

Original Article

Weight-related stigmatization and binge eating among overweight adults in Southern Taiwan

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Objective: The purpose of this study was to investigate the association between the level of weight-related stigmatizing experiences and binge eating in overweight adults in southern Taiwan. **Methods:** This study design was a cross-sectional questionnaire survey with convenience sample. A total of 141 questionnaires were analyzed. **Results:** The study showed that 97.9% participants had at least one weight-related stigmatizing experience in their lifetime. The main sources of weight-related stigmatizing experiences were from either parents, relatives or doctors. BMI and age were significantly correlated with weight-related stigmatizing experiences. Furthermore, about 19.9% of participants experienced binge eating. The scores of the weight-related stigmatizing experiences and binge eating were positively correlated ($r=0.33$, $p<0.01$). The scores of the weight-related stigmatizing experiences and monthly income significantly explained factors of binge eating. **Conclusions:** The findings showed that there is a need to develop interventions to assist overweight people cope with weight-related stigmatization and prevent binge eating in the future.

Key Words: weight-related stigmatization, binge eating, overweight, Taiwan, cross-sectional study

INTRODUCTION

Weight-related stigmatization is defined as negative assumptions that are translated into stigmatization toward overweight and obese individuals and may include judgments such as being unattractive, lacking willpower and having low self-efficacy.^{1,2} In the United States (US), a survey study including 20,649 participants indicated that the prevalence of weight-related stigmatization reached 20.5%.³ In the workplace setting, obese individuals compared with their normal weight colleagues have been found to be treated unfairly in relation to hiring decisions, performance reviews, and promotion decisions.⁴ In the educational setting, obese students have been found to be more likely to receive unfair or inferior treatment and fewer educational resources, compared with students of normal weight.⁵ Stigmatization of obese individuals threatens health, generates health disparities, and interferes with effective obesity intervention efforts.⁶

Individuals with a higher BMI are more likely to experience weight-related stigmatization.⁷ When an individual experiences more weight-related stigmatization, he/she may experience more stress. In order to cope with the stress, individuals may increase their intake of calorie dense food that are high in sugar and fat and they may also experience binge eating.^{8,9} Friederich and colleagues found that 40% of people with a BMI ≥ 30 kg/m² experienced binge eating behaviors.¹⁰ Obese individuals who experienced weight-related stigmatization were 3.3 times as likely to be diagnosed with a binge eating disorder.⁸ A binge eating disorder can be defined as an ineffective coping strategy for stress relief and may result in further weight gain.⁷ Further, individuals who experience binge eating may avoid social situations and opportunities for

social interaction.¹¹

The percentage of overweight and obese individuals in Taiwan was found to be the highest compared with all other Asian countries.¹² In Taiwan, the definition of overweight by BMI is ≥ 24 kg/m² and obesity is defined as a BMI ≥ 27 kg/m².¹² Approximately 44% of Taiwanese (18 years or older) are either overweight or obese compared with the U.S., where 69% of adults age 20 years and over are either overweight or obese.^{12,13} Weight loss is a popular trend in Taiwan. The Taiwan government has set up an obesity prevention network and strongly promotes healthy weight management programs in workplaces, schools, communities and hospitals. The number of participants that are currently reached through this program is 720,000.¹⁴ Furthermore, this weight loss trend may be also due to high social pressure related to body image in the Taiwanese culture.¹⁵ The cultural importance of being thin equates to beauty and popularity and overweight and obesity is considered undesirable in Taiwan.¹⁶ Individuals who suffered from weight-related stigmatization and sought weight loss methods may experience higher social pressure than individuals who did not seek weight loss methods. Hence, those individuals who sought methods for weight loss may have had a higher

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sensitivity to weight-related stigmatization.⁷

A majority of studies related to weight-related stigmatization were from western society.^{2,4,17,18} To date, there are few studies related to this issue in Asian society.¹⁹ Moreover, no studies examined the level of and the correlation between weight-related stigmatization and binge eating in Taiwan. Lin and Lin's preliminary exploration of the adolescents dieting behaviour and related factors in Taiwan showed that the occurrence of eating disorders contributed significantly to adolescents' experiences of being ridiculed about their body type, which may continue on even as the adolescents advance into adulthood.¹⁹ Hence, the primary purpose of this study was (a) to investigate the level of weight-related stigmatizing experienced and binge eating in overweight Taiwanese adults; (b) to examine the correlation between weight-related stigmatization and binge eating; and (c) to discover factors that explain binge eating. The secondary purpose of the study was to examine the correlation between weight-related stigmatization and demographic variables.

METHODS

Study design

The study was a cross-sectional survey with a convenience sample designed to understand weight-related stigmatization and binge eating behaviour in southern Taiwan. The study was conducted from September 1, 2011 through May 31, 2012.

Setting

The study was conducted in the southern section of Taiwan. The area of the southern section is approximately one-third of total area of Taiwan (3,863 m²/12,456 m²) with a population of 6.4 million with 40% of adults falling in the overweight category.^{12,20}

Power analysis

To determine sample size, G*Power 3 was used.²¹ Using a study conducted by Ashmore and colleagues,⁸ our study set the effect size at 0.15, α value at 0.05, power at 0.8, and the number of explaining factors at 11. A total of 123 participants were needed to reach a power of 0.8. To account for a 20% attrition rate we would need to enrol a total of 148 participants.²²

Sample

The study participants were enrolled from two groups. The first group consisted of attendees from a weight loss program at a weight management centre at the medical university hospital in southern Taiwan. The second group of participants was reached through snowball sampling and did not attend a weight loss program. Inclusion criteria included (a) the participant resided in the southern section of Taiwan; (b) ≥ 20 years of age; (c) and have a BMI ≥ 24 kg/m². Exclusion criteria included participants who had an education level below the sixth grade, because we were concerned that they would not understand the questionnaires; and participants who had mental illness (schizophrenia, delusional disorder or bipolar disorder), which would make it difficult to complete the questionnaires.^{23,24}

Measurement

Sociodemographic data, reported weight, the Stigmatizing Situations Inventory and the Binge Eating Scale were used.^{25,26} The Stigmatizing Situations Inventory and Binge Eating Scale were translated into Chinese and back translated into English through a professional translation service and tested for reliability and validity.

Sociodemographic data

Participants were asked to report their gender, age, occupation, monthly income, education, marriage status, previous dieting experience and previous attempts at weight loss with methods other than dieting.

Weight and BMI

Participants were asked to report their current height and weight on a piece of paper and were not measured secondary to concerns of privacy in this culture. BMI was calculated by computer by entering height and weight.

Stigmatizing Situations Inventory

The participant's weight-related stigmatizing experience was measured using the Stigmatizing Situations Inventory,²⁵ which was modified by Carissa's study.¹⁸ The original Stigmatizing Situations Inventory was developed by Myers and Rosen and had 50 items with 11 subcategories: (1) comments from children (four questions); (2) others making negative assumptions about you (three questions); (3) physical barriers (seven questions); (4) being stared at (five questions); (5) inappropriate comments from doctors (four questions); (6) nasty comments from family (seven questions); (7) nasty comments from others (11 questions); (8) being avoided, excluded, ignored (two questions); (9) loved ones embarrassed by your size (three questions); (10) job discrimination (three questions); and (11) being physically attacked (one question).²⁵ Due to the repetitiveness of the 11 subcategories, Carissa¹⁸ reorganized and merged the 11 subcategories into two subcategories,¹⁸ which included the Stigmatizing Situations Inventory from people and Stigmatizing Situations Inventory from others. The subcategory of Stigmatizing Situations Inventory from people included ten original subcategories (subcategory 1,2,4,5,6,7,8,9,10 and 11) and 43 questions. The subcategory of Stigmatizing Situations Inventory from others included one original subcategory (subcategory 3) and seven questions. A 4-point scale was used with the Stigmatizing Situations Inventory. 0=never experienced the weight-related stigmatizing situation in question; 1=experienced one episode; 2=experienced more than one episode; 3=experienced multiple episode.²⁷ The overall score of Stigmatizing Situations Inventory was computed by adding all of the questions and dividing by 50 to create a mean score of weight-related stigmatizing experiences. Average scores range from 0 to 3 with higher scores indicating higher weight-related stigmatizing experiences.⁸ The Cronbach's alpha values of the overall mean score of the Stigmatizing Situations Inventory, the subcategory of the Stigmatizing Situations Inventory from people and the Stigmatizing Situations Inventory from others in our study were 0.94, 0.94 and 0.82, respectively.

Binge Eating Scale

Binge eating was measured using the Binge Eating Scale.²⁶ The Binge Eating Scale contains a total of 16 items divided into either the emotional and cognitive responses subscale (eight items) or the behavioural characteristics subscale (eight items). Every item has three or four statements and each statement was independently scored from 0 to 3 or 0 to 4.²⁶ Participants could only choose one statement for each item. The overall Binge Eating Scale scores range from 0 to 46. Higher scores suggest a greater degree of binge eating severity.⁸ The severity of binge eating is as follows: a score ≤ 17 non-binge eating; 18 to 26 moderate binge eating, and ≥ 27 severe binge eating.²⁶ The Cronbach's Alpha values of the overall Binge Eating Scale, the emotional and cognitive responses subscale, and the behavioural characteristics subscale in this study were 85, 75 and 73, respectively.

Procedures

Our protocol for this research project has been approved by the Institutional Review Board of Kaohsiung Medical University Chung-Ho Memorial Hospital (KMUH-IRB-20110168). All subjects gave informed consent and their anonymities were preserved. After approval of the Kaohsiung Medical University Chung-Ho Memorial Hospital Institutional Review Board, participants were recruited from either a weight management centre in the Chung-Ho Memorial Hospital or by the snowball method. The first method of recruitment entailed a researcher attending weight management classes to present the study, explain the benefits and risks of participating, requirements of research participants, and explain that their participation was voluntary and they could withdraw at any time. If participants were interested, the researcher reviewed the consent with the participants and after all questions were answered the participants were invited to sign the consent. After consent was obtained, the researcher provided the participants with questionnaires to fill out. Participants either completed the questionnaires in class or returned them to the researcher at the next weight management class. The second method of recruitment was by snowball method. The researcher asked the participants to introduce their family members or friends who fit our study inclusion criteria to the researcher if they were interested. After prospective participants contacted the researcher by phone or e-mail, the researcher discussed the purpose of the study and if interested the researcher met the participants either at their home or in a local coffee shop. After obtaining their consent, the participants finished the questionnaires in the meeting or the participants mailed them back to the researcher.

Data analysis

All data was analyzed using SPSS software.²⁸ Descriptive statistics were used to provide the mean, standard deviation, range, and percentage of demographic variables. Secondary to two sources of participants in our study (participants from the weight loss program and from snowball sampling), the results of the scores of Stigmatizing Situations Inventory and Binge Eating Scale were

provided by overall participants and by two different sources of participants. Group differences between the sources of participants were evaluated with Mann-Whitney U test because of non-normal distribution. Correlational analyses were used to evaluate the relations between personal background variables, the score of weight-related stigmatizing experiences and the score of binge eating.

To examine the effect of key independent variables on binge eating, hierarchical regression analyses were conducted because hierarchical regression allowed us to control the order of entry of the variables, to specify a priori a sequence for key independent variables, and to examine the effect of our key independent variables after removing the effect of confounding variables.²² We chose the score of weight-related stigmatizing experiences, BMI and monthly income as key independent variables because those variables were significantly correlated with the score of binge eating. We entered gender, source of participants, age, education, marriage status, and previous experience of dieting in a first model as controlling variables. We then entered monthly income as second model and entered the score of weight-related stigmatizing experience and BMI in third model. We did not combine monthly income to the third model because previous studies reported that the score of weight-related stigmatizing experiences and BMI may be highly related to binge eating.^{8,10} We were interested in examining the effect of the score of weight-related stigmatizing experiences and BMI on binge eating. In terms of data processing, this study viewed any *p*-value less than 0.05 as statistically significant.

RESULTS

Participant characteristics

Although we only needed 148 participants for the study, we were surprised when a total of 160 participants expressed an interest in participating. Seven data packets were incomplete and 12 were not collected for the following reasons: 10 participants completed the weight loss program at the weight management centre during the window in which the questionnaires were distributed, and did not return to the centre to submit the questionnaires and 2 participants decided not to continue with the study. At the completion the study, a total of 141 questionnaires were completed. The study attrition rate was 12%. The average age of the participants was 36.7 ± 12.4 years. The majority of the participants were female (51.8%), college graduates (44%), employed (89.4%), married (46.1%), and obese ($BMI \geq 30$ kg/m²; 41.1%). More than half (56%) of participants had previously dieted. Table 1 summarizes the characteristics of the sample.

Weight-related stigmatization

A majority (97.9%) of all participants experienced weight-related stigmatization. A total of 78.7% of participants experienced one episode of weight-related stigmatization and 19.2% of the participants experienced more than one episode. Only 2.1% of the participants had never experienced weight-related stigmatization. There were no significant differences between the participants from weight loss program and from snowball sampling in the

scores of the Stigmatizing Situations Inventory (Table 2). The highest mean scoring question was number 3 “A parent or other relative nagging you to lose weight” (1.91±1.09). Next was question number 44 “Parents or other relatives telling you how attractive you would be, if you lost weight” was the second highest scored question (1.48±1.19). The third highest scored question was number 16 “A doctor saying that your weight is a health problem, even when you are in good health” (1.37±1.10) (Table 3). Age had a significantly negative relationship with the Stigmatizing Situations Inventory ($r=-0.28$, $p<0.01$), while BMI was positively related to the Stigmatizing Sit-

uations Inventory ($r=0.47$, $p<0.01$) (Table 4).

Binge eating

A majority (80.1%) of all the participants were not binge eating (score less than or equal to 17 points); 17.1% were moderately binge eating (18-26 points); and 2.8% of the participants were severely binge eating (score 27 points or more). The participants from weight loss program had significantly higher scores of overall and for two sub-Binge Eating Scales than the participants from snowball sampling (Table 2). The variables significantly correlated with the score of binge eating and were related to the

Table 1. Descriptive analysis of personal background variables (n=141)

Categories	Characteristics	Mean (SD)	Range	Total
				Number of participant (%)
Gender	1. Male			68 (48.2)
	2. Female			73 (51.8)
Source of participants	1. Participants from weight loss program			86 (61.0)
	2. Participants from snowball sample			55 (39.0)
Age	1. 20-29	36.7 (12.4)	20-71	49 (34.8)
	2. 30-39			45 (31.9)
	3. 40-49			23 (16.3)
	4. 50-71			24 (17.0)
BMI	1. Overweight (24-26.9 kg/m ²)	29.2 (3.9)	24-42	52 (36.9)
	2. Moderately obese (27-29.9 kg/m ²)			31 (22.0)
	3. Severely Obese (≥ 30 kg/m ²)			58 (41.1)
Occupation	1. Military and police work			21 (14.9)
	2. Education/ research			13 (9.2)
	3. Finance			12 (8.5)
	4. Architecture/ communications			13 (9.2)
	5. Information/ technology			17 (12.1)
	6. Health/ medical professional			20 (14.2)
	7. Homemaker			16 (11.3)
	8. Other			14 (9.9)
	9. Unemployed (including students)			15 (10.6)
Monthly income	1. None			25 (17.7)
	2. Less than 20000 NTD			15 (10.6)
	3. 20000~30000 NTD			23 (16.3)
	4. 30001~40000 NTD			37 (26.2)
	5. 40001~50000 NTD			19 (13.5)
	6. 50001 NTD and above			22 (15.6)
Education	1. Middle school and below			6 (4.3)
	2. High school and equivalent			35 (24.8)
	3. Vocational school			19 (13.5)
	4. College			62 (44.0)
	5. Master's degree and beyond			19 (13.5)
Marriage status	1. Single (including divorced and widowed)			41 (29.1)
	2. Unmarried but in a relationship (including cohabitation)			35 (24.8)
	3. Married			65 (46.1)
Previous experience of dieting	1. Yes			79 (56.0)
	2. No			62 (44.0)
Previous attempts at weight loss with methods other than dieting	1. Yes			86 (61.0)
	2. No			55 (39.0)

SD: standard deviation; NTD: New Taiwan dollar.

Table 2. Scores of Stigmatizing Situations Inventory and Binge Eating Scale

Overall scales/Sub-scales	Total group (n=141)	Weight loss program (n=86)	Snowball sample (n=55)	<i>p</i> - value
	Mean (SD)/ Number (%)	Mean (SD)/ Number (%)	Mean (SD)/ Number (%)	
Stigmatizing Situations Inventory, 50 questions (0-3 points/ question)	0.60±0.48	0.53±0.42	0.70±0.54	0.14
Never	3 (2.1)	2 (2.3)	1 (1.8)	
One episode	111 (78.7)	73 (84.9)	38 (69.1)	
More than one episode (=2)	27 (19.2)	11 (12.8)	16 (29.1)	
Multiple episodes (>2)	0	0	0	
Stigmatizing Situations Inventory (from people), 43 questions	0.62±0.49	0.54±0.42	0.74±0.57	0.08
Never	4 (2.8)	3 (3.5)	1 (1.8)	
One episode	109 (77.3)	73 (84.9)	36 (65.5)	
More than one episode (=2)	26 (18.4)	9 (10.5)	17 (30.9)	
Multiple episodes (>2)	2 (1.4)	1 (1.2)	1 (1.8)	
Stigmatizing Situations Inventory (from others), 7 questions	0.47±0.56	0.46±0.57	0.49±0.56	0.66
Never	42 (29.8)	28 (32.6)	14 (25.5)	
One episode	81 (57.4)	48 (55.8)	33 (60.0)	
More than one episode (=2)	15 (10.6)	8 (9.3)	7 (12.7)	
Multiple episodes (>2)	3 (2.1)	2 (2.3)	1 (1.8)	
Binge Eating Scale, 16 items (46 points)	10.9±7.59	12.9±7.40	7.80±6.84	<0.001
No sign of binge eating (≤17 points)	113 (80.1)	61 (70.9)	52 (94.5)	
Moderate binge eating (18-26 points)	24 (17.1)	22 (25.6)	2 (3.6)	
Severely binge eating (≥27 points)	4 (2.8)	3 (3.5)	1 (1.8)	
Emotional and cognitive responses related to binge eating: 8 questions (23 points)	5.18±4.03	6.17±4.13	3.64±3.35	<0.001
Behavioural characteristics related to binge eating: 8 questions (23 points)	5.72±4.13	6.72±3.90	4.16±4.01	<0.001

SD: standard deviation; Weight loss program: participants from a weight loss program of a weight management centre; Snowball sample: participants from outside of the weight loss program by snowball sampling; *p*-value: Mann-Whitney U test for the weight loss program group and snowball sample group.

Table 3. Individual question scores of Stigmatizing Situations Inventory (n=141)

Rank	Questions	Range (0-3)	Mean (SD)
1	A parent or other relative nagging you to lose weight.	3	1.91 (1.09)
2	Parents or other relatives telling you how attractive you would be, if you lost weight.	3	1.48 (1.19)
3	A doctor saying that your weight is a health problem, even when you are in good health.	3	1.37 (1.10)
4	Not being able to find clothes that fit.	3	1.26 (1.22)
5	Being told, "All you really need is a little willpower".	3	1.26 (1.05)
6	A child coming up to you and saying something like, "You're fat!"	3	1.22 (1.16)
7	Having people assume that you overeat or binge-eat because you are overweight.	3	1.14 (1.11)
8	Being the only heavy person, or the heaviest person, at a family gathering.	3	1.04 (1.11)
9	Being called names, laughed at, or teased by other children when you were young.	3	0.87 (1.08)
10	Seeing bumper stickers, t-shirts, advertising, etc. that ridicules fat people.	3	0.86 (1.09)

SD: standard deviation.

score of weight-related stigmatizing experiences ($r=0.33$, $p<0.01$), BMI ($r=0.22$, $p<0.01$), and monthly income ($r=-0.26$, $p<0.01$) (Table 4).

The hierarchical regression analysis of the Binge Eating Scale (Table 5) found that the three-model of regression was able to explain 34% of the variance in the binge eating score, with R^2 at 0.38 and adjusted R^2 at 0.34. After testing the entire regression model, this explanation was determined to be statistically significant ($F(3,137)=8.83$, $p<0.001$). In the second model, the variable monthly income explained a significant factor of binge eating score ($B=-1.38$, $\beta=-0.30$, $t=-3.61$, $p<0.001$), while the standardized regression coefficient exhibited a nega-

tive explanation between monthly income and binge eating score, meaning that the lower the monthly income, the higher the binge eating score of the individual. After eliminating the influence of the first model, the second model explained the variance toward the binge eating score at 7% ($F(1,133)=13.0$, $p<0.001$), which meant that after controlling for the influence of gender, source of participants, age, education, marriage status, and previous experience of dieting, model two could explain an additional 7% of the variance. In the third model, the score of weight-related stigmatizing experience explained a significant factor of binge eating score ($B=0.09$, $\beta=0.27$, $t=3.27$, $p=0.001$). After eliminating the influence of the first and

Table 4. Correlation between Stigmatizing Situations Inventory, Binge Eating Scale and personal background variables (n=141)

	Stigmatizing Situations Inventory	Binge Eating Scale
Binge Eating Scale	0.33**	
Age	-0.28**	-0.04
BMI	0.47**	0.22**
Monthly income	-0.15	-0.26**
Education	-0.06	0.06

* $p < 0.05$; ** $p < 0.01$.

Table 5. Hierarchical regression analysis of Binge Eating Scale

Variables	Model 1		Model 2		Model 3	
	β	t	β	t	β	t
Gender	0.10	1.16	0.032	0.39	0.085	1.11
Source of participants	-0.32	-3.68**	-0.33	-4.01**	-0.40	-5.13**
Age	-0.04	-0.40	-0.083	-0.99	-0.02	-0.26
Education	-0.06	-0.71	0.035	0.39*	0.02	0.28*
Marriage status	0.10	1.23	0.18	2.19	0.20	2.62
Previous experience of dieting	-0.20	-2.55*	-0.21	-2.81**	-0.14	-1.99
Monthly income			-0.30	-3.61**	-0.22	-2.81**
Score of weight-related stigmatizing experience					0.27	3.27**
BMI					0.16	1.95
Adjusted R ²	0.15		0.22		0.34	
F value	5.12**		6.63**		8.83**	
R ² change			0.07		0.12	
Change in F value (net F value)			13.0**		12.5**	

* $p < 0.05$; ** $p < 0.01$.

second models, the third model explained the variance toward the binge eating score at 12% ($F(2,131) = 12.5$, $p < 0.001$), which meant that the score of weight-related stigmatizing experience and BMI in the model three could explain 12% of the variance in binge eating score, demonstrating that the addition of model three was effective in increasing the variance.

DISCUSSION

This study examined the level of weight-related stigmatization and binge eating, and whether weight-related stigmatization and other factors were associated with binge eating among overweight Taiwanese adults. The findings suggest that the level of weight-related stigmatization was high but the level of binge eating was low. Weight-related stigmatization was associated with BMI, age, and binge eating. Binge eating was also associated with BMI and monthly income. Overall, this study shows that in overweight Taiwanese adults, weight-related stigmatization was significantly related to binge eating.

Weight-related stigmatization

The results of this study found that 97.9% of the participants had experienced weight-related stigmatization, which was similar to Ashmore's study.⁸ These authors investigated associations between weight-based stigmatization, psychological distress, and binge eating behaviour in 93 obese adults and found that 98% of their participants had experienced weight-related stigmatization.⁸ However, Ashmore's study indicated that the most frequently experienced stigmatizing situation was people making unflattering comments about obese people.⁸ In

contrast, our study showed that the main source of weight-related stigmatization for the average participant was their parents or other relatives. Taiwanese culture has always valued the family structure and it is common for adults to still live at home after reaching economic independence.²⁹ Living with their parents after marriage is a way to display filial piety in Taiwanese society.³⁰ A government survey showed that of all domestic arrangements, 36% of Taiwanese families were composed of adults living with their parents.³¹ The traditional belief in filial piety is still prevalent and children are taught from an early age to respect their parents.³² In such circumstances, Taiwanese parents may be in a position of power in Taiwanese society and may tend to be authoritarians when they communicate with their children.³² This may support that parents are influential in the participant's body shape appearance in our study.

Previous studies show that the higher the BMI, the more frequently participants experienced weight-related stigmatization. Latner and colleagues investigated the experiences of obesity stigmatization in 185 overweight participants in a weight loss program and found that more frequent stigmatizing experiences were associated with higher initial BMI.³³ Carissa's study also found that participants with higher BMI may be more likely to encounter weight-related stigmatizing attitudes from other people.¹⁸ Our study was consistent with the previous studies. A possible factor for this may be that the higher one's BMI, the more severely obese one is, and so the more conspicuous one's appearance is.¹⁸ In contrast, Latner and colleagues' study showed that a possible cause for the lower level of weight-related stigmatization among fe-

male African Americans may be that the obesity rate in African American women is higher (79.9%) than other ethnicities,³⁴ making obese women less conspicuous in the community.³⁴ Due to the high number of obese people in the community, the community would be more accepting of fuller figures, exhibiting a lower level of weight-related stigmatizing attitude.³⁴ In contrast, the current overweight and obesity rate in Taiwan is 38.4%; and the overweight and obese population is still not the majority, and therefore those who are obese would be easily singled out. More specifically, compared with overweight participants, the higher BMI value of obese participants may have been accumulated over a longer period, and as such, those who were moderately or severely obese may be seen more often for a longer period of time than those who are overweight. The longer exposure in general may also translate to increased chances of encountering weight-related stigmatization.⁷

For the younger of the participants in our study, the higher their chances were of encountering weight-related stigmatizing situations. This was consistent with a previous study by Gray and colleagues that identified demographic correlates and moderators of weight-based stigmatization in 157 children and adolescents aged 7 to 17 years and found that weight-based stigmatization was greater among younger children and females.³⁵ A possible reason of that may be the ideal body shape of young participants.³⁴ Latner and colleagues found that the younger the participants of the study, the slimmer their ideal body shape tended to be.³⁴ As the participants' aged, the acceptable range of ideal body types changed as follows.³⁴ The slimmer one's expectation of an ideal figure, the more likely he/she would retain a distorted self-image, see him/herself as fat, have lower self-esteem and become even more sensitive about body-image-related criticism from others.³⁴ He/she may develop a higher sensitivity towards weight-related stigmatization.³⁴ Also, the younger generation may pay more attention to their appearance than the older generation.³⁶ In a retrospective look at body image, Yen and colleagues' study demonstrated that body image of the younger generation was easily influenced by media and their peers.³⁶ The younger generation also developed a common misconception of seeing themselves as too fat.³⁶ This may establish the slimness of their peers as a privileged group within the community, and thereby solidifying the weight-related discriminatory ideas for the younger generation. Of note, Gray's study also showed that gender moderated the relationship between age and weight-based stigmatization.³⁵ Future research may further examine moderator effects of gender on weight-based stigmatization.

Binge eating

Several studies have demonstrated the prevalence of binge eating among overweight people. Tseng and colleagues conducted a survey in Taiwan with overweight and obese participants (n=189) who were enrolled in weight loss program and found signs of binge eating in 15.9% of the participants.³⁷ Consistent with Tseng's research, our results showed that about 20% of the participants exhibited signs of binge eating. Carels and colleagues investigated 54 overweight and obese adults who

participated in 14 weeks weight loss program in U.S. and found that the mean binge eating score was 20.5 at baseline.³⁸ In contrast, our study showed that the mean binge eating score was 10.9 in overall participants. A possible reason of the low mean binge eating score of overall participants is that the mean binge eating score was 7.8 in the group of participants from the snowball sample. Food restriction has been shown to induce neuro adaptations in brain reward circuitry for survival through alternating cycles of food scarcity and abundance.³⁹ But the up regulation of mechanisms that promote foraging and reward-directed behaviour may pose a hazard when food restriction is self-imposed such as weight-loss dieting.³⁹ The mechanisms may contribute to the genesis of binge pathology,³⁹ which may explain why the group of participants from weight loss program in our study had a significantly higher mean score of binge eating than the group of participants from the snowball sample. However, the participants from the snowball sample may not have experienced weight-loss dieting during our study so the mean score of binge eating was relatively lower than the participants from weight loss program. The low mean score of binge eating in the group of participants from the snowball sample may influence the mean binge eating score of overall participants. In addition, the use of the Binge Eating Scale from developed and tested in another country for our study might be one of the reasons for the comparatively low binge eating score. In our study, the low mean binge eating score may not have been a true reflection of binge eating since this is the first time this instrument has been used in the Taiwanese population.

Prior studies showed that the higher the level of weight-related stigmatization the participants experienced, the more likely they were to binge eat. Carissa investigated 55 overweight and obese individuals who participated in a 14-week behavioural weight loss intervention and found that stigmatizing experiences were significantly related to baseline binge eating ($r=0.24$, $p=0.04$).¹⁸ In addition, regression analyses indicated that stigmatizing experiences predicted binge eating behaviour ($\beta=0.45$, $p<0.001$) accounting for 20% of its variance.⁸ Our study findings were consistent with these studies. Researchers believed that the cause of binge eating was extremely complicated, but obesity-associated distress was seen as one possible trigger for binge eating.¹¹ The higher the BMI, the higher the level of weight-related stigmatization the individual may experience.⁸ A high level of weight-related stigmatization may contribute to psychological distress.^{40,41} Distress may lead to stress, which may lead to obesity-triggered binge eating.⁷ Over-eating as a means to escape stress caused by weight-related stigmatization could manifest as a restrictive force and binge eating may be seen as a form of freedom from restriction.⁷ Our study could not determine the causal relationship between weight-related stigmatization and binge eating. If the causal relationship does exist, it may affect weight management of overweight populations. There is a need to investigate the mechanisms between weight-related stigmatization and binge eating in future research.

Although very little attention has been paid to the relationship between the monthly income and the binge eating, our study result demonstrated that the lower the par-

ticipant's monthly income, the higher the binge eating score. The result was similar to Spitzer and colleagues' study.⁴² Spitzer and colleagues found that participants who experienced difficulties at work were more inclined to binge eat.⁴² Low income may also be considered as a financial stress and evidences has shown that financial stress may affect health conditions.⁴³ Carlsson and colleagues found that financial stress may increase the risk of cardiovascular disease with hazard ratios of 2.84 (95% Confident interval 1.6 to 4.5) in Sweden.⁴³ Similarly, Sihpush and colleagues investigated the association of prolonged financial stress with subsequent obesity in Australia and found that individuals with lower income were more likely to experience financial stress, and prolonged financial stress was a strong predictor of subsequent obesity.⁴⁴ In our study, those who were unemployed and those without any income exhibited a higher binge eating score. Financial stress may be one of the possible triggers of binge eating and may affect an individual's body weight. Therefore, further investigations regarding the association between financial stress and binge eating are needed.

Limitations

This study has several limitations. First, our study was a cross-sectional study. We could only find the association between weight-related stigmatization and binge eating. Future studies on establishing a causal relationship between weight-related stigmatization and binge eating are needed. Secondly, the sample range of this study was confined to southern Taiwan because of limited time and manpower, we were unable to have a random sample. The convenient and a snowball method may be considered biased sampling. The majority of participants came from weight loss programs, which may have affected the results of the weight-related stigmatizing experience survey. In addition, the scoring scheme of the Stigmatizing Situations Inventory may have been a limitation. Since we used the 4-point scale used by Puhl and Brownell,²⁷ instead of the original 10-point scale. The definition of 2 points (more than one episode) and 3 points (multiple episodes) could have been confusing to the participants, thereby causing them to not answer the questions with certainty and influence overall scores. Furthermore, before we could establish a version of the Binge Eating Scale with the sensitivity and specificity suitable for the Taiwanese society, this study could only reference the cut-point of other studies.²⁶ Our research results could only gauge the level of binge eating of participants. In its current state, the questionnaire could not be used as a screening tool for binge eating disorder in Taiwan. The cut-points of the Binge Eating Scale in participants from Taiwan require further testing. Finally, the limitation of self-reported weight and height should be noted. We made the decision to accept the self-reported weight and height secondary to cultural sensitivity. In future research studies we will use standardized measurements for height and weight measurement taken in a private setting.

Conclusion

In conclusion, this study demonstrated the high ratio of weight-related stigmatization experiences in Taiwanese

overweight adults, and the positive correlation between the level of weight-related stigmatization and the level of binge eating. We believe that there is a need for enhancing overweight people's weight-related stigma coping skills in Taiwan. Such preventive measures should be implemented as early as possible. Health care providers should be aware of the possibility of binge eating among overweight patients and the influence of weight-related stigmatization and low income on overweight patient's binge eating behaviours.

AUTHOR DISCLOSURES

The authors declare no conflict of interest.

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Original Article

Weight-related stigmatization and binge eating among overweight adults in Southern Taiwan

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台灣南部超重成年人體重歧視和狂食

目的：本研究探討台灣南部超重成年人體重歧視經歷與狂食程度之相關性。
方法：本研究採橫斷性研究法，以結構式問卷及方便取樣收案，共收集有效樣本 141 位。
結果：研究結果顯示 97.9% 的受試者一生中至少有過一次體重歧視經歷，主要的體重歧視經歷來自於父母、親戚或醫師。BMI 及年齡與體重歧視經歷顯著相關。此外，約有 19.9% 的受試者有狂食的經歷。體重歧視經歷程度與狂食程度呈顯著正相關 ($r=0.33$, $p<0.01$)，而體重歧視經歷程度與月收入為影響狂食程度之顯著因素。
結論：本研究結果建議未來有必要制定干預措施來幫助超重人群處理體重歧視，並避免狂食行為發生。

關鍵字：體重歧視、狂食、超重、台灣、橫斷性研究