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Do mother's interests in weight control influence preschoolers' obesity and weight related concerns?

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Abstract

The purpose of this study was to assess the relationship between the mother's interest in weight control and its association with the preschooler's obesity and weight related concerns. This was a cross-sectional study based on 470 parents' self-reports. To score interests in weight control, mothers rated each of 6 items on a five-point Likert scale ranging from disagree (1) to agree (5). The perceptions of mothers' weights and their children's weights, mothers' Body Mass Index (BMI), preschoolers' Weight-Length Index (WLI) (%), and weight-related concerns were determined. The mothers' BMI was significantly correlated with interest scores of weight control in mothers ($r=0.632$, $p<0.001$) while their children's obesity was weakly correlated with the mothers' interest scores ($r=0.133$, $p=0.025$). Mothers with a high interest of weight control reported higher percentages of family history of obesity than mothers with lower interests (63.2% vs. 36.8%, $p<0.001$). Two-thirds of the mothers (65.4%) were accurate in their perceptions about their weights. Similarly, 63.7% of mothers knew exactly their children's weight-statuses. Compared with mothers with low interest in weight controls, mothers with high interest in weight control had lower correct-perceptions about their weights ($p<0.05$) but higher correct-perceptions about their children's weights. More than two-thirds of mothers (85%) reported not worrying about their children's obesity in the future. Only 14.3% of the mothers were satisfied with their current weight statuses. Three-fourths of mothers preferred exercise as an effective weight-control method for their children, 20% preferred diet therapy and 5.5% preferred behavior modification. More girls were overweight / obese, than boys (overweight: 16.1% (girl) vs. 12.8% (boy), obese: 5.4% (girl) vs. 4.5% (boy)). About 40% of overweight girls' mothers had low interests in their weight controls with low correct-perceptions in their children's weights, which suggests possible elevated risk of obesity, especially in girls, in the future.

Key Words: Interests in weight control, preschooler, WLI obesity index, Body mass index(BMI), obesity

Introduction

Being overweight is becoming one of the public health problems of childhood. There is growing concern that people may underscore increasing obesity rates in preschoolers (Francis & Birch, 2002; Kim *et al.*, 2004; Klohe *et al.*, 2007) According to the 2005 Korea National Health and Nutrition Examination Survey (KNHANES), the prevalence of overweight among children aged 6 through 9 years is 11.8%, which is alarming rate, compared to the obesity rate of 2.8% at aged 1-4 years (Ministry of Health & Welfare, 2006). Preschooler obesity can lead to increased health risks such as type 2 diabetes and cardiovascular diseases (Ball & McCarger, 2003).

Eating habits and a sedentary lifestyle are major environmental-factors for obesity. Mothers, at younger ages, have significant influences on their children's eating and life-style patterns. Several studies reported that childhood obesity is associated with maternal characteristics, especially with the mother's eating habits, nutrition knowledge, perceptions of their children's body sizes, and mother's depression (Birch *et al.*, 2000; Birch & Fisher, 1998; Contento *et al.*, 2003; Danielzik *et al.*, 1999; Hood *et al.*, 2000; Klohe *et al.*, 2007). Mothers who used more eating prompts had children with improper eating habits (Abramovitz, 2003). Mothers concerned about their children becoming overweight were more likely to restrict their children's intake of specific foods and less likely to pressure their child to eat (Killion *et al.*, 2006). A mother's misperception on their children's weights was also positively related to childhood obesity (Dubios *et al.*, 2007; Hyun & Hong, 2005). Abramovitz & Birch (2000) reported that mother's dieting behavior contributed on their children's emerging ideas about dieting even at a younger age (Abramovitz & Birch, 2000; Fulkerson *et al.*, 2002). Maternal dieting behaviors resulted in overemphasis on weight-control to their adolescents, suggesting these behaviors may lead to an increased risk for the development of obesity (Fulkerson JA *et al.*, 2002).

Many of the above studies have assessed various factors separately regarding maternal diet or weight concerns and school aged children's obesity, but few have examined their relationships between interests in weight control and overweight in preschoolers. In Korea, some studies also have focused on the relationships between interests in weight control and nutrition

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knowledge or eating behavior or nutrition intakes in various subjects, not in preschoolers, such as young female adults, high-school girls, and housewives (Jung *et al.*, 2003; Kim *et al.*, 1998; Kim, 2004; Ryu *et al.*, 1997).

Even with studies about preschoolers and obesity, (Choi & Youn, 2003; Kang, 2005; Kim *et al.*, 2001; Kim *et al.*, 2004; Lee & Youn, 1999; Lim, 2001), still little is known about maternal interests in weight control and its relationship with obesity in their children. The increasing overweight-rates among preschool-age children suggest that greater attention should be paid to this population, and various maternal factors related with preschooler's obesity need to be elucidated. Therefore, this study strived to explicate whether a mother's interest in weight control is associated with a preschooler's obesity and whether the extent of interests of weight control in mothers influence differently on weight-perceptions, dieting behaviors, and weight concerns for themselves or their preschoolers.

Subjects and Methods

This was a cross-sectional study of 470 mothers of 23-60 months old children using a self-administered questionnaire. To obtain a sample of mothers from diverse socio-economic backgrounds, participants were recruited from 4 kindergartens in Seoul and its surrounding area between June 1, 2007 to June 30, 2007. Questionnaire items were developed and adapted from existing questionnaires (Jung, 2005; Kim, 2005; Park & Park, 2001). The questionnaire included items in 4 areas: 1) family demographics, 2) maternal interests about weight control, 3) the extent of obesity and related concerns for themselves and their children, and 4) maternal perceptions about their weight and their child's weight.

BMI was calculated from self-reported data according to the formula: weight (kg)/height (meters squared). According to IOTF guidelines (IOTF, 2000), respondents were classified into one of four groups: underweight (BMI<18.5), normal weight (BMI= 18.5-22.9), overweight (BMI=23.0-25.0), and obese (BMI>25.0). The weight-length index (WLI) for the index of obesity in preschoolers was also calculated: [actual weight in kilograms ÷ actual height in centimeters/50th percentile expected weight in kilograms for age ÷ 50th percentile expected in height for age] (Durant & Linder, 1981). Preschoolers were classified as underweight (WLI<90%), normal weight (90%≦WLI<110%), overweight (110%≦WLI<130%), and obese (WLI≧130%) (Durant & Linder, 1981).

The questionnaire for assessing mothers' interests in weight control included 6 questions: caring about controlling weight, thinking about being thinner, thoughts for effective weight control, perception about current weight, caring about diet information, and number of diets tried. Parents were asked to evaluate in a five-point Likert scale ranging from unsatisfied (1) to very satisfied (5). After summing up scores, with a mean score of 21.25 ± 4.44, interest scores were divided into three categories: Low score (0-16), Medium score (17-24), High score (25-30).

Mothers were also asked about perceptions of their children's weights and concerns for the children's obesity, and these questions included: how they would describe their children's current weights (response options included underweight, about right, somewhat overweight or very overweight), whether they worried about their children's obesity, whether they generally cooked with weight concerns for children, preferred dieting methods when necessary, whether they always care about diet and nutrition information for their children (the response options were dichotomized into 'yes', 'no', and 'so-so').

To calculate the correct perception, the value of each response choice, such as "underweight (1)", "about the right weight (2)", "overweight (3)", or "very overweight (4)", was subtracted from their BMI score which was categorized into 4 groups: underweight (1), normal (2), overweight (3), obese (4). If the subtraction score was "0", the mother was considered to know exactly her weight status. Anthe score, such as -1, -2, 1, or 2, was considered as wrong perceptions of weight. The same calculations were also applied to determine the maternal perceptions of their children's weights. For demographic data, additional information, such as job status, feeding methods, education level, age, and family income was collected.

Statistical Analysis

In all the analyses with the statistical package program of SPSS PC$^+$, group differences between low, medium, and high scores were analyzed using One-way Analysis of Variance and Chi-Square test. Post-hoc tests such as the Tukey and LSD test were applied if there were significant differences among three groups. Spearman correlation coefficients were calculated between mother's interest scores in weight control, mother's or children's BMI, and other related measures, i.e. educational level, monthly income, feeding methods, job status, mothers' and perceptions of their child's weight. A two-tailed α-level of 0.05 was used for all statistical tests. The findings should be interpreted with caution due to the small sample sizes once the groups were split by three groups of interest scores (e.g. some cells contained less than n=10).

Results

As shown in Table 1, there were no significant relationships between the extent of interest scores of weight control and mother's age, educational level, job status, or monthly family incomes. About 85% of mothers were aged between 20 and 30 years. Thirty-seven percent of mothers had a high school education or less and 74% were full-time housewives. About half of the subjects (49.9%) had a monthly family income of 3,000,000 won or more. Mothers who fed breast milk to their

Table1. Demographic characteristics of preschooler's mothers

Variables	Criteria	Interest scores in weight control of mothers				
		Low[1]	Medium	High	Total	p value[2]
Age (year)	20-29	0 (0.0)[3]	5 (2.8)	2 (1.6)	7 (1.6)	
	30-39	111 (86.0)	150 (83.8)	111 (88.1)	372 (85.7)	0.33
	>40	18 (14.0)	24 (13.4)	13 (10.3)	55 (12.7)	
Educational level	≤High school	44 (33.1)	74 (39.6)	53 (37.6)	171 (37.1)	
	2 year college	37 (27.8)	45 (24.1)	35 (24.8)	117 (25.4)	0.891
	University	48 (36.1)	64 (34.2)	51 (36.2)	163 (35.4)	
	>University	4 (3.0)	4 (2.1)	2 (1.4)	10 (2.2)	
Occupation	No	88 (67.7)	141 (75.4)	109 (78.4)	338 (74.1)	0.218
	Yes	42 (32.3)	45 (24.1)	30 (21.6)	117 (25.7)	
Monthly income (10,000 won)	<200	17 (12.5)	19 (10.6)	112 (7.9)	130 (10.3)	
	200 - 300	50 (38.5)	66 (36.9)	61 (44.2)	177 (39.6)	0.51
	301 - 500	52 (40.0)	66 (36.9)	50 (36.2)	168 (37.6)	
	>500	11 (8.5)	28 (15.6)	15 (10.9)	54 (12.1)	
Obesity history*	Yes	53 (39.6)	87 (47.8)	86 (63.2)	226 (50.0)	0.001
	No	81 (60.4)	95 (52.2)	50 (36.8)	226 (50.0)	
Chronic diseases	Yes	69 (52.3)	92 (49.2)	70 (50.0)	231 (50.3)	0.86
	No	63 (47.7)	95 (50.8)	70 (50.0)	228 (49.7)	
Feeding methods	Breast	48 (35.8)	63 (33.5)	52 (36.9)	163 (35.2)	
	Milk	48 (35.8)	58 (30.9)	42 (29.8)	148 (32.0)	0.719
	Breast + milk	38 (28.4)	67 (35.6)	47 (33.3)	152 (32.8)	
Mean scores*		13.6 ± 2.3[4]	20.7 ± 2.1	26.6 ± 1.6	21.3 ± 4.4	

[1] Low score: 10-16, Medium score: 17-24, High score: 25-30
[2] p value: significance at $p<0.05$ by chi-square test
[3] Number of subjects (percentage)
[4] Mean and standard Deviation
* Mean interest scores in weight controls of mothers

Table 2. Obesity index and weight-perception rate according to interest scores of weight control in mothers

Variables	Criteria	Interest scores of weight control in mothers				
		Low[1]	Medium	High	Total	p value[2]
Mother	Age (year)	36.4 (3.4)[3]	36.1 (3.21)	35.9 (3.0)	36.1 (3.2)	
	Height (cm)	160.0 (4.52)	160.3 (4.74)	160.5 (4.31)	160.3 (4.6)	
	Weight (kg)	50.4 (5.12)[a]	54.7 (5.23)[b]	59.1 (7.43)[c]	54.7 (6.8)	
	Mean (SD)	19.69 (1.74)[a]	21.29 (1.84)[b]	23.08 (2.47)[c]	21.4 (2.4)	
BMI[5]	Underweight	76 (61.2)[4]	35 (21.0)	6 (5.1)	117 (28.3)	
	Normal	44 (35.5)	104 (62.3)	47 (40.1)	195 (47.2)	
	Overweight	3 (2.3)	22 (13.2)	42 (35.9)	67 (17.5)	0.001
	Obese	1 (1.0)	6 (3.5)	22 (18.9)	29 (7.0)	
	Total	124 (30.0)	167 (40.5)	117 (29.5)	408 (100.0)	
Perception rate	Correct	96 (74.4)	104 (60.1)	71 (63.2)	274 (65.4)	0.032
	Wrong	33 (25.8)	69 (39.9)	43 (36.8)	145 (34.6)	
	Total	129 (30.8)	173 (41.3)	117 (27.9)	419 (100.0)	
Children	Age (year)	4.8 (0.6)[3]	4.6 (0.6)	4.6 (0.6)	4.6 (0.6)	
	Height (cm)	110.8 (6.3)	110.9 (6.5)	110.2 (6.7)	110.6 (6.5)	
	Weight (kg)	18.98 (2.72)[a]	19.46 (3.23)[a]	20.06 (3.21)[b]	19.5 (3.1)	
	WLI (%)	98.7 (10.05)[a]	99.8 (12.44)[a]	103.7 (11.2)[b]	100.7 (11.6)	
WLI Obesity Index (%)[6]	Underweight	17 (18.7)	20 (16.5)	9 (9.7)	46 (15.1)	
	Normal	59 (64.8)	80 (66.1)	61 (65.6)	200 (65.6)	
	Overweight	14 (15.4)	13 (10.7)	17 (18.3)	44 (14.4)	0.187
	Obese	1 (1.1)	8 (6.6)	6 (6.5)	15 (4.9)	
	Total n	91 (29.8)	121 (39.7)	93 (30.5)	305 (100.0)	
Perception rate	Correct	50 (55.6)	77 (64.7)	64 (70.3)	191 (63.7)	
	Wrong	40 (44.4)	42 (35.3)	27 (29.7)	109 (36.3)	0.113
	Total n	90 (30)	119 (39.7)	91 (30.3)	300 (100)	

[1] Low score: 10-16, Medium score: 17-24, High score: 25-30
[2] p value: significance at $p<0.05$ by chi-square test
[3] mean and standard deviation
[4] number of subjects (percentage)
[5] BMI (Body Mass Index) = weight (kg)/height (meters squared).
[6] WLI (weight-length index)^2 = [actual weight in kilograms ÷ actual height in centimeters/50th percentile expected weight in kilograms for age ÷ 50th percentile expected in height for age]
[a,b,c] Different letters, a, b, & c, donate significant difference among groups, (Low-Score, Medium-Score, and High-Score) at $p<0.05$ level.

children and who were full time housewives had higher interest in weight control than the other groups, but no statistical significance was shown. Mothers with high interest scores of weight control reported higher percentage of family history of obesity than the low-scoring groups (63.2% vs. 36.8%, $p<0.001$). Mean of interest scores of weight control in mothers were 21.2 ± 4.4 with a range of 7 to 30 with 13.6 ± 3.3 in Low score, 20.7 ± 4.1 in Medium score, and 26.6 ± 1.6 in High score, respectively ($p<0.05$).

According to BMI, 24.5% of mothers studied were overweight or obese and rest of mothers were either normal-weight or underweight ($p<0.05$). Mothers with high scores in weight control were significantly heavier (BMI: 23.08 ± 2.47) than mothers who had low or medium interest scores of weight control (BMI: 21.29 ± 1.84 in Medium score or BMI: 19.69 ± 1.74 in Low score, $p<0.05$). When overweight was defined for children as WLI obesity index (%), 14.4% of children were overweight, with the values of 4.9 % obese, 65.6% normal weight, 15.1% underweight. Two-thirds of mothers (65.4%) were accurate in their perceptions about their own weights. Similarly, 63.7% of mothers exactly knew about their children's weight statuses. Interestingly, mothers with high interest scores of weight control had lower correct perceptions for their weights than mothers with low interests of weight control (63.2% vs. 73.4%, $p<0.001$). Opposite trends were shown in maternal perception of their children's weights. In mothers with low interest scores of weight control, 44% of mothers falsely perceived their children's weight statuses compared to 29.7% of wrong perception rates in mothers with high interest scores.

In all subjects, the mother's obesity was significantly correlated with interest scores of weight control ($r=0.632$, $p<0.001$, Fig. 1). It was evident from this figure that the BMI of mothers and the interests in controlling their weights showed a positive linear relationship.

Fig. 2 showed weak correlation between WLI obesity index (%) of preschoolers and mother's interest scores of weight controls, although some trends that higher percentages of overweight/obese children included in higher scores of weight controls were shown ($r=0.133$, $p=0.025$).

No statistical gender differences between WLI obesity index and interest-scores of weight control in mothers were shown (Table 3). Among total preschoolers, more girls were overweight or obese than boys (overweight: 16.1 % (girl) vs. 12.8 % (boy), obese: 5.4 % (girl) vs. 4.5 % (boy)). In boys, mothers with high interest scores of weight control had high percentages of overweight (15.2%) and obese sons (9.1%), compared with mothers with low interest score with low percentages of overweight sons (2.3%). Interestingly in mothers with overweight girls, 41.7% (10/24) reported low interest in weight control of themselves. Mothers with obese girls showed either medium (75%, 6/8) or high interest scores (25%, 2/8) of weight controls. Meanwhile, mothers of underweight girls (48.1%, 13/27) or normal-weight girls (33.1%, 5/18) reported high interest in weight control.

More than two-thirds of mothers (85%) reported not worrying about their children's obesity in the future. Mothers' interests

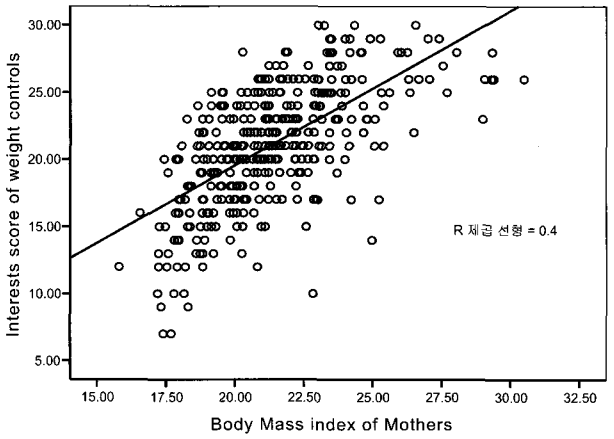

Fig. 1. The correlations between BMI and interest scores of weight controls in mothers

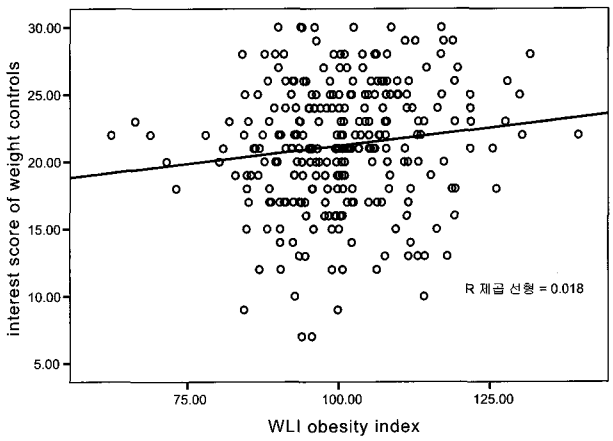

Fig. 2. The correlations between the WLI obesity index of preschooler and interest scores of weight controls in mothers.

Table 3. The relationships between WLI obesity index of preschoolers and interest scores of weight control in mothers

n (%)

Variable	Criteria	Interest scores of weight control in mothers			
		Low[1)]	Medium	High	Total
Boys (p=0.613)	Underweight	8 (18.2)	7 (10.6)	4 (8.7)	19 (12.2)
	Normal	31 (70.5)	48 (72.7)	23 (67.4)	110 (70.5)
	Overweight	4 (9.1)	9 (13.6)	7 (15.2)	20 (12.8)
	Obese	1 (2.3)	2 (3.0)	4 (8.7)	7 (4.5)
	Total	44 (28.2)	64 (23.6)	46 (29.5)	156 (100.0)
Girls (p=0.036)	Underweight	9 (19.1)	13 (23.6)	5 (10.6)	27 (18.1)
	Normal	28 (59.6)	32 (58.2)	30 (63.8)	90 (60.4)
	Overweight	10 (21.3)	4 (7.3)	10 (21.3)	24 (16.1)
	Obese	0 (0)	6 (10.9)	2 (4.3)	8 (5.4)
	Total	47 (31.5)	55 (36.9)	47 (31.5)	149 (100.0)

[1] Low interest score (10-16), Medium (17-24), High (25-30)
* p value: significance at $p<0.05$ by chi-square test

Table 4. The relationships between weight related concerns for their children and interest scores of weight control in mothers.

n (%)

Variable	Criteria	Interest scores of weight control in mothers			
		Low[1)]	Medium	High	Total
Worrying about child obesity* (p<0.001)	Yes	8 (5.9)	22 (11.8)	37 (26.1)	67 (14.5)
	No	123 (91.1)	162 (86.5)	104 (73.9)	389 (84.5)
	So-so	4 (3.0)	2 (1.1)	0 (0.0)	6 (1.3)
	Total	135 (29.2)	187 (40.4)	141 (30.5)	463 (100.0)
Cooking always with weight-concern (p=0.662)	Yes	59 (26.6)	59 (40.1)	74 (33.3)	222 (48.1)
	No	71 (31.7)	91 (40.6)	62 (27.7)	224 (48.5)
	So-so	5 (31.3)	7 (43.8)	4 (25.0)	16 (3.5)
	Total	135 (29.2)	187 (40.5)	140 (30.3)	462 (100.0)
Caring about diet/nutrition information (p=0.072)	Yes	75 (55.5)	111 (59.3)	94 (71.8)	280 (60.6)
	No	56 (41.5)	75 (40.7)	45 (31.9)	176 (38.1)
	So-so	4 (3.0)	0 (0.0)	2 (1.3)	5 (1.1)
	Total	135 (29.2)	187 (40.4)	141 (30.5)	463 (100.0)
Preferring weight managements for children (p=0.994)	Exercise	88 (85.4)	130 (85.5)	88 (83.5)	304 (84.9)
	Diet	9 (8.7)	13 (8.6)	10 (9.7)	32 (8.9)
	Behavior	6 (5.8)	9 (5.9)	7 (6.8)	22 (6.1)
	Total	103 (28.8)	152 (42.5)	103 (28.8)	358 (100.0)

[1] Low interest score (10-16), Medium (17-24), High (25-30)
* p value: significance at p<0.05 by chi-square test

in weight control were significantly associated with a variable worrying about their children's weight-gaining in the future (26% vs. 11.8% (medium score) or 5.9% (low score), p<0.05). About half of mothers (48.1%) generally cooked at home with concerns about their children's weights and 60% of mothers generally cared about nutrition/ diet information about children. However, there were no significant differences between preparing low calorie foods or obtaining diet/ nutrition information and interest scores of weight control in mothers. As for weight controlling methods, if necessary, most mothers (85%) preferred exercise as an effective intervention. Only 9% of mothers considered calorie reduction and 6% of mothers considered behavior modification.

About one-third of mothers (28.3%) had no experience of weight control, while 53% of mothers reported that they tried to lose weight one or more times. Mothers with high interest of weight control had dieted 3 times or more (63.9% vs. 13.2% (Medium) or 0.7% (Low), p<0.05). In addition, mothers with high interest in weight control also showed significantly higher desire to lose weight than mothers with low interest scores (80.5% vs. 40.8%). On average 62% of the subjects wanted to lose some weight from their current weights. Only 14.3% of the subjects were satisfied with their current weight statuses. 75% of the subjects preferred exercise as effective dieting methods, 20% diet therapy and 5.6% behavior modification. Mothers with high interest in weight control chose more behavior modification (8.3%) as preferred dieting regimens, compared with mothers with either low (3.6%) or medium interest scores (5.1%) in weight controls.

Table 5. The relationships between weight related concerns and interest scores in weight control in mothers.

n (%)

Variable	Criteria	Interest scores of weight control in mothers			
		Low[1)]	Medium	High	Total
Experience about weight control (p<0.001)*	No	101 (73.7)	24 (12.7)	5 (3.8)	130 (28.3)
	Want to try	18 (13.1)	62 (32.8)	6 (4.5)	86 (18.7)
	1 time	13 (9.5)	49 (25.9)	11 (8.3)	73 (15.9)
	2 times	4 (2.9)	29 (15.3)	26 (19.5)	59 (12.9)
	3 or more	1 (0.7)	25 (13.2)	85 (63.9)	111 (24.1)
	Total	137 (29.8)	189 (41.2)	133 (29.0)	459 (100.0)
Desirable weight (p<0.001)	Gain weight a lot	4 (2.9)	1 (0.5)	2 (0.4)	7 (1.5)
	Gain weight a little	27 (19.7)	0 (0.0)	7 (5.1)	34 (7.1)
	Satisfy	50 (36.5)	12 (6.3)	4 (2.9)	66 (14.3)
	Lose weight a little	55 (40.1)	167 (88.4)	65 (47.4)	287 (62.0)
	Lose weight a lot	1 (0.7)	9 (4.8)	69 (43.1)	69 (14.9)
	Total	137 (29.6)	189 (40.8)	137 (29.6)	463 (100.0)
Preferring weight control methods (p=0.05)	Exercise	93 (83.3)	138 (78.4)	83 (65.9)	314 (75.9)
	Diet	15 (13.4)	29 (16.5)	30 (23.8)	74 (17,9)
	Behavior	4 (3.6)	9 (5.1)	10 (8.3)	23 (6.2)
	Total	112 (27.1)	176 (42.5)	126 (30.4)	414 (100.0)

[1)] Low score: 10-16, Medium score: 17-24, High score: 25-30
* p value: significance difference at p<0.05 level among Low score, Medium score, and High scores by chi-square test

Discussion

Weight-controlling behaviors of mothers were associated with their teenager's obesity and dieting behavior. Therefore, this study tried to determine whether the mother's interest of weight control is related with the preschooler's obesity and obesity-related concerns. Mothers with high interests in weight control had a higher family history of obesity (Table 1, p<0.05) and higher BMI (Fig 1, r=0.632). From this result, we can suggest that mothers' high interest in weight control and high BMI may come from a history of obesity within the family. It is well published that genetic factors are contributing factors for the development of obesity (Francis *et al.*, 2002; Johnson & Birch, 1994; Lee *et al.*, 2000). Gibeson *et al.* (2007) suggested that having an overweight mother and coming from a single mother increased the likelihood of a child being overweight or obese.

In this study, mothers with high interests in weight control were also found to have higher percentage of overweight preschoolers, compared to mothers with low interests (p<0.05). Mothers' interests in weight control were significantly but weakly correlated with their children's obesity index (r=0.133, p=0.025, Fig. 2). Mothers with high interest scores of weight control, also reported very much worrying about their children's weights (Table 4), having higher corrected perception of children's weights, compared to mothers with low interests about weight controls (Table 2). Since the nature of cross-sectional study, we can't explain the origin of this association. Nevertheless, we can sug-

gest that mothers who have a family history of obesity and thus have high interests in weight control for themselves will also try to maintain a healthy weight in an obesogenic environment which lead to more attentions to their children's weight and thus have high corrected-perceptions for their children's weight (Gibeson *et al.*, 2007). Thus, maternal interests in weight control and maternal BMI may be factors that influence on childhood obesity.

As seen in Table 3, mothers with low interest in weight control had 41% of overweight girls (10 out of total 24 overweight girls), while mother's weights were either underweight (65%) or normal weight (22.6%) (Table 2). Mothers with low interest in weight control also shown to have lower correct-perceptions about their children's weights compared to mothers with high interest in weight control (55.6% vs 70.3%). Because mothers of overweight girls have no weight problems; they might think there are few possibilities for their children to be obese in the future (Baughcum *et al.*, 2000). Mothers may also believe even if their children's weights are slightly above the recommended standard, it is beneficial for the children in terms of growth and development (Baughcum *et al.*, 1998). Several studies showed that a parent's misperception of their children was associated with their BMI and children's obesity (Baughcum *et al.*, 1998; Baughcum *et al.*, 2000; Contento *et al.*, 2003; Davison *et al.*, 2000; Hyun & Hong, 2005). A mother's concern of controlling food intake can reduce obesity in childhood (Birch & Fisher, 2000; Danielztk *et al.*, 1999; Johnson & Birch, 1994; Robinson *et al.*, 2001). Therefore, mothers with overweight children should be aware of their children's exact weight statuses, and need to have more interest in their children's eating habits and weights.

Our studies had some limitations. First, since we used obesity index according to the mothers self reported-data, using the reported BMI of mothers WLI obesity index of preschoolers are limited. Second, the widespread emphasis on weight concerns may have led mothers to under or over - report when asked about weight related questions. Further studies including other possible maternal factors such as parenting skills, maternal psychological problems, and obesity related stresses are needed to clarify maternal influence on childhood obesity. In particular, longitudinal data is essential to clarify how parental influences may contribute to subsequent childhood obesity.

In summary, high interests of weight controls in mothers are greatly associated with family history of obesity, mother's BMI, and preschooler obesity. Although some mothers with high interests in weight control reported worrying about childhood obesity, most mothers in this study seemed not to worry about their children's weights as much as their own weight interests. Special attention is perhaps needed for overweight girls with overweight mothers who have low interest in their weight controls.

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