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Body size perception in Thai school-aged children

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- Background** : *Body size perception is the basic of body image that usually be developed during early childhood. Overestimation of children and/or their parents may lead further negative body image, whereas underestimation may cause overlooked obesity problems.*
- Objectives** : *To investigate the accuracy of body size perception among Thai school-aged children and the correlation between children's and their parents' estimation.*
- Methods** : *In 2015, a cross-sectional study was conducted in a primary school in central Bangkok. Anthropometric indices were measured. Perceived body sizes of children was assessed by the children and their parents using visual image scale (Children Body Scale: CBIS).*
- Results** : *In all, 1, 217 children (625 boys, 592 girls) were recruited in the study. Only 27% of the children and 30% of their parents had accurate body size estimation. Both children and parents in underweight and mild underweight group tended to overestimate their body size, whereas those in normal, overweight, mild obesity and obesity group tended to underestimate their body size. Data showed the significant and positive correlation between participating children and their parents. ($r = 0.753$, $P < 0.001$).*

Conclusion : *This is the first study of school-aged children's body size perception in Thailand. We demonstrate that only nearly one-third of children and their parents can estimate children's body size accurately. Our findings also suggest that both over- and underestimation are common in varied weight status, which has implications for health education among school-aged children and their parents.*

Keywords : *Body size perception, school-aged children, Thai, underweight, overweight, obesity.*

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ฉันท์สุดา พงศ์พันธุ์ผู้ภักดี, อรภา สุธีโรจน์ตระกูล, เทอดพงศ์ เต็มภาคย์. การรับรู้ขนาดรูปร่าง
ของเด็กชั้นประถมศึกษาในประเทศไทย. จุฬาลงกรณ์เวชสาร 2560 พ.ศ. - มิ.ย.;61(3):
343 - 55

- เหตุผลของการทำวิจัย** : การรับรู้ในขนาดรูปร่าง (body size perception) นั้นเป็นพื้นฐาน
ในการมีทัศนคติต่อรูปร่างของตนเอง (body image) ซึ่งความสามารถ
ดังกล่าวนี้เริ่มพัฒนาตั้งแต่ในช่วงวัยเรียนหรืออายุประมาณ 6 ปี
การประมาณขนาดรูปร่างของเด็กโดยเด็กและ/หรือผู้ปกครองที่ไม่ตรง
กับความจริงนั้น อาจส่งผลเสียต่อทัศนคติต่อรูปร่างของตนในอนาคต
ได้ รวมทั้งการประมาณที่น้อยกว่าความเป็นจริงอาจทำให้มอง
ข้ามปัญหาโรคอ้วนที่พบได้บ่อยในช่วงวัยเด็กและวัยรุ่น
- วัตถุประสงค์** : เพื่อศึกษาความถูกต้องของการประมาณขนาดรูปร่างในเด็กวัยเรียน
ชั้นประถมศึกษาของไทย และศึกษาความสัมพันธ์ระหว่างการประมาณ
ขนาดรูปร่างระหว่างเด็กและผู้ปกครอง
- วิธีการทำวิจัย** : การศึกษานี้เป็นการศึกษาแบบภาคตัดขวาง (cross-sectional study)
ที่โรงเรียนประถมศึกษาในกรุงเทพมหานคร และทำการประเมินขนาด
ร่างกายโดยการวัดน้ำหนัก ส่วนสูง คำนวณค่าดัชนีมวลกาย และประเมิน
การรับรู้ในการประมาณขนาดของรูปร่าง โดยให้อาสาสมัครเลือกรูปที่
คิดว่าตรงกับตนเองหรือบุตรหลานของตนมากที่สุด (Children Body
Image Scale: CBIS)
- ผลการวิจัย** : อาสาสมัครทั้งหมด 1,217 ราย เด็กชาย 625 ราย (ร้อยละ 51.4)
เด็กหญิง 592 ราย (ร้อยละ 48.6) ได้เข้าร่วมโครงการ พบว่าเด็กเพียง
ร้อยละ 27 เท่านั้นที่สามารถเลือกรูปที่มีขนาดตรงกับขนาดรูปร่าง
ของตนเองและผู้ปกครองเพียงร้อยละ 30 เท่านั้นที่สามารถเลือกรูป
ที่มีขนาดตรงกับขนาดรูปร่างของบุตรหลานของตนเอง โดยเด็กและ
ผู้ปกครองของกลุ่มเด็กที่มีรูปร่างค่อนข้างผอมและผอมนั้น มักเลือก
รูปร่างที่อ้วนกว่ารูปร่างจริงของตน ในขณะที่เด็กและผู้ปกครองของเด็ก
ที่มีรูปร่าง สมส่วน ค่อนข้างอ้วน และอ้วนนั้นมักเลือกรูปที่ผอม
กว่ารูปร่างจริง โดยพบความสัมพันธ์ของการเลือกระหว่างเด็กและ
ผู้ปกครองไปในแนวทางเดียวกันอย่าง มีนัย ($r = 0.753, P < 0.001$).

- สรุป** : การศึกษานี้เป็นการศึกษาแรกที่ศึกษาเรื่องการรักษารูปร่างของเด็กวัยเรียนในประเทศไทย โดยพบว่า มีเพียงเด็กและผู้ปกครองเพียงไม่ถึงหนึ่งในสามเท่านั้นที่สามารถประมาณรูปร่างของเด็กได้ถูกต้อง ซึ่งการประมาณมากเกินไปหรือน้อยเกินไปนั้นแตกต่างกันไปในกลุ่มเด็กที่รูปร่างต่างกัน ผลการศึกษานี้สามารถนำไปประยุกต์ใช้ในการให้ความรู้เรื่องรูปร่างและการดูแลสุขภาพสำหรับเด็กนักเรียนชั้นประถมศึกษาและผู้ปกครองต่อไป
- คำสำคัญ** : การรักษารูปร่าง, เด็กประถมศึกษา, ไทย, น้ำหนักน้อย, คอข่าย
อ้วน, อ้วน.

Body size perception is defined as how people think and estimate their body shape comparing with norms. Body size misperception occurs when individuals has over- or underestimated their perceived body size and shape. This may also lead to dissatisfaction of their body and negative body image.^(1,2) Negative body image is associated with further various psychological and physical problems such as eating disorders, low self-esteem, depression, obsessive compulsive disorders and obesity.

Body size perception and body image is developed during early childhood, about the age of six. Young children can exhibit body dissatisfaction.⁽³⁾ Previous study showed that an important influence on children's body image attitude is parents' body image attitudes and children's body size estimation.⁽⁴⁾ Recognition of child's body size directly attribute to the common practice of having more control food preparation, physical activities and clothing choices. Under- or overestimation of body size leded inappropriate control to their children that will affect their children's long-term health, whereas, the actual appearance and size of a parent (mothers in particular) can also affect the standards the child will internalize.⁽⁵⁾ According to the study in 2006, most of parents did not recognize their children as overweight or at risk of overweight and need weight intervention, even their doctor has proposed it. Only 26 percent of them were concerned about their child's weight.⁽⁶⁾

Because of Westernization, eating disorders and obesity are truly global. Increased cultural contact with the West results in transmission of western ideas, cultural norms and eating styles. Many studies estimated the higher prevalence of eating disorders

and obesity in Asian countries including Thailand than ever before.^(7,8)

To our knowledge, no research has investigated school-aged child's and parents' perception of body size in Thailand. Hence, the purpose of this study was to (a) assess the accuracy of perceived children's body size by children and their parents, (b) investigate the correlation between children's and their parents' estimation.

Methods

Participants

This cross-sectional study was conducted at a primary school in central Bangkok, Thailand in 2015. We recruited all students in grade 1 to 6 (1,249 children). The study sample is representative of middle- to high- income families in Thailand. Self-administered questionnaires were filled out by children and their parents (97.5% response rate).

Study questionnaires

The questionnaire consisted of two parts. The first includes personal and socio-demographic characteristics (age, gender, year of education, parental education and household incomes. In the second part, we inquired child and parental choose their perceived body image by pictorial scale: children's body image scale (CBIS). (Figure 1.)

Measures

Anthropometric measurements were taken by trained three researchers using standard protocols. The height of each child was measured with stadiometer in centimeter. Body weight was measured using a digital portable scale. Each child

was weighed to the nearest tenth of a kilogram in uniform clothing without shoes. Body mass index (BMI: weight in kg/height in m²) for children and parents were calculated by their measurements. Due to no standard sex - and age - matched childhood body mass index (BMI) curve for Thai children available, we use the standard curve of weight for height curve of Thai children. Children's body shapes were categorized into six ranges: >3 SD = obese, 2 to 3 SD = mild obese, 1.5 to 2 SD overweight, 1.5 to - 1.5 SD = normal, -1.5 to -2 SD = mild underweight, < -2 = underweight. Child BMI values were compared with CBIS figure to assess the actual body shape.

Children's body image scale

The perceived body size was determined by children's body image scale (CBIS) with permission⁽⁹⁾ which consisted of seven gender-specific pictorial scale posed in the anatomical position (Figure 1). This scale is based on measurable index of adiposity. Each figure represented photograph of a pre-pubertal boy or girl with a specific range of BMI according to National Center for Health Statistics (NCHS). CBIS consisted of specific range for one to seven (3rd - 97th percentiles of ten years old boy and girl). Figures were horizontally arranged in ascending order of adiposity and were labeled from 'A' to 'G' (For boys, figure A = BMI 14 -14.6, figure B = BMI 14.7 - 15.5, figure C = BMI 15.6 - 16.5, figure D = BMI 16.6 - 18.5, figure E = BMI 18.6 - 24.9, figure F = BMI 25.0 - 28.4, figure G = BMI 28.5 - 29 and for girls, figure A = BMI 13 - 13.5, figure B = BMI 13.6 - 14.9, figure C = BMI 15 - 16.6, figure D = BMI 16.7 - 17.7, figure E = BMI 17.8 - 19.4, figure F = BMI 19.5 - 24.6, figure G = BMI 24.7 - 28.5). After that the chosen figures were converted from '1' to '7' respectively for analysis. This scale was in child's and parent's questionnaire with

the question "Which of the following pictures is the most similar in size to you/your child?"). The accuracy of "perceived body size" is calculated by comparing with their measured BMI. We subtracted the actual figure of BMI score from the perceived body size. Negative scores indicated underestimation, zero indicated accurate estimation, and positive score indicated overestimation.

Statistical analysis

Descriptive statistics were used (mean \pm standard deviation for quantitative variables, and frequency with percentage distribution for categorized variables). Bivariate associations were examined using Chi-square tests for categorical variables and student *t*-test for quantitative variables. The correlation between child's, parental perceived body size and actual measurements was examined using the Pearson correlation (*r*). Significance level was set at *P* < .05 for all data.

Results

Sample characteristics

Among 1,217 children in this study, boys slightly outnumbered than girls (51.4% versus 48.6% respectively), and their age ranged from 6 years 6 months to 12 years 6 months. The majority of participants had normal body shape (66.9% for boys and 80.5% for girls). On average, participants had a BMI of 18.0 \pm 0.6. Boys significantly outweighed than girls. More boys were categorized in overweight, mild obesity and obesity than girls (27.1% and 12.7% respectively). There were no statistically significant differences between boys and girls regarding age, height, parental BMI, parental educational level and household income. (Table 1)

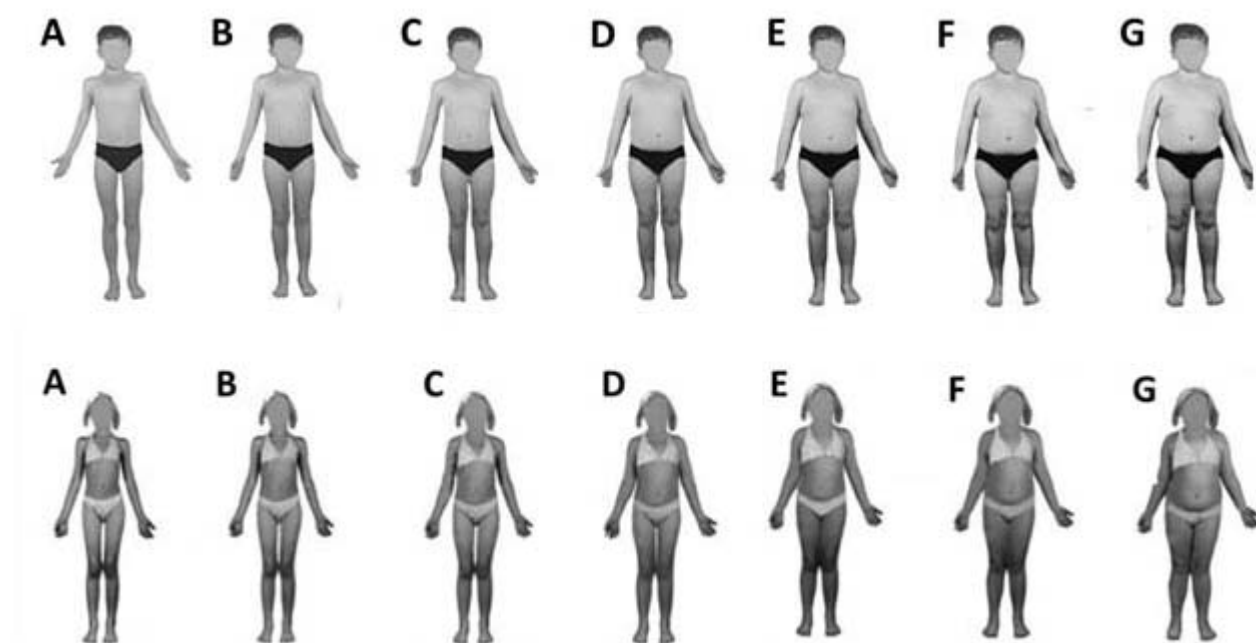


Figure 1. Children's body image scale (CBIS).

Table 1. Anthropometric and demographic sample characteristics: (mean (SD) or percentage). ($P < 0.001$)

	Male n = 625		Female n = 592		Total n = 1,217		Significance
	Mean \pm SD		Mean \pm SD		Mean \pm SD		P
Children							
Age	9.2 \pm 1.4		9.1 \pm 1.5		9.1 \pm 1.4		0.392
Body weight	34.3 \pm 11.0		31.9 \pm 9.4		33.1 \pm 10.3		<0.001
Height	134.8 \pm 10.2		134.4 \pm 10.7		134.6 \pm 10.4		0.81
BMI	18.6 \pm 3.8		17.4 \pm 3.1		18.0 \pm 0.6		<0.001
Parents							
Parental BMI							
- Father	N = 137		N = 103		N = 240		0.09
	BMI = 25.4 \pm 5.3		BMI = 24.4 \pm 3.9		BMI = 25.0 \pm 4.8		
- Mother	N = 368		N = 365		N = 733		0.318
	BMI = 22.1 \pm 3.4		BMI = 21.8 \pm 3.4		BMI = 22.0 \pm 3.4		
	No	%	No	%	No	%	
Education level							
- Less than bachelor	22	3.8	12	2.2	34	3.1	0.063
- Bachelor degree	232	40.4	187	34.8	419	37.6	
- High than bachelor	321	55.8	339	63.0	660	59.3	
Income (Baht)							
- <10,000	6	1.0	2	0.4	8	0.7	0.502
- 10,000 – 50,000	105	18.1	93	17.3	198	17.7	
- 50,000 – 100,000	163	28.0	163	30.4	326	29.1	
- >100,000	308	52.9	279	52.0	587	52.5	

Visual perception of body size by the participating children

When the children were asked to identify the figure most similar in size to them, of these 8.3% chose the very thin figure, 26.7% chose thin figure, 27.1% chose the normal size figure, 32.5% chose the overweight figures and 5.3% chose the obese figures. There was no statistical significance between genders ($P = 0.06$). (Table 2)

Table 3 showed the comparing with their actual shape (evaluated by BMI), of the children 55.9% chose underestimated figures, 27% chose accurate figures and 17.1% chose overestimated figures. Both boys and girls in underweight and mild underweight group

tended to overestimate their body size, whereas boys and girls in normal, overweight, mild obesity and obesity group tended to underestimate their body size. Only 27% of children had accurate perceived body size.

Visual perception of body size by the parents

Unlike children, parents of boys were more likely identify their children figures as very thin and thin figures than parents of girls. The difference between parental perceptions of children's body size of boys and girls was statistically significant ($P < 0.001$). The overall actual perceived size among the parents (30.6%) was slightly over than among

Table 2. Visual perception of body size by the participating children ($P = 0.06$) and their parents. ($P < 0.001$)

Children						
	Male	%	Female	%	Total	%
A	59	10.1	36	6.5	95	8.3
B	164	27.9	141	25.4	305	26.7
C	135	23.0	174	31.4	309	27.1
D	138	23.5	124	22.3	262	23.0
E	56	9.6	54	9.7	110	9.6
F	22	3.7	17	3.1	39	3.4
G	13	2.2	9	1.6	22	1.9
Total	587		555		1,142	
Parents						
	Male		Female	%	Total	%
A	135	23.2	69	12.6	204	18.1
B	119	20.4	148	27.1	267	23.7
C	112	19.2	156	28.6	268	23.8
D	102	17.6	81	14.8	183	16.2
E	65	11.2	49	9.0	114	10.1
F	28	4.8	29	5.3	57	5.0
G	21	3.6	14	2.6	35	3.1
Total	582		546		1,128	

children (27%). However, the trend of underestimation and overestimation was similar to the participating children. The parents of underweight and mild underweight children were more likely to choose the underestimated figures and the parents of normal, overweight, mild obesity and obesity group were more likely to choose the underestimated figures.(Table 2 and 3)

Table 3. Accuracy (number and percentage) of children identifying their body size.

	Children													
	Underestimation = 626				Accurate = 302				Overestimation = 192				Total = 1,120	
	Boys	Girls	Total	%	Boys	Girls	Total	%	Boys	Girls	Total	%	Total	%
underweight	0	1	1	0.2	1	3	4	1.3	3	2	5	2.6	10	0.9
mild underweight	2	8	10	1.6	9	6	15	5.0	12	16	28	14.6	53	4.7
normal	214	252	466	74.4	99	123	222	73.5	80	65	145	75.5	833	74.4
overweight	41	31	72	11.5	11	2	13	4.3	5	0	5	2.6	90	8.0
mild obesity	28	21	49	7.8	24	5	29	9.6	5	1	6	3.1	84	7.5
obesity	21	7	28	4.5	14	5	19	6.3	3	0	3	1.6	50	4.5

Table 4. Accuracy (number and percentage) of parents identifying their children's body size.

	Parents 1													
	Underestimation = 651				Accurate = 339				Overestimation = 115				Total = 1,105	
	Boys	Girls	Total	%	Boys	Girls	Total	%	Boys	Girls	Total	%	Total	%
underweight	0	1	1	0.2	4	3	7	2.1	0	2	2	1.7	10	0.9
mild underweight	1	7	8	1.2	15	11	26	7.7	5	12	17	14.8	51	4.6
normal	252	284	536	82.3	87	125	212	62.5	49	23	72	62.6	820	74.2
overweight	35	19	54	8.3	18	12	30	8.8	3	1	4	3.5	88	8.0
mild obesity	23	15	38	5.8	27	8	35	10.3	8	2	10	8.7	83	7.5
obesity	11	3	14	2.2	20	9	29	8.6	10	0	10	8.7	53	4.8

The correlation between children and their parents' perception

The significant and positive correlations were found in perceived body image of children and parents with their actual BMI pictures ($r = 0.686, P < 0.001$ and $0.777, P < 0.001$ respectively). (Figure 2 and Figure 3)

Figure 4 also showed the significant and positive correlation between participating children and their parents. Most of children chose the same perceived body figures with their parents ($r = 0.753, P < 0.001$).

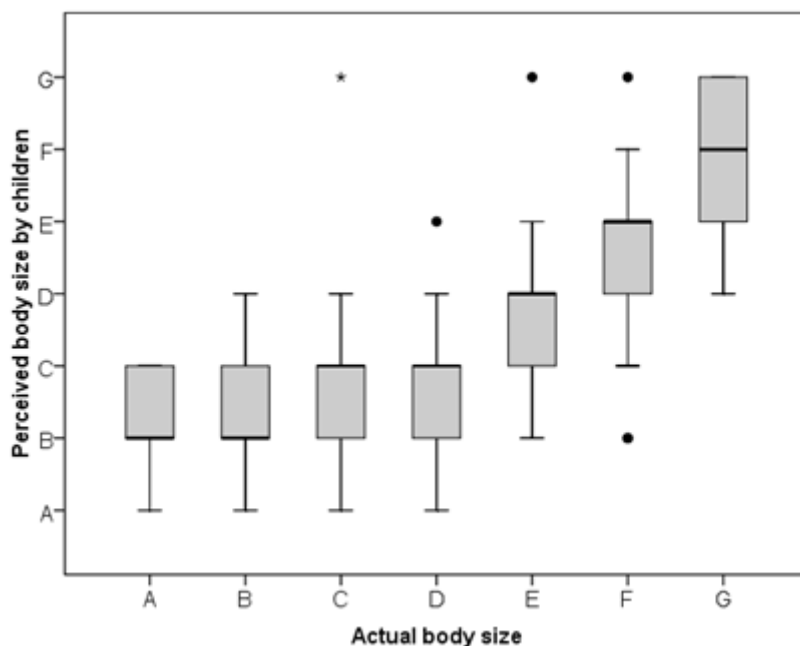


Figure 2. The correlation between perceived body image of children and their actual BMI pictures ($r = 0.686, P < 0.001$).

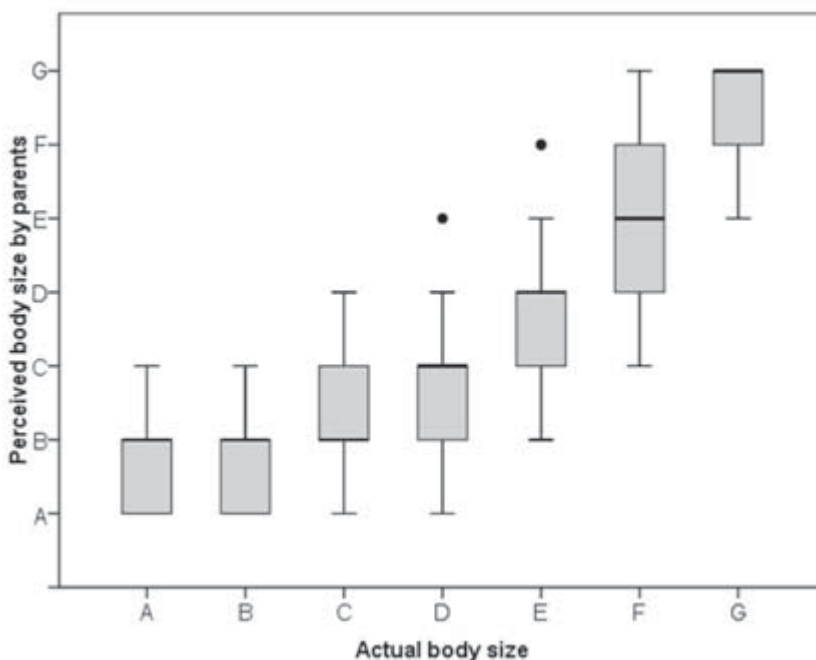


Figure 3. The correlation between perceived body image of parents and their children's actual BMI pictures ($r = 0.777, P < 0.001$).

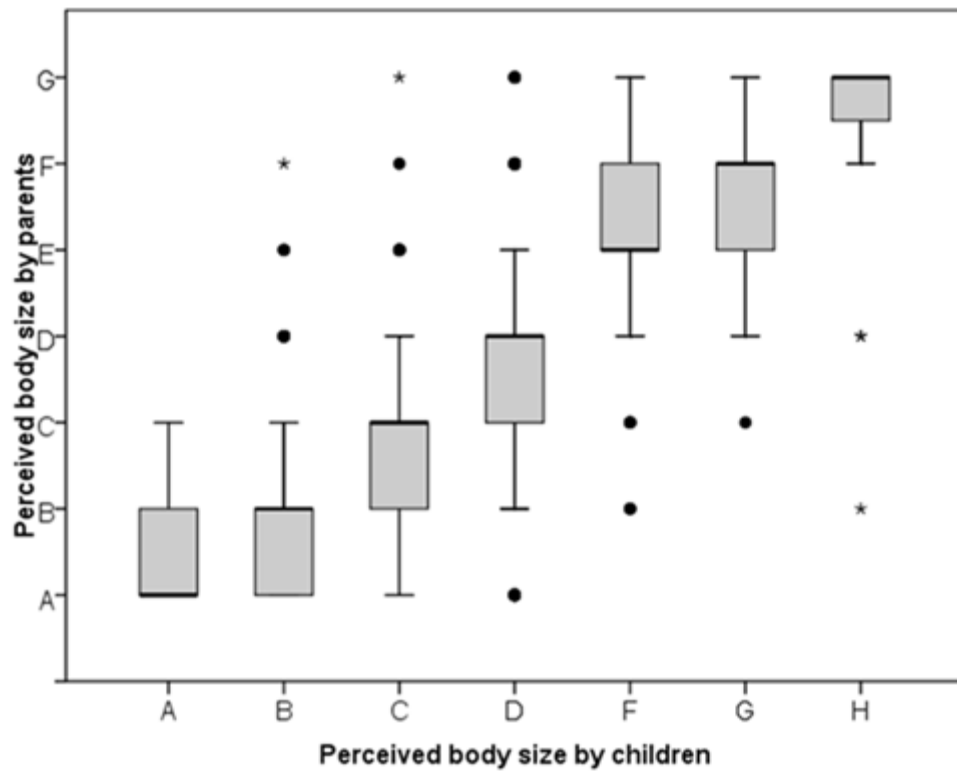


Figure 4. The correlation of perceived body size between children and their parents ($r = 0.753, P < 0.001$).

Discussion

To our knowledge this is the first study that attempted to investigate the accuracy of body size perception among Thai children in primary school, aged between 6 - 12 years using the visual scale methods. We used CBIS, the pictorial scale, that recent studies have been confirmed to use as the reliable body image measure for boys and girls.^(9, 10) Along with the previous studies,^(11, 12) we found that the accuracy of body size perception in Thai boys and girls varied with their weight status. Lighter children (underweight and mild underweight groups) were more likely to identify a figure larger than their own, but heavier children showed higher tendency to choose the underestimated pictures. We found that more than half of children in normal weight group chose figures substantially smaller than their own. This result was

similar to previous study in UK.⁽¹²⁾ These may reflect the attitude of Thai children and early adolescent that generally favors slim appearance. The accuracy of body size among boys was only 27.6% and girl was only 26.7%. One explanation of this result is that children preferred to choose mid-ranged pictures and avoid choosing stigmatizing pictures. Both thin and fat figures were described more negatively by children around this age.^(12, 13) This trend of misperception was similar between boys and girls, different from the previous study which indicated that this tendency stronger in girls.⁽¹²⁾ The wide spread misconception of body size estimation in both sexes showed the more preoccupied in body shape and body image among pre-adolescent boys than previous.

In the same way, most of parents indicated mid-ranged images for their children's body size.

Parents of overweight and obese children tended to underestimate. This result was parallel to previous studies.^(14, 15) They were less likely to categorize their children as overweight and obese and to correct it. Misperceived children's weight status may cause them overlook and neglect the obese problem. Body size misperception could influence the perceived relevance of health recommendations and the efficacy of weight control interventions. In children of this age, parents are the main caregivers of lifestyle change. Moreover, parents of thin children tended to perceive their children heavier than their actual shape. In addition, the majority of parents and children in normal body size group chose the underestimated perceived body size. It could be due to changes in society norms in Thailand, that conception of "normal shape" shifts larger than previous decades. Therefore the parents of normal children perceived that their children were thin comparing with overall population.

Most of parents and children indicated the same image for children's body size. This correlation may reflect the impact of parents and family to body image among school-aged children.⁽¹⁶⁾ Furthermore, these may relate with parent's comments and actions about the body size or eating habit that would have further impact on children's body image.⁽¹⁷⁾

Conclusion

These results indicate that some children and parents have the accurate perceived body size with visual-matching methods. Underestimation was more common in underweight and mild underweight children, while overestimation was more common in normal, overweight, mild obese and obese group. This misconception may be the important factors leading

to unrecognized health problems and negative body image. Correction of parents' and children body size perception would be the first step to improve the health and body image of the children.

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