

Impact of self-efficacy and parenting practice on physical activity among school children

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ABSTRACT

As insufficient engagement in physical activity (PA) is becoming a major health concern in Thailand, we aimed to investigate the impact of parenting practices and children's self-efficacy on a child's PA level and further in the subgroups, stratified by the child's sex and weight status. A total of 609 primary school children recruited by cluster sampling in two schools were asked to complete questionnaires, and general familial factors and parenting practice related to activities were completed by parents. Multivariate linear regressions were conducted to calculate the standardized beta-coefficients (β). Children's PA level was positively related to greater support seeking self-efficacy ($\beta=0.281$) for engaging in PA, and parenting practices, including less limit setting ($\beta=-0.124$) and more discipline ($\beta=0.147$) in the total sample. In the analyses of subgroups by a child's sex and weight status, parenting practice, such as less limit setting and discipline played a more important role in children's PA in normal weight children and girls as taking account of around 10% of variance of the child's PA, while only seeking support self-efficacy showed great impact in overweight children and boys. In conclusion, impacts of children's self-efficacy and parenting practices on children's PA were different by child's sex and weight status. This can suggest that future interventions to increase children's PA might need to consider different strategies to increase children's self-efficacy as well as parenting strategies when targeting different groups of children.

Keywords: parenting practice; physical activity; children; self-efficacy

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INTRODUCTION

Increasing the proportion of children who engage in regular physical activity (PA) continues to be a public health priority due to its health benefits, such as avoidance of weight gain, metabolic disease risk profile, and depression symptoms.¹⁾ Despite the health benefits of PA, a result from a national survey showed that the proportion of Thai children aged 11 to 14 who are playing or engaging in exercise seemed to reduce from 73.1% in 2007 to 60.1% in 2011.²⁾ A recent Global School-based Student Health Survey (GSHS) study also reported that only 24%

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of Thai children aged 13–15 years did PA for 5 days or more during the past 7 days.³ Thus, understanding factors influencing the child's PA habits is important.

Social Cognitive Theory (SCT) is one of the predominant models for understanding and impacting health behavior, such as PA. Indeed, recent review studies reported that SCT, which explains that behavior is influenced by social and psychological determinants, is a useful framework for explaining PA behavior.^{4,5} In light of social determinants, as health-related behaviors are established during childhood predominantly within the context of the family,⁶ parents play a critical role in developing and shaping their child's PA behaviors,⁷ directly through parenting practices, which are defined as strategies that parents use to help their children to engage in a behavior.⁸ A few studies have investigated the impact of parenting styles or practices on the child's PA,^{9–11} although its impact on children's PA still remains an understudied subject. Meanwhile, a significant psychosocial construct of healthy behavior identified by SCT is self-efficacy, which is defined as "people's beliefs in their capabilities to organize and execute courses of action required to perform a given behavior."¹² The child's self-efficacy^{13,14} as well as the parent's role can enhance a child's PA during the process of PA adoption and maintenance. In particular, older primary school children moving to the peri-puberty period, may have an increasing degree of freedom and decision-making power to either make or influence family decisions, compared to younger primary school children,¹⁵ and thus parental control begins to be undermined.¹⁶ Despite a body of literature on the association of either self-efficacy¹⁴ or parenting practice^{8,9,17} with PA, their associations on children's PA still remains unclear. Therefore, the first aim of this study was to identify the association of the child's self-efficacy and parenting practices with the child's PA based on SCT among older primary school children. Also, many interventions have been done by child's weight status,^{18,19} and factors related to child's PA is different by child's sex.^{10,20,21} The second aim, therefore, was to investigate separately for children by weight status and sex of children. This information could be important for future intervention investigators to tailor the intervention to specific subgroups.

MATERIALS AND METHODS

Study design and participants

A cross-sectional study was conducted in two conveniently selected primary schools in Nakhon Pathom, Thailand, in 2015. One school was selected among schools run by municipal governments, and the other was chosen among general public schools run by the Office of the Basic Education Commission (OBEC), Ministry of Education. Prior to undertaking the study, the study design and purpose were discussed with the director of each school and their approvals were obtained. All students in randomly selected classes from 4th Grade to 6th Grade in the two schools were invited to participate in the measurements consisting of a written questionnaire and anthropometry (n=609), which was administered by trained researchers during school time (response rate=100%). Students' parents or caregivers were invited by letter to complete a written questionnaire on socioeconomic factors and parenting practices (response rate=88%).

Ethical consideration

The study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving human subjects were approved by the Human Research Ethics Committee of Mahidol University, Thailand (Approval No.: 2015/033.2701). Written informed consent was obtained from all children and their parents after explanation of the study objectives and assurance of the confidentiality of their identity and assurance that choosing not to

participate would not disadvantage them in any way. All data were treated anonymously with study identification number.

Self-efficacy for engaging in PA

Questions for self-efficacy for engaging in PA were developed by Saunders and her colleagues,²²⁾ and the questions had 'yes' or 'no' response options. Self-efficacy was assessed with two subscales, such as seeking support (7 items) and barriers (4 items) for engaging in PA. The internal consistency of each subscale, as assessed by Cronbach's alpha coefficient (α), was 0.65 and 0.73, respectively. Seeking support self-efficacy measured confidence in the ability to ask for help in getting PA, while barrier self-efficacy measured confidence in the ability to be physically active in the presence of barriers, such as hot or cold outside, lots of homework, busy day or feeling tired. For example, "If I were to be physically active most days, I think I can/would..." Response options were 'yes' or 'no' responses.

Parenting strategies

The Parenting Strategies for Eating and Activity Scale (PEAS)²³⁾ was developed for Latino parenting strategies related to children's obesogenic behaviors, such as eating (16 items) and activity (10 items). Activity-related questions from PEAS were used to assess parenting practices related to children's PA in our study. A 5-point Likert-type response style was given for the scales. The questions related to children's activity habits from the PEAS were used to measure (1) parental control (1 item for parents' use of control styles, for example, "I offer TV, video, video games, mobile-phone games to my child as a reward for good behavior"); (2) limit setting (4 items, $\alpha=0.81$) to assess parents' use of appropriate boundaries with sedentary behaviors during weekdays and during weekends, such as i) watching TV or videos and ii) playing video games/being on a computer; (3) monitoring (2 items to measure the frequency with which parents monitored i) the amount of TV or video their children watched and ii) the amount of exercise their child is getting); (4) reinforcement (1 item to measure how often parents praise your child for being physically active); and (5) discipline (2 items measured the frequency with which parents disciplined their children for engaging in sedentary behavior [e.g. watching TV and playing video games or on the computer] without their permission).

Physical activity level

PA was assessed using the Physical Activity Questionnaire for Thai children (PAQ for Thai),²⁴⁾ was developed and validated to assess PA against the Computer Science Application accelerometer to set norms of Physical activity Level (PAL) of Thai children aged 9–12 years. The PAQ for Thai has 53 items and includes 4 components, including household activity, play activity, exercise activity, and sports activity. The frequency response of each PA item ranged from never, sometimes (1–2 days), usually (3–5 days), to every day (6–7 days), which were coded as 0, 1.5, 4, and 6.5 days, respectively. Each activity on the questionnaire was assigned a metabolic equivalent (MET) score based on the Compendium of Physical Activity²⁵⁾ that was obtained from the intensity of each activity. The MET value is the energy expenditure achieved during the performance of an activity.²⁵⁾ Total PA scores (METs per week) were calculated by multiplying the frequency of each activity by MET scores. The values from the individual activities were summed up to a total PA score per week. The internal consistency of PAQ for Thai was high in this study ($\alpha=0.95$).

Data analysis

Descriptive statistics were used to describe the proportion or mean of general characteristics

of participants. Based on the age and gender-specific BMI values using the extended IOTF BMI cutoffs,²⁶⁾ the weight status was categorized to normal weight (less than 25) and overweight (25 or above). As the outcome variable of the total scores of PA (METs for a week) was skewed, square root transformation was used to obtain the variable with a normal distribution. Collinearity was checked by calculating the variance inflation factors (VIF), which showed no collinearity among predictors (1.4 was the highest VIF). The covariates in terms of child characteristics, parent/family characteristics, and parenting practices were entered into a multiple linear regression model to identify variables related to the PA level (total score of METs per week) and the standardized beta-coefficients (β) and p-values were presented. P-value <0.05 was considered significant. Statistical analyses were conducted with SAS for Windows 9.3 (SAS Institute Inc., Cary, NC, USA).

RESULTS

Students were on average 10.6 years old and 54.4% was girls (Table 1). Approximately 40% of parents reported they had a higher maternal education (college education or higher) and a household income of more than 20,000 Baht per month (equivalent of 560 US dollar).

In the overall sample (Table 2), seeking support self-efficacy for engaging in PA ($\beta=0.281$) and disciplinary practice ($\beta=0.147$) were positively associated with being more physically active, while limit setting was negatively associated ($\beta=-0.124$). The model 2 explained 8% of the variance in children's PA. When variables of parenting practice were included in model 3, the final model showed a 4% increment of the variance compared to that in model 2.

Table 1 General characteristics of study sample (n=609)

	Total		Girls		Boys	
	n	% or Mean \pm SD	n	% or Mean \pm SD	n	% or Mean \pm SD
Child's characteristics						
Child's sex						
Girls	331	54.4	–	–	–	–
Boys	278	45.7	–	–	–	–
Child's age	608	10.6 \pm 0.93	331	10.6 \pm 0.9	277	10.7 \pm 1.0
Child's grade						
Grade 4	222	36.5	117	35.4	105	37.8
Grade 5	227	37.3	130	39.3	97	34.9
Grade 6	160	26.3	84	25.4	76	27.3
Child's BMI						
Normal weight (<25 kg/m ²)	420	69.1	254	76.7	166	59.9
Overweight (\geq 25 kg/m ²)	188	30.9	77	23.3	111	40.1
School						
School A	304	49.9	177	53.5	127	45.7
School B	305	50.1	154	46.5	151	54.3
Physical activity level (METs/week) (Min, Max)	609	577 \pm 362 (27,1752)	331	570 \pm 345 (59,1752)	278	585 \pm 383 (27,1752)
Seeking support SE ¹⁾ (0–7scores)	594	5.0 \pm 1.8	322	5.0 \pm 1.7	272	5.0 \pm 1.8
Barrier SE (0–4 scores)	600	1.7 \pm 1.5	326	1.5 \pm 1.4	274	2.1 \pm 1.5

Children's physical activity

Family characteristics

Maternal education level						
Primary-	115	23.8	70	25.3	45	21.7
Secondary	173	35.7	94	33.9	79	38.2
College +	196	40.5	113	40.8	83	40.1
Parents w/ high BMI ($\geq 25\text{kg/m}^2$)						
None	174	47.03	103	49.8	71	43.6
One or both	196	52.97	104	50.2	92	56.4
No. of people <18 yrs						
2+	324	63.5	191	65.6	133	60.7
1	186	36.5	100	34.4	86	39.3
Family income (Baht/month)						
less than 10,000	118	22.7	74	25.1	44	19.6
10,001 – 20,000	190	36.5	106	35.9	84	37.3
$\geq 20,001$	212	40.8	115	39.0	97	43.1

Parenting strategies for Activity

Control (1–5 score)	526	2.7 \pm 1.5	300	2.7 \pm 1.4	226	2.8 \pm 1.5
Limit setting (4–20 score)	526	16.2 \pm 3.9	300	16.0 \pm 3.9	226	16.5 \pm 3.8
Monitoring (2–10 score)	526	6.8 \pm 1.6	300	6.7 \pm 1.5	226	6.8 \pm 1.7
Reinforcement (1–5 score)	526	3.3 \pm 1.3	300	3.3 \pm 1.3	226	3.3 \pm 1.3
Discipline (1–10 score)	526	6.7 \pm 2.2	300	6.7 \pm 2.2	226	6.7 \pm 2.2

1) SE; self-efficacy

Table 2 Regression coefficients of physical activity level for general characteristics, self-efficacy, parenting strategies and physical activity level in total sample

	Total		
	Model 1	Model 2	Model 3
General characteristics			
Child's age	0.028	0.002	0.005
Child's obesity (yes vs. no)	-0.061	-0.051	-0.048
Child's sex (boys vs. girls)	0.016	-0.009	-0.021
Maternal education (college + vs. secondary-)	-0.025	-0.067	-0.066
Parental overweight (one or both vs. none)	0.057	0.081	0.090
No. of people < 18 yrs (1 vs. 2+)	0.068	0.036	0.037
Family income (high vs. low)	-0.037	-0.023	-0.040
Psychosocial factors			
SE for social support		0.288 ***	0.281 ***
SE for barriers		0.052	0.097
Parenting strategies			
Control			0.066
Limit setting			-0.124 *

Monitoring			0.099
Reinforcement			0.013
Discipline			0.147 **
Adjusted R²	-0.008	0.084	0.124
F-value	0.640	4.300	4.270

SE; Self-efficacy, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Girls were more physically active when having higher seeking support self-efficacy ($\beta = 0.236$) and when parents monitored ($\beta = 0.160$) and disciplined them ($\beta = 0.221$) but did not set limits ($\beta = -0.214$) (Table 3). The final model showed that the inclusion of parenting practices increased the variance of a child’s PA from 3% in model 2 to 13% in model 3. Meanwhile, boys were more likely physically active when parents reinforced PA ($\beta = 0.192$) and had lower maternal educational ($\beta = -0.219$), and boys had higher seeking support self-efficacy ($\beta = 0.341$). The final model with the inclusion of parenting practices did not show a great change in the variance of a child’s PA (from 14% in model 2 to 16% in model 3).

As shown in Table 4, children with a normal weight were more physically active when parents controlled ($\beta = 0.140$), for example, providing games as a reward for good behavior, when they disciplined ($\beta = 0.227$), or did not engage in limit setting ($\beta = -0.159$). Children had higher seeking support self-efficacy ($\beta = 0.272$) and barriers self-efficacy ($\beta = 0.152$) for engaging in PA, while children with high BMI were associated only with seeking support self-efficacy for engaging in PA ($\beta = 0.395$). The final model with the inclusion of parenting practices increased the variance of a child’s PA in normal weight children (from 6% in model 2 to 16% in model 3), while it did not change at all in overweight children (8.6%).

Table 3 Regression coefficients of physical activity level for general characteristics, self-efficacy, parenting strategies and physical activity level by child’s sex

	Girls			Boys		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
General characteristics						
Child’s age	0.049	-0.002	0.025	0.010	0.024	0.046
Child’s obesity (yes vs. no)	-0.065	-0.066	-0.048	-0.051	-0.023	0.005
Child’s sex (boys vs. girls)						
Maternal education (college+ vs. secondary-)	0.072	0.040	0.054	-0.143	-0.206 *	-0.219 *
Parental overweight (one or both vs. none)	0.022	0.047	0.091	0.112	0.139	0.124
No. of people <18yrs (1 vs. 2+)	-0.016	-0.019	-0.027	0.129	0.046	0.036
Family income (high vs. low)	-0.094	-0.072	-0.098	0.040	0.057	0.042
Psychosocial factors						
SE for social support		0.242 **	0.236 **		0.339 ***	0.341 ***
SE for barriers		0.028	0.065		0.076	0.135

Children's physical activity

Parenting strategies						
Control			0.070			0.057
Limit setting			-0.214 **			0.034
Monitoring			0.160 *			-0.037
Reinforcement			-0.062			0.192 *
Discipline			0.221 **			0.034
Adjusted R²	-0.016	0.0329	0.132	0.009	0.140	0.160
F-value	0.520	1.77	3.090	1.230	3.900	3.090

SE; Self-efficacy, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4 Regression coefficients of physical activity level for general characteristics, self-efficacy, parenting strategies and physical activity level by child's weight status

	Normal weight			Overweight+		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
General characteristics						
Child's age	0.024	-0.002	-0.009	0.060	0.022	0.025
Child's obesity (yes vs. no)						
Child's sex (boys vs. girls)	0.001	-0.032	-0.037	0.046	0.061	0.103
Maternal education (college + vs. secondary-)	-0.030	-0.075	-0.078	0.003	-0.018	-0.031
Parental overweight (one or both vs. none)	0.046	0.069	0.084	0.081	0.100	0.093
No. of people <18yrs (1 vs. 2+)	0.050	0.020	0.020	0.107	0.079	0.071
Family income (high vs. low)	-0.011	-0.002	-0.024	-0.106	-0.078	-0.102
Psychosocial factors						
SE for social support		0.257 **	0.272 ***		0.380 **	0.395 **
SE for barriers		0.089	0.152 *		-0.071	-0.061
Parenting strategies						
Control			0.140 *			-0.153
Limit setting			-0.159 *			0.031
Monitoring			0.112			0.065
Reinforcement			-0.031			0.154
Discipline			0.227 ***			-0.125
Adjusted R²	-0.020	0.0632	0.163	-0.025	0.086	0.086
F-value	0.240	2.92 **	4.350 ***	0.600	2.140 *	1.700

SE; Self-efficacy, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

DISCUSSION

The results showed that children were more physically active when they had greater seeking support self-efficacy for engaging in PA and had parents who disciplined them or less likely set limits on sedentary behaviors. In the subgroup analyses stratified by child's sex and weight status, parenting practice, such as less limit setting and discipline, played a more important role in children's PA in normal weight children and girls, while only seeking support self-efficacy showed great impact in overweight children and boys. Our findings may provide valuable insights for tailoring family-based interventions to specific subgroups of children.

Our study supports many other studies by showing significant contribution of parenting practice, including more discipline and less limit setting, as taking account of 10% of variance of the child's PA level in almost subgroups. A study by Gubbels JS *et al.* (2011)²⁷⁾ that used the modified Child Feeding Questionnaire (CFQ) to create an 'activity-related parenting questionnaire' found that restriction of sedentary behavior was related to less PA and stimulation to be active was positively associated with PA. Arredondo *et al.*⁹⁾ in a study of 800 Latino parents and their children found that parental reinforcement and monitoring were both positively associated with a child's PA. These may support our findings that less forceful parenting practices like discipline and less limit setting were associated with child-reported PA level.

In the context of the parent's role in a child's PA, self-efficacy^{14,28)} should be considered together as an important factor of PA behaviors. While parental control was related to lower self-efficacy beliefs, parental support showed a positive association with self-efficacy beliefs and indirectly an association with participation in PA via self-efficacy beliefs and enjoyment of PA.²⁸⁾ The greater impacts of self-efficacy were apparently shown in overweight children and boys with less impact of parenting practice. For overweight children, it may be explained partly that overweight children respond more negatively to a given parenting style than normal weight children;²¹⁾ their parents do not seem to have a constant specific effective parenting strategy since they use both permissive as well as coercive discipline techniques with fewer health-promoting strategies.¹⁹⁾ A recent study also showed that parents of obese children reported more internal conflict between a mother and a father over childrearing and lack of confidence in managing children's health lifestyle.¹⁹⁾ These findings may lead to further studies on the effective parenting strategies for parents with obese children to provide a supportive environment to help their children to make healthy choices and engage in more healthy PA behavior. Meanwhile, for boys, 14% of the variance in child's PA level was explained by self-efficacy for engaging in PA, compared to 2% variance by parenting practice. In consideration of the age of our study sample aged 9 to 12 years, it is expected that older primary school children, particularly boys, were more likely to be independent in making decisions on PA. Boys, compared to girls, exhibited higher physical activity and also higher screen time, such as television, video games, and computer use peaked in the peri-pubertal years.²⁰⁾ As our study showed that boys were more physically active when a parent praised them for being physically active, further studies should be needed to find ways to encourage boys to participate in PA via self-efficacy beliefs and parental enjoyment of PA. Meanwhile, boys were less active when they had less educated mothers compared to those with mothers with higher education. The negative association of maternal education level in boys may be linked to higher parental expectations of school achievements with regard to boys rather than girls. Mothers who were more educated may more likely invest more money and time to educate their child, particularly boys.

On the other hand, children with normal weight and girls in this study were more physically active when specific parenting practices were carried out. For children with normal weight, parents controlled, for example, providing games as a reward for good behavior, when they

disciplined, or less likely engaged in limit setting as shown in the total sample. In addition, the barrier self-efficacy to engage in PA was associated with their own PA level only in the subgroup of children with normal weight in our study. It is supported by a recent Thai primary school children study showing that PA was not associated with perceived benefits, while the study revealed a significant association between perceived barriers, such as bad weather and heavy load of homework, and lack of PA.²⁹⁾ While girls seemed more physically active when parents disciplined their child to watch TV or videos or play games without permission and less likely when limiting screen times but kept on monitoring their child's activity. It can be explained by firstly different patterns of PA, for example, in terms of places for playing and different types of activities engaged in PA.³⁰⁾ Girls generally prefer playing indoors and with friends or family. In addition, the less activity in girls in the age groups, in consideration of the age of this study sample aged 9 to 12 years, can be explained by growth spurt occurring during the peri-puberty period, which results in a decrease in their habitual PA due to physical change. It is thus expected that girls are less physically active than boys.^{20,30-32)} Moreover, girls reacted more negatively to parental control²¹⁾ during this developmental period of transition from childhood to early adulthood that is accompanied by big social and emotional changes. Therefore, as our study showed the greater influence of parenting practices on girls' PA level, more supportive parenting practice may help girls to be more active. This study provides some insights on the gender difference in PA and parenting practice and it maintains that gender should be considered an important influencing factor in a child's PA.

The main strength of this study, to the best of our knowledge, is that there is no study on the association of children's self-efficacy as well as parenting practices on children's PA and furthermore, stratified analyses by child's sex and weight status. The information could be important for future intervention developers to tailor the intervention to a specific subgroup. There are several limitations to the present study that are worth noting. First, this study is cross-sectional in nature, and thus no causal relationship can be drawn from these findings. Secondly, there can be a concern on measurement tools used in the study. The self-report questionnaires from parents may have led to inconsistency with actual experiences or social desirability bias. Furthermore, 5 components of parenting practices related to activity were measured by a few items and may thus not be appropriate to represent the construct of activity-related parenting practices. In addition, the regression models in our study presented with small R^2 values, although the almost models were significant. Thus, it leads to a need of further studies on identification of other factors, which may be involved in determining the PA level. Finally, from a total of 609 parent-child dyads, 88% of parents submitted parent questionnaires and further reduction of parent sample due to missing information on mother's education or parental BMI may have contributed to a certain amount of selection bias. Moreover, the selected schools showed differences in family's socioeconomic status ($p < 0.001$), although the other general characteristics were not statistically different between the two schools ($p > 0.05$). Therefore, we should be cautious about generalizing our findings to all parents of primary school children. Further studies are required to explain how the child's psychosocial components and parental practices are related to PA in a specific population.

In conclusion, significant associations of children's self-efficacy seeking for social support and parenting practices with children's PA were found in the total sample. The impacts of self-efficacy and parenting practice were different in children by child's sex and weight status. This study may imply that appropriate parenting practice may increase PA level in children with normal weight and girls, while self-efficacy seeking was significantly associated with PA level in children with overweight and boys. This finding can suggest that future interventions to increase children's PA might need to consider strategies to increase children's self-efficacy as well as appropriate

parenting strategies when targeting different groups of children.

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CONFLICTS OF INTEREST

The authors have no conflicts of interest.

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