



# Pocket money, eating behaviors, and weight status among Chinese children: The Childhood Obesity Study in China mega-cities



Miao Li <sup>a,b</sup>, Hong Xue <sup>c</sup>, Peng Jia <sup>a,d</sup>, Yaling Zhao <sup>e</sup>, Zhiyong Wang <sup>f</sup>, Fei Xu <sup>f</sup>, Youfa Wang <sup>c,\*</sup>

<sup>a</sup> Systems-Oriented Global Childhood Obesity Intervention Program, Department of Epidemiology and Environmental Health, University at Buffalo, State University of New York, Buffalo, NY 14215, USA

<sup>b</sup> Department of Sociology, University of Notre Dame, Notre Dame, IN 46556, USA

<sup>c</sup> Fisher Institute of Health and Well-being, College of Health, Ball State University, Muncie, IN 47306, USA

<sup>d</sup> Department of Earth Observation Science, Faculty of Geo-Information Science and Earth Observation, University of Twente – ITC, Enschede 7500, The Netherlands

<sup>e</sup> School of Public Health, Xi'an Jiaotong University Health Science Center, No. 76 West Yanta Road, Xi'an, Shaanxi 710061, PR China

<sup>f</sup> Department of Non-Communicable Disease Prevention, Nanjing Municipal Center for Disease Control & Prevention, Nanjing 210003, PR China

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## ABSTRACT

Both the obesity rate and pocket money are rising among children in China. This study examined family correlates of children's pocket money, associations of pocket money with eating behaviors and weight status, and how the associations may be modified by schools' unhealthy food restrictions in urban China. Data were collected in 2015 from 1648 students in 16 primary and middle schools in four mega-cities in China (4 schools/city): Beijing, Shanghai, Nanjing, and Xi'an. Cluster robust negative binomial regression models were fit to assess family correlates of pocket money, associations of pocket money with child eating behaviors and weight outcomes, and possible modifying effects of schools' unhealthy food restrictions. Sixty-nine percent of students received pocket money weekly. Students received more pocket money if mothers frequently ate out of home (IRR = 2.28 [1.76, 2.94]) and/or family rarely had dinner together (IRR = 1.42, 95% = [1.01, 1.99]). Students got less pocket money if parents were concerned about child's future health due to unhealthy eating (IRR = 0.56 [0.32, 0.98]). Students with more pocket money more frequently consumed (by 25–89%) sugary beverages, snacks, fast food, or at street food stalls, and were 45–90% more likely to be overweight/obese. Associations of pocket money with unhealthy eating and overweight/obesity were weaker in schools with unhealthy food restrictions. Pocket money is a risk factor for unhealthy eating and obesity in urban China. School policies may buffer pocket money's negative influence on students' eating and weight status.

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## 1. Introduction

Childhood obesity has become a global epidemic (Ng et al., 2013). As the largest developing country in the world, China has seen a rapid increase in childhood obesity over the past two decades (Yu et al., 2012). The burden of child obesity is particularly heavy in urban China: around 30% boys and 16% girls were either overweight or obese (Song et al., 2015; Sun et al., 2014).

Despite the well-studied associations between family socioeconomic status (SES) and childhood obesity in many countries (Jones-Smith et al., 2011; Shi et al., n.d.; Wang et al., 2002), few studies have examined how children's disposable income (or pocket money) may affect their eating and weight outcomes. Pocket money gives children a certain degree of autonomy in purchasing and consumption (Roberts et al., 2003; van Ansem et al., 2015), some of which entail health risks (Jung et al.,

2010), such as smoking and substance use (Ausems et al., 2003; Chen et al., 2013; Guo et al., 2015; Ma et al., 2013; Mohan et al., 2005). Studies from the U.S., Europe, India, Korea, and Vietnam suggest that pocket money is a potential risk factor for child unhealthy eating (and thus overweight/obesity) (Jensen et al., 2012; Jung et al., 2010; Lachat et al., 2009; Punitha et al., 2014; Roberts et al., 2003; van Ansem et al., 2015; Wang et al., 2007). However, there are no such studies in China. Further, two related key questions need to be examined: a) what family factors predict children's disposable income? and b) whether/how school environment and policies may alter the potential impact of children's disposable income?

In the Chinese context of children's increasing exposure to obesogenic environments, purchasing autonomy through pocket money (i.e., allowance, small funds for minor expenses) may potentially produce health risks for children. However, children's pocket money is on the rise due to several social trends. First, parallel with the fast economic growth, family disposable income per capita increased >90 times in the past three decades (China National Bureau of Statistics, 2011), which has fueled the increase in children's pocket money. Second, parents'

\* Corresponding author.

E-mail address: [ywang26@bsu.edu](mailto:ywang26@bsu.edu) (Y. Wang).

caregiving roles compromised by increasing work-family conflicts often leaves monetary compensation for children a reasonable/popular coping mechanism for parents (Lancaster, 1975; Pocock, 2006). Finally, as many families have only one child, parents tend to lavish their love through money giving. The prevalent “4-2-1” family structure (i.e., 4 grandparents, 2 parents, and 1 child) in China implies children can often receive large amount of money from other relatives (ChinaDaily, 2006). Under such circumstances, it is urgent to consider whether/how the rising child pocket money may contribute to the obesity epidemic, as well as what family factors affect children’s pocket money in China.

A related question deserving attention is how the potential impact of pocket money on obesity may be modified by school environments/policies. Schools are a key setting influencing students’ health behavioral outcomes (Li et al., 2016). As a major outlet for student purchasing and consumption, schools have become a key target for intensive food advertising and marketing (Federal Trade Commission, 2012; Story and French, 2004; Terry-McElrath et al., 2014). Rampant food commercialism has made school a critical place for child obesity and eating behavior interventions. Studies in the U.S. revealed that school restrictions on access to unhealthy foods limit unhealthy food purchase/consumption and lower risk of obesity among students (Fox et al., 2009; Kubik et al., 2005; Neumark-Sztainer et al., 2005). However, little is known about whether and how school environment/policies may alter pocket money’s influence on students’ eating and weight status in China.

Using data recently collected from four Chinese mega-cities (population > 8 million in each city), this study aimed to: 1) investigate family factors influencing children’s pocket money by gender, 2) examine gender-specific associations of children’s pocket money with eating behaviors and weight status, and 3) examine how schools’ unhealthy food restrictions may modify the influence of pocket money.

## 2. Methods

### 2.1. Study design and participants

This study used baseline data from the Childhood Obesity Study in China mega-cities (COCM) that was collected in 2015. The data are unique in that they capture trends in areas at the forefront of economic growth and dietary transition in China. COCM sampled 1648 students from 16 primary and middle schools in four mega cities in China (4 schools/city): Beijing (China’s capital city, North China), Shanghai (the largest city in China, East China), Nanjing (China’s capital city before 1949, East China), and Xi’an (the largest city in West China). In each city, two primary schools and two middle schools were randomly selected. In each school, a class from each grade (grades 3–6 in primary schools, and grades 7–9 in middle schools) was then randomly selected. In total, 33 classes from the 16 schools were finally included in the survey. All students in the selected classes and their mothers (or other primary care giver if mother was absent) were interviewed. School information was provided by a school administrator, school doctors and physical education teachers. Data collected included child growth and health, child eating behaviors, family characteristics, parenting practices and attitudes, and school environment. Written informed consent was obtained from parents and children. Observations with missing data on related variables were excluded (i.e., list-wise deletion). The final study sample was 1409 students (missing rate = 12%). We also conducted analyses based on multiply imputed data and presented the results in the supplemental material. The study was approved by the Ethical Committee of The State University of New York at Buffalo and related collaboration institutes in China.

### 2.2. Variables and measurements

#### 2.2.1. Outcomes

**2.2.1.1. Weight status.** Students’ Body Mass Indices (BMI) were calculated based on body weight and height information (i.e., kg/m<sup>2</sup>) measured

by trained health professionals. Overweight and obesity were defined based on the International Obesity Task Force (IOTF) recommended age-sex-specific cut-offs corresponding to BMI = 25 and BMI = 30 at age 18, respectively (Cole and Lobstein, 2012).

**2.2.1.2. Students’ eating behaviors.** Students’ eating behaviors included self-reported weekly frequency of sugary beverages, snack, fast food, and street food consumption. Each student was asked to report the average times/week that he/she did the following things in the last three months: drink sugary beverages, eat snacks, eat at a Western-style fast food restaurant, and eat at street food stalls.

#### 2.2.2. Exposure

**2.2.2.1. Students’ pocket money.** Students were asked “On average, how much pocket money do you receive from your family every week?” To facilitate interpretation, the variable was coded in yuan (rounded to the nearest integer) when examined as a dependent variable and in categories (0, 1–10, 11–30, and >30) when predicting students’ eating and weight outcomes.

**2.2.2.2. School food policy.** School administrators were asked to report “whether the school restricts unhealthy foods” at school cafeteria, school stores, and food stalls within the school vicinity (check all that apply). However, only one school had restrictions in school stores, which also had restrictions in cafeteria; four schools had restrictions in school vicinity food stalls, one of which also had restrictions in cafeteria. Thus, we constructed a global dichotomous measure for school food policy, with “1” representing a school that has certain restrictions over unhealthy food provision in any of the three locales and “0” otherwise.

#### 2.2.3. Covariates

We included a host of covariates in models predicting students’ eating behaviors and weight outcomes, which were also examined as potential family correlates of students’ pocket money. These covariates include: age (in years), sex (“boy” and “girl”), father’s and mother’s BMI (in kg/m<sup>2</sup>, both parents’ body weight and height was reported by mother), parental highest education (“middle school or lower”, “high and vocational schools”, and “college or above”), and family home ownership (“rent or share residency with relatives”, “own an apartment”, and “own a house”). In addition, we constructed a group of variables on nutrition-related parenting practices and attitudes.

**2.2.3.1. Nutrition-related parenting practices.** Two variables on nutrition-related parenting practices were examined: the weekly frequency of mother’s out-of-home eating (“never”, “one or two times”, and “three times or more”), and whether family often eats dinners together (“yes” vs. “never or rarely”). Father’s out-of-home eating information was not collected.

**2.2.3.2. Nutrition-related parenting attitudes.** Students’ mothers were asked to report their normative attitudes/beliefs regarding ideal/desirable/correct nutritional practices in raising a child by choosing whether they agree or disagree with the following statements: “child should only eat during regular meal times”, “snacks are among the best incentives for child”, “parents should not overfeed child”, “parents should be concerned about child’s future diseases due to unhealthy eating (e.g., diabetes or cardiovascular diseases)”, “parents should be concerned about child’s overweight/overnutrition”, and “parents should monitor the time and content of child’s everyday eating”. Responses to each statement were coded using a 5-point Likert scale ranging from “strongly disagree” to “strongly agree”. We recoded the scale into three categories in which “strongly dis/agree” and “dis/agree” were combined into one category.

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