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Lifestyle and socioeconomic correlates of breakfast skipping in Hong Kong primary 4
schoolchildren

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Abstract

Objective

Although breakfast is associated with different benefits, breakfast skipping is increasingly common among children. This study aimed to identify lifestyle and socioeconomic correlates of breakfast skipping in Hong Kong schoolchildren.

Methods

68 606 primary 4 participants of the Department of Health Student Health Service in 1998-2000 reported breakfast habit and other lifestyle characteristics using a standardized questionnaire. Height and weight were measured by trained SHS nurses. Socioeconomic data were reported by parents. In cross-sectional analysis, multivariate logistic regression was used to identify lifestyle and socioeconomic correlates of breakfast skipping.

Results

3 598 subjects (5.2%) usually skipped breakfast. Breakfast skipping was associated with being overweight (Odds ratio=1.59, 95% CI: 1.46 to 1.73) and obese (2.06, 1.80 to 2.36), and unhealthy dietary habits including more frequent junk food (1.23, 1.14 to 1.33) but less frequent fruit/vegetable (1.23, 1.13 to 1.34) and milk (1.98, 1.80 to 2.16) intake. Breakfast skippers tended to skip lunch, do less extra-curricular physical activity, watch more television and have less educated parents.

Conclusions

Breakfast skipping was significantly related to various health-compromising lifestyle characteristics and lower parental education. Breakfast habit can be a potential lifestyle indicator. Education programmes aimed at specific target groups should encourage regular breakfast consumption.

Keywords

Breakfast, Children; Food habits; Life style; Hong Kong

1. Introduction

Breakfast has favourable effects on cognition and learning (Gajre *et al.*, 2008), diet quality (Dubois *et al.*, 2009) and the prevention of chronic diseases (Timlin and Pereira, 2007). However, breakfast skipping is increasingly common among children and has been linked to high plasma total cholesterol (Resnicow, 1991), overweight (Croezen *et al.*, 2009) and other unhealthy lifestyle characteristics (Keski-Rahkonen *et al.*, 2003).

Patterns of breakfast consumption vary between countries (Pearson *et al.*, 2009). Breakfast is important in the Chinese dietary pattern (Chen and Xu, 1996). Even so, the problem of breakfast skipping may be particularly serious in Hong Kong, partly attributed to the distinctively fast-paced local lifestyle. However, breakfast skipping in Chinese populations is understudied, particularly among children who require an ample supply of energy and nutrients for growth. We therefore investigated the socioeconomic and lifestyle correlates of breakfast skipping in Hong Kong primary 4 (P4, grade 4) schoolchildren.

2. Methods

Study sample

The Student Health Service (SHS)¹, Department of Health, Hong Kong SAR² provided data for analysis. The SHS is a health assessment programme for all primary and secondary school students in Hong Kong. 68 606 Chinese P4 SHS participants in academic years 1998/1999 and 1999/2000 were analyzed.

Procedures and measures

A standardized health assessment questionnaire in Chinese was completed by primary school students at annual appointments. It comprised 20 close-ended lifestyle-related questions, each with four responses that were dichotomized due to small numbers of

¹ SHS: Student Health Service

² SAR: Special Administrative Region

subjects in several sub-categories. Breakfast habit was assessed using the question “I usually have breakfast at...” Since we were interested in breakfast skipping behaviour, those who chose “home”, “fast food stall/cafeteria/restaurant” or “some other places” were classified as “breakfast eaters” and those who chose “no breakfast at all” as “breakfast skippers”.

Age, sex, weight status (defined according to International Obesity Task Force standards (Cole *et al.*, 2000)), pubertal development, socioeconomic status (SES) and six lifestyle characteristics of subjects were assessed as potential correlates of breakfast habit. P4 weight (to the nearest 0.1kg) and height (to the nearest 0.1cm) were measured by trained nurses during appointments using calibrated equipment. Highest parental education and occupation status (recorded when subjects first joined the SHS, usually primary 1 (grade 1)) were used as SES proxies.

The test-retest reliability of the questionnaire was previously examined. The intra-class correlation coefficient for the breakfast assessment question was moderately high (0.575, 95% CI: 0.411 to 0.704, $p < 0.001$) and were moderate for the six lifestyle-related questions (0.431 to 0.580, all $p < 0.001$).

The study protocol was approved by the Department of Health Ethics Committee and the Institutional Review Board of the University of Hong Kong/Hospital Authority Hong Kong West Cluster.

Statistical analysis

Data analysis was performed using SPSS (version 17.0; SPSS Inc., Chicago, IL, USA). The significance of association between breakfast habit and potential correlates was assessed using chi-square (χ^2) test and Student’s t-test. Further analysis used significant ($p < 0.05$) correlates and breakfast habit as independent and dependent variables, respectively, in multivariate logistic regression, yielding crude and mutually adjusted odds ratios for breakfast skipping.

3. Results

Of 68 606 subjects (mean age: 9.85 years, SD=0.61), 49.2% were male. Our subjects were similar to the corresponding Hong Kong population group in sex ratio, housing type and residential district with small Cohen effect size of 0.05, 0.07 and 0.07, respectively.

Breakfast skippers (5.2%) differed from eaters (94.8%) in age, weight status, SES and physical activity (all $p < 0.001$), but not sex or pubertal development (Table 1). Breakfast skippers ate more junk food but less fruits/vegetables and drank less milk (all $p < 0.001$).

After mutual adjustment, each year increase in age was associated with 10% (95% CI: 4% to 16%) greater odds of skipping breakfast (Table 2). Being overweight/obese was related to breakfast skipping (p for trend < 0.001). Having less educated parents increased the risk of skipping breakfast (p for trend = 0.017). However, having parents with manual (vs. managerial/professional) jobs decreased the risk of skipping breakfast (0.78 (0.70 to 0.86)). Subjects who skipped lunch, consumed less fruits/vegetables and milk but more junk food, watched more television or engaged in less physical activity were also more likely to skip breakfast.

4. Discussion

Only 5.2% of our subjects skipped breakfast, while a separate local study found 30.5% primary 6 schoolchildren skipped breakfast at least once in the previous week (Cheng *et al.*, 2008). The word ‘usually’ in our breakfast assessment question should have captured habitual (unlikely affected by breakfast consumption on assessment day) and excluded occasional breakfast skipping, contributing to a lower prevalence. Although few children were habitual breakfast skippers (precise data on breakfast frequency were not collected), promotion of breakfast consumption among these children may be particularly important.

Our finding that breakfast skippers were older is consistent with published reports (Utter *et al.*, 2007). Sleeping and waking up late due to increased autonomy may minimize breakfast time.

As with our results, some studies show a cross-sectional relation between breakfast skipping and being heavier (Keski-Rahkonen *et al.*, 2003; Utter *et al.*, 2007). Meal composition (Barton *et al.*, 2005), timing (Dubois *et al.*, 2009) and frequency (Toschke *et al.*, 2009), and the clustering of health-compromising lifestyle characteristics (Timlin and Pereira, 2007) may explain the link. Also, lower levels of physical activity among skippers (Keski-Rahkonen *et al.*, 2003) may affect energy balance (Rampersaud *et al.*, 2005) and lead to weight gain. However, cross-sectional observations are subject to reverse causality (Rampersaud, 2009). Prospective studies are therefore needed to examine the temporal sequence and mechanisms linking breakfast skipping and body weight, particularly in understudied Chinese populations.

Similar to our findings, a clustering of health-compromising behaviours with breakfast skipping has been reported (Keski-Rahkonen *et al.*, 2003). Breakfast skippers were more likely to skip lunch (Utter *et al.*, 2007), consumed less milk products (Dubois *et al.*, 2009) and fruits/vegetables per day (Utter *et al.*, 2007) than eaters. Breakfast skippers also snacked more frequently than eaters (Utter *et al.*, 2007). Late-night snacking (popular in Hong Kong) may cause loss of appetite during breakfast time. Further studies should investigate meal patterning of breakfast skippers in Chinese populations. Although the significance of results may partly be attributable to our large sample size, breakfast skipping was consistently associated with various unhealthy lifestyle characteristics.

Children with less educated parents (possibly reflecting lower health consciousness) were more likely to skip breakfast. Although breakfast skipping has been related to lower SES (Sjoberg *et al.*, 2003; Timlin *et al.*, 2008), financial difficulties may not be the main explanation as inexpensive breakfast foods are widely available in Hong Kong. The weak association between parental unemployment and breakfast skipping supports this. Interestingly, breakfast skipping was less likely if parents had manual rather than

managerial or professional jobs. Higher energy requirement of manual work (Yao *et al.*, 2002) may necessitate breakfast eating among some parents, hence encouraging breakfast eating among children through behaviour modeling (DeJong *et al.*, 2009; Pearson *et al.*, 2009).

Study strengths

Our large sample is representative of Hong Kong primary school children, as supported by the similarities between subjects and the corresponding Hong Kong population group. Furthermore, height and weight were objectively measured where potential confounders that were suggested contributors to literature inconsistencies (Dubois *et al.*, 2009; Rampersaud *et al.*, 2005) were accounted for.

Study limitations

Our study has several limitations. Firstly, residual confounding was possible where potentially insightful information such as breakfast quality was not collected. Secondly, self-reported answers, particularly among young children, may be inaccurate (Baxter *et al.*, 2002), although such error is unlikely to be differential between breakfast eaters and skippers (Cheng *et al.*, 2008). Finally, interpretation of results should consider possible alterations in SES since time of data collection.

5. Conclusions

Breakfast skipping was correlated with increased age, overweight/obesity, lower parental education, non-manual parental occupations and various health-compromising lifestyle characteristics. Our results imply that interventions to promote healthy lifestyle including breakfast consumption could target high-risk groups. More detailed studies focused on breakfast skipping in Chinese populations are needed to develop suitable intervention programmes.

Conflict of interest

The authors declare that there are no conflicts of interest.

Role of funding source

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REFERENCES

- Barton, B. A., Eldridge, A. L., Thompson, D., Affenito, S. G., Striegel-Moore, R. H., Franko, D. L., et al., 2005. The relationship of breakfast and cereal consumption to nutrient intake and body mass index: The National Heart, Lung, and Blood Institute Growth and Health Study. *J. Am. Diet. Assoc.* 105, 1383-1389.
- Baxter, S. D., Thompson, W. O., Litaker, M. S., Frye, F. H., Guinn, C. H., 2002. Low accuracy and low consistency of fourth-graders' school breakfast and school lunch recalls. *J. Am. Diet. Assoc.* 102, 386-395.
- Chen, J. D., Xu, H., 1996. Historical development of Chinese dietary patterns and nutrition from the ancient to the modern society. *World Rev. Nutr. Diet.* 79, 133-153.
- Cheng, T. S. Y., Tse, L. A., Yu, I. T.-S., Griffiths, S., 2008. Children's perceptions of parental attitude affecting breakfast skipping in primary sixth-grade students. *J. Sch. Health* 78, 203-208.
- Cole, T. J., Bellizzi, M. C., Flegal, K. M., Dietz, W. H., 2000. Establishing a standard definition for child overweight and obesity worldwide: international survey. *BMJ* 320, 1240-1243.
- Croezen, S., Visscher, T. L. S., Ter Bogt, N. C. W., Veling, M. L., Haveman-Nies, A., 2009. Skipping breakfast, alcohol consumption and physical inactivity as risk factors for overweight and obesity in adolescents: results of the E-MOVO project. *Eur. J. Clin. Nutr.* 63, 405-412.
- DeJong, C. S., van Lenthe, F. J., van der Horst, K., Oenema, A., 2009. Environmental and cognitive correlates of adolescent breakfast consumption. *Prev. Med.* 48, 372-377.
- Dubois, L., Girard, M., Potvin Kent, M., Farmer, A., Tatone-Tokuda, F., 2009. Breakfast skipping is associated with differences in meal patterns, macronutrient intakes and overweight among pre-school children. *Public Health Nutr.* 12, 19-28.
- Gajre, N. S., Fernandez, S., Balakrishna, N., Vazir, S., 2008. Breakfast eating habit and its influence on attention-concentration, immediate memory and school achievement. *Indian Pediatr.* 45, 824-828.
- Keski-Rahkonen, A., Kaprio, J., Rissanen, A., Virkkunen, M., Rose, R. J., 2003. Breakfast skipping and health-compromising behaviors in adolescents and adults. *Eur. J. Clin. Nutr.* 57, 842-853.
- Pearson, N., Biddle, S. J. H., Gorely, T., 2009. Family correlates of breakfast consumption among children and adolescents. A systematic review. *Appetite* 52, 1-7.
- Rampersaud, G.C., 2009. Benefits of breakfast for children and adolescents: update and recommendations for practitioners. *Am. J. Lifestyle Med.* 3, 86-103.
- Rampersaud, G.C., Pereira, M.A., Girard, B.L., Adams, J., Metz, J.D., 2005. Breakfast habits, nutritional status, body weight, and academic performance in children and adolescents. *J. Am. Diet. Assoc.* 105, 743-760; quiz 761-742.
- Resnicow, K., 1991. The relationship between breakfast habits and plasma cholesterol levels in schoolchildren. *J. Sch. Health* 61, 81-85.

- Sjoberg, A., Hallberg, L., Hoglund, D., Hulthen, L., 2003. Meal pattern, food choice, nutrient intake and lifestyle factors in The Goteborg Adolescence Study. *Eur. J. Clin. Nutr.* 57, 1569-1578.
- Timlin, M. T., Pereira, M. A., 2007. Breakfast frequency and quality in the etiology of adult obesity and chronic diseases. *Nutr. Rev.* 65, 268-281.
- Timlin, M. T., Pereira, M. A., Story, M., Neumark-Sztainer, D., 2008. Breakfast eating and weight change in a 5-year prospective analysis of adolescents: Project EAT (Eating Among Teens). *Pediatrics* 121, e638-645.
- Toschke, A. M., Thorsteinsdottir, K. H., von Kries, R., 2009. Meal frequency, breakfast consumption and childhood obesity. *Int. J. Pediatr. Obes.* 4, 242 - 248.
- Utter, J., Scragg, R., Mhurchu, C. N., Schaaf, D., 2007. At-home breakfast consumption among New Zealand children: associations with body mass index and related nutrition behaviors. *J. Am. Diet. Assoc.* 107, 570-576.
- Yao, M., McCrory, M. A., Ma, G., Li, Y., Dolnikowski, G. G., Roberts, S. B., 2002. Energy requirements of urban Chinese adults with manual or sedentary occupations, determined using the doubly labeled water method. *Eur. J. Clin. Nutr.* 56, 575-584.

Table 1. Characteristics of 68 606 primary 4 subjects by breakfast eating habit (1998-2000, Hong Kong)

Characteristic	Breakfast eaters (%)	Breakfast skippers (%)	p-value
Total^a	94.8	5.2	
Sex			
<i>Male</i>	49.2	50.2	0.25 ^b
<i>Female</i>	50.8	49.8	
Age			
<i>Mean age (SD)</i>	9.85 (0.61)	9.91 (0.62)	<0.001 ^c
Weight status			
<i>Underweight</i>	3.0	2.5	<0.001 ^b
<i>Normal</i>	76.9	66.8	
<i>Overweight</i>	16.2	23.2	
<i>Obese</i>	3.9	7.5	
Pubertal development^d			
<i>Preadolescent (Tanner stage 1)</i>	81.0	80.6	0.509 ^b
<i>Onset of puberty (Tanner stages 2 to 5)</i>	19.0	19.4	
Highest parental education			
<i>No Schooling/kindergarten/primary (1-6)</i>	17.6	19.5	<0.001 ^b
<i>Secondary/matriculation</i>	72.4	72.5	
<i>Tertiary (non-degree/degree)</i>	10.0	8.0	
Highest parental occupation			
<i>Unemployed</i>	3.3	4.2	<0.001 ^b
<i>Manual job</i>	43.7	39.5	
<i>Clerical job/service industry</i>	30.7	35.1	
<i>Managerial/professional</i>	22.3	21.2	
Junk food consumption			
<i>Everyday/occasionally</i>	70.7	76.0	<0.001 ^b
<i>Rarely/never</i>	29.3	24.0	
Fruit/vegetable consumption			
<i>≥3 times/day</i>	23.7	18.9	<0.001 ^b
<i><3 times/day</i>	76.3	81.1	
Milk consumption			
<i>≥1 time/day</i>	30.3	16.1	<0.001 ^b
<i><1 time/day</i>	69.7	83.9	
Frequency of physical activity			
<i>≥3 times/week</i>	20.2	16.7	<0.001 ^b
<i><3 times/week</i>	79.8	83.3	
Average daily hours of TV watching			
<i>≤2 h</i>	62.9	44.7	<0.001 ^b
<i>>2 h</i>	37.1	55.3	
Lunch habit			

<i>Eat</i>	96.6	96.0	0.030 ^b
<i>Skip</i>	3.4	4.0	

^a Given as row percentage

^b Differences between breakfast eaters and skippers analyzed using chi-square test

^c Differences between breakfast eaters and skippers analyzed using T-test

^d Pubertal development was assessed by SHS doctors using Tanner stages I to V in primary 5 (grade 5). Pubic hair development was used as a marker for pubertal development in this study. As most subjects belonged to stage I, pubertal development was dichotomized as “preadolescent” (stage I) and “onset of puberty” (stages II to V).

Table 2. Correlates of breakfast skipping in 68 606 Hong Kong primary 4 children (1998-2000)		
	Crude ORs (95% CI)	Adjusted ORs ^a (95% CI)
Age^b	1.17** (1.11 to 1.23)	1.10** (1.04 to 1.16)
Weight status^c		
<i>Normal weight</i>	1	1
<i>Underweight</i>	0.96 (0.78 to 1.19)	0.92 (0.74 to 1.14)
<i>Overweight</i>	1.65** (1.52 to 1.79)	1.59** (1.46 to 1.73)
<i>Obese</i>	2.21 ** (1.94 to 2.53)	2.06** (1.80 to 2.36)
Highest parental education^c		
<i>Tertiary (non-degree/degree)</i>	1	1
<i>Secondary/matriculation</i>	1.26** (1.11 to 1.42)	1.15 (1.00 to 1.32)
<i>No Schooling/kindergarten/primary (1-6)</i>	1.39** (1.21 to 1.60)	1.26* (1.07 to 1.48)
Highest parental occupation		
<i>Managerial/professional</i>	1	1
<i>Clerical job/service industry</i>	1.20** (1.10 to 1.32)	1.04 (0.94 to 1.15)
<i>Manual job</i>	0.96 (0.87 to 1.04)	0.78** (0.70 to 0.86)
<i>Unemployed</i>	1.34* (1.12 to 1.60)	1.04 (0.86 to 1.26)
Fruit/vegetable consumption		
<i>≥3 times/day</i>	1	1
<i><3 times/day</i>	1.33** (1.22 to 1.45)	1.23** (1.13 to 1.34)
Junk food consumption		
<i>Rarely/never</i>	1	1
<i>Everyday/occasionally</i>	1.31** (1.21 to 1.42)	1.23** (1.14 to 1.33)
Milk consumption		
<i>≥1 time/day</i>	1	1
<i><1 time/day</i>	2.26** (2.06 to 2.47)	1.98** (1.80 to 2.16)
Frequency of PA		
<i>≥3 times/week</i>	1	1
<i><3 times/week</i>	1.26** (1.15 to 1.38)	1.15* (1.05 to 1.26)
Average daily hours of TV watching		
<i>≤2 h</i>	1	1
<i>>2 h</i>	2.10** (1.96 to 2.24)	1.92** (1.80 to 2.06)
Lunch habit		
<i>Eat</i>	1	1
<i>Skip</i>	1.21* (1.02 to 1.44)	1.22* (1.02 to 1.45)

^a. Adjusted ORs were mutually adjusted

^b. Age was analyzed as continuous variable where ORs represent an increased chance for breakfast skipping behaviour for the increase of age in years

^c. Test for trend where $p < 0.05$ for crude model and adjusted models

* $p < 0.05$; ** $p < 0.001$