Prevalence of Emotional Eating and Its Associated Psychosocial Factors Among Urban Chinese Undergraduates In Hong Kong: A Cross-Sectional Study

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Abstract

Background

Emotional eating (EE), defined as eating to cope with negative emotions, has been previously associated with poor diet and obesity. Since there are limited data from non-Western populations, this study aims to examine the prevalence and associated factors of EE among urban Chinese adolescents.

Methods

A cross-sectional study was conducted on 424 university students (aged 18-24 years) from two large universities in Hong Kong in 2019. Respondents were randomly invited to complete an anonymous online questionnaire that obtained background information, emotional eating subscale of Dutch Eating Behaviour Questionnaire (DEBQ), and Depression Anxiety and Stress Scales (DASS-21). Two-sample independent t-test and multiple regression analyses were conducted to test the association of study variables with emotional eating.

Results

There was nearly a four-fold higher likelihood of EE among females (14.8%) compared with their male counterparts (4.5%) (OR=3.7). Having at least mild depressive symptoms was the only independent factor associated with EE among males (OR=10.1) while for females, EE was independently associated with not having a romantic partner (OR=3.45), having depressive symptoms (OR=44.5) and having at least mild stress (OR=5.65). Anxiety levels were not independently associated with EE for either gender. Higher EE scores were associated with worse perceived health and worse life satisfaction in both genders and associated with higher BMI among females.

Conclusions

This study revealed that EE is prevalent in female Chinese university students and not uncommon in male students. To address disordered eating, regional health promotion programmes may strategically target those at high-risk for depression.

Background

Emotional eating (EE) is defined as “the tendency to overeat in response to negative emotions such as anxiety and irritability” (1). EE is receiving an increasing amount of attention, not only because it is prevalent (affecting 8.9–56% of college students in Western countries), but it also causes a range of physical and psychological problems (2, 3). When facing stress and negative emotions, emotional eaters, rather than directly confront the stressors, uses food as a source of emotional comfort and this may represent a poor coping method (4). As emotional eaters tend to consume food that is high in sugar and fat content when facing stress, EE was associated with an increase in weight over time, binge eating, overweight/obesity, difficulty in losing weight and in sustaining weight loss and all-cause mortality (5–8). Furthermore, EE was implicated as both the cause and consequences of mood disorders and could be the mediator between depression and obesity (9, 10); emotional eaters also reported a lower health-related quality of life (11).

In studies conducted in western countries, various psychosocial parameters were associated with EE. In general, EE was associated with psychological factors (e.g. impulsiveness and the presence of restricted eating), biological factors (e.g. sex and current weight), and situational factors (e.g. level of stress and current mood) (12). Yet, the current evidence suggested a prominent gender difference in the determinants of EE. In particular, females were more prone to EE to numb their emotions and were more influenced by depression, anxiety, and stress (13). Bennett et al. suggest that EE was triggered by stress in female college students but was triggered by anxiety in male students (14).

Life in universities can be stressful due to adaptation into a new environment, interpersonal difficulties, academic pressures, and anxieties about one's future career; and university students reported a high level of substance abuse and alcohol consumption (15, 16). However, there is a lack of similar research describing EE, including its prevalence and its associated psychosocial factors, in Chinese undergraduates. Most of the relevant studies were conducted in Western countries and previous Chinese research focused on much younger adolescents living at home and found that only 3% had EE (17). Other studies from China found that stress and mood problems were associated with EE in females and secondary school students (18, 19). Existing studies also described that EE behavior as a negative coping strategy to relieve mental tension (14, 20, 21). Furthermore, in contrast to most urban areas of China, Hong Kong has a long tradition of pre-processed foods and Western fast-food chains such as McDonald's; and it was unclear if EE is prevalent in older, university-aged students in Hong Kong.

This study aimed to determine the prevalence of EE among Hong Kong university students in Hong Kong and examine the characteristics of emotional eaters. As the primary objective, we hypothesized that EE was prevalent among this population and had prevalence approaching those reported in previous Western studies (approximately 20%) (5). For secondary objectives, we hypothesized that EE was associated with greater dysphoric mood (depression, anxiety, stress), higher body mass index (BMI), worse life satisfaction, and worse perceived health.

Methods

Participants

This survey study recruited university students in public areas of the two major universities in Hong Kong (The University of Hong Kong and The Chinese University of Hong Kong) between April and June 2019. Participants were included if they were (i) of 18–24 years of age and (ii) studying an undergraduate degree. International and exchange students were excluded from this study. The study recruited 424 participants (based upon sample size calculations,

All participants were invited to fill in a standardized questionnaire on the Google survey platform (details see below). Ethical approval was obtained from the Survey and Behavioural Research Ethics Committee of the university sponsoring the study prior to participant recruitment (Approval #043 – 19).

Assuming the prevalence of EE was estimated to be 20%, the precision of 4%, and the type I error at 5%, 385 participants were needed. 424 participants were recruited to account for possible missing data and drop out

at 10%.

Instruments

Dutch Eating Behavior Questionnaire (DEBQ)

The 13-item Emotional Eating Subscale of the Dutch Eating Behaviour Questionnaire (DEBQ) was the primary outcome of the current study and was one of the most commonly used instruments to detect EE in research (5). Each statement in the DEBQ was rated with a 5-point Likert scale (ranging from 1 “never” to 5 “very often”). The scores from each statement were summated and averaged to obtain the final score. DEBQ had high internal and factorial consistency, with a Cronbach's alpha of 0. 964 among Chinese adolescents (22). This study used a score of > 3.25 to classify respondents as having EE (5).

Depression, anxiety and stress scales (DASS-21)

Depression Anxiety and Stress Scales (DASS-21) consist of three 7-item scales, namely depression, anxiety, and stress subscale. All 3 subscales of DASS-21 had high internal consistency; the Cronbach’s alphas were 0.83, 0.80, 0.82, and 0.92 for depression, anxiety, stress, and overall scale respectively in Chinese students (23). Each statement was rated on a 4-point Likert scale; the score of the subscales can be calculated by summation of scores from respective individual items (23). The severity of depression, anxiety, and stress symptoms was defined previously (23) The distribution of these scores in our sample are shown in Table 1.

Table 1
Background characteristics of the study sample by gender (n = 424)

	Males (n = 201) **% (n)**	**Females (n = 223)** **% (n)**	**p-value***	**All (n = 424)** **% (n)**
Mean age	20.4 (SD = 1.6)	20.0 (SD = 1.6)	0.014	20.2 (SD = 1.6)
Place of birth			0.593	
Hong Kong	84.1% (169)	80.3% (179)		82.1% (348)
China	10.4% (21)	13.0% (29)		11.8% (50)
Other	5.5% (11)	6.7% (15)		6.1% (26)
Parent's education level			0.911	
Up to high school	58.21% (117)	58.74% (131)		58.49% (248)
University or more	41.79% (84)	41.26% (92)		41.51% (176)
Faculty			< 0.001	
Arts/ Education	5.47% (11)	30.9% (69)		18.9% (80)
Business	18.4% (37)	13.5% (30)		15.8% (67)
Social Science	8.46% (17)	12.6% (28)		10.6% (45)
Science/Engineering	40.3% (81)	14.8% (33)		26.9% (114)
Law	6.0% (12)	4.04% (9)		5.0% (21)
Medicine/Dentistry	21.4% (43)	24.2% (54)		22.9% (97)
Religious affiliation			0.533	
Christian	18.9% (38)	23.3% (52)		21.2% (90)
Catholic	4.0% (8)	2.7% (6)		3.3% (14)
Buddhist	3.0% (6)	1.8% (4)		2.4% (10)
No religion	74.1% (149)	72.2% (161)		73.1% (310)

*Chi-square p-value for categorical variables and t-test p-values for continuous variables.

† Life Satisfaction Score possible range from 1–5;

‡ Perceived health score possible range from 1–5;

§ Study satisfaction score possible range from 1–5.

Higher scales scores for perceived health life satisfaction and study satisfaction reflect greater levels of health and satisfaction.

	Males (n = 201) % (n)	Females (n = 223) % (n)	p-value*	All (n = 424) % (n)
Housing			0.548	
Live at home	43.3% (87)	46.2% (103)		44.8% (190)
Dorm or elsewhere	56.7% (114)	53.8% (120)		55.2% (234)
Part-time job			0.522	
Yes	50.3% (101)	53.4% (119)		51.9% (220)
No	49.8% (100)	46.6% (104)		48.1% (204)
Boyfriend/girlfriend			0.680	
Yes	57.2% (115)	59.2% (132)		58.3% (247)
No	42.8% (86)	40.8% (91)		41.8% (177)
Exercising at least moderately			0.049	
Yes	34.3% (69)	25.6% (57)		29.7% (126)
No	65.7% (132)	74.4% (166)		70.3% (298)
Life Satisfaction Scale score † $\bar{x}$ (SD)	3.6 (SD = 0.6)	3.6 (SD = 0.6)	0.959	3.6 (SD = 0.6)
Perceived health score ‡ $\bar{x}$ (SD)	3.9 (SD = 0.7)	3.6 (SD = 0.7)	< 0.001	3.7 (SD = 0.7)
Study satisfaction score § $\bar{x}$ (SD)	3.34 (SD = 0.7)	3.37 (SD = 0.7)	0.668	3.35 (SD = 0.7)
Body mass index $\bar{x}$ (SD)	22.0 (SD = 2.4)	20.6 (SD = 2.8)	< 0.001	21.3 (SD = 2.7)
Emotional Eating subscale score $\bar{x}$ (SD)	1.87 (SD = 0.7)	2.42 (SD = 0.9)	< 0.001	2.16 (SD = 0.8)
DEBQ score ≤ 3.25	95.5% (192)	85.2% (190)	< 0.001	90.1% (382)
DEBQ score > 3.25	4.5% (9)	14.8% (33)		9.9% (42)
DASS-21 depression levels			< 0.001	
Normal (0–9 points)	84.1% (169)	65.9% (147)		74.5% (316)

*Chi-square p-value for categorical variables and t-test p-values for continuous variables.

† Life Satisfaction Score possible range from 1–5;

‡ Perceived health score possible range from 1–5;

§ Study satisfaction score possible range from 1–5.

Higher scales scores for perceived health life satisfaction and study satisfaction reflect greater levels of health and satisfaction.

	Males (n = 201) % (n)	Females (n = 223) % (n)	p-value*	All (n = 424) % (n)
Mild (10–13 points)	10.5% (21)	13.0% (29)		11.8% (50)
Moderate (14–20 points)	4.0% (8)	15.3% (34)		9.9% (42)
Severe (21–27 points)	1.49% (3)	4.93% (11)		3.3% (14)
Extremely severe (28 + points)	0.0% (0)	0.90% (2)		0.47% (2)
DASS-21 anxiety levels			0.002	
Normal (0–7 points)	88.6% (178)	72.6% (162)		80.2% (340)
Mild (8–9 points)	2.5% (5)	6.7% (15)		4.7% (20)
Moderate (10–14 points)	6.5% (13)	13.0% (29)		9.9% (42)
Severe (15–19 points)	0.5% (1)	2.2% (5)		1.4% (6)
Extremely severe (20 + points)	2.0% (4)	5.4% (12)		3.8% (16)
DASS-21 stress levels			< 0.001	
Normal (0–14 points)	94.5% (190)	84.8% (189)		89.4% (379)
Mild (15–18 points)	0.50% (1)	7.2% (16)		4.0% (17)
Moderate (19–25 points)	2.0% (4)	7.6% (17)		5.0% (21)
Severe (26–33 points)	3.0% (6)	0.4% (1)		1.7% (7)
Extremely severe (34 + points)	0.0% (0)	0.0% (0)		0.0% (0)
*Chi-square p-value for categorical variables and t-test p-values for continuous variables.				
† Life Satisfaction Score possible range from 1–5;				
‡ Perceived health score possible range from 1–5;				
§ Study satisfaction score possible range from 1–5.				
Higher scales scores for perceived health life satisfaction and study satisfaction reflect greater levels of health and satisfaction.				

Covariates and other outcomes

Demographic data including age, sex, place of birth, faculty, presence of romantic relationship, and exercise habit were collected. As the questionnaire was conducted in an open area in the universities and measuring instruments were not feasible, the weight and height of the participants were self-reported. Life satisfaction and perceived health were rated on a 5-point Likert Scale (ranging from “1”: totally disagree to “5”: totally agree) to the statements “You are satisfied with your life” and “You perceive yourself as healthy”, respectively.

Statistical analysis

Demographic data and psychosocial factors among female and male students were described by mean and standard deviation (SD) and by percentage and absolute number for continuous and categorical variables respectively. Since EE was strongly linked to gender, we stratified all data analyses by gender. Body mass index (BMI) was calculated by weight (in kilograms) over square of height (in meters) and obesity was defined as body mass index of > 23 kg/m^2, which was the international cut-off for Southeast Asians (24). In the univariate analysis, the relationship between EE and various psychosocial factors was explored by Chi-Square and fisher-exact test as appropriate. Multiple logistic regression analysis was conducted to determine the most associated psychosocial factors with EE; All variables that demonstrated a marginal association ($p < 0.15$) in the unadjusted analysis were further computed in the backward multiple logistic model with EE being the dependent variable (α. = 0.05). Two-sample independent t-test was performed to compare the mean body mass index, perceived health, and DASS scores among participants with or without EE. All data were analyzed using SPSS v25.0 (IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp)

Results

Participants characteristics

Of the 424 participants, a similar number of males (n = 201) and females (n = 223) were recruited. The majority of participants were at their early 20 s (mean age 20.2; SD = 1.6), were born in Hong Kong (82.1%), had no religion (73.1%), were living away from home (55.2%), had a part-time job (51.9%), had a boyfriend/girlfriend (58.3%) and had no/little exercise (70.3%) (Table 1). The vast majority had a normal level of depressive symptoms (74.5%), anxiety symptoms (80.2%), and stress symptoms (89.4%). Male students reported better perceived health, greater BMI, and lower emotional eating score ($p < 0.001$), while female students reported higher depression, anxiety, and stress scores ($p < 0.05$).

Prevalence of emotional eating

EE was detected in 9.9% (95% confidence interval (CI): 7.1–12.8%) of university students. Difference was observed between male (4.5%; 95% CI: 1.6–7.4%) and female students (14.8%; 95% CI: 10.1–19.5%) (odd ratio (OR) 3.71, $p < 0.001$).

Psychosocial factors associated with EE

In the univariate analysis, EE was more prevalent in male students who lived at home (odds ratio (OR) = 5.0), had a part-time job (OR = 3.73), had depressive symptoms (OR = 23.4), had anxiety symptoms (OR 12.1) and had stress symptoms (OR = 21.1). In female students, EE was associated with not having a romantic relationship (OR = 3.51), had depression symptoms (OR = 106), had anxiety symptoms (OR = 9.2), and had stress symptoms (OR = 19.3). EE was not associated with all other demographic data (Table 2).

Table 2
Factors associated with emotional eating in male (n = 201) and female (n = 223) students

	Male students			Female students		
Factors	**Emotional Eating % (n)**	**Unadjusted OR (95% CI)**	**Multivariable OR (95% CI)**	**Emotional Eating % (n)**	**Unadjusted OR (95% CI)**	**Multivariable OR (95% CI)**
Age						
< 21 years of age	1.9% (2)	1.00		15.7% (22)	1.00	–
≥ 21 years of age	7.4% (7)	4.14 (0.84–20.4) †	NS	13.3% (11)	0.82 (0.38–1.79)	
Place of birth						
Hong Kong	4.1% (7)	1.00	–	14.5% (26)	1.00	–
Foreign-born	6.3% (2)	1.54 (0.31–7.79)		15.9% (7)	1.11 (0.45–2.76)	
Parental education						
Up to high school	4.3% (5)	1.00	–	17.6% (23)	1.00	–
University or more	4.8% (4)	1.12 (0.29–4.30)		10.9% (10)	0.57 (0.26–1.27)	
Area of study						
Non-Science majors	2.6% (2)	1.00	–	11.8% (16)	1.00	–
Science majors	5.6% (7)	2.24 (0.45–11.1)		19.5% (17)	1.82 (0.87–3.83)	
Religious affiliation						
No religion	4.7% (7)	1.00	–	15.5% (25)	1.00	–

*P < 0.05, †P < 0.10 NS: Non-significant at the p < 0.05 level

	Male students			Female students		
Has religion	3.8% (2)	0.81 (0.16–4.04)		12.9% (8)	0.81 (0.34–1.90)	
Housing						
Live at home	8.0% (7)	1.00		14.6% (15)	1.00	–
Dorm/Elsewhere	1.8% (2)	0.20 (0.04–1.01) *	NS	15.0% (18)	1.04 (0.49–2.18)	
Part-time job						
Yes	2.0% (2)	1.00		17.6% (21)	1.00	–
No	7.0% (9)	3.73 (0.76–18.4) †	NS	11.5% (12)	0.61 (0.28–1.31)	
In a romantic relationship?						
Yes	4.3% (5)	1.00	–	8.3% (11)	1.00	1.00
No	4.7% (4)	1.07 (0.28–4.12)		24.2% (22)	3.51 (1.61–7.67)*	3.45 (1.18-10.0)*
DASS-Depression						
Normal score	1.2% (2)	1.00	1.00	0.7% (1)	1.00	1.00
Depressive symptoms	21.9% (7)	23.4 (4.60–119) *	10.1 (1.51–67.4) *	42.1% (32)	106 (14.1–799) *	44.5 (5.58–356) *
DASS-Anxiety						
Normal score	2.2% (4)	1.00		6.2% (10)	1.00	

*P < 0.05, †P < 0.10 NS: Non-significant at the p < 0.05 level

	Male students			Female students		
Anxiety symptoms	21.7% (5)	12.1 (2.98–49.1) *	NS	37.7% (23)	9.20 (4.04-21.0)*	NS
DASS-Stress						
Normal score	2.6% (5)	1.00	1.00	6.9% (13)	1.00	1.00
Stress symptoms	36.4% (4)	21.1 (4.64–96.3) *	NS	58.8% (20)	19.3 (7.98–46.9)*	5.65 (1.93–16.6)*
*P < 0.05, †P < 0.10 NS: Non-significant at the p < 0.05 level						

In the multiple regression analysis, EE was significantly associated only with the presence of depressive symptoms in male students (OR = 10.1); In females students, EE was independently associated with the absence of a romantic partner (OR = 3.45), having at least mild depressive symptoms (OR = 44.5) and having at least mild stress (OR = 5.65) (Table 2).

Association of EE with bodyweight, perceived health, and perceived life satisfaction

Both male and female EE participants reported higher BMI, poorer self-perceived health, and life/study satisfaction than their non-emotional eating counterparts (Tables 3 and 4). Furthermore, obesity was more significantly more common in females with EE; obesity was found in 48.5% of EE females (vs 11.1% in non-EE females, p < 0.001) and 66.7% in EE males (vs 30.7% in non-EE males, p = 0.24) (non-tabulated).

Table 3
Body Mass Index, health perceptions and life satisfaction scores by emotional eating status for males (n = 201)

Males	**Emotional eaters (n = 9)**	***Body mass index $\bar{x}$ (SD)***	**24.0 (2.5)**	**p = 0.12**
	Non-emotional eaters (n = 192)		21.9 (2.4)	
	Emotional eaters (n = 9)	*Perceived health score † $\bar{x}$ (SD)*	3.00 (0.9)	p < 0.001
	Non-emotional eaters (n = 192)		3.89 (0.6)	
	Emotional eaters (n = 9)	*Life Satisfaction Scale score ‡ $\bar{x}$ (SD)*	3.00 (0.9)	p = 0.001
	Non-emotional eaters (n = 192)		3.65 (0.6)	
	Emotional eaters (n = 9)	*Study satisfaction score § $\bar{x}$ (SD)*	2.56 (0.5)	p = 0.001
	Non-emotional eaters (n = 192)		3.38 (0.7)	
Emotional eaters (Mean DEBQ score > 3.25) versus Normal emotional eating score (Mean DEBQ score ≤ 3.25)				
***p < .05, **p < .01.**				
† Perceived health score possible range from 1–5;				
‡ Life Satisfaction Scale score possible range from 1–5;				
§ Study satisfaction score possible range from 1–5.				
Higher scales scores for perceived health life satisfaction and study satisfaction reflect greater levels of health and satisfaction.				

Table 4
Body Mass Index, health perceptions and life satisfaction scores by emotional eating status for females (n = 223)

Females	**Emotional eaters (n = 33)**	***Body mass index $\bar{x}$ (SD)***	**22.3 (4.0)**	**p = 0.008**
	Non-emotional eaters (n = 190)		20.3 (2.4)	
	Emotional eaters (n = 33)	*Perceived health score † $\bar{x}$ (SD)*	2.94 (0.6)	p < 0.001
	Non-emotional eaters (n = 190)		3.69 (0.6)	
	Emotional eaters (n = 33)	*Life Satisfaction Scale score ‡ $\bar{x}$ (SD)*	3.09 (0.6)	p < 0.001
	Non-emotional eaters (n = 190)		3.71 (0.6)	
	Emotional eaters (n = 33)	*Study satisfaction score § $\bar{x}$ (SD)*	3.00 (0.7)	p = 0.002
	Non-emotional eaters (n = 190)		3.43 (0.7)	
Emotional eaters (Mean DEBQ score > 3.25) versus Normal emotional eating score (Mean DEBQ score ≤ 3.25)				
***p < .05, **p < .01**.				
† Perceived health score possible range from 1–5;				
‡ Life Satisfaction Scale score possible range from 1–5;				
§ Study satisfaction score possible range from 1–5.				
Higher scales scores for perceived health life satisfaction and study satisfaction reflect greater levels of health and satisfaction.				

Discussion

This is one of the first studies to describe the prevalence of EE in Chinese college students and found that EE was present in around 10% of the college students. A striking gender difference was found in terms of prevalence of EE (14.8% in female and 4.5% in male students) and its associated psychosocial factors. In male students, EE was only predicted by depression and stress scores, but EE was also predicted by the absence of a romantic relationship among females. Also, all other demographic data did not associate with EE. Furthermore, the current study showed that EE was associated with obesity, mood problem, poor self-rated health and poor life/study satisfaction.

The prevalence of EE in the current study was 10%, which was similar or lower to the prevalence reported in Western countries (2, 3, 25); however, this was substantially higher than the prevalence of EE in secondary school-age students in Hong Kong (17). The underlying reasons could not be concluded from the current

study – it could be a genuine change so that EE was increasingly prevalent or that EE was more common in college students than in secondary school-age students. However, this may also be due to the use of different definitions and instruments used to define EE in different studies (17). This could be investigated in longitudinal studies. Yet, in concordance with other studies, EE was more common in female than male and was associated with poorer health, mood, and life satisfaction(26, 27).

Our study was one of the first Chinese study to note that emotional eating behaviors and its relationship with psychosocial factors differ between genders. For instance, having a romantic partner was protective for emotional eating among female students only. Due to the cross-sectional nature of this study, it is unclear whether close interpersonal interactions from a romantic relationship may reduce reliance on emotional eating as a coping mechanism or if those who partake in maladaptive coping behaviors are less likely to form these relationships. Similar to previous studies (47,50), EE was associated with dysphoric mood. However, our study did not show that anxiety was an independent trigger for EE. It may reflect that EE is not a common coping mechanism for anxiety in Chinese adolescents or that the sample size was insufficient to detect an association.

The current research suggested that EE was common among university students, especially affecting female students. Therefore, clinicians may consider screening for EE, especially when seeing young adults with mood problems, and offer appropriate counseling and interventions. However, despite being associated with adverse physical and psychological consequences, there is a lack of guideline-based treatments for EE in Hong Kong and worldwide. As EE was conceptualized as a poor stress-coping strategy, treatments that enhance emotional coping skills may reduce EE (28). For instance, the latest meta-analysis suggested that mindfulness-based interventions could reduce EE and body weight; however, the current evidence was limited by unclear/high risk of bias and there was a lack of similar studies in the Chinese population (29). Further research could be conducted to delineate the prevalence of EE in other populations. Moreover, longitudinal studies will clarify the relationship between mood problems and EE; and similarly, high-quality randomized controlled trials will be needed to examine treatment modalities in the Chinese population.

The strength of the current study included adequate sample size and the use of the widely validated questionnaire (DEBQ) so that our results could be compared to international studies. It also examined multiple psychosocial factors and, to our knowledge, the relationship between EE and self-reported health was not previously examined. The questionnaire was completely anonymous so that sensitive answers (i.e. emotional eating behaviors) were least affected by social desirability.

Yet, several limitations could be discussed. First, as a common limitation to all cross-sectional studies, the causality between EE and other factors could not be concluded. For example, EE could have a bi-directional relationship with the self-reported level of health - people with EE may overeat or eat unhealthy food and led to poor health; yet, poor health could be a stressor that facilitated EE. The students from these two universities are more academic achieving and may be more likely to experience stress because of high expectations as compared to other tertiary institutes in Hong Kong. However, the age distribution and socio-economic backgrounds of students from the sample are not expected to be appreciably different from other universities in the region. Second, although our sample size was adequate for the primary outcome, only a few male participants had EE (n = 9) and this might limit the power to detect the association between EE and

psychosocial factors, especially among male students. Moreover, many outcomes, including BMI, were self-reported and were prone to reporting bias. Similarly, as the underlying causes of emotional eating could be multifactorial, there are likely other confounding variables that were not covered in this study such as aspects of social support.

Conclusion

Emotional eating is common in Chinese university students, with female being the most prominent risk factor. EE was associated with mood problem, obesity, poorer health, and poorer life/study satisfaction. More studies are needed to determine the best treatment strategies, especially in the Chinese population.

Abbreviations

BMI
Body mass index
CI
confidence interval
EE
emotional eating
DEBQ
Dutch Eating Behaviour Questionnaire
DASS-21
Depression Anxiety and Stress Scale
SD
standard deviation

Declarations

Ethics approval and consent to participate

Ethical approval was obtained from the Survey and Behavioural Research Ethics Committee of the Chinese University of Hong Kong. Written informal consent was obtained from the study participants in the questionnaire.

Consent for publication

Not applicable.

Availability of data and materials

All data generated or analyzed during this study are included in this published article.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

KS designed the study and collected the data. KS and RC conducted the statistical analyses. KS, EL and JHK interpreted the results and wrote the manuscript. All authors were involved in the production of the manuscript and approved the final version.

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