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ORIGINAL ARTICLE

# Low socioeconomic status may increase the risk of central obesity in incoming university students in Taiwan

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## KEYWORDS

Socioeconomic status;  
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## Summary

**Background:** Obesity is related to social disparity. The objective of the study was to evaluate different indicators of parental SES with the association of central obesity in young adult Taiwanese students.

**Methods:** This study was cross-sectionally designed and a total of 4552 subjects were recruited. Each subject completed a self-administrated questionnaire and received anthropometric and laboratory measurements. The indicators of SES in study subjects included parental education, occupation, household incomes, childhood and current index of social position (ISP), measured according to the modified Hollingshead's ISP. Central obesity was defined as waist circumference  $\geq 90$  cm in men and  $\geq 80$  cm in women.

**Results:** The prevalence of central obesity was 10.7% in this study. When compared to subjects with normal waist circumferences, subjects with central obesity were older, had a higher BMI, both systolic and diastolic blood pressure, a higher proportion of male gender, family history of diabetes and hypertension, alcohol consumption habit, and a higher proportion of low current household income, current parental blue collar occupational level, and lower current and childhood parental ISP level. Multivariate analysis showed the current parental household income and ISP were significantly higher indicators of risk of central obesity after adjustment for possible confounding factors. The odds ratios were 1.26 and 1.30, respectively.

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*Conclusions:* Our results showed that low household income and current ISP were independently associated with the risk of central obesity. Therefore, young adults with low SES should be an important target group for prevention and management of central obesity in school health promotion programs.

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Obesity is a global health problem with high prevalence in both developed and developing countries [1]. Obesity increases the risk of several leading causes of death and diseases in the world [2]. Furthermore, the highly prevalent rate of obesity is not only in middle-aged adults, but also in children and young adults. Several studies have indicated that diseases and causes of death are unequal according to social status [3,4]. One possible reason attributed to the associated higher risk of morbidity and mortality in people with low SES has been lower participation in physical activity and a higher prevalence of obesity [5,6]. Many studies have reported the association between SES and the risk of general obesity, and poor SES in both childhood and adulthood have been implicated in obesity risk among adults [7–9]. However, to date, few studies have attempted to establish the relative importance of childhood [10] and adult SES affecting weight gain and obesity risk in adulthood [11]. One population cohort study showed that the SES in both childhood and adulthood are independently inversely associated with BMI and weight change, but the associations varied by the SES indicator used [12]. Central obesity might have higher predictive value with regard to health problems than BMI [13], but the majority of studies have used BMI as the general obesity index to investigate the association between obesity and SES. Moreover, in these studies, only the father's education [14–16] or occupational level [17,18,7] was used to explore the relationship between childhood SES and obesity. Furthermore, different SES indicators might affect one's health via different pathways at different development stages. Therefore, the use of a single SES index to explain the effect of SES on obesity risk is not enough, thus, considering both parents' SES instead of only the father's or the individual's own SES might more accurately reflecting an unbiased association between SES and obesity. In addition, previous studies have also shown that the association between SES and obesity might vary by the economic development of the countries under investigation [1,19]. To our knowledge, there have been few studies investigating the

relationship between SES and central obesity in rapidly developing societies such as Taiwan. Therefore, the objective of this study was to evaluate the association of different parental SES indicators with central obesity in an incoming university student population in Taiwan.

## Methods

### Subjects

The baseline data was collected from an entrance health check-up survey in a university in 2007. All 5550 subjects received a health examination and completed a self-administrated structured questionnaire, which included demographic information, medical history, smoking, alcohol and coffee consumption habits, and physical exercise. After excluding subjects with incomplete data, a total of 4552 subjects were recruited for the study (2145 men, 61.8%; 1325 women, 38.2%). Informed consent was obtained from all of the study participants. Since they only agreed to have their questionnaire data and related examination results analyzed anonymously, any identifying information was kept confidential. The Ethical Committee for Human Research at National Cheng Kung University Hospital approved the study protocol.

### Instruments

#### Assessment of lifestyle and other factors

Smoking habit was classified as current smokers (defined by at least one pack/month) and non-smokers. Alcohol consumption was classified as drinkers (defined by at least one drink/week) and non-drinkers. Regular physical exercise was defined according to the recommendation of the American College of Sports Medicine guidelines of at least three times weekly vigorous exercise [20] (intense enough to cause sweating and/or heavy breathing/and/or to increase heart rate to a certain

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