Emotional Instability and Harm Avoidance for Childhood Obesity are Related to the Motivation for Weight Loss: A Pilot Study in Korea

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Abstract

Objective: The aim of this study was to evaluate the relationship between such psychosocial variables as the emotional and characteristic factors, and the motivation for weight loss in children with obesity. **Methods**: Thirty-seven children (mean age: 9.4±1.2 years) between the ages of 7 and 12 who had entered a summer camp for childhood obesity and their parents participated in this study. A questionnaire on the eating habits and life style of the child, the Child Behavioral Checklist (CBCL), and the Child Character Inventory (CCI) were completed by the parents of the subjects. The obese children completed the Child Depression Inventory (CDI) and the Parental Bonding Instrument (PBI) by themselves. We evaluated the motivation of the obese children to lose weight by having them take the Weight Loss Readiness Test (WLRT). Then, we analyzed the correlation between the psychological variables and the WLRT items. **Results**: The emotional instability scale on the CBCL was correlated with the WLRT item of emotional eating (r=0.336, p=0.042). The harm avoidance scale of the CCI was negatively correlated with the WLRT item on exercise patterns and attitudes (r=-0.047, p=0.014). However, no significant correlation was found between each of the severity scores of the CDI depressive symptoms and the other psychological variables and each of the six WLRT items. **Conclusion**: Our findings suggest that emotional instability and harm avoidance, as measured by the CCI, are related to the motivation for weight loss in obese children.

Key words: Childhood obesity, Psychological factors, Motivation, Weight loss.

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Introduction

Childhood obesity is defined when the obesity index, as calculated with the 50 % weight according to gender, age and height as a standard weight, is more than 20 %; 20-30 % is defined as mild obesity, 30-50 % is defined as moderate obesity and more than 50 % is defined as severe obesity. Childhood obesity is also defined based on the subject's body mass index (BMI), skin thickness and weight according to height.[1,2] The incidence of obesity in children and adolescents has continuously increased for the past 20 years. According

to a recent study performed in the US, the incidence of severe obesity with a BMI higher than the 95th percentile was 14 % in children and 12 % in adolescents. Based on the 85th percentile, 22 % of children were obese. These incidences have increased about two fold compared with just 20 years ago.

Childhood obesity is important in that obese children are likely to grow up to be obese adults, and obesity is known to be one of the major risk factors for diabetes and arthrosclerosis.[3,4,5] From the psychological point of view, childhood obesity induces negative self-perception, body image disturbances and difficulty for relating with peers. Considering the finding that the social problem score of the Child Behavior Checklist (CBCL) was increased in 20 % of obese children, obese children can face difficulties in social situations. Obese children worry too much over friendship and relationships with the opposite sex, they suffer from inferiority and anxiety, and they are likely to show a decreased ability to adapt; obesity becomes a preceding factor for depression, social phobia, learning difficulty, somatoform disorder, conduct disorder and the refusal to go to school.[4,6,7,8,9]

The most frequent nutritional malady for today's children and adolescents is childhood obesity, which is related with such health problems such as diabetes, hypertension and sleep difficulty, and childhood obesity brings about emotional and social problems such as depression, body image disturbance and low self-esteem.[5] Thus, childhood obesity should be treated effectively because the degree of obesity in children is directly proportional to its possibility of posing medical problems. Furthermore, obesity is related with the lipid distribution pattern, the insulin level and the blood pressure. Second, obese children are likely to grow up to be obese adults. Third, children with severe obesity are likely to develop low self-esteem and more psychological symptoms than those children with moderate obesity.[4] Thus, treating childhood obesity is important since it can reduce the risk of incurring adult diseases.

Childhood obesity is treated with diet, exercise, cognitive-behavioral therapy, psychotherapy, education, drugs and surgery. Among these, cognitive-behavior therapy is the most effective method for long-term weight loss, although the weight loss during the early stage of therapy is somewhat lower compared with other treatment methods. There are many studies reporting that systematic behavior therapy centered around the family is effective for long-term weight loss and its maintenance.[10,11,12]

The motivation for weight loss was reported in many studies to be very important for successful behavior therapy, and it is known that obese adults having high motivation for weight loss participate to a greater degree in weight loss programs, they show increased activity and greater weight loss, and they are likely to maintain the reduced weight once the diet program is over.[13,14] According to another study, the level of expectation in a weight loss treatment program for adult males correlated with weight loss after 2 years. It as apparent that the motivation for weight loss itself increases self-control: this eventually brings about positive behavior changes in diet habits, and motivation for weight loss is related with the degree of continuing with a treatment program.[15] Thus, the degree of motivation for weight loss is suggested to be the primary factor predicting the degree of participation in a weight loss program and maintaining the behavior changes that were modified through the program.[16]

Even for children, the hourly participation in a diet program is related with the success of behavior therapy. Thus, a motivation enhancement strategy is needed to assist children and their families to participate in behavior therapy and maintain their weight loss.[12] As related to the motivation for obesity treatment, it was reported that psychological pain is greater in the adult obese patients who wanted treatment than in those who did not want treatment.[17] It was also reported that the level of physical self-esteem was lower in children who were under a treatment program than the level of physical self-esteem in those children who were not in a

program, and this suggests that obese children have more emotional problems.[6] When considering the results from previous studies, we could predict that the motivation for weight loss or participation in a weight loss program would be higher in obese patients having greater psychological suffering. However, no study has investigated the emotional and characteristic factors that are related with the motivation for weight loss.

In this study, we examined the emotional and characteristic factors related with the motivation for weight loss in obese children with using the Weight Loss Readiness Test (WLRT),[18,19] and this is well known as an instrument that reflects the degree of motivation for participating in a weight loss program.

Methods and Materials

Subjects

We surveyed 37 children between the ages of 7 and 12 years, along with their parents, who participated in a childhood obesity camp that was hosted by the committee on childhood obesity, the Korean Society for the Study of Obesity. Among these 37 children, 26 were boys and 11 were girls. The average age of the subjects was 9.4±1.2 years, the average height was 141.9±7.8 cm, the average weight was 49.6±9.3 kg and the average obesity index was 31.3±16.6%. Seven children showed an obesity index of less than 20 %, 11 showed an obesity index of 20-30 % (mild obesity), 16 showed an obesity index of 30-50 % (moderate obesity), and 3 showed an obesity index of more than 50 % (severe obesity) (Table 1).

TABLE 1. Demographic data of the subjects

	Male (n=26)	Female (n=11)	Total (n=37)
	Mean ± SD		
Age (yr)	9.3 ±1.2	9.6±1.3	9.4 ±1.2
Weight (kg)	50.7 ±7.9	47.0±11.9	49.6 ±9.3
Height (cm)	142.2 ±16.8	141.2 ±10.2	141.2 ±7.8
OV (%)	32.6 ±17.8	28.2±13.4	31.3 ±16.6

SD: Standard Deviation,
OV: Overweight (%) = [(real weight - standardized weight for the height and age) / standardized weight for the height and age] ×100

Instruments for the diagnosis and evaluation of the clinical symptoms

Psychological evaluation instruments

1) The Child Behavior Checklist (CBCL) was developed by Achenbach et al.,[20] and this instrument is used to evaluate behaviors in children, as based on parental observations. It is divided into the social competence scale and the syndrome and total problem scale. The Korean version of this instrument was developed and standardized in the 1990's, and the instrument was found to be both reliable and valid.[21] It has been used in many clinical studies. The syndrome and total problem scale is composed of 118 questions, in which each question is evaluated on a 3-point scale from 0 to 2 points. It is composed of 12 subscales: withdrawal, somatic complaints, anxious/depressed syndrome, social problems, thought problems, attention problems, delinquent behavior, aggressive behavior, internalizing symptoms, externalizing symptoms and the total score. It is evaluated by the raw score and the T score, and a T score higher than 65 points shows clinical significance.

2) FACES-III (Family adaptability and cohesion evaluation scales): This instrument is used to measure the degree of emotional bonding and cohesiveness among family members. It is differentiated as a measure for evaluating adaptability, i.e., the ability to the change roles, regulations and structure within the family when the family members are confronted with tension and danger. It has been shown to have excellent reliability and validity for Koreans.[22]

3) Family APGAR (Adaptability, Partnership, Growth, Affection, and Resolve): This instrument is used to evaluate the emotional satisfaction of family interac-

tion and the overall functioning of the family. A score higher than 7 points is considered as a highly functional/high satisfactory group, between 4–6 points is considered as a middle group, and less than 3 points is considered as a low functional/unsatisfactory group. It has been shown to have excellent reliability and validity for Koreans.[22]

4) Parent-Child Interaction (PCI): This is a device to measure the interaction between mothers and children in which the mother fills out a questionnaire. Developed by Hetherington and Clingempeel,[23] it was translated into Korean and standardized in 1995.[24] It is composed of parent discipline behavior (PDB), child monitoring (CM), and expression of affection (EAF) scales. PDB and EAF scales are 7-point scales with the possible score between 43-301 points for PDB and 22-154 points for EAF. CM scale is a 5-point scale which is divided according to actual effects on the child's life, with the possible score being between 9-45 points.

5) Child Character Inventory (CCI): This instrument is composed of questions taken from two personality dimension scales by Cloninger, i.e., the Preschool Behavior Questionnaire and the Prosocial Behavior Questionnaire.[25] The characteristics of a child can be classified based on 3 dimensions: the novelty seeking dimension (NS), the harm avoidance dimension (HA) and the reward dependency dimension (RD). NS is the tendency of a child to stay busy and seek a challenge despite of some danger when a new and interesting situation arises. In healthy children, a high score for this dimension means that the child is curious and likely to develop a tendency for creative activities. HA is the tendency of a child to avoid new situations, tasks or danger. A high score for this dimension means that the child is quiet and shows compliance toward parents and teachers. On the other hand, it could mean that a child is timid, inactive and is afraid of meeting new people or facing new situations. RD is the tendency to be sensitive to social acceptance and to show an emotional attitude. A high score on the RD shows the tendency to be led by adults or peers rather than the child making his/her own decisions and selecting their behavior. A high RD score means that the child would take good care of someone younger than himself/herself, be very sympathetic and have quick emotional understanding. On the other hand, the child would have a tendency to get emotional easily, lack confidence and be dependent on the parents while lacking decision making skills. This scale is composed of 18 questions: there are 4 questions for each for the NS and HA, and 10 questions for the RD. For this instrument, the values of Cronbach's alpha were evaluated as 0.89 for the NS, 0.72 for the HA and 0.92 for the RD.

6) Childhood Depression Inventory (CDI): CDI is the instrument that is most extensively used to measure depressive symptoms in children.[26,27] It is composed of 27 questions that have a 3-point scale with the score between 0-2, and it is filled out by the subject himself/herself. CDI symptoms are divided into 5 subscales: negative mood, interpersonal problems, ineffectiveness, anhedonia and negative self-esteem. The total score ranges from 0 to 54 points, with the higher scores indicating severer depression. The reliability and validity of this instrument have been proven,[27,28] and the Korean-version of the CDI has been developed and standardized.[29]

7) Parental Bonding Instrument (PBI): This instrument is completed by the child to measure the parents' attitude toward rearing. It is composed of 25 questions regarding the mother and father with each question evaluated on a 4-point scale from "caring" to "excessive protection". This instrument has been proven to be valid and reliable for Koreans in 1992.[30]

Test of motivation for weight loss

Weight Loss Readiness Test (WLRT): This instrument is used to measure the degree of a subject's readiness for weight loss (motivation, responsibility and liv-

ing environment), and it is composed of 23 questions with each question having a 6 point scale from 0-5 points.[18] This instrument was developed by Brownell and it is composed of 6 sections. The first section that contains 6 questions for goals and attitudes reflects whether the person being tested thinks his/her goal could be realized and what is their degree of accountability toward the motivation and responsibility for weight loss. The second section contains 3 questions on the stimulations that lead to hunger and eating, and it measures how the person reacts toward food when it comes to perceptual, thought and environmental stimuli. The third section contains 3 questions that are related with controlling food intake, and the section measures the degree of effect according to the external pressure while the subject is on a diet. The fourth section contains 4 questions related with impulsive eating, and it measures the degree of problematic eating behavior. The fifth section contains 3 questions related with emotional eating, and it measures the degree of effect that emotional changes have on eating behavior. The sixth section contains 4 questions related with the pattern of and attitude toward exercise, and it measures the attitude toward regular exercise and the subject's self-esteem.

Statistical analysis

Pearson's correlation test was performed in order to examine the correlation between each subscale of CBCL, CCI, CDI, PBI, PCI, FACES-III and the Family APGAR with the 6 sections of the WLRT. Statistical analysis was performed using SPSS 11.5 for Windows.

Results

Psychosocial variables of the subjects

The average scores of CBCL subscales, the CCI and CDI in the subjects were demonstrated in (Table 2).

TABLE 2. Psychosocial variables of the Subjects

Items		Subjects (N=37) Mean ±SD
CBCL	SC	46.0 ±10.8
	SF	53.0 ±12.2
	TSL	47.9 ±13.6
	WD	51.7 ±18.2
	SMA	50.8 ±8.3
	DA	48.6 ±10.4
	IMM	59.8 ±12.4
	THO	50.7 ±9.6
	ATT	51.5 ±10.8
	CON	49.0 ±8.1
	VIO	49.2 ±11.8
	INN	49.7 ±11.2
	EXT	49.0 ±10.8
	TPB	49.6 ±10.3
	SEX	41.1 ±13.3
	EMO	41.8 ±13.9
CCI	NS	3.1 ±2.3
	HA	3.1 ±2.2
	RD	10.5 ±3.4
CDI		12.5 ±6.7

CBCL: Child Behavioral Checklist, SC: social competence, SF: social functioning, TSL: total social score, WD: withdrawal, SMA: somatic Sx, DA: depression-anxiety, IMM: immaturity, THO: thought problems, ATT: attentional problems, CON: conduct behavior, VIO: aggressive behavior, INN: Internalizing symptoms, EXT: Externalizing symptoms, TPB: Total problem score, SEX: sexual problems, EMO: emotional problems, CCI: Child Character Inventory, NS: Novelty seeking, HA: Harm avoidance, RD: Reward dependency, CDI: Childhood Depression Inventory

Correlation between the CBCL subscales and the motivation for weight loss

A significant correlation was seen between emotional instability on the CBCL and emotional eating on the WLRT (r=0.336, p=0.042). No significant correlations were seen between the other subscales of the CBCL and the 6 sections of the WLRT (Table 3).

Correlation between the CCI and the motivation for weight loss

A significant inverse relationship was present between harm avoidance on the CCI and the exercise pattern and attitude on the WLRT (r= -0.417, p= 0.014) (Table 4).

Others

TABLE 3. Correlations between the CBCL and the Weight Loss Readiness Test

WLRT / CBCL	AA	HS	FR	IMP	EM	EX
SC	.095	.088	.045	-.138	-.046	.008
SF	-.181	-.156	-.195	-.068	-.094	-.045
TSL	-.004	-.032	-.041	-.155	-.070	-.001
WD	-.068	-.007	.146	.042	.024	.015
SMA	.151	.046	.194	-.296	.219	.190
DA	-.200	-.071	-.250	-.064	.000	.014
IMM	-.044	-.020	-.041	-.002	-.122	.118
THO	-.029	-.164	.100	-.131	.048	-.111
ATT	.014	.078	-.008	-.185	.194	.146
CON	.098	-.099	.185	.093	-.115	.051
VIO	.005	.043	.034	.061	.182	.138
INN	-.146	-.040	-.089	-.071	.109	.105
EXT	.025	.036	.057	.054	.138	.109
TPB	-.065	.091	-.068	-.198	-.005	-.037
SEX	-.113	-.179	.068	.186	.271	-.026
EMO	-.096	-.139	-.041	.174	.336*	.028

*P - value :< 0.05 (0.042)
CBCL: Child Behavioral Checklist, SC: social competence, SF: social functioning, TSL: total social score, WD: withdrawal, SMA: somatic Sx, DA: depression-anxiety, IMM: immaturity,
THO: thought problems, ATT: attentional problems, CON: conduct behavior, VIO: aggressive behavior, INN: Internalizing symptoms, EXT: Externalizing symptoms, TPB: Total problem score, SEX: sexual problems, EMO: emotional problems, WLRT: Weight Loss Readiness Test, AA: Goals and Attitudes, HS: Hunger and Eating Cues, FR: Control Over Eating, IMP: Binge Eating and Purging, EMO: Emotional Eating, EXE: Exercise Patterns and Attitudes

No significant correlations seen among the CDI, PBI and the WLRT. As for the correlation between the obesity index and the motivation for weight loss, a significant correlation was seen for the items related to goals and attitudes (r=0.342, p= 0.038), but no significant correlations were seen for the other 5 items. No correlations were observed among the subscales of the CDI, PBI, PCI and the WLRT. Furthermore, no significant correlations were seen for the scores of the FACES-III and the Family APGAR with the subscale scores of the WLRT.

TABLE 4. Correlations between the CCI and the Weight Loss Readiness Test

	WLRT					
CCI	AA	HS	FR	IMP	EM	EX
NS	-.104	.028	-.018	.194	.212	.034
HA	-.162	.043	-.322	.062	.088	-.417*
RD	-.062	.153	-.129	-.077	.026	-.143

*P-value : < 0.05 (= 0.014)
CCI: Child Character Inventory, NS: Novelty seeking, HA: Harm avoidance, RD: Reward dependency, WLRT: Weight Loss Readiness Test, AA: Goals and Attitudes, HS: Hunger and Eating Cues, FR: Control Over Eating, IMP: Binge Eating and Purging, EMO: emotional Eating, EXE: Exercise Patterns and Attitudes

Discussion

According to the results of this study, a significant correlation was seen between the item of “emotional instability”, among the 13 items in the syndrome, and the total problem scale on the CBCL and “emotional eating” on the WLRT, which measures motivation for weigh loss in obese children. This result agrees with previous studies that eating habits are related with the emotional status in children and adolescents, and our result is in partial agreement with some studies reporting that emotional problems are present in patients with bulimia nervosa or anorexia nervosa.[31,32,33,34]

Repeated binging without compensatory behaviors such as induced vomiting is called binge-eating disorder. Among those obese patients under treatment, 20-30% of them had a tendency to binge, and more functional damage was seen in the obese patients with binge episodes than in those obese patients without binge episodes. Obese patients with binge-eating disorder characteristically have emotional problems such as low self-esteem, body image distortion, an excessive interest over weight and diet, feelings of inadequacy and a lack of control over their life.[35] It is known that the tendency to binge is greater as hunger and disinhibition become greater, but weight loss becomes more significant as the tendency to control food intake becomes greater.[36]

It is already widely known that emotional eating is the most important factor among those factors that cause excess eating or binging. As found in this study, many studies confirm that obese children with emo-

tional instability have a tendency toward emotional eating such as excess eating or binging, depending on their mood. The emotional factors inducing excess eating and binging are negative mood, self-doubt and unhappiness.[37] The emotional factors used to predict binging in obese adults are depression, a diet tendency, weight-cycling, a teasing tendency, dissatisfaction with their body, and negative affect.[38] Those adults who binge or feel out of control are likely to become obese compared with those adults who do not binge or who have control over their life. The women who have frequent episodes of binging are likely to have feelings of deprivation and negative affect, and they are likely to become obese or develop a binge disorder.[39] However, most of the previous studies were conducted with adults or adolescents, and most of the subjects had visited hospitals for obesity treatment. Thus, the significance of this study was that our subjects were elementary school children between the ages of 7 to 12 years and the subjects, rather than visiting hospitals for the clinical treatment of obesity, were a non-clinical group composed of the children and parents who went to an obesity camp for 2 nights and 3 days of friendship and leisure. Before entering a weight loss program, obese children with emotional instability should be evaluated for their emotional eating habits and they should be treated via self-observation and cognitive-behavior therapy.

Another result found in this study was a significant correlation between harm avoidance on the CCI and the exercise pattern and attitude on the WLRT. The exercise pattern and attitude section on the WLRT is composed of 4 questions that have 5-point scales for measuring the degree of self-sureness, the frequency of exercise, regular exercise, the mood at the time of exercise and whether regular exercise could be made part of the subject's daily activities. The results of this study could be interpreted that motivation or the readiness for active exercise is not readily achieved in those obese children who have a high level of harm avoidance, i.e., those who are careful with thoughts and behavior, and who are afraid and worry too much in novel situations, and who cry easily even over little things. This strongly suggests that the characteristics of a child are closely related with the lack of exercise since obesity becomes severe or unsolvable for children in modern society due to serious lack of activities in most cases. Thus, childhood obesity should be approached from many directions when considering the child's characteristics, rather than immediately proceeding with an exercise program or increasing activities. Especially, parents of obese children should form a cooperative structure that considers the child's characteristics and suits the child. In a study that compared the relationship between obese children and their parents with that between normal children and their parents, the mothers of obese children were in a relatively dominant position, and their obese children assumed a complementary submissive position.[40] In other words, one of the factors leading children to obesity is harm avoidance. Thus, these children should be treated professionally with the awareness that the pattern of rearing by the parents and the method of communication with the parents could inhibit obesity treatment. Sothern et al.[41] have claimed that the method for increasing activities should be very systematic and gradual for the treatment of childhood obesity. They suggested a 4-step approach with an emphasis on the awareness of body movement and the motivation for exercise. Thus, before forcing children to enroll in an exercise treatment program or sending them regularly to a sports center, parents should seek ways to show children the advantages of increased levels of activity during their daily life, and they should emphasize that the motivation to exercise is happiness and not fear.

In the present study, no significant correlations were seen among the CDI, Family APGAR, PCI and the WLRT scores, and this was probably because the subjects in this study were non-clinical subjects. It was reported that obese children having serious depression or poor Family APGAR and PCI scores are highly motivated to obtain professional treatment at obesity

centers6. In other words, among the various psychological variables, the degree of the subject's seriousness toward losing weight was probably low in the subjects included in this study, as they were a non-clinical group with a relatively low level of motivation, and this was unlike a clinical group having high motivation for weight loss.

This study contained some limitations. First, no normal controls were included. Second, the subjects were motivated for weight loss since they participated in the obesity program, despite that they were a non-clinical group. Supplementary studies are needed that include a sample of randomly picked subjects in the study population. The third limitation was that the WLRT has been found reliable and valid only in adults, and not in children and adolescents. However, Cheon found a significant correlation between a decreased obesity index and each item of the WLRT for 15 children who participated in a group therapy program with cognition/behavior treatment for the purpose of losing weight after 12 sessions.[42,43] Nonetheless, repeated studies are needed after the standardization of this instrument.

In conclusion, according to the results of this study on children with obesity, there was a correlation between emotional instability on the CBCL and emotional eating according to the WLRT, and there was correlation between harm avoidance on the CCI and the exercise patterns and attitudes on the WLRT. These results suggest that emphasizing the importance of weight loss is especially important to motivate obese children to lose weight. Other than exercise, diet and behavior therapy, these results also suggest that improving the children's relationship with their parents, when considering the child's characteristics, and promoting emotional stability are important to increase the effect of weight loss and to maintain long-term weight loss.

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