

3-2017

## Parental influences on weight-related health behaviors in western and eastern cultures

B. S. Niemeier  
*University of Wisconsin-Whitewater*

Y. P. Duan  
*Hong Kong Baptist University, duanyp@hkbu.edu.hk*

B. R. Shang  
*Hong Kong Baptist University*

J. Yang  
*East China Normal University*

Follow this and additional works at: [https://repository.hkbu.edu.hk/hkbu\\_staff\\_publication](https://repository.hkbu.edu.hk/hkbu_staff_publication)



Part of the [Health and Physical Education Commons](#)

This document is the authors' final version of the published article.

Link to published article: <http://dx.doi.org/10.1111/cch.12438>

---

### APA Citation

Niemeier, B., Duan, Y., Shang, B., & Yang, J. (2017). Parental influences on weight-related health behaviors in western and eastern cultures. *Child: Care, Health and Development*, 43 (2), 259-266. <https://doi.org/10.1111/cch.12438>

This Journal Article is brought to you for free and open access by HKBU Institutional Repository. It has been accepted for inclusion in HKBU Staff Publication by an authorized administrator of HKBU Institutional Repository. For more information, please contact [repository@hkbu.edu.hk](mailto:repository@hkbu.edu.hk).

This is the accepted non-edited version of the manuscript:

Niemeier, B.S., Duan, Y.P., Shang, B.R., & Yang, J. (2017). Parental Influences on Weight-Related Health Behaviors in Western and Eastern Cultures. *Child: Care, Health and Development*.

## **Parental influences on weight-related health behaviors in Western and Eastern cultures**

### **Abstract**

**Background:** Excessive bodyweight contributes to a myriad of risk factors for chronic diseases, and multiple reports have demonstrated that parents influence the development of their children's behaviors that contribute to bodyweight. However, studies that include considerations for cultural influences are limited, and methodology that considers direct reports from young adults and their parents across cultures does not exist.

**Methods:** A sample of young adults (N=327) and their parents in the U.S. and in China were recruited and completed a series of questionnaires in two cycles (2010 and 2014). With correlation and multiple regression analyses, parents' characteristics, behaviors, and parental authority styles were examined and compared to weight-related health behaviors and bodyweight of their young-adult children. Additionally, similarities and differences of parental influences between the two cultures were explored.

**Results:** Parents' body mass indexes (BMIs) and dietary behaviors were positively associated with those of their young adult children in the mixed-culture sample ( $P < .001$  for both). When controlling for gender, at high levels of authoritarian and permissive parental authority, the relationships between young adults' and their parents' BMIs were negative for U.S. participants and positive for Chinese participants ( $P < .05$  for both). Further, at high levels of authoritarian parenting, the relationship between young adults' and their parents' dietary consumption behaviors was negative for U.S. participants and positive for Chinese participants ( $P < .001$ ).

**Conclusions:** This study provides evidence that the development of life-long health behaviors that contribute to BMI are significantly influenced by parents' behaviors and parenting styles. Moreover, an interaction of parental characteristics and cultural norms is indicated.

**Keywords:** parental authority, health behavior development, culture, BMI, obesity

## INTRODUCTION

It has been well established that excessive bodyweight contributes to a myriad of risk factors for chronic diseases, increased morbidity and mortality and reduced productivity (Gates *et al.*, 2008; woo *et al.*, 2013). Rates of overweight conditions are high in both Western and Eastern cultures (Spritzer, 2004; Truong and Sturm, 2005). In the U.S., 33.5% of men, 36.1% of women, and 16.9% of youth are obese (Ogden *et al.*, 2014). Comparatively, in China, 11.4 % of men, 10.1% of women, and 13.1% of children are obese (Liang *et al.*, 2012; Xi *et al.*, 2012). Since overweight conditions and related behaviors in childhood and adolescence typically follow into adulthood (Economos, 2001; Joseph & Kramer, 1996; Sayers *et al.*, 2009; Sokol, 2000), understanding factors related to weight-related health behaviors in the early years is key. Current literature that illustrates the influence of parental characteristics and behaviors on the development of their children's behaviors is remarkable (Blissett and Bennett, 2013; Leary *et al.*, 2013; Niemeier & Hektner, 2012; Philips *et al.*, 2014). Parents who are controlling, for example, have heavier children (Sato *et al.*, 2010), while children of parents who provide structure and effective behavioral control are less likely to engage in emotional eating (Philips *et al.*, 2014).

Among the literature that reports on studies of parental influences on weight-related health behavior development, reports of the influences of parental authority exist but are limited. Three of the parental authority styles that have emerged as primary are the Authoritative, Authoritarian, and Permissive parenting styles (Baumrind, 1971). Parents who employ Authoritative practices typically encourage collaboration with their children during discipline, and punishments are accompanied by open discussions and affection. Parents who engage in Authoritarian practices, instead, expect strict obedience from their children, and punishments are imposed without discussion. In Permissive parenting, parents highly regard their children's independence; therefore, both guidance and punishment may be nonexistent.

Generally, all parents possess qualities of all three parental authorities to varying degrees but typically have high levels of only one (Baumrind, 1971). It has been established that the levels of cultural acceptance of the parental authorities styles vary across cultures and that cultural norms could, therefore, influence the parenting styles that parents' exhibit (Blissett and Bennett, 2013; De Decker *et al.*, 2012; Philips *et al.*, 2014).

The aim of the current study was to, with a mixed-culture sample consisting of participants from the U.S. and China, examine relationships of parents' BMIs, weight-related health behaviors, and parental authority and their respective young adult children's BMIs and weight-related health behaviors. Additionally, similarities among and differences between parental influences in the U.S. and in China were explored. The study design was developed according to and as an extension of a previous study by Niemeier and Hektner (2012).

## **METHODS**

### **Participants and procedures**

In both the U.S. and China, participants consisted of young adult university students and one parent of each student whom the student selected as being the primary decision maker for family meals and activities. In the U.S. sample, most participants were students at a large, Midwestern university who responded to a press release in a local newspaper or to an email invitation. Participants voluntarily completed a series of questionnaires either electronically or with hard copies and then forwarded the parent questionnaires on to their parents to complete and submit independently. A total of 151 U.S. young adults, aged 18 to 25 years ( $M = 19.1$ ,  $SD = 1.4$ ), and one parent of each participated.

In the Chinese sample, participants were students at two large universities in Shanghai. Students were informed of the study by class lecturers, and those who volunteered completed a series of hard copy questionnaires and took a second series of questionnaires to their

parents to complete during a weekend visit. A total of 176 Chinese young adults, aged 16 to 23 years ( $M=19.0$ ,  $SD=1.1$ ), and one parent of each of them participated and completed all questionnaires. The current study was approved by the Institutional Review Board at a Midwest University.

Table 1 illustrates sample characteristics for the 327 young adult participants from the U.S. and China. Most U.S. and Chinese young adult participants were full-time students at large universities (99.3%,  $N = 150$  and 100%,  $N=176$ , respectively). Most U.S. parent participants were white (92.1%,  $N = 139$ ), a majority race in the U.S., and most Chinese parent participants were ethnic Han (95.5%,  $N = 168$ ), a majority race in China (see Table 1).

## **Measures**

Both young adult and parent participants in the U.S. and in China completed an adapted version of the Global Physical Activity Questionnaire (GPAQ), the Parental Authority Questionnaire (PAQ), and demographic questionnaires. U.S. participants completed the Block Brief Food Frequency Questionnaire (U.S.-FFQ), while Chinese participants completed a comparable Food Frequency Questionnaire that was developed in China (China-FFQ).

*Global Physical Activity Questionnaire.* The GPAQ consists of 16 questions that assess usual weekly energy expenditure among individuals (Armstrong and Bull, 2006; WHO, 2015). GPAQ is considered valid in a variety of language versions including English and Chinese (Armstrong and Bull, 2006). In the current study, the GPAQ was adapted slightly for use as a self-administered questionnaire. Participants were asked to indicate the time they spend doing various types of physical activity under varying levels of intensity using a 7-point Likert scale. The metabolic equivalents (MET) were then calculated for each participant according to the responses.

*Food Frequency Questionnaires (FFQs).* Due to the cultural differences in food type and dietary habits, two different FFQ versions were used in this study. Both provided estimates of regular energy consumption (measured in calories) for participants. The U.S.-FFQ is a condensed version of the previously validated full-length Block FFQ (Block *et al.*, 1990) and has undergone additional assessments and is considered valid (Block *et al.*, 1990). The China-FFQ was developed by Chinese scholars who compared the China-FFQ to previously validated Chinese FFQs, and found correlations confirming validity (Wu *et al.*, 2008).

*Parental Authority Questionnaire.* The PAQ is a 30-item survey that was developed to measure the three parental authorities described as Authoritative, Authoritarian, and Permissive (Baumrind, 1971; Buri, 1991). The English version of the PAQ was tested previously, and discriminant and criterion validity were determined to be acceptable (Buri, 1991). The Chinese version of the PAQ was also tested in a study of Chinese college students, and it was determined to have acceptable reliability and validity (Zhou *et al.*, 2010). The PAQ was adapted slightly for use in the current study. Young adults described their parents' styles by using a 5-point Likert scale. For each participant, the ratings of items were averaged to compute scores for each parental authority (Niemeier and Hektner, 2012).

*Demographic Questionnaire.* Young adult and parent participants self-reported several demographic characteristics, including their nationality and self-reported height and weight. BMI (United States Department of Health and Human Services, 2015) was calculated prior to analyses.

## **Data analysis**

Analyses were performed using *SPSS 22.0 for Windows*. BMI, average daily energy consumption (measured in calories), and average weekly energy expenditure (measured in METs) were considered separately to compare parents' and children's weight statuses,

dietary behaviors, and physical activity behaviors, respectively, and to further examine the relationships of PAQ scores as moderators.

The differences of gender and BMI status according to nationality were examined further with  $X^2$  tests both for children and parents. Correlation analyses were used to assess the relationship between parents' and their young adult children's BMI, daily energy consumption, and weekly energy expenditure. Sequentially, three multiple linear regression analyses were conducted to examine the parental influences on weight status, daily energy consumption, and weekly energy expenditure in young adults in different cultures.

## **RESULTS**

### **Sample characteristics**

A total of 327 pairs of young adults and their parents from the U.S. (n=151) and China (n=176) participated in this study. A gender difference was observed between the two samples ( $X^2 [1, N = 327] = 8.49, P < 0.01$ ). More U.S. participants were female (60.9%) than Chinese participants (45.5%). BMIs of the U.S. sample ranged from 16.8 to 40.9 kg/m<sup>2</sup> (M=23.3 kg/m<sup>2</sup>, SD = 3.9), while BMIs of the China sample ranged from 16.3 to 36.6 kg/m<sup>2</sup> (M=21.0 kg/m<sup>2</sup>, SD = 3.0). The relationship of nationality and BMI categories was significant ( $X^2 [2, N=327] = 29.42, P < .001$ ). The U.S. young adult sample contained more participants who were overweight or obese (25.8%) but less participants who were underweight (4.6%), when compared to Chinese young adult participants (8% and 18.8%, respectively).

For the parent participants, a gender difference was observed between the two samples ( $X^2 [1, N = 327] = 71.83, P < 0.01$ ). More U.S. parent participants were female (86.1%) compared to Chinese parent participants (40.3%). The relationship of nationality and BMI categories for parent participants was significant ( $X^2 [2, N=327] = 50.56, P < .001$ ). The U.S.

parent sample contained more participants who were overweight or obese (63.6%) and less participants who had a healthy weight status (35.8%) or were underweight (0.7%), when compared to Chinese parent participants (25.6%, 67.6%, and 6.8%, respectively).

### **Correlation analyses**

Pearson correlation analyses revealed that young adult and parent participants' BMIs were moderately correlated,  $r = .36$ ,  $P < .001$ . Young adult and parent participants' amounts of calories consumed per day had a moderate to strong correlation,  $r = .49$ ,  $P < .001$ . Weekly energy expenditure for young adult and parent participants were not correlated,  $r = .07$ ,  $P = .224$ .

### **BMI and Parental Authority**

The linear combination of young adult gender, nationality, parent BMI, and the parental authority scores significantly predicted young adults' BMI,  $R^2 = .23$ , adjusted  $R^2 = .22$ ,  $F(6, 316) = 15.97$ ,  $P < .001$  (see Table 2). Terms for the interactions between parents' BMI and the parental authority scales did not significantly contribute to the model,  $R^2$  change = 0.01,  $F(3, 313) = 0.86$ ,  $P = .46$  (see Table 2). However, terms for the interactions between parent BMI, the parental authority scales, and nationality significantly contributed to the model,  $R^2$  change = 0.04,  $F(3, 310) = 5.86$ ,  $P < .01$  (see Table 2).

When controlling for gender, both moderating effects of Authoritarian and Permissive parental authorities on the relationship between young adults' and their parents' BMIs were affected by nationality. As shown in Figure 1, for the U.S. sample, at high levels of Authoritarian parenting, there was a slight negative relationship between young adults' and their parents' BMIs, whereas a positive relationship occurred for those with low to average levels of Authoritarian parenting. In comparison, for the Chinese sample, a positive relationship appeared in average to high levels of Authoritarian parenting, in contrast to a negative relationship seen among those with low levels of Authoritarian parenting.

As indicated in Figure 2, BMIs for U.S. young adults with highly Permissive parents were negatively related to their parents' BMIs, whereas a positive relationship occurs for those with low to average levels of Permissive parenting. In comparison, there was no moderating effect of Permissive parenting scores on the positive relationship between Chinese young adults' and their parents' BMIs.

### **Daily energy consumption and parental authority**

The linear combination of young adult gender, nationality, parent daily energy consumption, and parental authority styles significantly predicted young adults' daily energy consumption,  $R^2 = .32$ , adjusted  $R^2 = .31$ ,  $F(6, 295) = 23.02$ ,  $P < .001$  (see Table 3). Terms for the interaction between parents' daily energy consumption and the parental authority scales significantly contributed to the model,  $R^2$  change = .03,  $F(3, 292) = 4.42$ ,  $P < .01$  (see Table 3). Moreover, terms for the interactions between nationality, parents' daily energy consumption, and the parental authority scales also significantly contributed to the model,  $R^2$  change = 0.02,  $F(3, 289) = 3.55$ ,  $P < .05$  (see Table 3).

When controlling for gender, both Authoritative and Authoritarian parental authorities significantly moderated the predictive relationship of parents' and young adults' daily energy consumption, while the moderating effect of the Permissive parental authority was marginally significant (see Table 3). In addition, the moderating effect of Authoritarian parenting on the relationship between young adults' and their parents' energy consumption was affected by nationality. As illustrated in Figure 3, for U.S. young adults with highly Authoritarian parents, there was a negative relationship between their energy consumption and their parents' energy consumption, whereas a positive relationship occurs for those with low to average levels of Authoritarian parenting. In comparison, there was no moderating effect of Authoritarian parenting on the positive relationship between Chinese young adults' and their parents' energy consumption.

## **Weekly energy expenditure and parental authority**

The relationships of parents' and young adults' weekly energy expenditures were examined along with the moderating relationships of parental authority scores. Parents' weekly energy expenditure was not a significant predictor of young adults' weekly energy expenditure,  $P = .09$ , but Permissive parenting significantly negatively predicted young adults' energy expenditure (Unstandardized $\beta = -1090.64$ ,  $P < .05$ ).

## **DISCUSSION**

It is, perhaps, not surprising that significantly more U.S. participants were overweight than the Chinese participants in this study (Heinonen *et al.*, 2014). Interestingly, however, for all participants, the young adults' BMIs were significantly positively correlated with parents' BMIs, and the young adults' daily calories consumed were significantly positively correlated with parents' daily calories consumed. This underscores the already established principle that parents' weight statuses and related behaviors influence those of their children (Andrews *et al.*, 2010; Leary *et al.*, 2013; Niemeier & Hektner, 2012; Perry and Langley, 2013; Philips *et al.*, 2014), even across Western and Eastern cultures.

Interestingly, parents' weekly energy expenditures were not predictive of their young adult children's weekly energy expenditures. This could be, at least in part, because a majority of the young adult participants (96.0%) in the U.S. attended a large Upper Midwestern university and had access to a state-of-the-art on-campus fitness center and related fitness programming (Niemeier & Hektner, 2012). Similarly, the Chinese young adult participants lived on campus and attended compulsory PE classes.

In the current study, the Authoritarian parental authority presents different moderating influences when considering the U.S. and Chinese participants separately. At high levels of Authoritarian parenting, the relationship becomes negative among the U.S. participants but

positive among Chinese participants. Similarly, in the presence of high levels of Authoritarian parenting, young adults' and parents' daily calories consumed are negatively related among the U.S. participants but positively related among Chinese participants. The converse results indicate differences between Eastern and Western cultures.

It has been suggested that young adult children from Western societies are encouraged to think independently and have self-directed freedoms (Newfield, 1996); whereas, Confucianism regulates Chinese culture, and the harsh and controlling parenting style is a conventional method in Chinese society (Leung *et al.*, 1998; Huang, 2013). The discrepancy of parental influences on children's behaviors between Eastern and Western cultures can also be found in other disciplines, including studies of academic achievement and of child well-being (Leung *et al.*, 1998; Zheng, 2011).

In the current study, in the presence of high levels of Permissive parenting, parents' and young adults' BMIs are inversely related among the U.S. participants but are not related among the Chinese participants. This suggests that, regardless of whether Chinese parents exhibited high level of permissive parental authority, the young adult children follow their parents' weight-related behaviors; whereas, in the U.S., children of permissive parents may look to others' behaviors to model.

## **Conclusions**

The findings in the current study are profound, as there is indication that parental authority styles significantly influence relationships of parents' and young adults' weight statuses and weight-related behaviors, even in a mixed-culture sample. Further, the directions of the relationship of parents' and young adults' BMIs are different when examining the U.S. and Chinese participants separately. Since the Authoritarian parental authority is considered unacceptable in the U.S. and acceptable in China (Kern *et al.*, 2014; Scharf *et al.*, 2011; Lui and Rollock, 2013), and since the moderating influence of the Authoritarian parental

authority is negative for U.S. participants and positive for Chinese participants, the findings of this study suggest that cultural norms and levels of social acceptance of specific parental authority may be the true indicator of influences on the development of children's weight-related health behavior patterns. Ferguson and his colleagues (2013) provide evidence to support this notion.

The current study suggests that parents' adherence to the more socially acceptable parental authority influences the moderating relationships of parents' and their children's weight-related health behaviors in Western and Eastern cultures. Therefore, to further investigate cultural influence, studies that primarily consider the levels of social acceptance of parental characteristics and their moderating influences on children's development of a range of behaviors are warranted. Similarly, professionals who aim to promote positive health behaviors via parent education should consider parental authority and the varying levels of social acceptance.

## REFERENCES

- Andrews, K. R., Silk, K. S., & Eneli, I. U. (2010). Parents as health promoters: A theory of planned behavior perspective on the prevention of childhood obesity. *Journal of Health Communication, 15*, 95-107.
- Armstrong, T., & Bull, F. (2006). Development of the world health organization global physical activity questionnaire (GPAQ). *Journal of Public Health, 14*, 66-70.
- Baumrind, D. (1971). Current patterns of parental authority. *Developmental psychology, 4*, 1.
- Blissett, J., & Bennett, C. (2013). Cultural differences in parental feeding practices and children's eating behaviours and their relationships with child BMI: a comparison of Black Afro-Caribbean, White British and White German samples. *European journal of clinical nutrition, 67*, 180-184.
- Block, G., Hartman, A. M., & Naughton, D. (1990). A reduced dietary questionnaire: development and validation. *Epidemiology, 58*-64.
- Buri, J. R. (1991). Parental authority questionnaire. *Journal of personality assessment, 57*, 110-119.
- DeCoster, J., & Iselin, A. (2009). <http://www.stat-help.com/spreadsheets/Comparing%20Correlation%20Coefficients%202009-06-24.xls>. Accessed on 4 October, 2015.
- De Decker, E., De Craemer, M., De Bourdeaudhuij, I., Wijndaele, K., Duvinage, K., Koletzko, B., & Cardon, G. (2012). Influencing factors of screen time in preschool children: an exploration of parents' perceptions through focus groups in six European countries. *Obesity reviews, 13*, 75-84.
- Economos, C. D. (2001). Less exercise now, more disease later? The critical role of childhood exercise interventions in reducing chronic disease burden. *Nutrition in Clinical Care, 4*, 306-313.
- Ferguson, E. D., Hagaman, J. A., Maurer, S. B., Mathews, P., & Peng, K. (2013). Asian culture in transition: is it related to reported parenting styles and transitivity of simple choices? *Journal of Applied Social Psychology, 43*, 730-740.
- Gates, D. M., Succop, P., Brehm, B. J., Gillespie, G. L., & Sommers, B. D. (2008). Obesity and presenteeism: the impact of body mass index on workplace productivity. *Journal of Occupational and Environmental Medicine, 50*, 39-45.
- Heinonen, I., Rinne, P., Ruohonen, S. T., Ruohonen, S., Ahotupa, M., & Savontaus, E. (2014). The effects of equal caloric high fat and western diet on metabolic syndrome, oxidative stress and vascular endothelial function in mice. *Acta Physiologica, 211*, 515-527.
- Huang, C. Y. S. (2013). *Chinese parenting and children's compliance to adults: a cross-cultural comparative study* (Doctoral dissertation, University of Cambridge).
- Joseph, K. S., & Kramer, M. S. (1996). Review of the evidence on fetal and early childhood antecedents of adult chronic disease. *Epidemiologic Reviews, 18*, 158-174.
- Kern, R. M., Rasmussen, P. R., & Curlette, W. L. (2014). Parenting from the Individual Psychology Perspective: Obstacles, Challenges, Culture, and Psychoeducational Programs. *The Journal of Individual Psychology, 70*, 87-88.
- Leary, J. M., Ice, C. L., Neal, W. A., & Cottrell, L. (2013). Parent and child weight status predict weight-related behavior change. *Journal of Communication in Healthcare, 6*, 115-121.
- Liang, Y. J., Xi, B., Song, A. Q., Liu, J. X., & Mi, J. (2012). Trends in general and abdominal obesity among Chinese children and adolescents 1993–2009. *Pediatric obesity, 7*, 355-364.

- Lui, P. P., & Rollock, D. (2013). Tiger mother: Popular and psychological scientific perspectives on Asian culture and parenting. *American Journal of Orthopsychiatry*, **83**, 450-456.
- Muntean, C. (2014). The child's education—object of parental authority regarding the child's personality. *Contemporary Readings in Law and Social Justice*, **1**, 701-710.
- Niemeier, B. S., & Hektner, J. M. (2012). **Weight-related health behaviors and body mass: Associations between young adults and their parents moderated by parental authority.** *Journal of Health Education*, **43**, 366-377.
- Ogden, C. L., Carroll, M. D., Kit, B. K., & Flegal, K. M. (2014). Prevalence of childhood and adult obesity in the United States, 2011-2012. *Jama*, **311**, 806-814.
- Perry, A. R., & Langley, C. (2013). Even with the best of intentions: paternal involvement and the theory of planned behavior. *Family process*, **52**(2), 179-192.
- Philips, N., Sioen, I., Michels, N., Sleddens, E., & De Henauw, S. (2014). The influence of parenting style on health related behavior of children: findings from the ChiBS study. *International Journal of Behavioral Nutrition and Physical Activity*, **11**, 95.
- Sato, A. F., Jelalian, E., Hart, C. N., Lloyd-Richardson, E. E., Mehlenbeck, R. S., Neill, M., & Wing, R. R. (2010). Associations between parent behavior and adolescent weight control. *Journal of pediatric psychology*, jsq105.
- Sayers, S., Singh, G., Mott, S., McDonnell, J., & Hoy, W. (2009). Relationships between birthweight and biomarkers of chronic disease in childhood: Aboriginal Birth Cohort Study 1987–2001. *Paediatric and perinatal epidemiology*, **23**, 548-556.
- Scharf, M., Wiseman, H., & Farah, F. (2011). Parent–adolescent relationships and social adjustment: The case of a collectivistic culture. *International Journal of Psychology*, **46**, 177-190.
- Sokol, R. J. (2000). The chronic disease of childhood obesity: the sleeping giant has awakened. *The Journal of pediatrics*, **136**, 711-713.
- Spritzer, D. A. (2004). Global health: obesity epidemic migrates east. *CMAJ: Canadian Medical Association Journal*, **171**, 1159.
- Truong, K. D., & Sturm, R. (2005). Weight gain trends across sociodemographic groups in the United States. *American Journal of Public Health*, **95**, 1602.
- United States Department of Health and Human Services. (2015). Assessing Your Weight. <http://www.cdc.gov/healthyweight/assessing/index.html> Accessed 15 May 2015.
- Woo, J., Yu, R., & Yau, F. (2013). Fitness, fatness and survival in elderly populations. *Age*, **35**, 973-984.
- World Health Organization. (2015). Global Physical Activity Surveillance. [http://www.who.int/chp/steps/GPAQ\\_CH.pdf?ua=1](http://www.who.int/chp/steps/GPAQ_CH.pdf?ua=1) Accessed on 3 October 2015
- Wu, W., U., Li, J., & Luo, Y. (2008). Assessment of reliability and validity of food frequency questionnaire. *Academic Journal of Second Military Medical University*, **29**, 571-573.
- Xi, B., Liang, Y., He, T., Reilly, K. H., Hu, Y., Wang, Q., Yan, Y., & Mi, J. (2012). Secular trends in the prevalence of general and abdominal obesity among Chinese adults, 1993–2009. *Obesity reviews*, **13**, 287-296.
- Zheng, Z. (2011) *The research on the relationship between family environment, parenting style and adolescent subjective well-being* (Doctoral dissertation, Tianjin Normal University).
- Zhou, Y. J., Liang, B. Y., & Cai, Y. (2010). Chinese revision of buri's parental authority questionnaire. *Chinese Journal of Clinical Psychology*, **18**, 8-10.

## TABLES

**Table 1:** Characteristics of young adult and parent participants

Characteristics of Young Adults	U.S. Young Adults (N = 151)		Chinese Young Adults (N = 176)		U.S. & Chinese Young Adults (N = 327)	
	Mean (SD)	%	Mean (SD)	%	Mean (SD)	%
<b>Age</b>	19.1 (1.4)		19.0 (1.1)		19.0 (1.2)	
<b>Gender</b>						
Female	93	61.6	80	45.5	173	52.9
Male	58	38.4	96	55.5	154	47.1
<b>Study Year</b>						
Freshman or Sophomore	129	85.4	161	91.5	290	88.7
Junior or Senior	22	14.6	15	8.5	37	11.3
<b>Current Living Situation</b>						
Live with parents	15	10.0	28	16.0	43	13.1
Live in college housing	102	67.5	145	82.9	247	75.8
Rent a home off-campus	33	21.9	1	0.6	34	10.4
Own a home off-campus	1	0.6	1	0.6	2	0.6
<b>Childhood/Adolescence Living Situation:</b>						
Lived with two biological or adoptive parents	126	83.5	134	76.2	260	79.5
Lived with single parent	15	9.9	2	1.1	17	5.2
Lived with either biological or adoptive parent and stepparent	9	6.0	3	1.7	12	3.7
Lived with extended family members	0	0	25	14.2	25	7.6
<b>BMI</b>	23.3 (3.9)		21.0 (3.0)		22.1 (3.7)	
Underweight (less than 18.5 kg/m <sup>2</sup> )	7	4.6	33	18.7	40	12.2
Normal (18.5-24.9 kg/m <sup>2</sup> )	105	69.5	129	73.3	234	71.6
Overweight or obese (25 kg/m <sup>2</sup> and above)	39	25.8	14	8.0	53	16.2
<b>Characteristics of Parents</b>	U.S. Parents (N = 151)		Chinese Parents (N = 176)		U.S. & Chinese Parents (N = 327)	
	Mean (SD)	%	Mean (SD)	%	Mean (SD)	%
<b>Age</b>	48.5 (5.3)		45.7 (4.0)		47.0 (4.8)	
<b>Gender</b>						
Female	130	86.1	71	40.3	201	61.5
Male	21	13.9	105	59.7	126	38.5
<b>Education</b>						
Illiterate or semi-literate	0	0	2	1.1	2	0.6
Primary School	28	18.5	16	9.1	44	13.5
Middle school	38	25.2	51	29.1	89	27.2
High school	25	16.6	46	26.3	71	21.7
University degree or above	60	39.7	60	34.3	120	36.7
<b>BMI</b>	27.6 (6.2)		23.1 (3.9)		25.2 (5.5)	
Underweight (less than 18.5 kg/m <sup>2</sup> )	1	0.6	12	6.8	13	4
Normal (18.5-24.9 kg/m <sup>2</sup> )	54	35.8	119	67.6	173	52.9
Overweight or obese (25 kg/m <sup>2</sup> and above)	96	63.6	45	25.6	141	43.1

**Table 2:** Main and interaction effects of young adults' gender, nationality, parents' BMI and PAQ measures on young adults' BMI

Variable	Model 1			Model 2			Model 3		
	$\beta$	<i>SE</i>	<i>P</i>	$\beta$	<i>SE</i>	<i>P</i>	$\beta$	<i>SE</i>	<i>P</i>
Young adult gender	1.84	0.37	< .001	1.88	0.38	< .001	1.73	0.37	< .001
Nationality	1.47	0.46	<.01	1.53	0.47	<.01	1.24	0.46	.01
Parents' BMI	0.18	0.04	< .001	0.19	0.04	< .001	0.22	0.03	< .001
Authoritative parenting score	0.44	0.36	.22	0.37	0.36	.31	0.86	0.42	.04
Authoritarian parenting score	0.47	0.35	.18	0.40	0.36	.27	1.10	0.40	.01
Permissive parenting score	0.20	0.34	.55	0.19	0.34	.59	0.80	0.40	.05
Parents' BMI * Authoritative				-0.08	0.07	.22	0.11	0.13	.39
Parents' BMI * Authoritarian				0.00	0.06	.98	0.35	0.13	.01
Parents' BMI * Permissive				-0.07	0.07	.32	0.16	0.14	.25
Parents' BMI*Authoritative* Nationality							-0.26	0.17	.12
Parents' BMI*Authoritarian * Nationality							-0.55	0.16	< .001
Parents' BMI * Permissive * Nationality							-0.45	0.18	.01

Note:  $\beta$  values are unstandardized.  $N = 323$ ; Model 1  $R^2 = 0.23$ ; Model 2  $R^2 = 0.24$ ; Model 3  $R^2 = 0.28$

**Table 3: Main and interaction effects of young adults' gender, nationality, parents' daily calories consumed, and PAQ measures on young adults' daily calories consumed**

Variable	Model 1			Model 2			Model 3		
	$\beta$	SE	P	$\beta$	SE	P	$\beta$	SE	P
Young adult gender	434.86	85.41	< .001	427.38	84.25	< .001	407.13	83.48	<.001
Nationality	-31.01	109.20	.78	-108.10	110.68	.33	-88.47	110.70	.425
Parents' average calories consumed per day	0.46	0.05	< .001	0.42	0.05	< .001	0.48	0.06	<.001
Authoritative parenting score	119.65	81.97	.15	100.04	80.83	.22	34.48	87.40	.69
Authoritarian parenting score	110.65	80.34	.17	118.89	79.48	.14	26.27	84.73	.76
Permissive parenting score	37.95	77.82	.63	48.43	77.25	.53	45.53	84.02	.59
Parents' calories * Authoritative				-0.20	0.09	.03	-0.04	0.12	.75
Parents' calories * Authoritarian				0.23	0.09	.01	0.03	0.13	.79
Parents' calories * Permissive				-0.17	0.09	.05	-0.20	0.10	.06
Parents' calories *Authoritative* Nationality							-0.31	0.21	.14
Parents' calories *Authoritarian * Nationality							-0.62	0.21	<.001
Parents' calories * Permissive * Nationality							-0.12	0.22	.60

Note:  $\beta$  values are unstandardized.  $N = 302$ ; Model 1  $R^2 = 0.32$ ; Model 2  $R^2 = 0.35$ ; Model 3  $R^2 = 0.37$

## FIGURES

### Titles and captions

**Figure 1:** Authoritarian Parenting Score Moderates Young Adults' and Parents' BMIs in U.S. and China. The figure shows the predicted values of young adults' BMI at mean and +/- 1 SD of parents' BMIs and Authoritarian parenting scores in U.S. and China.

**Figure 2:** Permissive Parenting Score Moderates Young Adults' and Parents' BMIs in U.S. and China. The figure shows the predicted values of young adults' BMIs at mean and +/- 1 SD of parents' BMIs and Permissive parenting scores in U.S. and China. For Chinese sample, 3 predicting lines are overlapped into one line with permissive parenting scores at low, average and high levels.

**Figure 3:** Authoritarian Parenting Score Moderates Young Adults' and Parents' Average Daily Calories Consumed in U.S. and China. The figure shows the predicted values of young adults' calories consumed per day at mean and +/- 1 SD of parents' calories consumed per day and Authoritarian parenting scores in U.S. and China. For Chinese sample, 3 predicting lines are overlapped into one line with authoritarian parenting scores at low, average and high levels.