



## Research report

Effects of emotional symptoms and life stress on eating behaviors among adolescents <sup>☆</sup>Fangli Hou, Shaojun Xu <sup>\*</sup>, Yuqiu Zhao, Qingyun Lu, Shichen Zhang, Ping Zu, Ying Sun, Puyu Su, Fangbiao Tao

Department of Maternal, Child and Adolescent Health, School of Public Health, Anhui Medical University, 81 Mei Shan Road, Hefei 230032, Anhui, China  
 Anhui Provincial Key Laboratory of Population Health & Aristogenics, Hefei 230032, Anhui, China

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## ABSTRACT

The aim of this study was to explore possible effects of emotional symptoms (depressive symptoms and anxiety symptoms) and life stress on eating behaviors (restrained, emotional and external eating behaviors) among junior and high school students in China. A total of 5473 students in Xuzhou, Jiangsu Province were sampled to participate in this survey based on a clustering sampling approach. The survey collected sociodemographic data, emotional symptoms, life stress and eating behaviors of adolescents. Spearman correlation coefficients were measured and tested to examine the relationship between eating behaviors and emotional symptoms as well as life stress. In addition, we analyzed the data using Chi-square tests and multivariate logistic regression models. The results showed positive correlation between emotional symptoms, life stress, and eating behaviors. Furthermore, depressive symptoms, anxiety symptoms and life stress were significantly associated with unhealthy eating behaviors, after adjusting for gender, age, BMI, parental education level and self-assessed family economic status. This study suggests that a comprehensive intervention focusing on emotion and stress management would be helpful for the prevention of unhealthy eating behaviors among Chinese adolescents.

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## Introduction

Eating disorders (EDs), which can cause insufficient ingestion and/or overeating, has shown the highest morbidity and mortality among all types of mental disorders (Capasso, Putrella, & Milano, 2009; Herpertz-Dahlmann, 2009). According to the National Comorbidity Survey Replication Adolescent Supplement (NCS-A) of the US, the lifetime morbidity rates of anorexia nervosa, bulimia nervosa, and binge-eating disorder were 0.3%, 0.9%, and 1.6%, respectively among adolescents (Swanson, Crow, Le Grange, Swendsen, & Merikangas, 2011). Along with the rapid economic and social transformation, eating disorders are more widespread in China nowadays, which may directly threaten adolescents' physical and mental health. Because good nutrition is essential

for growth and development in adolescence, it is crucial to develop and maintain healthy dietary habits during this period which can last until adulthood. Establishing healthy eating behaviors among adolescents has both short- and long-term health benefits (Levin, Kirby, Currie, & Inchley, 2012).

Adolescence is accompanied by physical, psychological, and emotional changes (Patton & Viner, 2007). Nutrient requirements for growth and development during adolescence reach maximum. Besides, parental control begins to weaken in this period and adolescents have more autonomy over their food choices than children. Food choices of adolescents are mainly influenced by food preferences, such as the color, smell, taste and texture of the food (Fitzgerald, Heary, Nixon, & Kelly, 2010). Healthy eating was often considered by adolescents to be unpleasant and unnatural. In addition, adolescents tend to relate healthy eating to short-term activity to avoid the stigma of obesity or to enhance attractiveness. The four key barriers to adolescent healthy eating were physical and psychological reinforcement of eating behavior, perceptions of food and eating behavior; perceptions of contradictory food-related social pressures; and perceptions of the concept of healthy eating itself (Stevenson, Doherty, Barnett, Muldoon, & Trew, 2007).

Adolescence is a time of increased risk for emotional and behavior problems. It is generally accepted that eating behavior, especially among children and adolescents, has resulted from

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<sup>\*</sup> Corresponding author. Tel.: 86 551 63869179.

E-mail address: [xushaojun@ahmu.edu.cn](mailto:xushaojun@ahmu.edu.cn) (S. Xu).

physiological, psychological and social factors (Grimm & Steinle, 2011). Multiple studies in adults have found that negative mood and emotional eating are positively correlated, particularly in women (Konttinen, Männistö, Sarlio-Lähteenkorva, Silventoinen, & Haukkala, 2010; Loxton, Dawe, & Cahill, 2011). Meanwhile, the association between emotional symptoms and emotional eating in children and adolescents has been consistently reported in the literature (Forrester-Knauss, Perren, & Alsaker, 2012; Michels et al., 2012; Nguyen-Rodriguez, McClain, & Spruijt-Metz, 2010). Furthermore, a growing body of evidence has suggested that stress affects health not only through physiological processes directly but also through changes in health behaviors such as food choice and intake (Wallis & Hetherington, 2009). Greater perceived stress was associated with indices of greater drive to eat, and less attempts to control eating (Groesz et al., 2012; Sims et al., 2008). Women tended to eat sweet and high fat food when stressed (Mikolajczyk, El Ansari, & Maxwell, 2009; Zellner, Saito, & Gonzalez, 2007). For many people eating in response to negative emotions or stress is quite common, which it may be considered as both an emotional relief and a form of maladaptive coping (Manzoni et al., 2009).

Although it is well documented that emotional symptoms and stress can affect eating behavior and food intake in western countries, until recently there has been very little research done on the dietary habits in Chinese adolescents (Li, Dibley, Sibbritt, & Yan, 2010; Weng et al., 2012). Therefore, in this study we examined the relationship between emotional systems or life stress and eating behaviors among Chinese urban adolescents. We hypothesized that unhealthy eating behaviors (restrained eating, emotional eating, and external eating) among Chinese adolescents is associated with their depressive and anxiety symptoms, and life stress. We further hypothesized that adolescents who experience life stress would lead to increasing of anxiety and depression symptoms, which result in altered eating behaviors. Altered eating behaviors then could become a stressor, forming a negative spiral.

## Methods

### Sample

Participants were sampled from the 7th and 10th grade students from 10 urban junior and high schools in Xuzhou, Jiangsu Province. 5473 out of 5730 participants responded to the questionnaires resulting in a 95.5% responding rate. Ultimately, 2,885 (52.7%) students from grade 7, aged 11–13 years (mean age 11.92 years, SD = 0.42), and 2588 (47.3%) students from grade 10, aged 14–17 years (mean age 15.31 years, SD = 0.72) were analyzed.

### Procedure

The surveys were completed in class with average completion time ranging between 30 and 45 min. Investigators were available onsite to answer any questions or deal with any critical incidents. All completed questionnaires were deposited in a lockbox in front of the classrooms to ensure confidentiality of responses. The study has been approved by ethical committee of Anhui Medical University and written consent has been obtained from students as well as their parents or custodians. Participants have been told the purpose of the study which was to explore the relationships between eating behaviors and emotional symptoms and life stress among adolescents.

### Measures

Sociodemographic information of the adolescents and their families, and detailed information about adolescents' depressive

symptoms, anxiety symptoms, life stress, as well as eating behaviors were collected.

### Overweight and obesity

Weight was measured to the nearest 0.1 kg using a standardized digital scale. Height was measured to the nearest 0.1 cm with a manual height board. Students were asked to wear light clothing and to remove their shoes before measurements were taken. Body mass index was calculated by dividing the participant's weight in Kilograms by height in meters squared ( $\text{kg}/\text{m}^2$ ). Overweight and obesity were defined by age- and sex-specific BMI cut-off points according to the Working Group on Obesity in China (WGOC). The sample of students was then divided into two groups of overweight/obesity, and normal/lean weight (WGOC, 2004).

### Depression symptoms

The instrument used to screen for Depression symptoms of the students is the Children's Depression Inventory (CDI) designed by Kovacs, which contains 27 items that measure five dimensions of symptoms: negative mood, interpersonal problems, ineffectiveness, anhedonia, and negative self-esteem (Kovacs, 1992). Each item response is rated on a 3-point scale from 'no presence' to 'highest severity' with higher scores indicating more serious depression symptoms. A cut-off score of 19 was used to screen for depression among adolescents in the survey. The reliability and validity of Chinese version Children's Depression Inventory (CDI-C) were tested before with Cronbach's alpha coefficient being 0.88, Pearson's correlation coefficient being 0.81 and intra-class correlation coefficient being 0.89 (Wu, Lu, Tan, & Yao, 2010).

### Anxiety symptoms

The Screen Scale for Child Anxiety Related Emotional Disorders (SCAREDs), designed by Birmaher is a 41-item questionnaire suitable for assessing anxiety symptoms of 9–18 years old respondents. The SCARED measures five dimensions of symptoms: somatic/panic; generalized anxiety; separation anxiety; social phobia; and school phobia (Birmaher et al., 1999). The items are rated on a 3-point scale indicating symptom severity (i.e., 0 = almost never, 1 = sometimes and 2 = often) with higher aggregate score indicating more anxiety symptoms. A cut-off score of 23 was used to screen for anxiety disorder among adolescents. It has been shown that SCARED has acceptable test-retest reliability (Pearson's  $r = 0.57\text{--}0.61$ ), internal consistency (Cronbach's  $\alpha = 0.43\text{--}0.89$ ), and both high sensitivity and specificity to assess anxiety syndrome of Chinese children (Wang et al., 2002).

### Life stress

The instrument used to measure life stress of students is the Multidimensional Life Events Rating Questionnaire for middle school students, as designed by Tao et al. (2010). Its test-retest reliability, Cronbach's alpha coefficients and split-half reliability are 0.89, 0.92, and 0.88, respectively. The questionnaire contains 43-item measuring five dimensions of life stress: family life, school life, companion relation, healthy growth and love and sex, with higher score indicating greater reported life stress. Students in this study were categorized as being stressed if their scores were  $\geq P_{75}$ .

### Eating behavior

The Dutch Eating Behavior Questionnaire (DEBQ) is a 33-item self-report questionnaire that contains 5-point Likert-type scales ranging from 0 (never) to 4 (very often). The DEBQ measures three unhealthy eating behaviors: restrained eating (10 items) which is the tendency to restrict food intake in order to control body weight. (e.g., When you have put on weight, do you eat less than you usually do?); emotional eating (13 items) which is defined as a tendency using food to cope with negative emotions. (e.g.,

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