
PP	7	Exercise increases my children's muscle strength.
	15	Exercising increases my children's level of physical fitness.
	17	My muscle tone is improved with exercise.
	18	Exercising improves functioning of my children's cardiovascular system.
	22	Exercise increases my children's stamina.
	23	Exercise improves my children's flexibility.
	31	My children's physical endurance is improved by exercising.
	43	Exercise improves the way my children's body looks.
PO	1	My children enjoys exercise.
	2	Exercise decreases feelings of stress and tension for my children.
	3	Exercise improves my children's mental health.
	8	Exercise gives my children a sense of personal accomplishment.
	10	Exercising makes my children feel relaxes.
	20	My children has improved feelings of well being from exercise.
SI	30	Exercising is a good way for my children to meet new people.
	11	Exercising lets my children have contact with friends and persons I enjoy.
	38	Exercise is good entertainment for my children.
	39	Exercising increases my children's acceptance by others.
PH	5	My children will prevent heart attacks by exercising.
	13	Exercising will keep my children from having high blood pressure.
	27	My children will live longer if I exercise.

Note: LE = Life Enhancement; PP = Physical Performance; PO = psychological Outlook;

SI = Social Interaction; PH = Preventive Health



Note: LE = Life Enhancement; PP = Physical Performance; PO = psychological Outlook; SI = Social Interaction; PH = Preventive Health

Figure 10. Measurement Model of Parents' Perceived Exercise Benefits

Table 17. Fit Indices for the Models (Parents' Perceived Exercise Benefits)

Model	χ^2	*df*	*p*	χ^2/df	RMSEA (90%CI)	CFI	NNFI	SRMR
Model	1510.21	367	.001	4.115	.072 (.069-.076)	.940	.934	.069

Note: RMSEA = Root Mean Square Error of Approximation; CI = Confidence Interval; CFI = Comparative Fit Index; NNFI = Non-Normed Fit Index; SRMR =Standardized Root Mean Residual

Table 18. Standardized factor loadings (SFL), Standardized Error, Squared Multiple Correlation (R2) and Composite Reliability (CR) - Parents' Perceived Exercise Benefits

Items	SFL	Theta	R^2	CR
Life Enhancement				.67
25	.65	.58	.42	
26	.55	.70	.30	
29	.40	.84	.16	
32	.69	.52	.48	
34	.58	.66	.34	
35	.48	.77	.23	
36	.51	.74	.26	
41	.64	.58	.42	
Physical Performance				.75
7	.66	.57	.43	
15	.61	.63	.37	
17	.68	.54	.46	
18	.67	.55	.45	
22	.73	.47	.53	
23	.74	.45	.55	
31	.73	.46	.54	
43	.47	.78	.22	
Psychological Outlook				.72
1	.55	.69	.31	

2	.70	.51	.49	
3	.67	.55	.45	
8	.59	.65	.35	
10	.72	.48	.52	
20	.63	.60	.40	
Social Interaction				.63
30	.49	.76	.24	
11	.51	.74	.26	
38	.58	.66	.34	
39	.61	.63	.37	
PH				
Psychological Outlook				.61
5	.63	.60	.40	
13	.56	.69	.31	
27	.57	.67	.33	

Table 19. Testing for Factorial Invariance Across Father and Mother - Parents' Perceived Exercise Benefits

Model	χ^2	*df*	*p*	Model comparison	$\Delta \chi^2$	Δdf	CFI	ΔCFI	NNFI
Father	769.14	367	.0005				.919		.910
Mother	1188.36	367	.0005				.945		.939
1.	1952.45	734	.0005				1.000		1.000
2.	1988.69	758	.0005	Model 1 – Model 2	37.24*	24	1.000	0	1.000
3.	2048.12	787	.0005	Model 2 – Model 3	59.43*	29	1.000	0	1.000
4.	2064.94	802	.0005	Model 3 – Model 4	16.82	15	1.000	0	1.000

*$p < .05$.

Note: χ^2 = Maximum Likelihood Ratio Chi-Square; CFI = Comparative Fit Index. Model 1: Configural Invariance (unconstraint); Model 2: Constrained factor loadings; Model 3: Constrainted factor loadings and errors variance; Model 4: Constrained factor loadings, error variance and covariances, and factor variances and covariances

Parents' Perceived Exercise Barriers

Confirmatory factor analysis. Based on the factor structure suggested by Sechrist et al. (1987), the measurement model demonstrated an acceptable model fit (χ^2 (71) = 322.96, $p < .05$; χ^2/df = 4.549; CFI = .90; NNFI = .88; SRMR = .067; RMSEA= .077[90% CI = .069 to .086]). Even NNFI was slightly lower than .90; however, the other goodness-of-fit indices indicated that the model represented an

acceptable model for explaining the exercise barriers. The measurement model of parents' perceived exercise barriers was showed in Figure 11. Its item in subfactor was showed in table 20 and the fit indices were presented in Table 21.

Reliability. The reliability of parents' perceived exercise barrier was acceptable, indicating by the moderate composite reliability ranging from .48-.71. Table 22 showed the composite reliability of the construct and squared multiple correlations of each parcel or items in parents' perceived exercise barriers. All standardized factor loadings ranged from .29 to .77. Even some standardized factor loadings (e.g., item 42 and item 4) were about .3, they were remained in the model in the study because they did not negatively affect the model fit and. Therefore, the measure of parents' perceived exercise barriers demonstrated to have acceptable reliability in the study.

Measurement invariance. Results of factorial invariance were shown in table 23. Initially, both fathers (χ^2 (71) = 159.79, $p < .05$; CFI = .89) and mothers (χ^2 (71) = 85.93, $p > .05$; CFI = .96) showed very good fit to the data. In Model 1 (i.e., baseline model), simultaneous test of unconstrained model for fathers and mothers was conducted and it fitted data as well (χ^2 (142) = 419.30, $p < .05$; CFI = 1.000). Next, in Model 2, factor loadings were constrained to be equal among fathers and mothers, change of CFI was less than .01. As it was nested within Model 1, factor loadings of Model 2 were found to be invariant among fathers and mothers (χ^2 (152) = 446.66, $p < .05$; CFI = 1.000). Both factor loadings and error invariances were then constrained to be equal among fathers and mothers, and this model (i.e., Model 3) was also invariant among fathers and mothers (χ^2 (166) = 471.00, $p < .05$; CFI = 1.000). The factorial invariance was to further examine if all factor loadings, error variances and factor variances and covariance were equal among

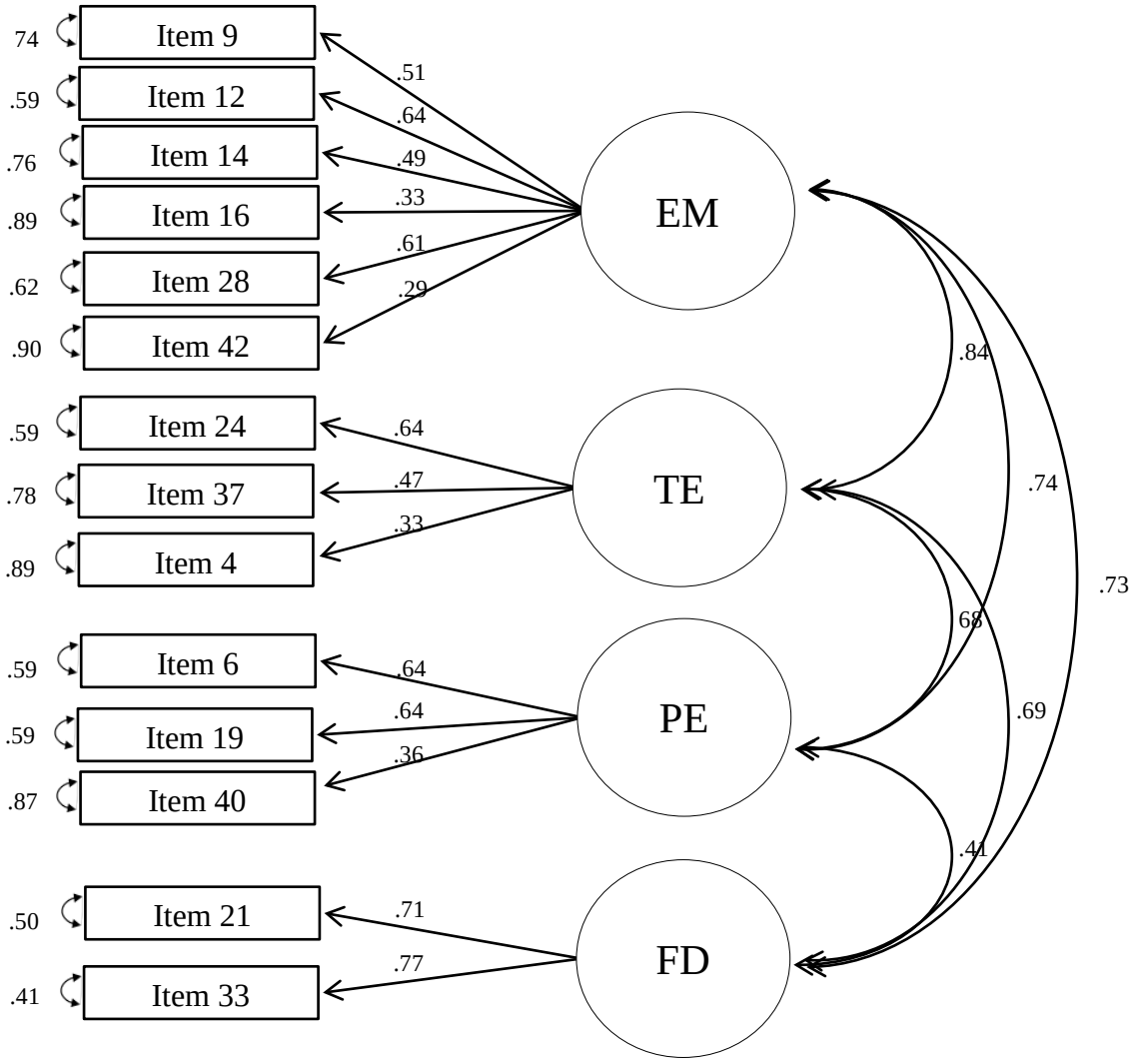
fathers and mothers. The result revealed that all factor loadings, error variances and factor variances and covariance were thus invariant among fathers and mothers in this study(χ^2 (176) = 487.66, $p < .05$; CFI = 1.000) with no change to the value of CFI. Hence, factorial invariance was supported in parents' perceived exercise barriers across fathers and mothers.

Table 20. Items in Subfactor - Parents' Perceived Exercise Barriers

Subfactor	Item no.	Item
EM	9	Places for my children to exercise are too far away.
	12	My children is too embarrassed to exercise.
	14	It costs too much money to exercise.
	16	Exercise facilities do not have convenient schedules for my children.
	28	My children think people in exercise clothes look fun.
	42	There are too few places for my children to exercise.
TE	24	Exercise takes too much time from family relationships.
	37	Exercise to my children takes too much time from family responsibilities.
	4	Exercising takes too much of my children's time.
PE	6	Exercise tires my children.
	19	My children is fatigued by exercise.
	40	Exercise is hard work for my children.
FD	21	My spouse (or significant other) does not encourage exercising.
	33	My family members including me do not encourage my children to exercise.

Note: EM = Exercise Milieu; TE = Time Expenditure; PE = Physical Exertion; FE = Family Discouragement

Figure 11. Measurement Model of Parents' Perceived Exercise Barriers



Note: EM = Exercise Milieu; TE = Time Expenditure; PE = Physical Exertion; FE = Family Discouragement

Table 21. Fit Indices for the Models (Parents' Perceived Exercise Barriers)

Model	χ^2	*df*	*p*	χ^2/df	RMSEA (90%CI)	CFI	NNFI	SRMR
Model 1	322.957	71	.0005	4.549	.077 (.069-..86)	.90	.88	.067

Note: RMSEA = Root Mean Square Error of Approximation; CI = Confidence Interval; CFI = Comparative Fit Index; NNFI = Non-Normed Fit Index; SRMR =Standardized Root Mean Residual

Table 22. Standardized Factor Loadings (SFL), Standardized Error, Squared Multiple Correlation (R^2), and Composite Reliability (CR) - Parents' Perceived Exercise Barriers

Items	SFL	Theta	R^2	CR
Exercise Milieu				.57
Item 9	.51	.74		
Item 12	.64	.59		
Item 14	.49	.76		
Item 16	.33	.89		
Item 28	.61	.62		
Item 42	.29	.91		
Time Expenditure				.48
Item 24	.64	.59		
Item 37	.47	.78		
Item 4	.33	.89		
Physical Exertion				57
Item 6	.64	.59		
Item 19	.64	.59		
Item 40	.36	.87		
Family Discouragement				.71
Item 21	.71	.50		
Item 33	.77	.41		

Table 23. Testing for Factorial Invariance Across Father and Mother - Parents' Perceived Exercise Barriers

Model	χ^2	*df*	p	Model comparison	$\Delta \chi^2$	Δdf	CFI	ΔCFI	NNFI
Father	159.79	71	.0005				.89		.87
Mother	85.93	71	.109				.955		.943
1.	419.30	142	.0005				1.000		1.00
2.	446.66	152	.0005	Model 1 – Model 2	27.36*	10	1.000	0	1.00
3.	471.00	166	.0005	Model 2 – Model 3	24.34*	14	1.000	0	1.00
4.	487.66	176	.0005	Model 3 – Model 4	16.66	10	1.000	0	1.00

*$p < .05$.

Note: χ^2 = Maximum Likelihood Ratio Chi-Square; CFI = Comparative Fit Index. Model 1: Configural Invariance (unconstraint); Model 2: Constrained factor loadings; Model 3: Constrainted factor loadings and errors variance; Model 4: Constrained factor loadings, error variance and covariances, and factor variances and covariances

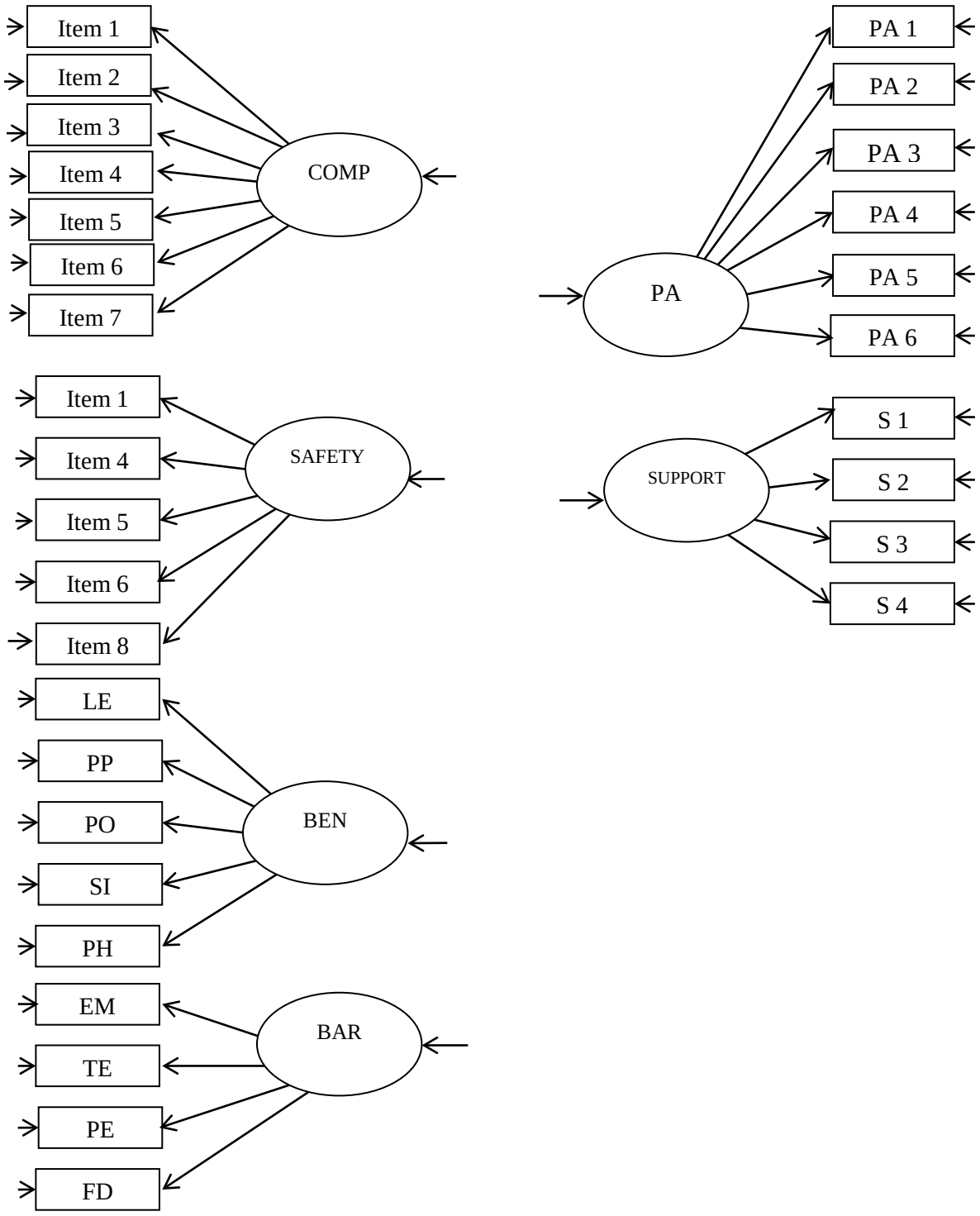
Main study: Overall Measurement Models

Other than individual measurement model using confirmatory factor analysis, overall measurement model combining each individual measurement models into a composite model as shown in Figure 12 was tested if it fit the data. Such overall

measurement model ensured that all significant results in the forecoming structural equational modeling were not caused by the result of inadequate measures (Anderson & Gerbing, 1988; Hayduk & Glaser, 2000).

The fit statistics showed that this overall measurement model had an acceptable fit (χ^2 (434) = 1220.69, $p < .001$; $\chi^2/df = 2.813$; SRMR = .114). Even the chi-square was significant and SRMR was over .10, other fit indices suggested this overall measurement model was a good fitting model (CFI = .939; NNFI = .935; RMSEA= .055 (90% CI = .052 to .059).

Figure 12. Finalized Overall Measurement Model



Note: COMP = Parents' perceived competence of children; SAFETY = Parents' Perceived Neighborhood Safety; BEN = Parents' Perceived Exercise Benefit; BAR = Parents' Perceived Exercise Barrier; SUPPORT = Parental support; PA = Children's PA

Main Study: Structural Model

Descriptive statistics and intercorrelations for all studied variables are presented in Table 24. All model tests were based on the covariance matrix and used maximum likelihood estimation as implemented in LISREL 9.1 (Joreskog & Sorbom, 1992). All constructs (i.e., Parents' Perceived Competence of Children, Parents' Perceived Neighborhood Safety, Parents' Perceived Children Exercise Benefits and Parents' Perceived Children Exercise Barriers, Parental Support and Children's PA) were tested as latent variables. The Parents' Perceived Exercise Benefits construct consisted of 5 items (i.e., Life Enhancement, Physical Performance, Psychological Outlook, Social Interaction, and Preventive health) while there were four items in Parents' Perceived Exercise Barriers (i.e., Exercise Milieu, Time Expenditure, Physical Exertion, and family Discouragement).

In order to answer research hypotheses 1- 4 (i.e., examine the relationships among parents' perceived competence of children, parents' perceived neighborhood safety, parents' perceived children exercise benefits and parents' perceived children exercise barriers, parental support and children's PA), the proposed model shown in Figure 13 was submitted to LISREL. Circles represented latent variables and rectangles represented measure variables. All standardized direct, indirect, and total effects were tested simultaneously and showed in Table 25.

The result of structural equation modeling was shown in Table 26. The proposed model was found to fit the data well as indicated by the fit indices (χ^2 (419) = 870.171, $p < .001$; $\chi^2/df = 2.077$; CFI = .966; NNFI = .962; SRMR = .048; RMSEA= .043 [90% CI

= .039 to .047]). Again, the significant chi-square was not surprising due to the sample size (N = 595) and the complexity of the model. As suggested by Cudeck and Browne (1983), cross validation is recommended at overcoming the problem of over-fitting. Over-fitting is a term which refers to when the model requires more information than the data can provide. Generally, cross validation needs two samples: calibration and validation samples. The procedure first starts with a fitting a model to calibration sample and then examine the discrepancy between covariance matrix implied by the model to that of validation sample. Model is then regarded to fit the data if this discrepancy is small. Without sufficient sample size for cross validation, Cudeck and Browne (1983) recommended to solve that problem by estimating the expected value of cross-validation index (i.e., ECVI) using only data from a single sample. In this finalized structural model, ECVI was 1.721 [90% CI = 1.586 to 1.870].

As shown in the Table 25, the independent variables explained 44.2% of the variance in children's PA and 12.9% of the variance in parental support. Only Parental support was directly predictive to parent report children's PA (β = 63, p < .01). Indirectly, both parents' perceived children competence (β = .18, p < .01) and parents' perceived exercise benefit (β = .28, p < .05) predicted parental support but in turn, parental support predicted children's PA (β = .63, p < .01).

The regression paths between all exogenous variables (i.e., parents' perceived competence of children, parents' perceived neighborhood safety, parents' perceived children exercise benefits and parents' perceived children exercise barriers) to endogenous variable (i.e., children's PA) were insignificant. Also, the regression paths

between two exogenous variables (i.e., parents' perceived children exercise benefits and parents' perceived neighborhood safety) to parental support were not significant as well.

Effect Sizes

Only Parental support was directly predictive to parent report children's PA (standardized Coefficient = .630, p <.05). Indirectly, we hypothesized that relationships between parents' perceived competence of children, parents' perceived neighborhood safety, parents' perceived exercise benefits and parents' perceived exercise barriers has an indirect effect on parents' report of Children's PA by parental support. According to the results, only parents' perceived competence of children (standardized coefficient = .114, p <.05) and parents' perceived exercise benefit (standardized coefficient = .179, p <.05) had significant indirect effect on parents' report of children's PA by parental support.

Among parents' perceived competence of children, parents' perceived neighborhood safety, parents' perceived children exercise benefits, parents' perceived exercise barriers, and parental support, parental support had the largest effect size predicting children's PA, followed by parents' perceived children exercise benefits and then parents' perceived competence of children.

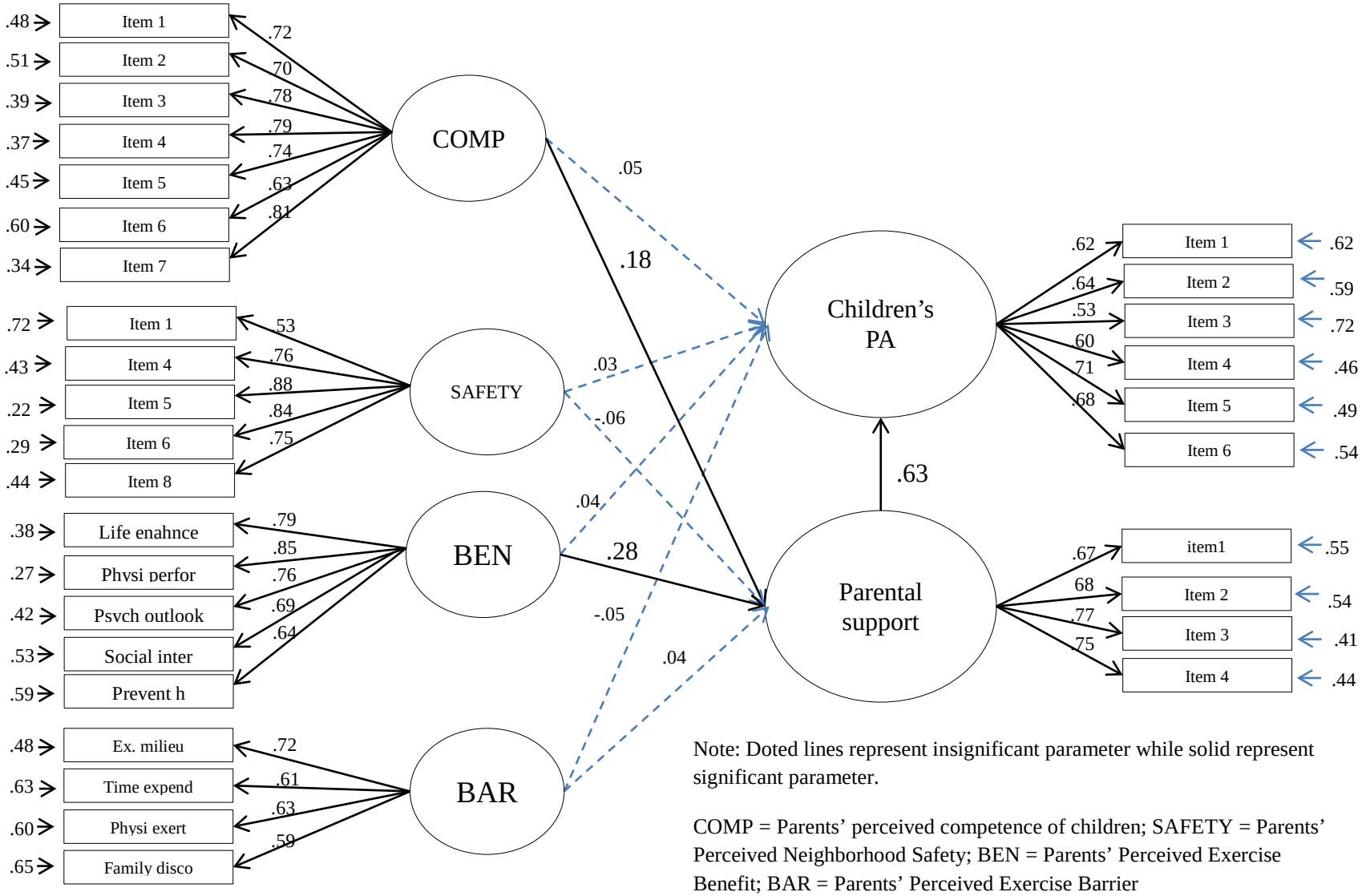
Deleting the non-significant path from the model did not result in a significant change to model fit, χ^2 difference (6) = 5.91, p > .01).

Table 24. Descriptive Statistics and Correlations for All Latent Variables

	M (SD)	PA	COMP	Support	Safety	Ben
PA	2.15 (.53)					
COMP	2.99 (.72)	.17**				
Support	2.58 (.73)	.53**	.19**			
Safety	1.78 (.62)	.02	-.03	-.06		
Ben	3.04 (.30)	.23**	.14**	.29**	-.07*	
Bar	2.05 (.29)	-.05	.011	-.09*	.19**	-.26**

Note. PA = Children's PA; COMP = Parents' perceived competence of children; Support = Parental support; Safety = Parents' Perceived Neighborhood Safety; Ben = Parents' Perceived Children Exercise benefits; Bar = Parents' Perceived Children Exercise Barriers.

*$p < .05$; ** $p < .001$



Note: Doted lines represent insignificant parameter while solid represent significant parameter.

COMP = Parents' perceived competence of children; SAFETY = Parents' Perceived Neighborhood Safety; BEN = Parents' Perceived Exercise Benefit; BAR = Parents' Perceived Exercise Barrier

Figure 13. Finalised Structural Model

Table 25. Standardized Direct, Indirect and Total Effects on the Finalized Model

	Indirect Effects (via Parental support)	Direct Effects	Total Effects
Parents' perceived competence of children	.114**	.054	.168**
Parents' Perceived Neighborhood Safety	-.036	.033	-.004
Parents' Perceived Exercise Benefit	.179*	.043	.223**
Parents' Perceived Exercise Barrier	.024	-.055	-.031
Parental support	-	.630	.630**

** p <.001

Table 26. Fit Indices for the Structural Models

Model	χ^2	*df*	p	χ^2/df	RMSEA (90%CI)	CFI	NNFI	SRMR
Model	870.717	419	.0005	2.077	.043 (.039-.047)	.966	.962	.048

Note: RMSEA = Root Mean Square Error of Approximation; CI = Confidence Interval; CFI = Comparative Fit Index; NNFI = Non-Normed Fit Index; SRMR =Standardized Root Mean Residual.

Summary of Results in regarding to each Research Hypothesis

Combing all results in the structured models, the followings are the answers to research hypotheses 1 to 4.

Research Hypothesis 1.

There would be positive relationship between parents' perceived competence of children and children's PA.

There was no significant relationship between parents' perceived competence and children's PA (β = .05, p > .05).

Research Hypothesis 2.

There would be positive relationship between parents' perceived neighborhood safety and children's PA.

There was no significant relationship between parents' perceived neighborhood safety and children's PA (β = .03, p > .05).

Research Hypothesis 3.

There would be significant relationships between parents' perceived children exercise barriers and parents' perceived children exercise benefits to children's PA.

Results showed that there was no significant relationship of parents' perceived exercise benefit (β = .04, p > .05) and parents' perceived exercise barrier (β = -.06, p > .05) to children's PA.

Research Hypothesis 4.

There would be positive relationship between parental support and children's PA.

There was significant relationship between parental support and children's PA (β = .63, p > .05). Parental support had a positive effect on the amount children engaged in PA.

In the following sections, the answers to the research hypotheses 5 to 9 will be presented. In brief, it explores the extent how the socio-demographic characteristics of parents' age, parents' gender, parents' education level, parents' income, parents' work status, parenting status and children's gender differ the studied constructs (i.e., parents' perceived competence of children, parents' perceived neighborhood safety, parents' perceived children exercise benefits and parents' perceived children exercise barriers, parental support and children's PA).

Research Hypothesis 5

In this hypothesis, we examined the *differences among parents' age, parents' gender, parents' education level, parents' income, parents' work status, parenting status and children's gender on parents' perceived children exercise barriers and parents' perceived children exercise benefits.*

Regarding *parents' perceived children exercise benefits,* there were no significant differences among parents' age (F(4,581) = 1.43, p >.05) , parents' gender (F(1,543) =1.51, p >.05) , parents' work status (F(3,581) = .66 , p >.05) and parenting status (F(1,538) = 3.06 , p >.05).

In parents' education level, there was a mean difference of parents' perceived children exercise benefits among different education levels (i.e., no schooling and primary school, secondary school and tertiary education or above) (F(2,581) = 9.73, p < .05). The post hoc (i.e., Bonferroni) showed that parents who attained higher education level (i.e.,

tertiary education or above) (mean = 3.12, $p < .05$) had significant higher perceived exercise benefits than parents in no schooling and primary school (mean = 2.97, $p < .05$) and secondary school (mean = 3.01, $p < .05$).

Regarding parents' income, a mean difference of parents' perceived children exercise benefits among different income levels (i.e., HK$50000 or above, HK$30000- 49999, HK$10000- 29999, HK$5000- 9999, HK$4999 or below) was found (F (4,566) = 5.65, $p < .05$). Parents who reported higher income group (i.e., HK$50000 or above) (mean = 3.15, $p < .05$) valued children's PA higher than parents in income groups "HK$30000- 49999" (mean = 3.09, $p < .05$), "HK$10000- 29999" (mean = 3.03, $p < .05$), "HK$5000 - 9999" (mean = 2.94, $p < .05$), and "HK$4999 or below" (mean = 2.97, $p < .05$). Similarly, parents in income group "HK$30000 - 49999" (mean = 3.09, $p < .05$) tended to perceived exercise benefit higher than parents in income group "$5000 - $9999" (mean = 2.94, $p < .05$).

Other than parents' education level and income, children's gender (F(1,593) = 12.67, $p < .05$) had a significant effect on parents' perceived exercise benefit. Parent with son (mean = 3.08, $p < .05$) valued children's PA higher than parent with daughter (mean = 2.99, $p < .05$). At last, both parents' gender and children's gender went into the two way ANOVA analysis and examined if both parents' gender and children's gender differed the parents' perceived children exercise benefit interactively. No interactive effect (F(1,541) = .21, $p > .05$) at affecting the parents' perceived children exercise benefit.

For *parents' perceived exercise barriers*, no significant differences were found among different parents' age group (F(4,581) = .61, $p > .05$), parents' work status (F(3, 581) = .72, $p > .05$), parents' gender (F(1,543) = 2.79, $p > .05$) and parenting status (F(1,538)

= .62, $p > .05$). Again, result of two way ANOVA analysis showed no significant main effects were found in parents' gender ($F(1,541) = 2.96$, $p > .05$) and children's gender ($F(1,541) = 1.26$, $p > .05$) at affecting the parents' perceived children exercise barriers. No interaction was found between parents' gender and children's gender ($F(1,541) = .24$, $p > .05$) at making a difference at the level of parents' perceived children exercise barriers.

For parents' education level, one mean difference of parents' perceived children exercise barriers was found between parents attained tertiary or postgraduate education and parents attained primary school or no schooling ($F(2,571) = 5.27$, $p < .05$). Parents attained primary education or no schooling (mean = 2.13, $p < .05$) perceived more children exercise barriers than parents attained tertiary or postgraduate education (mean = 2.00, $p < .05$).

For parents' income, a least a significant mean difference of parents' perceived children exercise barriers was found among different income groups (i.e., HK$50000 or above, HK$30000- 49999, HK$10000- 29999, HK$5000- 9999, HK$4999 or below) ($F(4,566) = 3.49$, $p < .05$). Parents with HK$50000 or above monthly income (mean = 1.96, $p < .05$) perceived lower exercise barriers than parents with lower income [i.e., HK$10000-29999 (mean = 2.07, $p < .05$).

Research Hypothesis 6

In this hypothesis, we examined *the difference among parents' age, parents' gender, parents' education level, parents' income level, parents' work status, parenting status and children's gender on parents' perceived neighborhood safety.* The results found that there would be no significant differences among parents' age ($F(4,581) = .19$, $p > .05$), parents' gender ($F(1,543) = 1.78$, $p > .05$), parents' income ($F(4,566) = 1.77$, $p > .05$) and parents'

work status ($F(3,581) = 2.49$, $p > .05$) on parents' perceived neighborhood safety of children's PA.

Next, parents with tertiary or postgraduate education perceived higher neighborhood safety of children's PA than parents with secondary education ($F(2,581) = 8.01$, $p < .05$). Bonferroni found that parents with tertiary or postgraduate education (mean = 1.64, $p < .05$) had lower mean score of perceived neighborhood safety than parents with secondary education (mean = 1.86, $p < .05$). In the other word, parents with higher education level felt more comfortable about neighborhood safety.

The last significant mean difference of parents' perceived neighborhood safety was found in different parenting status ($F(1,535) = 4.39$, $p < .05$). Family with both father and mother (mean = 1.75, $p < .05$) perceived significantly ($p < .05$) higher level of neighborhood safety than their single parent counterpart (mean = 1.98),

Research Hypothesis 7

In this hypothesis, we examined the *difference among parents' age, parents' gender, parents' education level, parents' income level, parents' work status, parenting status, and children's gender on parents' perceived competence of children.* No significant differences on parents' perceived competence of children's PA among parents' gender ($F(1,535) = .11$, $p > .05$), work status ($F(3,570) = .84$, p >.05) and parenting status ($F(1,526) = .04$, $p > .05$) were found.

For parents' age, two significant mean differences on parents' perceived competence of children's PA among different age groups ($F(4,569) = 3.08$, $p < .05$). Bonferroni tests found that younger parents aged 21-30 years old (mean = 3.44, $p < .05$) perceived their

children with higher competence than older parents aged 31-40 year old (mean = 2.97, $p < .05$) and aged 41-50 years old (mean = 2.93, $p < .05$).

For parents' education level, one mean difference of parents' perceived competence of children's PA was found between education levels "primary school or no schooling" and "tertiary or postgraduate education" ($F(2,570) = 3.83$, $p < .05$). Parents with primary school or lower (mean = 3.11, $p < .05$) perceived their children with higher competence than parents with tertiary or postgraduate education (mean = 2.87, $p < .05$).

For parents' income, one mean difference of parents' perceived competence of children's PA was found between different income levels "HK$4999 or below" and "HK$30000- 49999" ($F(4,554) = 2.70$, $p < .05$). Parents with income lower than HK$5000 (mean = 3.25, $p < .05$) perceived their children with higher competence than parents' income "HK$30000- 49999" (mean = 2.87, $p < .05$).

Two-way ANOVA was used to examine if both parents' gender and children's gender contribute to the difference in parents' perceived competence of children on PA. However, only children's gender contributed significantly to the difference in parents' perceived competence of children ($F(1,533) = 6.28$, $p < .05$). The interactive effect ($F(1,533) = .63$, $p > .05$) and the main effect of parents' gender ($F(1,533) = .06$, $p > .05$) were not significant. Parents perceived boys (mean = 3.05, $p < .05$) with higher competence than girls (mean = 2.90, $p < .05$).

Research Hypothesis 8

The differences among parents' age, parents' gender, parents' education level, parents' income level, parents' work status, parenting status, and children's gender on parental support

was examined in this hypothesis. Results showed no significant differences among parents' gender ($F(1, 543) = .42$, $p > .05$), education level ($F(2,581) = .26$, $p > .05$), income ($F(4,566) = 1.81$, $p > .05$), work status ($F(3,581) = .99$, $p > .05$) and parenting status ($F(1, 538) = 2.75$, $p > .05$) were found on parental support to their children's PA.

In parental support, among all the socio-demographic variables, only age contributed to at least a mean difference of parental support ($F(4,581) = 2.87$, $p < .05$) among different age groups (below 20 years old, 21-30 years old, 31-40 years old, 41-50 years old and 51 years old or above). The post hoc test showed that parents who were older (i.e., 51 years old or above) had a significant higher parental support (mean = 2.87, $p < .05$) to children more than parents in 21-30 years old (mean = 2.42, $p < .05$) and in 41-50 years old (mean = 2.47, $p < .05$).

Furthermore, two-way ANOVA was examined if parents' gender and children's gender had any effect at affecting parental support. Result found that only children's gender had main effect at affecting parental support ($F(1,541) = 75.55$, $p < .05$). Parents tended to provide more support to boys (mean = 2.79, $p < .05$) than girls (mean = 2.27, $p < .05$) at children's PA. There were no main effect of parents' gender ($F(1,541) = .00$, $p > .05$) or interaction between the two main effects on the dependent variable ($F(1,541) = 2.76$, $p > .05$) at affecting parental support.

Research Hypothesis 9

In the last hypothesis, we examined the differences among parents' age, parents' gender, parents' education level, parents' income level, parents' work status, parenting status, and children's gender on children's PA. Unexpectedly, results of the multiple ANOVA

revealed that there were no significant differences among parents' age ($F(4,561) = .57$, $p > .05$), parents' gender ($F(1, 524) = .70$, $p > .05$), parents' education level ($F(2,560) = 1.08$, $p > .05$), parents' income ($F(4,545) = 1.00$, $p > .05$), parents' work status ($F(3, 560) = .63$, $p > .05$) and parenting status ($F(1,519) = 2.14$, $p > .05$) on children's engagement of PA.

While taking the effect of parents' gender and children's gender into two way ANOVA analysis, there was no interactive effect of parents' and children's gender ($F(1,522) = .43$, $p > .05$) and main effect of parents' gender ($F(1,522) = .83$, $p > .05$) at affecting children's PA. Again, there was only a main effect of children's gender at affecting children's PA. Boys (mean = 2.25, $p < .05$) tended to be more active than girls (mean = 2.02, $p < .05$). This observation was confirmed in the table "Tests of between-subject effects", the main effect of children's gender was found to be significant ($F(1,522) = 17.27$, $p < .0005$) and the total sum of square for children's gender was 4.79.

CHAPTER 5

DISCUSSION

In this study, we analyzed the relationship of parents' perceptions about children's competence of children, neighborhood safety, exercise benefits and exercise barriers, and the influence of parental support on children's PA. We also investigated how socio-demographic characteristics differ the above constructs (i.e., parents' perceived competence of children, parents' perceived neighborhood safety, parents' perceived children exercise benefits and parents' perceived children exercise barriers, parental support and children's PA).

The main findings in these studies are: (1) Only parental support could predict children's PA; (2) Both parents' perceived competence of their children and perceived exercise benefits of their children could predict parental support to children's PA; (3) Parents' education and income levels differ their perceived exercise benefits and barriers, perceived neighborhood safety, and perceived competence of children; (4) Single parents tend to have lower perceived neighborhood safety; and (5) Parents of sons are likely to have higher perceived children exercise benefits, parental support, exercise competence as well as activity level.

Research Hypotheses 1- 4

As expected, parental support is associated with children's PA. This finding is consistent with the Eccles' Expectancy-value Theory that the behaviors of social influencer

(e.g., parents) affect children's expectation of success (e.g. perceived competence) and subjective task value towards physical activity. It then determines children's physical activity. Also, this result is supported by the findings of the previous studies (Cheung, 2006; Pugliese & Tinsley, 2007; Trost & Loprinzi, 2011; Zecevic, Tremblay, Lovsin, & Michel, 2010). A meta-analysis (Pugliese & Tinsley, 2007) showed that children had a relative risk of becoming inactive, 1.41x greater if their parents do not engage in any supportive socialization behaviors. Among the five parents' behaviors in the study, which include parents' encouragement, parents' instrumental behaviors, parents' modeling, parental work habits, and general parental support, the researchers found that parents' encouragement, parents' instrumental behaviors, and parents' modeling were positively related to children's PA. In a later study (Trost & Loprinzi, 2011), the general parental support was found to be positively related to children's PA. In fact, parental support may be categorized into parents' encouragement, parents' modeling, and parents' facilitation. Among those three categories, parents' modeling demonstrated the weakest relationship with children's PA. Trost and Loprinzi (2011) explained that this weak relationship between parents' modeling and children's PA was due to the inaccurate self-report questionnaires that were used, where parents were absent during children's PA. Both parents' encouragement and parents' facilitation were significantly related to children's PA. Parental encouragement will be further discussed in later sections. Overall, parental facilitation, which includes provision of sports equipment, transportation, and accessibility to exercise programs, was found to have significant helps to promote children's PA (Hoefer et al., 2001; Sallies et al., 1992, 1999).

Taking the Hong Kong culture into account, the result was not unexpected. Confucianism has been embraced in Chinese culture, including that in Hong Kong for more

than 2000 years. In regard to the parenting, parents represent authority in the family. All members of family, including mothers should be obedient to father, head of family. Therefore, with parental support to their children's' physical activity, it makes sense that children engage more in their participation of physical activity.

It is worth mentioning that there are only 5 questions used to measure parental support in this study. Even the measurement model of a parental support scale is deemed to be valid by confirmatory factor analysis, increasing items in the scale may capture the construct "parental support" in greater detail. Additionally, an increasing number of items in the scale may allow us to differentiate between the power effect of each aspect (i.e., parents' encouragement, parents' modeling, and parents' facilitation) of parental support as it affects children's PA. Therefore, conducting more studies of this related issue is necessary.

Other than the direct effect of parental support on children's PA, parents' perceived competence of children and parents' perceived exercise benefits indirectly impact parental support and, subsequently, children's PA. These results are also supported in theoretical perspective. The Eccles' Expectancy-Value Theory (Eccles, Wigfield, & Schiefle, 1998) explains human differences in choice, persistence, and performance on achievement choices in academic domains. In this theory, achievement choice is interpreted as a decision to partake in an activity, no matter how much effort he or she exerts, and for however long. This achievement choice is affected by one's expectancies of success, and his or her subjective task value.

Expectancy of success is akin to people's confidence in completing a task or activity (Eccles et al., 1998). In terms of PA, one's perceived physical competence is an example of

one's expectation of success. The source of these expectations comes from perceived task difficulty, social groups' beliefs and behaviors, past successes or failures, and gender stereotypes.

A subjective task value is the subjective value or sense of personal importance in completing a task or activity (Eccles et al., 1998). It consists of different types of value, such as utility value and cost of completion. One's past experience is the major source of his or her subjective task value. Other than one's past experience, social groups' beliefs and behaviors, individual goals, and gender stereotypes affect this subjective value.

In children's PA, social groups (e.g., parents) may have general beliefs about children's PA, such as gender stereotypes; they may also have children specific beliefs (e.g., belief in their own children's competence). The combination of parents' beliefs (i.e., expectancy of success and subjective task value) affects or determines parents' behaviors toward their children, such as the degree of parental support in role modeling, encouragement, and facilitation in children's PA. These parental behaviors then alter their children's sense of value and belief in the task or activity (i.e., expectancy of success and subjective task value).

In this study, parents' perceived children exercise benefits is an example of a subjective task value. In the measurement model of parents' perceived children exercise benefits of this study, there are 5 factors, namely life enhancement, physical performance, psychological outlook, social interaction, and preventive health. These factors correspond to the 4 components of task value in Eccles and her colleagues' studies (1998). For example, the improvement in psychological outlook (i.e., exercise enjoyment, and stress and tension relief) is comparable to the component of "interest value," which refers to the intrinsic value

of a task or activity suggested by Eccles and colleagues (1998). Based on Eccles' Theory, these parents' perceived exercise benefits determine the degree to which parental support is given to their children. The greater the parents value the PA, the higher effort that parents put into providing their children with the resources to be active within the achievement domain (i.e., PA). These notions are supported by the studies of Loprinzi and Trost (2010), and Trost et al. (2003). In fact, this is consistent with another attitude-behaviors theory, the Theory of Planned Behavior (Ajzen, 1985), which reported that parents would support their children to be active if they perceived that PA was good for their children.

Unexpectedly, parents' perceived competence of their children failed to predict children's PA in the current study, even though the critical level (i.e., *t*-score) is approaching a significant level. Studies that applied the Eccles' Expectancy-Value Theory showed that parents' perceived competence in children was one of the sources affecting children's expectancy of success, which ultimately determined children's PA (Dempsey et al., 1993; Kimiecik & Horn, 1998). For example, Kimiecik and Horn (1998) examined the role of parental beliefs in children's moderate-to-vigorous PA and found that parental beliefs, such as parents' perceived physical competence of their children, was significantly related to their children's participation in sports. Other studies also found a positive relationships among mothers' perceptions of children's competence, sport equipment purchases, and parents' encouragement (Fredricks & Eccles, 2005).

In the current study, the insignificant relationship between parents' perceived competence in children and children's PA is contradicted to the findings of the previous studies. Bois and colleagues (2005) showed that children's perceptions about their physical competence are influenced by their perceptions regarding their parents' evaluation of their

competence. These findings also apply to Harter's Perceived Competence Motivation Theory (1981), which states that children's PA is a product of children's mastery, in which his or her attempts feed directly into his or her sense of competence (Harter, 1981). Finally, children would attach to an activity in which they perceived competence, and avoid activities that they felt difficult to accomplish.

Nonetheless, parents' perceived competence of children is found significantly in predicting their children's PA output through parental support in this study; thus, parental support may be regarded as a mediator between parents' perceived children competence and children's PA. This finding answers a research gap in children's PA, as suggested by Horn and Horn (2007) that how does parents' perceived children competence affect children's self-competence. In most cases, parents who observe the competence of their children in a PA discover their children's interest in sports, and figure out their children's talents and temperaments in PA. All of these will build up their perceptions of physical competence, which helps parents interpret the achievement-related information in their children's PA; then, they can chose to offer more or less support for different activities. For example, if two parents think that their children are good or competent at playing volleyball, they may provide them with encouragement, enroll them in volleyball lessons, accompany them to volleyball games, etc. In this example, more support will be offered for those activities where parents perceive that their children are more likely to succeed. Likewise, Brustad (1992) reported that parents who had positive perceptions of their children's abilities provided more opportunities or encouragement for their children in PA than parents who perceived their children to possess weaker abilities.

Perceived neighborhood safety has a minor influence in both children's PA output and parental support. The finding in this study does not support the social-ecological model of health, highlighting the interaction between an individual and his or her environment (Sallis & Owen, 1999). The social-ecological model suggested that one's environment may affect his or her PA. For example, parents reported safety from crime increased their children's PA in public recreation spaces (Tappe Glanz, Sallis, Zhou, & Saelons, 2013). Conceivably, safety may not be an important concern for children's participation in PA in Hong Kong, being that Hong Kong is one of the safest cities in the world. According to the ECA International's Location Ratings system (2012), Hong Kong ranked 11th in the world and the 3rd in Asia in an assessment of overall quality of life, including personal safety (ECA International, 2012). Specifically, policemen patrol the streets 24 hours-a-day, and there is high ratio of police officers to Hong Kong citizens (400 police officers to 100,000 citizens) (Brand Hong Kong, 2012). Such a safe environment reduces its effect on explaining the variance between children's PA and parental support.

A review of related literature indicated that only a few studies in this area depicted parents' perception of safety in conjunction with children's participation in outdoor PA, which failed to impact parents' encouragement in children's PA (Dwyer, Higg, Hardy, & Baur, 2008; Hinkley, Salmon, Okely, Crawford, & Hesketh, 2011). Perhaps the results would be different if more neighborhood factors were identified and studied (e.g., road safety). A paucity of related research and a relationship between perceived neighborhood safety and children's PA poses a definite research gap that requires future studies to determine the environmental factors that may affect children's PA from their parents' perspective.

Surprisingly, parents' perceptions about their children's exercise barriers are trivial factors in predicting children's PA, as well as parental support in the current study. Its concept is similar to perceived cost, as suggested in Eccles's Expectancy-Value Theory (1998). These perceived costs refer to the negative consequences associated with performing PA, including time, energy, and opportunity costs. In Eccles' Expectancy-Value Theory, people ultimately weigh the benefits and barriers of performing a certain activity, and make their choices accordingly. Children may experience exercise barriers indirectly through their parents' perceived exercise barriers. Mulvihill, Rivers, and Aggleton (2000) qualitatively investigated both parents' and primary school children's views on PA; lack of time was a common barrier shared in parents' and children's points of view, which hindered children's PA. However, children were more concerned about time constraints, while parents were more concerned about safety. Therefore, it is possible that there is a discrepancy between parents' perceived children exercise barriers and children's perceived exercise barriers, meaning parents' perceptions may not affect children's PA and parental support.

In conclusion, among the exogenous variables (i.e., parents' perceived children competence, parents' perceived neighborhood safety, parents' perceived barriers of PA, parents' perceived benefits of PA, and parental support), only parental support has a direct effect on children's PA. However, both parents' perceived competence in their children's abilities, as well as parents' perceived children exercise benefits predict their children's PA of choice indirectly through parental support. It partially applied the Eccles' Expectancy-value Model.

Research Hypothesis 5

In this study, parents with lower income and lower education levels perceive less positive children exercise benefits and greater barriers to exercise. In the literature, there is a link between PA and families' socio-cultural environments. Lower income (Mo, Turner, Krewski, & Mo, 2005) and lower parental education (Stenhammar, Sarkadi, & Edlund, 2007) are associated with lower PA. As expected, income and parents' education levels are interrelated in previous literature (Census and Statistics Department, 2011). Parents with lower income and education were often confronted with greater exercise barriers (McNeill, Kreutuer, & Subramanian, 2006). For instance, children from these families were less likely to access neighborhood resources, such as good quality space or sport facilities; they also lacked transportation, and failed to provide the costs of facility fees, the cost of exercise programs, and lacked of free time due to household responsibilities (e.g., babysitting) (Kantomaa, Tammelin, Nayha, & Taanila, 2007; McNeill et al., 2006). Investment gaps in social services for those living in areas with lower incomes fail to provide proper roads and sidewalk conditions, neighborhood safety, and facilities that may contribute to their perceptions of exercise barriers (McNeill et al., 2006). In fact, parents were financially incapable of choosing activities, such as purchasing fitness club memberships (Kantomaa, Tammelin, Nayha, & Taanila, 2007). Additionally, parents with lower incomes and education levels might have greater work commitments. In terms of availability, they might not have time to engage in PA with their children, which becomes another exercise barrier.

Regarding perceived children exercise benefits, Nemet, Geva, Mecket, and Eliakim (2012) found that knowledge of PA for young children with lower socio-economic status was lower compared to those of moderate-to-high socio-economic status. In addition, parents

from low socio-economic populations tended to rely on short-term physical health benefits instead of long-term physical and psychological health benefits, in regard to children's PA (Hart, Herrrot, Bishop, & Truby, 2003). In all probability, parents' reported exercise barriers may outweigh their perceived children exercise benefits; that may be the reason that they perceived lower children exercise benefits than parents with higher income and education levels. Most notably, in Hong Kong, most parents generally realize that being active is good for their children; however, they may not totally understand how good the PA is for their children's health, or what the PA recommendations are for children (especially for children from families with less education and incomes).

These significant differences of parents' perceived children exercise benefits and exercise barriers by income are coincident with rising income inequality in Hong Kong. The thematic report of "Household Distribution in Hong Kong" (Census and Statistics Department, 2011) revealed that Hong Kong income inequality is getting worsen, indicated by the increasing Gini coefficient from .518 in 1996 to .538 in 2011. Gini coefficient is an index of income coefficient, with 1 representing absolute inequity and 0 representing absolute equality.

As expected by Eccles' theory, parents may perceive gender stereotypes, which shape children's sense of value about PA (i.e., perceived children exercise benefits). Parents with sons in this study value children's PA higher than parents with daughter. In childhood, parents of sons place more importance on sports or PA than parents of daughters (Eccles & Harold, 1991; Fredricks & Eccles, 2005; Jacobs & Eccles, 1992). The multiple analyses of the study (Fredrick & Eccles, 2005) found that both fathers and mothers perceived greater competence in their sons, as well as increased importance of PA for their sons, instead of

daughters. Such gender stereotypes may be even stronger under Confucianism in Hong Kong. With the Chinese gender-role under Confucianism, girls tend to be quiet and gravitate towards playing house or cooking; whereas, boys tend to actively play more aggressive action games. In this way, engaging in PA becomes less important and less beneficial to girls under Confucianism. The cultural background, itself, helps to explain the effect of gender differences on parents' perceived children exercises benefits .

Research Hypothesis 6

Similar findings are found in perceived neighborhood safety. Parents in higher education levels perceive higher neighborhood safety. These results are expected, as safety concerns are especially important barriers affecting children's PA in families with lower education levels. The lower socio-economic (SES) neighborhoods were found significantly lower in education (Estabrooks, Lee, & Gyurcsik, 2003). People living in lower SES neighborhoods reported higher perceptions of neighborhood crime, distrustful neighbors, and unsafe activities than those from higher SES neighborhoods (Wilson, Kirtland, Ainsworth, & Addy, 2004).

As mentioned previously, single parents are largely described as having poorer education, less likelihood of employment, and less social support (Cairney & Wade, 2002). They tend to live in less desirable neighborhoods, frequently characterized by violence and property crime. This explains why single parent families tend to perceive a lower level of neighborhood safety than their counterparts.

Research Hypothesis 7

In Eccles' Expectancy-Value Theory, parents played important roles in influencing children's personal sense of competence. In this study, parents of sons report that their children have higher physical competence than parents of daughters. This finding is in alignment with results from previous studies (Cairney et al., 2012; Fredricks & Eccles, 2002, 2005). Lirgg (1991) conducted a meta-analysis on the magnitude of gender differences in self-confidence; an effect size of .65 was found, favoring boys, for having more self-confidence in PA. A gender stereotype in expectations exists in PA. Again, Confucian relationship suggested that in typical Chinese family, sons are described as higher status (including competence) compared to daughters.

Due to the differences between social classes (Wright & Burrows, 2006), competence in physical education is regarded as embodying capital, which is related to excellence and fulfilling potential in high class schools; whereas, physical competence is remedial in helping students to become good citizens or workers in society with lower social class (with lower education level). With this information, parents from higher social classes (i.e., higher income and education level) shall perceive their children's physical competence as being higher; however, the results of this study does not support this notion, although it is not surprising if cultural factors were taken into consideration.

In Hong Kong, parents emphasize children's academic achievement under the influence of Confucianism because Confucianism links good parenting and good outcomes for their children in the future (Ha, Macdonald, & Pang, 2010). This could explain why parents may decrease the amount of time that children are involved in PA; it may decrease

distractions for them to achieve higher academic results. Parents frequently provide their children with strict academic schedules to learn musical instruments, languages, and even interview skills for entering more prestigious secondary schools. It was expected that parents from lower income and education levels were less capable at investing more money in educational resources (Chiu & Ho, 2006). Their children may subsequently enjoy more time engaging in PA to build up higher physical competence.

In this study, younger parents perceive that their children having higher physical competencies. Perhaps, younger parents who have higher physical competence may spend more time doing PA with their children. Parents may then perceive their children as more competent, due to higher levels of engagement in children-parent PA.

Research Hypothesis 8

Interestingly, the results indicate that older parents tend to provide more support for children's PA. This may be related to Hong Kong's social norms (e.g., working patterns). Younger people generally work more hours compared to older people (Welford, 2008). People aged 51 years or older are offered more career breaks, unpaid personal leave, partly-paid personal leave, and sabbaticals than younger members of the Hong Kong population (Chung, Pang, & Tong, 2010). These factors may cause older parents' working patterns to be more flexible and allow them to have more time to support for their children's PA, at least in terms of encouragement, facilitation, and children/parent engagement.

In addition to parents' age, boys are more likely to receive higher parental support for their PA than girls. This finding is supported by existing literature. According to Eccles' Expectancy-Value Theory, parents' beliefs and value perceptions, as well as their behaviors

(e.g., support), differ according to their children's genders. Studies have shown that parents have gender-stereotypes that influence their children's PA (Eccles, 1993, Greendorfer 1992; Gustafson & Rhodes, 2006; Nolan, Cottrell, & Dino, 2013). Parents are more likely to encourage their sons to participate in PA (Eccles, 1993; Greendorfer, 1992; Gustafson & Rhodes, 2006; Nolan et al., 2013) and sports (Kanters, Bocarro, & Casper, 2008) than their daughters. Similarly, parents reported gender differences in the amount of time that they engaged in PA with their children (Eccles, 1993; Gustafson & Rhodes, 2006). These findings are in alignment with Eccles's Expectancy-Value Theory, stating that parents retain gender-stereotypes that support their sons and daughters in the physical domain. In line with Confucianism in Hong Kong, sons are higher in status than that of daughters and so more resource or support is given to sons than its counterpart.

In addition, we explore how fathers and mothers differ in parental support of their sons vs. their daughters, and the insignificant results indicated that parents' gender does not account for the variance in parental support for their daughters and sons. This is contrary to the work of Langolis and Downs (1980), which stated that fathers support their sons more in "masculine-type" play.

Research Hypothesis 9

Surprisingly, children's gender is the sole factor that contributed to the variance in their PA. There are no differences in children's engagement in PA in regard to parents' age, gender, education level, income, work status, and parenting status.

In reviewing studies on PA in children (Sallies, Prochaska, & Taylor, 1999), 24 out of 30 studies demonstrated that boys are more active than girls. This result applies Eccles'

Expectancy-Value Theory (1983), in which males perceived themselves as having higher physical competence through reflecting their parents' beliefs and value systems (i.e., perceived competence of children, perceived neighborhood safety, perceived exercise benefits and barriers), as well as feeling encouragement from their parents' behaviors (i.e., parental support). Boys thus become more active than girls with higher subjective task values and greater expectations for success. Of equal importance, Confucianism supports this gender stereotypes that sons are more competent and active than daughters in a family in Hong Kong.

Practical Implications

This study confirms that parents who provide more support for their children can promote children's PA. Therefore, parents may increase their involvement in sport participation by being role models, educating them about the value of PA, giving positive feedback about their abilities, and by providing financial support and transportation (i.e., parental facilitation). Other than these 3 parental support behaviors, Davison, Li, Baskin, Cox, and Affuso (2011) reported that restricting access to sedentary activities, such as limiting the use of computers and television at home, are additional aspects of parental support.

In general, practitioners in health centers, or even in schools, may enhance parents' confidence and motivation to provide support for children's PA through motivational interviews. The motivational interview is a type of counseling that helps parents to explore and resolve their resistance to behavioral change. This is done by expressing empathy, challenging resistance, enhancing self-efficacy, and reducing the discrepancies between inactivity and active goals. It aims to boost parents' confidence in behavioral change (i.e., to

be active) and to value the importance of change. It was found to be effective in reducing the amount of time spent watching television (Taveras et al., 2011).

In conjunction with the Self Determination Theory (Ryan & Deci, 2002), parents may create a motivational climate that fosters learning, improvement, and efforts toward success. This kind of motivated environment helps to develop children's perceived competence and autonomy, as well as promote children's PA with positive intrinsic reasons (Standage, Duda, & Ntoumanis, 2003). One of the previous programs that adopted this strategy was TARGET, which used authority, recognition, grouping, evaluation, and time to manipulate student's motivation in physical education class (Bowler, 2009). Students in this program were allowed to develop multi-sport tasks which provided opportunities to develop different skills, create autonomy (by choosing activities in a lesson and manage/evaluate their learning progress), recognize their learning progress through encouragement, develop teamwork (by exercising in different, small cooperative groups), and have flexibility in the amount of time involved in performing different activities in a class. In fact, similar practices may be adopted to support family programs, or in parent-involved school programs. For example, parents can engage in the process of helping students to choose their activities, helping students to manage or monitor their learning progress, or even join parent/children activities (so as to retain the assigned team goals at home) or activities after school.

Moreover, teaching parents about parenting skills to promote children's PA is necessary. Golley and colleagues (2007) developed a program that provided parents with parenting skills; the results indicated that this parenting program was effective at reducing children's body mass index. Essentially, this parenting program helped children to discover

different disciplines, such as more active lifestyles; finally, it enhanced parents' ability to implement parent-led children behavioral improvements.

In terms of parental facilitation, parents may become empowered, themselves, to engage in PA, along with their children. Health practitioners may advocate for some shared and goal-oriented programs that target all family members. This program could ask both parents and children working on a PA to identify their related goals such as accomplishing to meet the assigned number of step count or exercise time a days. Next, health practitioners, or even the government, may create websites providing parents with updated information about the PA programs in their cities. These PA providers not only include governments, but also clubs and sports organizations in each community; perhaps online registration for these programs could be facilitated by parents.

On a macro scale, governments may work to make our environments friendly to do PA. Even though facilities and environments were not a primary reason that Hong Kong residents did not take initiative in PA, an increasing community of sport facilities was the second-most important suggestion that they gave, pertaining to strengthening PA programs (Leisure and Cultural Services Department, 2009). Therefore, governments may enhance their infrastructure for sports team participation, including sports complexes, playgrounds, parks, and other open areas. Without much effort, governments can increase the attractiveness of sidewalks and bike trails such as convenience and cleanliness to enhance parent-led walking and running in their sparse time. With these efforts, parents may become more active, and this will help facilitating more PA opportunities for their children.

Next, it is important to identify the ways that parents enable children's PA. An optimal challenge means an appropriate level of difficulty that is associated with a children's skill level. In Eccles' Expectancy-Value Theory (1983), children's perceived competence comes from their perceived task difficulty, social groups' beliefs and behaviors, past successes or failures, and gender stereotypes. Therefore, it is essential for parents to teach or provide appropriate PA opportunities for their children. If children are involved in optimal challenges which test their competence, it may enhance children's perceived competence in fulfilling PA. In turn, children will perceive greater competence, which underlies the intrinsic motivation for children's PA.

Applying our results, parents may affect children's participation in PA through perceived competence and perceived benefits of children's PA. Pragmatically speaking, assisting parents to strengthen and facilitate their children's perceived physical competence is important, as parents' and children's perceptions are positively related (Eccles, 1983). This may be achieved by helping parents to teach or to provide age or skill level appropriate PA opportunities to their children and helping parent adopt suitable parenting styles aimed at promoting children's PA. Kimieck and Horn (2012) examined the influence of different parenting styles on children's PA; parents who promoted challenge and advocated risk taking, helped their children to develop autonomy and individualism. Goal attainment was linked to those children who perceived personal competence; whereas, highly supportive parents who nurtured and provided warmth enhanced positive parent/children communication. Most importantly, this parent/children communication is the often-overlooked key in determining if parents' encouragement (in terms of delivering the belief of perceived competence and perceived benefits of PA) is effective at promoting children's PA.

In spite of the common consensus on PA's benefits to children, parents may not fully understand the PA recommendations for their children, and the best way to measure and monitor children's PA (Bentley et al., 2012; Dwyer, Needham, Simpson, & Heeney, 2008); therefore, education regarding PA recommendations is required. In addition to children's PA recommendations, parents need to understand the PA recommendations for adults, as well. Both parents and children may then work together to meet the PA recommendations.

Another strategy to enhance parents' perceived children exercise benefits is effective mass media campaigns. In Hong Kong, more than half of Hong Kong residents (54.2%) are seldom or never aware of sports-related information (Leisure and Cultural Services Department, 2009). Certainly, more mass media campaigns are needed at promoting PA, with increased coverage such as more advertisements in electronic mass media to the public. Regarding this, the content of the mass media campaign is the most important. A lesson can be learned from Canada, that suggested that messages in mass media campaigns should include how PA is measured, the benefits of PA in the short- and long-term, and how insufficient it is for children to rely solely on their schools' physical education classes (Canadian Fitness and Lifestyle Research Institute, 2005).

Socio-demographic Variables to Studied Variables

Parents' education and income levels made significant differences to perceived exercise benefits and barriers, perceived neighborhood safety, and perceived competence of children. These findings may point to the need for health practitioners to create PA programs for these populations. Humbert and colleagues (2006) examined the factors of participation in PA among low socioeconomic (SES) and high SES youth. Youth from low SES areas

encountered specific barriers in PA, such as time constraints from family obligations, high costs of sports facilities and programs, lower proximity of sports facilities, and poorer quality of sports facilities and safety. Even though Humber's study was not targeted at children, it identified the different exercise barriers in diverse socio-economic populations.

Recently, Cleland, Tully, Kee, and Cupples (2012) reviewed PA interventions in disadvantaged communities. The elements that make these programs effective in these populations are their theoretical development, educational foundations, PA classes, exercise incentives, and social support groups. For example, an intervention that consists of class discussions and exercise provides a platform for low-income mothers to share ideas for designing exercise goals, tackling barriers, and forming different social support groups (Clarke et al., 2007); the educational intervention teaches the importance of warming up and cooling down before and after exercise, exercise safety, injury prevention, treatment of minor injuries, and how exercise benefits enhance positive attitudes toward PA (Hovel et al., 2008). Intervention provides a free 1-year gym membership for families to relieve them from the financial pressures of participating in PA (Yancey et al., 2006). Humbert and colleagues (2006) advocated more school PA programs, which hold the greatest promise for providing children from families with lower incomes and education levels with inexpensive, convenient, and safe PA. In addition, as suggested in the previous discussion, effective mass media campaigns may help to educate parents and children about exercise benefits, so that we can overcome potential exercise barriers in the future.

All of the above suggestions may also help single-parent households, as single-parent families have a statistically lower socio-economic status (Curtis, 2001). In these studies, parenting status also had an influence on parents' perceived neighborhood safety. To enhance

single parents' perceived neighborhood safety, health practitioners may provide them with fun and safe exercise experiences. Azar, Naughon, and Joseph (2009) reported that little-to-no cost, convenient exercises, and social programs with children care services improved exercise perceptions in both parents and their children. School PA programs may help to make parents more comfortable about supporting their children to be active after school. On a macro scale, governments can work to build and maintain safety in parks, sport complexes, and open spaces by enhancing street lighting and assigning more patrol officers to those areas.

Finally, children's gender made a significant difference in parents' perceived children exercise benefits, parents' perceived competence of children, parental support, and children's overall PA. These gender-related findings provide some potential implications for promoting children's PA. First, a systematic review of girls' PA concluded that multi-component school-based programs were effective at addressing the unique needs of girls in PA participation (Camacho-Miñano, LaVoi, & Barr-Anderson, 2011). Therefore, health practitioners or educators may use the multi-component programs in the future. Examples of effective multi-component programs included activities classes with social support and goal setting, along with take-home activities requiring parent involvement. Secondly, in order to minimize gender-stereotypes in children, educators and family members should strive to cultivate a supportive learning environment for both genders, especially girls. In order to enhance the transition of gender equality in PA, or even sports participation, gender awareness training may need to be implemented for family members so that they can become more sensitive to potential gender issues. In addition to relying on educators and family members, gender stereotypes may also decrease through girls' efforts, in conjunction with appropriate mass media coverage (Horn, 2008). Ha, Abbott, Macdonald, and Pang (2009)

found that a lack of interest, few-to-no choices, time constraints, and poor skill competence were the main barriers for older girls (11-16 years old) who participated in PA in Hong Kong. This indicates that we must identify ways to overcome these barriers to enhance girls' PA participation in the future. For example, schools may develop enjoyable after-school programs by increasing the choices of PA and introducing more non-competitive PA; teaching and coaching could be unisex and encourage equal value in support of girls' achievements. Lastly, in Hong Kong, the ideology of Confucianism advocates that girls should generally be quiet and discreet, which is in opposition to masculine behavior in sports and other PA; this ideology may discourage girls to participate in PA. For this reason, further studies in young girls' exercise barriers as well as PA participation, which encompass unique cultural aspects, may provide more insights to the effective strategies for promoting PA among young girls in Hong Kong.

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

This study examined parents' perceptions about children's competence of children, neighborhood safety, exercise benefits and exercise barriers, parental support, and children's PA. Each of the relationships among the above constructs was analyzed, including how socio-demographic characteristics differ the above constructs (i.e., parents' perceived competence of children, parents' perceived neighborhood safety, parents' perceived children exercise benefits and exercise barriers, parental support, and children's PA).

Summary of Results

The result partially supported the application of Eccles' Expectancy-Value Theory on understanding the influence of parental socialization on children's PA. Only parental support was a significant factor for predicting children's PA. Indirectly, both parents' perceived competence in their children, and children exercise benefits predicted parental support; which, in turn, predicted children's overall PA output. Regarding socio-demographic variables, parents' education and income levels differed parents' perceived exercise benefits and barriers, perceived neighborhood safety, and perceived competence of children. Parenting status differed significantly on parents' perceived neighborhood safety. Single parents tended to have lower perceived neighborhood safety. Lastly, children's gender made a significant difference in parental support, perceived exercise competence, perceived exercise benefits,

and children's PA. Parents of sons were likely to have higher perceived children exercise benefits, parental support, exercise competence as well as a more active son.

Strength of the Study

In this study, several strengths should be noted. For example, parenting status (i.e., dual-parent and single-parent) was a major factor taken into consideration. Unfortunately, literature surrounding children's PA in single-parent families is scarce; more research as suggested by Trost and Loprinzi (2011) is needed. Next, this study made a strong attempt at understanding parents' perception on children's PA in Hong Kong, a city of China in Asia, whereas most previous studies that examined children's PA were concentrated in Western countries. Thus, this study that was conducted in a different cultural background, which was suggested by Trost and Loprinzi (2011), would contribute to advancing the science of effective intervention planning for promoting children's PA on a global (standardized) scale. Most importantly, the previous related study (Cheung, 2006) in Hong Kong was targeted older children (9-12 years old). This study was aimed at understanding the determining factors influencing younger children's PA output to create age-specific interventions that can be developed for youth 6-9 years old. This study has also confirmed the validity and reliability of a modified PA Questionnaire for Children to assess parent proxy reports of their young children's PA outside of school time. This modified instrument can be used in Hong Kong's PA programs in the future. Importantly, the structural model of this study explained 44% of children's PA, which is higher than average effect size of previous relating studies reviewed by Pugliese and Tinsley (2007).

Methodological Recommendations

Although this study contains some strengths, it has limitations which should be cautions in future study. First, the questionnaires were self-administrated, which might lead to social desirability bias and lower the validity of findings in the study. This study involved a cross-section design where all data were collected at one time. Horn (2004) found that social influencers' influence varied according to the age and developmental stage of the children. Rather than heavily rely on parents' feedback, when children get older, they may increase their cognitive development and synthesize different information sources and evaluate their own competence. With regard to the developmental consideration, older children may increase their needs for social acceptance from peer and such development changes may lower the influences from parents on their physical activity. Considering that parents' influence on children's PA changes as children grow older; children's developmental characteristics as relating to parents' influence should be addressed in the future studies. In the future, a longitudinal study should investigate the changes of parents' influence on children's PA at multiple times. In this study, there were only five items (Sallis et al., 2000) measuring parental support. These few items may lower the ability to examine other influencing factors of parental support. Well-developed scales with more factors will definitely be necessary to explore parental support comprehensively. In addition, it should be noted that only one parent was asked to complete the questionnaires, and most of the respondents were mothers; therefore, future studies may ask for both fathers' and mothers' participation when complete questionnaires so that we may better understand gender biases and their influence on children's PA. Moreover, even the structural model indicated that about 40% of children's PA was influenced by other predictors, such as parenting style and

family cohesion; these predictors may need to be investigated in the future. Furthermore, to fully understand how children's PA is determined, other socializing agents, such as siblings, peers, and teachers should be included in future studies. Most importantly, a major limitation of this study was our small sample size. We did not divide the sample in two, for confirmatory factor analysis and structural equation modeling, respectively; instead, pool data were used for both confirmatory factor analysis and structural equation modeling. Even ECVI was supplemented in the study, future studies with larger sample sizes are recommended to duplicate this study design.

In addition to the above issues, specific areas in the study may warrant additional investigation. Currently, Chalabaev et al. (2013) has suggested a situational approach to understanding gender stereotypes in PA participation. Other than internalizing explanations suggested by Eccles' Expectancy-Value Theory, the situational approach indicated that the mere presence of stereotypes in an evaluation situation may be another explanation for the decrease in girls' PA participation. Future studies may apply this alternative to study children's PA and, perhaps, by drawing on this alternative, interventions can be developed by modifying negative situational factors.

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APPENDIX A

I am Leung Ka Man, Carman, a student studying in Doctor of Philosophy in the Hong Kong Baptist University. I am now working on a project investigating children's physical activity. It should take only a few minutes to complete. If there is any question relating to this questionnaires, please contact me at 3411 3095. All the information you provided will be kept confidential. Thank you for your cooperation.

1. The following section includes statements about your child's physical competence. Please circle the according number to show how true each sentence is about **your child**.

Not at all true	Not very true				Sort of true	Very true
1	2	My child does not do well at all sports.	But	My child does well at all sports.	3	4
1	2	My child is poorer at sports.	But	My child is better at sports.	3	4
1	2	My child does unwell at new activity.	But	My child does well at new activity.	3	4
1	2	My child is not good enough at sports.	But	My child is good enough at sports.	3	4
1	2	My child is not first chosen for games.	But	My child is first chosen for games.	3	4
1	2	My child watch rather than play.	But	My child plays rather than watch.	3	4
1	2	My child is not good at new sports.	But	My child is good at new sports.	3	4

2. The following section includes statements about your support to your child's physical activity. Please circle the according number to show how true each sentence is about **you.**

	How often do you	None	One day a week	Three days a week	Five days a week	Daily
i.	Encourage your child to do physical activities or play sport?	1	2	3	4	5
ii.	Do physical activities or play sports with their child?	1	2	3	4	5
iii.	Provide transportation so your child can go to a place where he or she can do physical activities or sport?	1	2	3	4	5
iv.	Watch your child participate in physical activity and sport?	1	2	3	4	5
v.	Tell your child that physical activity is good for his or her health?	1	2	3	4	5

3. The following section includes statements about your perceived neighborhood safety. Please circle the according number to show how true each sentence is about **you.**

How often you find the following things occur in the neighborhood?		Never	Rarely	Sometimes	Frequently
i.	Drug dealers or users hanging around	1	2	3	4
ii.	Drunks hanging around	1	2	3	4
iii.	Unemployed adult loitering	1	2	3	4
iv.	Young adults loitering	1	2	3	4
v.	Gang activity	1	2	3	4
vi.	Disorderly or misbehaving groups of young children	1	2	3	4
vii.	Disorderly or misbehaving groups of teenagers	1	2	3	4
viii.	Disorderly or misbehaving groups of adults	1	2	3	4

4. Below are statements that relate to ideas about exercise. Please indicate the degree to which you agree or disagree with the statements by circling appropriate answer.

		Strongly agree	Agree	Disagree	Strongly disagree
1.	My child enjoys exercise.	1	2	3	4
2.	Exercise decreases feelings of stress and tension for my child.	1	2	3	4
3.	Exercise improves my child's mental health.	1	2	3	4
4.	Exercising takes too much of my child's time.	1	2	3	4
5.	My child will prevent heart attacks by exercising.	1	2	3	4
6.	Exercise tires my child.	1	2	3	4

7.	Exercise increases my child's muscle strength.	1	2	3	4
8.	Exercise gives my child a sense of personal accomplishment.	1	2	3	4
9.	Places for my child to exercise are too far away.	1	2	3	4
10.	Exercising makes my child feel relaxes.	1	2	3	4
11.	Exercising lets my child have contact with friends and persons I enjoy.	1	2	3	4
12.	My child is too embarrassed to exercise.	1	2	3	4
13.	Exercising will keep my child from having high blood pressure.	1	2	3	4
14.	It costs too much money to exercise.	1	2	3	4
15.	Exercising increases my child's level of physical fitness.	1	2	3	4
16.	Exercise facilities do not have convenient schedules for my child.	1	2	3	4
17.	My muscle tone is improved with exercise.	1	2	3	4
18.	Exercising improves functioning of my child's cardiovascular system.	1	2	3	4
19.	My child is fatigued by exercise.	1	2	3	4
20.	My child has improved feelings of well being from exercise.	1	2	3	4
21.	My spouse (or significant other) does not encourage exercising.	1	2	3	4
22.	Exercise increases my child's stamina.	1	2	3	4
23.	Exercise improves my child's flexibility.	1	2	3	4
24.	Exercise takes too much time from family relationships.	1	2	3	4
25.	My disposition is improved by exercise.	1	2	3	4
26.	Exercising helps my child sleep better at night.	1	2	3	4
27.	My child will live longer if he or she exercises.	1	2	3	4
28.	My child thinks people in exercise clothes look funny.	1	2	3	4
29.	Exercise helps my child decrease fatigue.	1	2	3	4
30.	Exercising is a good way for my child to meet new people.	1	2	3	4
31.	My physical endurance is improved by exercising.	1	2	3	4
32.	Exercising improves my child's self-concept.	1	2	3	4
33.	My family members including me do not encourage my child to exercise.	1	2	3	4

34.	Exercising increases my child's mental alertness.	1	2	3	4
35.	Exercise allows my child to carry out normal activities without becoming tired.	1	2	3	4
36.	Exercise improves the quality of my child's work.	1	2	3	4
37.	Exercise to my child takes too much time from family responsibilities.	1	2	3	4
38.	Exercise is good entertainment for my child.	1	2	3	4
39.	Exercising increases my child's acceptance by others.	1	2	3	4
40.	Exercise is hard work for my child.	1	2	3	4
41.	Exercise improves overall body functioning for my child.	1	2	3	4
42.	There are too few places for my child to exercise.	1	2	3	4
43.	Exercise improves the way my child's body looks.	1	2	3	4

5. This section is about your child's level of physical activity from the last 7 days (in the last week). This includes sports or dance that make the child sweat or make their legs feel tired, or games that make our child breathe hard, like tag, skipping, running, climbing, and others.

Remember:

1. There are no right and wrong answers — this is not a test.

2. Please answer all the questions as honestly and accurately as you can

I. 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 square per row.)

	No	1-2	3-4	5-6	7 times or more
Skipping	☐	☐	☐	☐	☐
Hide and seek……..	☐	☐	☐	☐	☐
Walking or jogging.....	☐	☐	☐	☐	☐
Bicycling	☐	☐	☐	☐	☐
Swimming or water sport……	☐	☐	☐	☐	☐
Dance……..	☐	☐	☐	☐	☐
Kung Fu (e.g. judo and taekwondo)	☐	☐	☐	☐	☐
Ball games (e.g. basketball, soccer, badminton, table tennis, volleyball…etc)	☐	☐	☐	☐	☐

Skateboarding……..	☐	☐	☐	☐	☐
Ice skating……	☐	☐	☐	☐	☐
Others (not listed above)	☐	☐	☐	☐	☐
Activity: _____	☐	☐	☐	☐	☐

II. In the last 7 days, on how many days *right after school*, did you do sports, dance, or play physical related games in which you were very active? (Check one only.)

None……. ☐

1 time last week…… ☐

2 or 3 times last week…… ☐

4 or 5 last week…… ☐

6 or 7 times last week……..…….. ☐

III. In the last 7 days, on how many *evenings* did you do sports, dance, or play physical relate games in which you were very active? (Check one only.)

None…… ☐

1 time last week…… ☐

2 or 3 times last week……. ☐

4 or 5 last week…….. ☐

6 or 7 times last week……. ☐

IV. *On the last weekend*, how many times did you do sports, dance, or play physical related games in which you were very active? (Check one only.)

None…… ☐

1 time last week…… ☐

2 or 3 times last week…… ☐

4 or 5 last week…… ☐

6 or 7 times last week…… ☐

V. 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.

All or most of my free time was spent doing things that involve little physical effort…… ☐

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)……..... ☐

I often (3 — 4 times last week) did physical things in my free time…… ☐

I quite often (5 — 6 times last week) did physical things in my free time…..... ☐

I very often (7 or more times last week) did physical things in my free time…….. ☐

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

	None	Little bit	Medium	Little often	Very often
Monday	☐	☐	☐	☐	☐
Tuesday	☐	☐	☐	☐	☐
Wednesday	☐	☐	☐	☐	☐
Thursday	☐	☐	☐	☐	☐
Friday	☐	☐	☐	☐	☐
Saturday	☐	☐	☐	☐	☐
Sunday	☐	☐	☐	☐	☐

VII. Were you sick last week, or did anything prevent you from doing your normal physical activities? (Check one.)

Yes…….. ☐

No……... ☐

If Yes, what prevented you?_____ ☐

Part II: Personal Particulars

Parents

1. Age (to the last birthday)

   Up to 20 ☐ 21-30 ☐ 31-40 ☐

   41-50 ☐ 51or above ☐

2. Gender: Male ☐ Female ☐

3. Highest education level completed:

   No schooling or primary school ☐ Secondary school ☐

   Tertiary education or above ☐

4. Current work status:
   Full time ☐ Part time or temporary job ☐

   Searching for job ☐ Housewife ☐

5. Monthly income:

   HK$50000 or above ☐ HK$30000 - 49999 ☐ HK$10000 - 29999 ☐

   HK$5000 - 9999 ☐ HK$4999 or below ☐

6. If you are a single parent, please indicate:
   Yes ☐ No ☐

Child

1. Gender of your child: Boy ☐ Girl ☐
2. Age of your child **(**to the nearest year): _____

Thank you very much for your participation in the research.

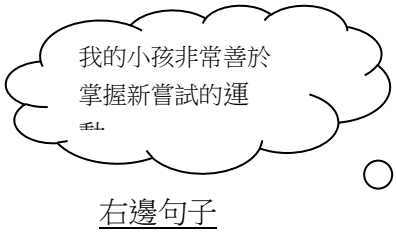
APPENDIX B

各位:

您們好，我是香港浸會大學體育系博士生，現正進行一項有關家長對子女體能活動看法的研究。懇請閣下撥冗回答本問卷，您們的意見對了解兒童體能活動及未來發展非常重要。如果您對此問卷有任何疑問，請聯絡本人 梁家文小姐(3411 3095)。您所提供的一切資料將絕對保密，如蒙參與，不勝感激。

第一部分: 對子女身體能力的看法

下列是關於你子女身體能力的陳述。試想想你的子女是否跟以下描述的小孩相似，或你的子女是否喜歡以下描述的小孩。請用心閱讀，並圈出最適當的數目字。*(請回答所有問題)*



步驟 1) 左邊一句還是右邊一句較適合形容你的子女?

步驟 2) 這句子非常真確或有點真確地形容你的子女?

	非常真確	有點真確	左邊句子		右邊句子	有點真確	非常真確
例子	1	2	一些小孩並非善於掌握新嘗試的運動。	但是	一些小孩善於掌握新嘗試的運動。	3	4
	1	2	一些小孩不是在所有運動都表現良	但是	一些小孩在所有運動表現良好。	3	4
	1	2	一些小孩運動表現較差。	但是	一些小孩運動表現較佳。	3	4
	1	2	一些小孩嘗試新活動時表現不太好。	但是	一些小孩嘗試新活動時表現良好。	3	4
	1	2	一些小孩運動得不夠好。	但是	一些小孩運動得夠好。	3	4
	1	2	一些小孩不是首先被選中參加比賽的。	但是	一些小孩是首先被選中參加比賽的。	3	4
	1	2	一些小孩寧願觀看而不參與遊戲。	但是	一些小孩寧願參與遊戲而不會觀看。	3	4
	1	2	一些小孩並非善於掌握新嘗試的運動。	但是	一些小孩善於掌握新嘗試的運動。	3	4

第二部分：你為孩子參與體能活動提供的支持

下列是關於你為孩子參與體育活動提供的支持，請用心閱讀，並圈出最適當的數目字。*(請回答所有問題)*

在平常的一周裏，你經常做以下事情嗎？		從不	一星期一次	一星期兩三次	一星期四五次	每天
i.	鼓勵孩子參與體能活動或做運動？	1	2	3	4	5
ii.	與孩子一起參與體能活動或做運動？	1	2	3	4	5
iii.	接送孩子參與體能運動或做運動？	1	2	3	4	5
iv.	在場旁觀孩子參與體能活動或做運動？	1	2	3	4	5
v.	教導孩子體能活動是有益健康的？	1	2	3	4	5

第三部分：鄰近環境的安全

下列是關於你對鄰近環境安全的看法，請用心閱讀，並圈出最適當的數目字。*(請回答所有問題)*

鄰近環境是否經常出現以下情況？		從不出現	很少出現	有時出現	經常出現
i.	毒販或吸毒者在附近流連	1	2	3	4
ii.	醉漢在附近流連	1	2	3	4
iii.	無業者在附近遊蕩	1	2	3	4
iv.	年輕人在附近遊蕩	1	2	3	4
v.	糾黨活動	1	2	3	4
vi.	搗亂或行為不檢的孩子聚集	1	2	3	4
vii.	搗亂或行為不檢的青年聚集	1	2	3	4
iii.	搗亂或行為不檢的成年人聚集	1	2	3	4

第四部分：對運動的看法

以下是你對子女運動的看法，請用心閱讀，並圈出最適當的數目字。*(請回答所有問題)*

	極不同意	不同意	同意	極同意
1．我的子女享受運動。	1	2	3	4
2．運動舒緩子女的壓力及緊張情緒。	1	2	3	4
3．運動改善子女的精神健康。	1	2	3	4
4．運動佔用子女太多的時間。	1	2	3	4
5．運動可預防子女患上心臟病。	1	2	3	4
6．運動令子女疲倦。	1	2	3	4
7．運動增強子女的肌肉力量。	1	2	3	4
8．運動為子女帶來個人成就感。	1	2	3	4
9．子女做運動的地點太遙遠。	1	2	3	4
10.運動令子女放鬆。	1	2	3	4
11.運動讓子女接觸他/她的朋友和他/她喜歡的人。	1	2	3	4
12.運動令子女感到十分尷尬。	1	2	3	4
13.運動可預防子女患上高血壓。	1	2	3	4
14.運動花費太多金錢。	1	2	3	4
15.運動增強子女的體能。	1	2	3	4
16.運動設施的使用時間不方便子女使用。	1	2	3	4
17.運動令子女的肌肉更結實。	1	2	3	4
18.運動強化子女的心血管功能。	1	2	3	4
19.子女運動後感到非常疲乏。	1	2	3	4

20.運動令子女感到身心更健康。	1	2	3	4
21.我的配偶（或其他對我重要的人）並不鼓勵運動。	1	2	3	4
22.運動增強子女的耐力。	1	2	3	4
23.運動提升子女的柔韌度。	1	2	3	4
24.運動奪去子女太多親子時間。	1	2	3	4
25.運動能陶冶子女的性情。	1	2	3	4
26.運動令子女在夜晚睡得好一點。	1	2	3	4
27.如果子女做運動，他們便會更長壽。	1	2	3	4
28.子女認為穿著運動服裝的人看起來很奇怪。	1	2	3	4
29.運動令子女減少疲累的感覺。	1	2	3	4
30.運動是子女結識朋友的理想途徑。	1	2	3	4
31.運動可以改善子女身體的耐力。	1	2	3	4
32.運動可提升子女的自我概念。	1	2	3	4
33.家人(包括我在內)並不鼓勵子女做運動。	1	2	3	4
34.運動提升子女的心理靈敏度。	1	2	3	4
35.運動令子女進行日常活動時不會疲倦。	1	2	3	4
36.運動提升子女的功課質素。	1	2	3	4
37.運動佔據子女履行家庭責任(如幫助家務)的時間。	1	2	3	4
38.運動是子女的良好娛樂活動。	1	2	3	4
39.運動可提升人們對子女的認同。	1	2	3	4
40.運動對子女來說是一件難事。	1	2	3	4
41.運動可改善子女的全身機能。	1	2	3	4
42.讓子女做運動的地方太少。	1	2	3	4
43.運動改善子女的身型外貌。	1	2	3	4

第五部分:子女參與體能活動的情況

在下列各題中，請在您所選擇的方格上加上“✓”號。

1．在過去一個星期（7 日）的空餘時間裏，您的子女有沒有從事下列的體育活動？

	沒有	1-2 次	3-4次	5-6次	7次或以上
跳繩	☐	☐	☐	☐	☐
捉迷藏	☐	☐	☐	☐	☐
跑步、步行	☐	☐	☐	☐	☐
踏單車	☐	☐	☐	☐	☐
游泳、水上活動	☐	☐	☐	☐	☐
跳舞、跳舞機	☐	☐	☐	☐	☐
打功夫（例如柔道、跆拳道等	☐	☐	☐	☐	☐
各項球類(如籃球、足球、羽毛球、排球、乒乓球等)	☐	☐	☐	☐	☐
滑板、滑板車	☐	☐	☐	☐	☐
溜冰	☐	☐	☐	☐	☐
其他請註明: _____	☐	☐	☐	☐	☐

2．在過去一個星期，有多少天的課外時間您的子女會參與運動、舞蹈或遊戲活動？

無	1 天	2-3天	4-5天	6-7天
☐	☐	☐	☐	☐

3．在過去一個星期，有多少個晚上您的子女會參與運動、舞蹈或遊戲活動？

無	1 天	2-3天	4-5天	6-7天
☐	☐	☐	☐	☐

4．在上個周末（星期六及日），您的子女曾進行運動、舞蹈或遊戲活動多少次？

無	1 次	2-3次	4-5次	6-7次
☐	☐	☐	☐	☐

5．以下那一句最能形容您的子女過去7天參與體力活動的情況？

a）您的子女上星期全部空餘時間所進行的活動只需少許體力 ☐
b）在上星期的空餘時間裏，您的子女間中（1-2次）進行體力活動（例如跑步、游泳、踏單車等） ☐
c）在上星期的空餘時間裏，您的子女常（3-4次）進行體力活動（例如跑步、游泳、踏單車等） ☐
d）在上星期的空餘時間裏，您的子女頗經常（5-6次）進行體力活動（例如跑步、游泳、踏單車等） ☐
e）在上星期的空餘時間裏，您的子女經常（7次或以上）進行體力活動（例如跑步、游泳、踏單車等） ☐

6．在上個星期的每一天裏，您的子女從事體力活動、遊戲、舞蹈的情況是：

	不會做任何體力活動	做少許	做中等量	做得頗多	做非常多
星期一	☐	☐	☐	☐	☐
星期二	☐	☐	☐	☐	☐
星期三	☐	☐	☐	☐	☐
星期四	☐	☐	☐	☐	☐
星期五	☐	☐	☐	☐	☐
星期六	☐	☐	☐	☐	☐
星期日	☐	☐	☐	☐	☐

7．您的子女上星期有沒有生病，或有甚麼事情妨礙您的子女不能從事正常的體力活動？

☐ 無

☐ 有，因為（請填寫）_____

所以您的子女上星期未能進行正常的體育活動。

第六部分:個人資料

家長

1. 年齡:
   20 歲或以下 ☐　　21-30 歲 ☐　　31-40 歲 ☐
   41-50 歲 ☐　　51-60 歲 ☐　　61 歲或以上☐
2. 性別: 父親 ☐　母親 ☐
3. 最高學歷:
   未受教育 ☐　　小學畢業 ☐　　中學畢業 ☐
   專上學位 ☐　　研究院或以上 ☐
4. 目前的就業情況:
   全職　☐　　兼職或臨時工 ☐　　待業 ☐
   家庭主婦 ☐　　已退休　☐
5. 經濟狀況 (家庭總收入):
   每月收入五萬　☐　　每月收入三萬至五萬 ☐　　每月收入一萬至三萬 ☐
   每月收入五千至一萬　　每月收入五千或以下 ☐
6. 如果你是一名單親，請指出：是 ☐　　否 ☐

子女

1. 性別: 男 ☐　女 ☐
2. 年齡: 大約 _____歲

多謝你的參與。

CURRICULUM VITAE

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