Proceedings of the 2nd International Conference on Global Politics and Socio-Humanities
DOI: 10.54254/2753-7048/2024.24801

The Review of Causes of Obesity Rate Differences Between Chinese Students: From Socioeconomic Perspective

Yun Cui[1*], Zihang Wang[2], Tianhao Zhang[3], Jiajun Han[4]

[1]*School of Health Policy and Management, Nanjing Medical University, Nanjing, China*
[2]*School of Public Health, University of Washington, Seattle, USA*
[3]*Shenzhen Nanshan Concord College of Sino-Canada, Shenzhen, China*
[4]*Shanghai International High School of BANZ, Shanghai, China*
**Corresponding Author. Email: 2390315634@qq.com*

Abstract. Obesity, recognized as a chronic disease, imposes enormous economic and health burdens on Chinese society. In examining obesity rates across various age groups in China, this study identifies a paradox: An observation has been made that obesity rates among university students are comparatively lower than those seen in high school. Despite extensive research on the factors contributing to obesity and strategies for its reduction, there has been limited exploration into why university students are less affected by obesity than high school students. This paper addresses this gap by conducting a comprehensive review of the literature, focusing on socioeconomic status (SES) as a critical factor. We categorize the determinants of this phenomenon into external factors, such as urban-rural disparities, income, and educational attainment, and internal factors, including gender differences and behavioral responses to stress. By offering academic insights and policy implications, this review aims to contribute to the early prevention and management of obesity, ultimately improving public health in China.

Keywords: Obesity, Socioeconomic Status, Policy guidance.

1. Introduction

Obesity as a chronic disease has placed a significant economic and health burden on Chinese society. In studying obesity rates across different age groups in China, we found that the obesity rate among Chinese university students is lower than that of high school students. While there is extensive research on the factors contributing to obesity and ways to reduce obesity rates, there is a lack of specific investigation into why the obesity rate among university students is lower than that of high school students. As a chronic disease, the early prevention and treatment of obesity are crucial. Therefore, we focus on adolescents and provide a review of the reasons behind the lower obesity rate among university students compared to high school students, offering academic insights and implications for policymakers and scholars.

The second section will analyze the external and internal reasons behind the lower obesity rate among university students compared to high school students. The third section will summarize the

DOI: 10.54254/2753-7048/2024.24801

paper and provide recommendations for policymakers.

2. Literature review

The impact of socioeconomic status (SES) on obesity is a complicated and multidimensional issue, involving various factors such as education, income, gender, and urban-rural disparities. This section will explore why university students have lower obesity rates than high school students from the perspective of SES by examining these factors.

2.1. Causes of obesity: external perspectives

In China, there are significant SES gaps between urban and rural areas, which in turn affect obesity differently. [1] discover that there is a powerful influence of SES on obesity in rural populations, whereas, in urban populations, obesity rates are only associated with individual education levels. This urban-rural disparity may stem from the greater influence of family income on health in rural areas. Additionally, [2] found that men with high SES and women with low SES are more prone to obesity, with this effect being particularly pronounced among rural residents. [3]revealed an inverted U-shaped relationship between BMI and income, meaning that after reaching a certain income level, further increases in income lead to a decrease in BMI. This suggests that both low- and high-income groups tend to have lower BMIs, while middle-income groups have relatively higher BMIs. [4]Additional research reinforced these findings, revealing a pattern where higher family income among urban adolescents correlated with a lower risk of being chronically overweight or obese, whereas in rural adolescents, the same economic status was linked to an elevated risk of such conditions.

What is clear from the data released by the Ministry of Education the gross enrollment rate of China's higher education was 51.6% in 2019. Besides, data from the Capital University Growth Tracking Survey shows that the proportion of rural students among university students overall is 26.77% [5]. In terms of family background, 80% of rural households in China lack the ability to afford higher education expenses [6]. The education expenses for rural families, including tuition, miscellaneous fees, accommodation, and book fees, account for an average of 72% of household income [7]. Specifically, rural students have an annual family income of 39,720 RMB, with only 11.1% of fathers and 5.4% of mothers having received higher education. In contrast, urban students have an annual family income of 110,810 RMB, with 66.3% of fathers and 55.9% of mothers having received higher education [5]. Based on this data, among the students entering university, students from urban areas generally have higher SES, while rural university students have lower SES, both groups tend to have lower obesity rates. This contributes to the overall lower obesity rate among university students compared to high school students.

2.2. Causes of obesity: internal perspectives

2.2.1. Gender factors

Many studies have shown that a disparity exists between the obesity rate of male and female. However, the former researchers have rarely investigated how this disparity affect the obesity rate of high school and college students in China. This part of the research aims to discuss how gender correlates with the obesity rate of Chinese high school and college students from the perspective of biological, socio-cultural, and behavioral factors.

DOI: 10.54254/2753-7048/2024.24801

According to existing research, there is a significant difference in fat distribution and fat percentage (FM%) between boys and girls which associate with their biological development. While the average males undergoes puberty from the age of 11 to 20, females experience puberty from 10 to 18 [8]. Notably, the average male and female undergo puberty during high school, which brings about remarkable biological developments related to body fat. Boys' FM% reaches the highest point around the age of 11, while girls' FM% keeps raises until the end of adolescence[9,10]. When teenagers reach puberty, the pituitary gland in males begins secretion of luteinizing hormone (LH) and follicle-stimulating hormone (FSH), which stimulates the testes to produce testosterone, an anabolic hormone that facilitates muscle mass and bone density. The rising testosterone results in a lipolytic effect, which leads to the breakdown of body fat[11]. Consequently, the average male has a lower FM% at the end of adolescence than that of females. On the other hand, the hormonal change in females contributes to the higher fat percentage at the end of adolescence. The increase in the sex hormone level, or estrogen, of females, promotes fat storage in areas such as hips, thighs, and breasts. Average females are inclined to gain body fat throughout their adolescent development [12]. Coincidentally, high school students also graduate at an age when puberty ends, which accounts for the higher obesity rate of high school students.

Chinese socio-cultural ideology of overweight and the difference between males and females in perceiving overweight also contribute to the obesity rate of high school students. In the Chinese socio-cultural context, Men might be more socially acceptable to be overweight or obese than it is for women [13]. Many people in China equate strength with masculinity, but they often mistakenly associate overweight or obesity with physical power. In Chinese society, the concept of body shape holds significant importance. Being slim and petite is more highly prized than physical strength for Chinese female students, which may lead them to be more motivated to control their diet to maintain the culturally preferred body size [14,15]. Research also indicates adolescent boys have a statistically greater difference of opinion of weight than adolescent girls. While adolescent boys were about twice more likely to consider themselves as underweight (23·3 v. 12·8 %) and underestimate their body weight (23·9 v. 9·4 %), on the other hand, girls were more likely to overestimate their weight (29·6 v. 11·0 %) [16]. The difference in awareness of body mass corresponds with discrepancies in lifestyle, such as dieting habits, which are associated with obesity. When students transition to university, the amount of leisure time increases, and the social environment they are exposed to alters, changing their lifestyle dramatically. Due to increased social interactions and the desire to fit in with peer groups, young adults become more aware of their physical health and appearance. The change in social environment encourages male university students to foster healthier lifestyles, leading to a decreased obesity rate.

In addition to the traditional gender norms, Chinese high school students behavioral responses to pressure also relate to obesity. Chinese high school students tend to have a hectic schedule focusing on studying, which leads to a sedentary lifestyle [17]. The Chinese public school system grants few opportunities for extracurricular activities and deemphasizes the concept of maintaining physical health, which correlates with obesity in high school students[18,19]. With high academic burdens, students inevitably suffer from psychological stress. Research from 2023 shows that adolescents under high stress are more likely to develop stress-related binge eating, and the probability is higher in males [20]. While male students showed less behavior control over food consumption and choice under stressful situations than their female counterparts[14]. In contrast, college students in China have relatively lower academic stress and flexible schedules. They often have greater autonomy in managing their time and lifestyle. They can make more conscious decisions regarding their diet and

DOI: 10.54254/2753-7048/2024.24801

have access to the gym and sports clubs. This increased autonomy in university life may contribute to the lower obesity rates observed among university students compared to high school students.

2.2.2. Other factors

university students have a strong awareness of the dangers of obesity and are capable of engaging in regular aerobic exercise, which helps prevent the occurrence of obesity [21]. To be specific, 27.5% of university students had attempted to lose weight, and 11.3% were actively dieting. Interestingly, 64.9% of those currently dieting were not actually obese but had normal or even underweight body types [22]. This healthy behavior is associated with the higher SES of university students, as they often come from families with higher SES, which provides them with variable options and resources for healthy behaviors and lifestyles. This also helps to explain why obesity rates among university students in China are lower than those among high school students.

3. Conclusion

This study explores the underlying reasons for the lower obesity rates observed among Chinese university students compared to high school students. The results indicate that income, urban-rural differences, and gender are key factors influencing obesity rates. First, the impact of income on obesity varies significantly between urban and rural areas. In rural areas, higher income is often associated with higher obesity rates, as wealthier families may have greater access to high-calorie foods but lack health education resources. In urban areas, however, higher-income groups typically have greater health awareness and access to healthier food options and exercise resources, leading to lower obesity rates. Secondly, during adolescence, males generally have a lower fat percentage due to physiological factors, but in high school, academic pressure and societal norms that place less emphasis on male body weight contribute to higher obesity rates among males. Females, on the other hand, are more focused on body image due to societal beauty standards and tend to control their weight through dieting and exercise. Upon entering university, males begin to place greater emphasis on health and appearance in their new social environment, gradually adjusting their unhealthy eating habits, which leads to a decline in obesity rates. Females continue to maintain strong weight management practices during their university years, resulting in an overall lower obesity rate among university students compared to high school students.

Based on the above conclusions, we hope that policymakers will consider classifying obesity as a chronic disease. Currently, obesity in China is regarded as an independent disease, a classification that emphasizes the causes and mechanisms of obesity itself, focusing more on direct interventions and treatment specifically targeting obesity. However, as an independent chronic disease, obesity's impact is broader, affecting multiple systems and organs and being associated with various complications. This requires a more comprehensive management approach, including lifestyle changes, dietary adjustments, exercise interventions, and psychological support. Therefore, classifying obesity as a chronic disease would enable earlier identification and intervention, providing adolescents with the necessary medical and educational resources to help them manage their weight. This, in turn, would help reduce obesity rates in China at the source.

Acknowledgments

Yun Cui and Zihang Wang contributed equally to this work and should be considered co-first authors.

DOI: 10.54254/2753-7048/2024.24801

Tianhao Zhang and Jiajun Han contributed equally to this work and should be considered co-second authors.

References

[1] Zhang, H. , Xu, H. , Song, F. , Xu, W. , Pallard-Borg, S. , & Qi, X. (2017). Relation of socioeconomic status to overweight and obesity: a large population-based study of Chinese adults. Annals of Human Biology, 44(6), 495–501.

[2] Li Yaoyue, Wang Guixin. The Impact of Socioeconomic Factors on Obesity Among Chinese Residents [J]. Population and Development, 2022, 28(05): 107-125.

[3] Mao Fengfu, Yao Jianfeng. Urbanization and "Fat China": Income, Income Inequality, and BMI [J]. Business Economics and Management, 2015, (04): 84-96. DOI:10. 14134/j. cnki. cn33-1336/f. 2015. 04. 009.

[4] Liang Y, Qi Y. Developmental trajectories of adolescent overweight/obesity in China: socio-economic status correlates and health consequences. Public Health. 2020 Aug;185:246-253. doi: 10. 1016/j. puhe. 2020. 05. 013. Epub 2020 Jul 17. PMID: 32688100.

[5] WU Qiuxiang, CUI Sheng. Road to "Counterattacks" of Rural Students at Universities: An Empirical Study Based on Beijing College Students Panel Survey. Journal of East China Normal University (Educational Sciences), 2019, 37(1): 124-136. DOI: 10. 16382/j. cnki. 1000-5560. 2019. 01. 014.

[6] He, Z. (2007). An Analysis of the Affordability of Higher Education Costs for Rural Families in China [J]. Problems of Agricultural Economy, (06), 40-43+111.

[7] Han, R. (2011). A Study on the Relationship Between Rural Household Income and Higher Education Expenditure: A Case Study of 300 Samples in County S, Shanxi Province [D]. Henan: Henan Normal University. DOI:10. 7666/d. Y1960945.

[8] Rogol, A. D. , Clark, P. A. , & Roemmich, J. N. (2000). Growth and pubertal development in children and adolescents: Effects of diet and physical activity. The American Journal of Clinical Nutrition, 72(2), 521S-528S. https://doi. org/10. 1093/ajcn/72. 2. 521S

[9] Guo, S. S. (2016). The timing and tempo of puberty in relation to body composition in youth. Annals of the New York Academy of Sciences, 1382(1), 44-54.

[10] Biro, F. M. , & Wien, M. (2010). Childhood obesity and adult morbidities. American Journal of Clinical Nutrition, 91(5), 1499S-1505S. https://doi. org/10. 3945/ajcn. 2010. 28701B

[11] Ahmed, M. L. , Ong, K. K. , & Dunger, D. B. (2009). Childhood obesity and the timing of puberty. Trends in Endocrinology & Metabolism, 20(5), 237-242.

[12] James, W. P. T. , Leach, R. , Kalamara, E. , & Shayeghi, M. (1999). The worldwide obesity epidemic. Obesity Research, 7(S1), 1S-4S.

[13] Zhang, Y. , & Wang, S. (2010). Socio-cultural influences on physical health: Body image and body weight in Chinese society. Journal of Health Psychology, 15(8), 1077-1085.

[14] Jiang, J. , Xia, Q. , & Ding, X. (2018). Gender differences in emotional eating among Chinese adolescents: The role of self-esteem and body dissatisfaction. Eating Behaviors, 31, 80-85.

[15] Liu, Y. , & Fang, H. (2016). Chinese adolescents' weight perception and psychological well-being: The role of cultural factors. Child and Adolescent Psychiatry and Mental Health, 10, 29. https://doi. org/10. 1186/s13034-016-0119-3

[16] Wang, Y. , Mi, J. , Shan, X. , Wang, Q. J. , & Ge, K. Y. (2018). Is China facing an obesity epidemic and the consequences? The trends of obesity and chronic disease in China. International Journal of Obesity, 31(1), 177-188. https://doi. org/10. 1038/sj. ijo. 0803354

[17] Sun, J. , & Dunne, M. P. (2011). The influence of student lifestyle factors on stress and academic performance in Chinese adolescents. Journal of Youth and Adolescence, 40(6), 670-679.

[18] Liu, Y. , Sun, J. , & Dunne, M. P. (2023). Academic stress and eating behaviors in Chinese adolescents: The mediating role of emotional eating. Eating Behaviors, 41, 101482.

[19] Chen, X. , Sekine, M. , Hamanishi, S. , Yamagami, T. , & Kagamimori, S. (2020). The association between stress and eating behaviors among students in China. Nutritional Neuroscience, 23(10), 751-759. https://doi. org/10. 1080/1028415X. 2019. 1706105

[20] Xie, J. , Wang, J. , & Zhang, S. (2023). Adolescent stress and its association with stress-related eating behaviors and weight gain: A cross-sectional study in China. Nutrients, 15(2), 272. 2

[21] Zhang, R. (2017). An Investigation of Obesity Rates and Influencing Factors Among University Students in Four Different Universities in Shenyang [C]//Chinese Society of Exercise Physiology, Proceedings of the 2017 Academic

DOI: 10.54254/2753-7048/2024.24801

Symposium on "Student Physical Health and Exercise Physiology". Shenyang Sport University, 2017:2.
[22] Liang, J. , Zhang, F. , Pan, W. , et al. (2008). An Investigation and Analysis of University Students' Cognition of Obesity and Weight Loss Behavior [J]. Modern Preventive Medicine, (15), 2918-2919