Original Article

Body image, weight management behavior, nutritional knowledge and dietary habits in high school boys in Korea and China

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Background: Adolescence is an important period with rapid physical growth transitioning from childhood to adulthood. Distorted body image can result in eating disorders or inadequate nutrient intakes in adolescence. Limited research has been done with high school boys in both Korea and China. **Objectives:** To examine body image, weight control behaviors, nutritional knowledge, and dietary habits in Korean and Chinese teenage boys, and to evaluate any differences in these measures between two countries. **Methods and Study Design:** High school boys in Yongin of Korea and Weihai region of China (n=201 Korean and n=196 Chinese) participated in a self-report survey. A previously validated questionnaire assessed height and weight, body image, nutritional knowledge, and dietary habits. Descriptive statistics, t-test, Chi-square, and Pearson correlations were used for data analysis. **Results:** About 41.4% of Korean students and 40.8% of Chinese students desired to be thinner. The majority of the students from both countries showed a perception gap between ideal body image and current body image. Korean students had a higher frequency of weight control attempts compared with Chinese students (p=0.004). Overall, Korean students had higher scores in nutritional knowledge (p<0.001), while Chinese students had higher scores in dietary habits (p<0.001). Nutrition knowledge in Korean students and dietary habit in Chinese students showed positive correlation with body shape satisfaction (p<0.01). **Conclusions:** The findings of this study support that developing proper body image among high school boys is important in Korea and China. Different educational strategies might be beneficial to Korean or Chinese students.

Key Words: body image, nutritional knowledge, dietary habits, high school students, Korea and China

INTRODUCTION

Adolescence is an important period with rapid physical growth and sexual maturity, and the transition from childhood to adulthood. Dietary habits during this period can greatly influence growth and development as well as their lifelong health; thus it is important to provide sufficient nutrients and balanced meals in this period.[1,2] However, adolescents in East Asian countries such as South Korea and China often have problems in dietary habits including skipping breakfast, imbalanced diet, irregular meals, frequent intake of processed foods or fast foods, and night snacking,[3,4] and the prevalence of obesity has steadily increased.[5]

Most adolescents are sensitive to body weight, body shape, and other people's perception on their body image,[6,7] and it has been reported that dietary habits and weight control behaviors are greatly influenced by adolescents' perception on their body shape or body weight.[8] In Korea, adolescents have shown seriously distorted perceptions of body image due to the influence of individual desire for thin body shape, social trend, and mass media, and have reported that they are not satisfied with their body shapes and that they are trying thoughtless weight control.[2,7,9] In China, recent rapid economic growth has drastically changed their meal patterns, and prevalence of overweight and obesity has been increasing[10] as well as radical changes in cultural belief and the norm for beauty.[11] Dissatisfaction on body shape in adolescence can cause undesirable dietary habits and inappropriate weight loss attempts.[7,12] It has been reported that, if the gap

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between the current body image and the ideal body image is great, adolescents tend to have lower self-esteem and higher eating disorders.[13,14]

Most studies on body image in adolescents have been among girls.[2,6,7] It has been noticed that boys are recently trying to build a healthy and attractive figure, and their interest in appearance tends to increase as the media, such as TV programs and advertisements, emphasize physical appearance in the young generation.[15] It is also been reported that many high school boys desire to lose more weight even though they perceive their body weight as normal.[9,16] Thus, developing healthy body image among teenage boys should not be overlooked.

Understanding teenagers' perceived body image, weight control behaviors, nutrition knowledge, and dietary habits will contribute to conducting nutrition education programs and provide beneficial data for establishing directions for health promotion. However, depending on teenagers' cultural and socio-economic backgrounds, there might be differences in body image and other related indicators listed above. Understanding similarities and differences of body image and related indicators in diverse settings and populations may help developing nutrition education and promotion programs for specific target populations.

Korea and China are geographically close and show similarities in social changes, but China is a very large country and its dietary lifestyle and attitude and perception of obesity vary, depending on regions. There might be cultural differences among adolescents with different social systems such as capitalism and socialism, and different rate of social changes. Particularly, investigating and comparing perception of body image, nutrition knowledge, and dietary habits between two countries will help us to understand unique characteristics of adolescent boys in each country and develop appropriate education programs. There have been several comparative studies examining differences in eating habits between Korean and Chinese adolescents, but only among girls.[17,18] To our knowledge, there is no study comparing perceived body image and related factors between Korean and Chinese adolescent boys.

The purpose of this study was to examine and compare perceived body image, weight control behaviors, nutrition knowledge, and dietary habits in high school boys in Yongin in Korea and Weihai region of China with similar regional characteristics, and to provide educational perspectives on establishing healthy body image and dietary habits in high school boys.

METHODS

Participants

High school boys from Yongin in Korea and Weihai region of China participated in this survey study. Yongin and Weihai were selected based on urbanicity and location. Both cities are considered as urban areas (but not metropolitan), and located on the same latitude. Weihai region of China is the closest city from Yongin across the Yellow Sea. Weihai city is about 731 km^2 and Yongin is about 591 km^2 in size. Students were in 10^{th} and 11^{th} grade boys. A total of 406 students (210 Korean and 196 Chinese students) participated in the study between November 2011 and December 2011. The study was approved by the Institutional Review Boards of Myongji University.

Measures

The paper-and-pencil survey was administered in classroom setting and students completed the survey in a 45-minute class period. A previously validated questionnaire[9] was used, which consisted of questions on height and weight, current body image and ideal body image, weight control behaviors, nutrition knowledge and dietary habits. Body mass index (BMI, kg/m^2) was calculated, and based on the 2000 Asia-Pacific Region Criteria adopted by the Korean Society for the Study of Obesity, weight status was determined for each student: underweight group with BMI less than 18.5, normal weight group with BMI 18.5-22.9, and overweight group with BMI over 23.

Current body image (CBI) and ideal body image (IBI) were evaluated with the Stunkard body figure scale[19] showing from the most lean (1) to the most obese (9) for students to select a relevant number that best represented their "current shape" and then their "ideal shape". A difference score (CBI-IBI) was calculated. This method has been used in Korean and Chinese populations.[9,19] In addition, students' satisfaction of their own body shape was measured with a question "How are you satisfied with your own body shape?" and 5-point Likert response options: 'very dissatisfied' 1 point; 'somewhat dissatisfied' 2 points; 'Neither satisfied nor dissatisfied' 3 points; 'somewhat satisfied' 4 points; and 'very satisfied' 5 points.

Weight control behaviors were measured using frequency of weight control attempts and types of method used for weight controls.

Nutrition knowledge was measured with 20 questions in general knowledge, food composition, nutrients, and diseases, including 5 questions per category. The score was coded, as 1 for correct answer and zero for incorrect answer, and the total score for nutrition knowledge was calculated by adding points of each item.

Dietary habits were measured with 9 frequency questions, using Likert 5-point scale: 'always', 'often', 'average', 'seldom', and 'never'. The average score for dietary habit was calculated.

Data analysis

Frequency and percentage were calculated and χ^2 test was performed to evaluate the general characteristics and weight control status of the participants, and t-test was performed to compare perceived body image, nutritional knowledge, and dietary habit between Korean and Chinese students. Pearson's correlation analysis was performed to determine whether or not students' body shape satisfaction was associated with nutritional knowledge, or with dietary habits. All data were analyzed using SPSS (Statistical Package for the Social Science) Win 15.0.

RESULTS

Characteristics of the participants

Results for age, height and weight, and BMI of Korean and Chinese students are shown in Table 1. The age was

Table 1. Demographic and anthropometric indices of participants by country

Classification		Korea (N=210)	China (N=196)	Total (N=406)	t or χ^2	p
		N (%), M±SD†	N (%), M±SD	N (%), M±SD		
Age (yrs)	15	14 (6.7)	10 (5.1)	24 (5.9)		
	16	80 (38.1)	103 (52.6)	183 (45.1)		
	17	81 (38.6)	72 (36.7)	153 (37.7)		
	18	35 (16.7)	11 (5.6)	46 (11.3)		
Height (cm)		174±5.281	177±6.48	175±5.98	-3.69**	<0.001
Weight (kg)		65.1±10.4	63.6±11.1	64.4±10.8	1.38	0.167
BMI classification‡	Underweight	11 (5.2)	39 (19.9)	50 (12.3)	20.3**	<0.001
	Normal	172 (81.9)	138 (70.4)	310 (76.4)		
	Overweight	27 (12.9)	19 (9.7)	46 (11.3)		
	BMI(kg/m^2)	21.4±2.91	20.4±3.63	20.9±3.30	2.78*	0.006
Monthly household income (10,000 won/yuan)	<300 / <3,000	42 (20.0)	35 (17.9)	77 (19.0)		
	300-599 / 3,000-5,999	124 (57.6)	98 (50.0)	219 (53.9)		
	600≤ / 6,000≤	47 (22.4)	63 (32.1)	110 (27.1)		
Father's education	Elementary school	1 (0.5)	3 (1.5)	4 (1.0)		
	Middle school	8 (3.8)	49 (25.0)	57 (14.0)		
	High school	56 (26.7)	63 (32.1)	119 (29.3)		
	College	114 (54.3)	67 (34.2)	181 (44.6)		
	Graduate school	31 (14.8)	14 (7.1)	45 (11.1)		
Mother's education	Elementary school	3 (1.4)	5 (2.6)	8 (2.0)		
	Middle school	4 (1.9)	57 (29.1)	61 (15.0)		
	High school	100 (47.6)	62 (31.6)	162 (39.9)		
	College	91 (43.3)	58 (29.6)	149 (36.7)		
	Graduate school	12 (5.7)	14 (7.1)	26 (6.4)		
Father's Occupation	Production worker / laborer	17 (8.1)	30 (15.3)	47 (11.6)		
	Sales / service worker	24 (11.4)	11 (5.6)	35 (8.6)		
	Office worker	81 (38.6)	36 (18.3)	117 (28.8)		
	Administrative worker	24 (11.4)	35 (17.9)	59 (14.5)		
	Professional	15 (7.2)	20 (10.2)	34 (8.4)		
	Self-employment	49 (23.3)	64 (32.7)	113 (27.9)		
Mother's occupation	Production worker / laborer	10 (4.8)	27 (13.8)	37 (9.1)		
	Sales / service worker	41 (19.5)	16 (8.2)	57 (14.0)		
	Office worker	32 (15.2)	45 (22.9)	77 (19.0)		
	Administrative worker	5 (2.4)	19 (9.7)	24 (5.9)		
	Professional	17 (8.1)	23 (11.7)	40 (9.9)		
	Self-employment	19 (9.0)	50 (25.5)	69 (17.0)		
	Housekeeping	86 (41.0)	16 (8.2)	102 (25.1)		
Total		210 (51.7)	196 (48.3)	406 (100)		

†M±SD represents mean±standard deviation.
‡Underweight: <18.5, normal: 18.5-22.9, overweight: ≥23.
*p<0.01, **p<.001.

mostly 16-17 years (76.7% of Korean students and 89.3% of Chinese students). The average height was 176.5 cm in Chinese students, which was significantly higher than 174.4 cm in Korean students (p<0.001). BMI results showed that the majority of students in both countries were within normal weight. The percentage of students who were overweight was 12.9% in Korean students and 9.7% in Chinese students. The percentage of students in the underweight category was 19.9% in Chinese students, which was significantly higher than 5.2% in Korean students (p<0.001). The average BMI was 21.4 in Korean students, which was significantly higher than 20.4 in Chinese students (p<0.01), but both were in the normal range.

There were more students whose fathers had college or graduate level education in Korea (69.1%) compared with China (41.3%). Similarly, there were more students whose mothers graduated high school, college or graduate level education in Korea (96.6%) compared with China (68.3%). For father's occupation, office worker was the highest (38.6%) among Korean students while self-employment was the highest (32.7%) in the case of fathers of the Chinese students. However, there was no distinctive difference in household income between Korean and Chinese students.

Perceived body image & body shape satisfaction

Results for perceived body image of Korean and Chinese students are shown in Table 2. The score for current body image was 4.62 and 4.40 in Korean and Chinese students, respectively, without a significant difference. The score for ideal body image was 4.59 and 4.29 in Korean and Chinese students, respectively, showing that Chinese students significantly perceived a thin body shape as an ideal body image (p<0.05). The value that subtracted ideal body image from current body image was not different between students in both countries.

The score of the body shape satisfaction was 3.78 in

Table 2. Perceived current & ideal body image and body shape satisfaction among Korean and Chinese high school boys

Classification[†]	Korea (N=210) M±SD[‡]	China (N=196) M±SD	Total (N=406) M±SD	*t*	*p*
CBI	4.62±1.72	4.40±1.81	4.51±1.76	1.29	0.198
IBI	4.59±1.06	4.29±1.46	4.45±1.27	2.36[*]	0.019
CBI-IBI	0.03±1.84	0.11±1.91	0.07±1.87	-0.40	0.692
Satisfaction with body shape	3.78±0.75	3.88±0.77	3.83±0.76	-1.30	0.194

CBI: current body image; IBI: ideal body image.
[†]Response options: Satisfaction of body shape (1: not satisfied to 5: satisfied); CBI and IBI (1: lean to 9: the most obese).
[‡]M±SD represents mean±standard deviation.
[*]$p<0.05$

Table 3. Difference between current body image (CBI)[†] and ideal body image (IBI)[†] among Korean and Chinese high school boys

Classification[‡]	Korea (N=210)		China (N=196)		Total (N=406)	
	Frequency	%	Frequency	%	Frequency	%
-8	1	0.5	1	0.5	2	0.5
-7	-	-	1	0.5	1	0.2
-4	3	1.4	4	2.0	7	1.7
-3	15	7.1	9	4.6	24	5.9
-2	24	11.4	17	8.7	41	10.1
-1	34	16.2	33	16.8	67	16.5
0	46	21.9	51	26.0	97	23.9
1	37	17.6	36	18.4	73	18.0
2	38	18.1	32	16.3	70	17.2
3	8	3.8	6	3.1	14	3.4
4	3	1.4	3	1.5	6	1.5
5	1	0.5	2	1.0	3	0.7
6	-	-	1	0.5	1	0.2

[†] Response options: CBI and IBI (1: lean to 9: the most obese).
[‡]Classification based on CBI – IBI.

Korean students and 3.88 in Chinese students on a 5-point scale, indicating both means were between 'Neither satisfied nor dissatisfied' and 'somewhat satisfied'. There was no statistically significant difference between two countries for this measure.

The difference between CBI and IBI was shown in Table 3, in which the ratio of students with the same CBI and IBI was only 21.9% in Korean students and 26.0% in Chinese students. About 41.4% of Korean students and 40.8% of Chinese students hoped to be thinner, while 36.6% of Korean students and 33.1% of Chinese students hoped to gain more weight.

Weight control behaviors

Results for frequency and methods of weight control in Korean and Chinese students are shown in Table 4. More students (36.2%) in Korea reported that they have tried at least one weight control attempt in the past, compared with students in China (22.4%). The percentage of students with more than 3 attempts of weight control was 14.3% in Korean students, which was significantly higher than 6.2% in Chinese students ($p<0.01$). The methods for weight control in a multiple choice question showed that students in both countries mostly preferred exercise (Korea 54.1%, China 63.3%). More students in China reported that they did exercise as a method of weight control, compared with students in Korea (63.3% vs. 54.1%, respectively), while more students in Korea reported that they used fasting to lose weight (16.3%) than Chinese students (11.7%).

Nutrition knowledge

Results for nutrition knowledge of Korean and Chinese students are shown in Table 5. Overall, Korean students had significantly higher scores than Chinese students ($p<0.001$). The total score was 17.0 in Korean students, which was significantly higher than 15.9 in Chinese students ($p<0.001$). Students from both countries showed relatively high scores in general knowledge and in the food composition categories. Among the questions in the food composition category, almost all Korean students correctly answered the question, 'Tofu is an excellent source of protein', and almost all Chinese students correctly answered the question, 'Fruits and vegetables are high in vitamins'. There was a significant mean difference between Korean (89% correctly answered) and Chinese (68% correctly answered) students in a question asking 'Carbohydrate is a nutrient providing heat and energy required for our daily activities' ($p<0.001$). There was no significant difference in total score for the general knowledge category between two countries, while Korean students showed a higher total score in the food composition category than Chinese students ($p=0.023$).

Both Korean and Chinese students showed the lowest

Table 4. Weight control behaviors among Korean and Chinese high school boys

Classification		Korea	China	Total	χ^2	*p*
Frequency of weight control attempts (times)	Never	134 (63.8) †	152 (77.6)	286 (70.4)	15.5**	0.004
	1-2	46 (21.9)	32 (16.3)	78 (19.2)		
	3-4	22 (10.5)	6 (3.1)	28 (6.9)		
	5-6	5 (2.4)	1 (0.5)	6 (1.5)		
	7 ≤	3 (1.4)	5 (2.5)	8 (2.0)		
	Total	210 (51.7)	196 (48.3)	406 (100)		
Methods of weight control (multiple choice)	Fasting	16 (16.3)	7 (11.7)	23 (14.6)		
	Dietary restriction	26 (26.5)	15 (25.0)	41 (25.9)		
	Exercise	53 (54.1)	38 (63.3)	91 (57.6)		
	Medicine	1 (1.0)	-	1 (0.6)		
	Others	2 (2.1)	-	2 (1.3)		
	Total	98 (62.0)	60 (38.0)	158 (100)		

†N (%)
**p<0.01.

Table 5. Comparison of nutrition knowledge scores between Korean and Chinese high school boys

Classification		Korea (N=210) M±SD	China (N=196) M±SD	Total (N=406) M±SD	*t*	*p*
General knowledge	Good dietary habits are formed in the child-hood.	0.94±0.24	0.93±0.25	0.94±0.25	0.18	0.856
	Eating salty foods is good for health.	0.91±0.29	0.87±0.34	0.89±0.31	1.35	0.180
	The amount of nutrients needed in the body is the same regardless of age and sex.	0.82±0.39	0.84±0.37	0.83±0.38	-0.47	0.638
	Highly nutritious foods mean high-calorie foods.	0.85±0.36	0.89±0.32	0.87±0.34	-1.06	0.290
	Poor growth due to insufficient eating during the growing period can be supplemented later in life.	0.85±0.36	0.86±0.35	0.85±0.35	-0.42	0.677
	Total	4.37±0.95	4.39±1.03	4.38±0.99	-0.22	0.830
Food composition	Soft drinks have no calorie.	0.86±0.35	0.88±0.33	0.87±0.34	-0.60	0.546
	Eggs are high in cholesterol.	0.69±0.46	0.67±0.47	0.68±0.47	0.37	0.714
	Tofu is an excellent source of protein.	0.95±0.22	0.92±0.27	0.94±0.25	0.99	0.325
	Fruits and vegetables are high in vitamins	0.94±0.24	0.97±0.17	0.95±0.21	-1.51	0.132
	Carbohydrate is a nutrient providing heat and energy required for our daily activities.	0.89±0.31	0.68±0.47	0.79±0.41	5.21***	<0.001
	Total	4.32±0.85	4.13±0.88	4.23±0.87	2.28*	0.023
Nutrient	The same amount of carbohydrates and fat has the same calorie.	0.85±0.36	0.86±0.35	0.86±0.35	-0.28	0.777
	The nutrient making bones and teeth in the body is calcium.	0.89±0.32	0.91±0.29	0.90±0.30	-0.74	0.459
	The nutrient making muscles and blood of the body is carbohydrate.	0.67±0.47	0.49±0.50	0.59±0.49	3.65***	<0.001
	High-fiber foods are good for preventing obesity.	0.72±0.45	0.61±0.49	0.67±0.47	2.29*	0.023
	White sugar contains vitamins and minerals.	0.77±0.42	0.63±0.48	0.70±0.46	2.96**	0.003
	Total	3.90±1.15	3.51±1.05	3.71±1.12	3.52***	<0.001
Disease	Patients with hypertension should restrict sodium intake.	0.84±0.36	0.23±0.42	0.55±0.50	15.62***	<0.001
	Diabetic people should eat well without re-stricting foods.	0.85±0.36	0.87±0.33	0.86±0.35	-0.72	0.473
	Obese individuals are prone to have hyper-tension and cardiovascular diseases.	0.95±0.21	0.92±0.27	0.94±0.25	1.39	0.166
	Iron deficiency can cause anemia.	0.92±0.27	0.96±0.19	0.94±0.24	-1.96	0.051
	Cholesterol is the cause of arteriosclerosis and hypertension.	0.86±0.35	0.92±0.27	0.89±0.32	-1.97	0.050
	Total	4.42±0.87	3.90±0.75	4.17±0.85	6.41***	<0.001
Nutrition knowledge		17.0±2.96	15.9±2.32	16.5±2.72	4.09***	<0.001

*p<0.05, **p<0.01, ***p<0.001

scores on the questions in the nutrient category. Korean students had a higher total score in this category compared with Chinese students (p<0.001). The question, 'The nutrient making muscles and blood of the body is carbohydrate', was the most difficult question in this category: 67% of Korean students and 49% of Chinese stu-

Table 6. Comparison of dietary habit scores between Korean and Chinese high school boys

Classification	Korea (N=210) M±SD	China (N=196) M±SD	Total (N=406) M±SD	t	*p*
How often do you eat breakfast?	3.84±1.34	4.20±1.18	4.01±1.28	-2.89**	0.004
How often do you eat adequate amount of food for each meal?	3.51±1.00	4.11±1.07	3.80±1.08	-5.81***	<0.001
How often do you consider combination of food groups at each meal?	2.80±1.00	3.58±1.24	3.18±1.19	-6.89***	<0.001
How often do you eat green and orange vegetables?	3.05±1.08	3.52±1.33	3.28±1.23	-3.88***	<0.001
How often do you eat fruits?	3.50±1.07	4.02±1.33	3.75±1.23	-4.33***	<0.001
How often do you eat vegetables?	3.54±0.98	4.31±1.07	3.91±1.09	-7.57***	<0.001
Is meat, fish, egg or beans included in at least 2 meals a day?	3.60±1.01	3.84±1.31	3.72±1.17	-2.08*	0.038
How often do you drink milk or eat other dairy products such as yogurt?	3.21±1.28	3.83±1.50	3.51±1.43	-4.43***	<0.001
How often do you eat seaweed such as laver and kelp?	2.87±0.98	2.59±1.26	2.74±1.13	2.49*	0.013
Average dietary habit score	3.32±0.62	3.78±0.84	3.54±0.77	-6.15***	<0.001

*p<0.05, **p<0.01, ***p<0.001

dents got it right, and the difference between two countries was significant (p<0.001).

Both Korean and Chinese students had relatively high scores on questions in the disease category. The total scores of this category were 4.42 and 3.90 in Korean and Chinese students, respectively. However, because only 23% of Chinese students correctly answer the question, 'Patients with hypertension should restrict sodium intake', vs. 84% of Korean students got this question right, the total scores on this category were significantly different between two countries (p<0.001).

Dietary habits

Dietary habits of Korean and Chinese students are shown in Table 6. Among 9 questionnaire items on dietary habits, only 'Eat seaweeds such as sea mustard and laver everyday' showed a significantly high score in Korean students than in Chinese students (p<0.05), and other 8 items showed significantly higher scores in Chinese students compared with Korean students (p<0.05~0.001). The overall score for dietary habits was significantly higher at 3.78 in Chinese students compared with 3.32 in Korean students (p<0.001), indicating that Chinese students had more desirable dietary habits compared with the Korean students.

Nutritional knowledge and dietary habits associated with body shape satisfaction

The correlation between body shape satisfaction and nutritional knowledge/dietary habits and in Korean and Chinese students showed that nutritional knowledge was significantly and positively correlated with body shape satisfaction (r=0.208; p<0.01) in Korean students, but there was no significant correlation between dietary habit and body shape satisfaction. On the other hand, a significantly positive correlation between dietary habits and body shape satisfaction was observed in Chinese students (r=0.210; p<0.01), but there was no significant correlation between nutritional knowledge and body shape satisfaction.

DISCUSSION

The study examined the perceived body image, weight control, nutritional knowledge, and dietary habits in high school boys of Yongin, Korea and Weihai region of China. In terms of body image, IBI score was slightly lower than CBI score in both countries, suggesting that students wanted to be thinner than their current body shapes. The differences between IBI and CBI scores were similar in both countries. Only 21.9% of Korean students and 26.0% of Chinese students considered their CBI as IBI, and 41.4% of Korean students and 40.8% of Chinese students wanted to be thinner. The results of this study were consistent with a similar study showing that the desirable BMI was lower than the current BMI in Korean and Chinese high school students.[20-24] Regarding increasing modern pop cultures in both countries, this may suggest that external social and/or media stimuli might have influenced boys to become more sensitive about their own body image and appearance. However, the body shape satisfaction was generally high in both countries, and not significantly different between Korean students and Chinese students.

Despite the fact that the average IBI score was significantly lower among Chinese high school boys, compared with the one in Korean boys, the prevalence of students who have ever tried weight control was 36.2% in Korean students, which was significantly higher than 22.4% in Chinese students. This is similar to the results from studies conducted in Jeju-do, Korea,[4] Yantai, Shandong province, China,[25] and Zibo city, China,[26] demonstrating that the interest in weight control in Korean students was higher than that in Chinese students. In terms of weight control methods, students of both countries preferred exercise as a primary method. This was also similar to the results from previous studies,[4,9,24,27] which reported that students usually use exercise as a weight control method. When compared, exercise rate was higher in Chinese students, while rates of fasting and dietary restriction were higher in Korean students. Previous studies reported that girls tend to have slim body shapes by losing weight, which was influenced mostly by adults and friends around them and media, while boys tend to increase muscles rather than simply losing weight influenced by their peer groups.[28,29] Higher frequencies of weight control attempts with undesirable methods such as fasting in Korean students suggest that proper nutrition and weight management education is greatly needed in this popula-

tion.

Even though Korean students reported that they have tried more undesirable weight control methods such as fasting and medicine, the results on nutrition knowledge suggest that Korean students had slightly better nutrition knowledge than Chinese students. It is possible that Korean students may have received more nutrition information through their schools or media,[4] but not practiced healthy methods for weight control. Frequent fasting or extreme calorie-restricted diets can lead to developing undesirable dietary habits.[30]

The total score for dietary habits was significantly higher in Chinese students than Korean students in this study, suggesting that Chinese students had more desirable dietary habits. Several studies have investigated relationships between nutritional knowledge and dietary behaviors in adolescence. For example, a positive relationship between attitudes towards dietary intake and nutritional knowledge has been reported.[4] Nutrition knowledge has been a significant predictor of dietary behavior mediated by perceived body image, and students tried to apply nutrition knowledge to their dietary lifestyle.[17] In addition, significant positive correlations were observed among nutrition knowledge, meal frequency, and vegetables and milk consumption.[21] On the other hand, Jeong et al[21] reported that girls showed significant correlation between nutrition knowledge and dietary behavior, but not in boys. In the current study, even though Korean students had higher scores on nutrition knowledge than Chinese students, they had more undesirable dietary habits than Chinese students. Again, although Korean students have good nutrition knowledge, they may have been unable to apply the knowledge to their lives because of their frequent weight control attempts using undesirable methods. Choi et al[16] reported that nutrition knowledge was not different between students who skipped breakfast and those who did not, and that the education only providing nutrition knowledge would not be sufficiently effective in improving meal-skipping problem.

In summary, both Korean and Chinese students in this study showed that there was a gap between ideal body image and current body image, and Korean students had a higher rate of weight control attempts compared with Chinese students. Body shape satisfaction was positively correlated with nutrition knowledge in Korean students, while it was correlated with better dietary habits in Chinese students. A positive association between interests in weight control and nutrition knowledge has been reported in one study.[31] It is possible that Korean students with greater interests in or under frequent weight control in our study had higher body shape satisfaction and higher level of nutrition knowledge. Further research is needed to better understand relationships among body satisfaction, knowledge, and dietary habits.

A limitation of the study includes that students might have had cultural bias when they answered survey questions depending on where they were from. Despite this limitation, the current study was one of the first studies that examined body image and related factors among high school boys, and indicating potential differences between Korean and Chinese populations.

To promote healthy dietary habits in Korean high school boys, nutrition education interventions that not only provide accurate nutrition information but also motivate them to apply acquired knowledge into their lives are warranted. For Chinese high school boys, focusing on prevention of developing undesirable body image would be more beneficial.

AUTHOR DISCLOSURES

No competing interests are reported.

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