Original Article

Chinese mothers' perceptions of their child's weight and obesity status

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This study recorded maternal perceptions of preschool children's weight in Chinese mothers living in Australia and China. A survey was undertaken of 1951 mothers living in Chengdu and Wuhan, China and 89 Chinese mothers living in Perth, Australia. All participants were mothers with children aged 2-4 years. The children's weight and height were measured and their weight status were classified using the International Obesity Task Force 2012 revised international child body mass index cut-offs. The prevalence of overweight or obese in children was 16.7% in China and 8% in Australia. The overall percentages of correct maternal perception of the child's weight were 35% in underweight children, 69.2% in normal weight children but only 10.8% in overweight/obese children. Among the overweight/obese children, only 14% in Australia and 10.8% in China were classified as overweight/obese by their mothers. Within the group of underweight children, normal weight mothers (p=0.004) and mothers with older age children (p=0.015) were more likely to correctly classify children's weight status. A higher percentage of overweight/obese mothers (p=0.002) and mothers who over-estimated her own weight status (p<0.001) have correct perception of the weight status of their overweight/obese children, compared to their counterparts. There was a high prevalence of incorrect maternal perception of preschool children's weight status in Chinese mothers, especially those with overweight/obese children. To address the obesity epidemic in children, future health promotion programs should put improved efforts to educate parents about obesity and its health consequences in order to reduce misperceptions.

Key Words: children, overweight, obesity, parental perceptions, Chinese

INTRODUCTION

Overweight and obesity in children is one of the most serious public health challenges of the 21st century.[1] Childhood overweight and obesity is associated with a range of immediate and long-term health comorbidities, including an increased risk of cardiovascular disease and diabetes and premature mortality.[2,3]

Many behaviour change models used in health promotion include as a first stage, awareness of the issue or problem in the community or the individual.[4] For example the emphasis in recent health promotion programs for tobacco control has been on awareness of the pathology associated with tobacco usage and awareness of alcohol problems has been a part of many health promotion programs.[5-8] Swinburn has noted that the child obesity epidemic began internationally about three decades ago, but it took another two decades before governments and international organizations became concerned.[9] A number of studies have found that adults often do not perceive themselves as obese, a first stage in taking action to lose weight and an earlier Australian study found that Australian mothers often do not recognize their child as being obese.[10] However there have been no reported studies of parental perceptions obesity in Chinese children living in China or Australia.

China, once been considered to have one of the leanest populations and despite differences in classifying obesity, there is little doubt that childhood obesity in China is fast catching up with the West.[11,12] A national epidemiological survey of childhood obesity in 2006 in China found that the prevalence of overweight and obesity in 0-6 years old urban children was 19.8% and 7.2% which was 4.7 and 3.6 times higher than that of 1996 respectively.[12]

In Australia, the number of overweight and obese children has increased significantly over the past two decades, with a quarter of children and adolescents (21%-25%) considered overweight or obese (5%-8% classified as obese).[13] It was reported that immigrants in Australia had a lower age-standardised rate of obesity (11%-15%) compared to the adult obesity rate of 18% in Australia, and the difference decreased with longer periods of resi-

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dence (ABS 2008). A cross-sectional survey of children aged 4-13 years found an independent effect of ethnicity on overweight and obesity, over and above the effect of socioeconomic status.[14] In the 2006 Australian Census, 669890 residents identified themselves as having Chinese ancestry and the number is increasing by 7.7% per year.[15] There were 53390 Chinese born residents in Perth in 2006, including 5527 children, about 2.9% of the city's population.[16]

Education and modifying eating habits within families is commonly advocated for tackling the obesity problem.[17] The role of the mother in the family's nutrition is essential to make the lifestyle changes necessary to help their children lose weight in most successful childhood obesity interventions.[18] If the mother does not perceive that her child is overweight then the program will not be effective. Little is known about how Chinese mothers of preschool children perceive their children's weight. The objective of this article was to record Chinese mother's perceptions of their child's weight in Australia and China.

METHODS

Data were collected from Chinese mothers and their children in Perth, Western Australia and in Chengdu and Wuhan, China between October 2010 and December 2011.[19,20] The study investigated the influences on Chinese mother's beliefs and attitudes towards health promoting activities of their children aged 2 to 4 years. Perth mothers were recruited from the Perth Chinese community through Chinese schools and community organizations. A total of 237 mothers agreed to participate with a response rate of 95.6%. There were 89 children in the study age group (2-4 years). Mothers interested in taking part in this study received an information sheet containing project details and were asked to sign the consent form. Participants in China were recruited from four kindergartens in four districts of Wuhan and 14 kindergartens in seven districts of Chengdu. A total of 2400 questionnaires were distributed to mothers by kindergarten teachers and 1607 and 471 were returned by the mothers in Chengdu and Wuhan respectively, a response rate of 86.6% in China. After excluding mothers with children under two years old, the final sample in China included 1951 mother and child pairs. The study was approved by the Curtin University Human Research Ethics Committee (approval number: HR 96/2010) and the local education authorities in China. Demographic data were collected using a validated and reliable questionnaire previously used in Chinese population studies.[21] Income was classified into two groups using categories based on local annual household income surveys.[22,23] The height and weight of mothers and children in Perth were measured during the interviews using standard anthropometric equipment and techniques.[24] The Chinese children's height and weight were measured by trained health workers in September or October 2011. The 2012 revised international child cut-offs developed by the International Obesity Task Force (IOTF) were used to classify thinness, overweight and obesity in children in this study.[25,26] The mothers' BMI were defined according to the Chinese adult cut-off points.[27] The mother's perception of her own and her child's weight were assessed with the question: "How would you describe your current weight status? (underweight, normal weight, overweight or obese)" and "How would you describe your child's weight at the moment? (underweight, normal weight, overweight or obese)".

All statistical analyses were performed using the IBM Statistical Package for Social Sciences (SPSS) Version 20.0. Chi-square (χ^2) test were used to compare basic characteristics of mothers and children in Australia and China, maternal perception of child's weight status in two countries and correct maternal perception of child's weight status by mother and child characteristic variables. p values <0.05 were considered statistically significant.

RESULTS

The general characteristics of the study populations are presented in Table 1. Chinese Australian mothers (71.9%) had a higher education level (university degree or higher) compared to China mothers (41.4%, p<0.001). Half of the Australia mothers (51.7%) were not employed, while 63.4% of China mothers had full-time work (Table 1). More mothers were overweight or obesity in Australia (24.4%) compared with mothers in China (9.0%, p<0.001). The majority of children between 2 to 4 years old were in the normal weight range (69.3 % in Australia and 71.4% in China). More children were overweight or obese in China (16.7% in China compared to 8.0% in Australia) but the proportion of underweight was higher in Australia (22.7% compared to 11.9% in China, p=0.007) (Table 1).

The overall percentages of correct maternal perception of the child's weight were 35.2% in underweight children, 69.2% in normal weight children and 10.8% in overweight/obese children. Maternal perceptions of child's weight status of Chinese mothers in Australia and China are presented in Table 2. Most mothers could correctly classify their children's weight if the child was normal weight, with more Australia mothers having right perceptions (83.6% in Australia and 68.4% in China, p=0.024) (Table 2). The percentages who correctly classified underweight children were 35.0% in both countries and very few underweight children were incorrectly classified as overweight/obese by Chinese mothers. Among the overweight or obese children, only 14.3% in Australia and 10.8% in China were classified as overweight/obese by their mothers (Table 2). Most overweight or obese children were viewed as being normal weight by their mothers and 14.3% in Australia and 13.9% in China were actually considered by their mothers to be underweight (Table 2).

Table 3 presents the percentages of Chinese mothers' correct classifications of the child's weight status by mother and child characteristic variables using pooled Australia and China data. Within the group of underweight children, normal weight mothers (p=0.006) and mothers with older age children (p=0.043) were more likely to correctly classify children's weight status (Table 3). A higher percentage of overweight/obese mothers (23.2%, p=0.002) and mothers who over-estimated her own weight status (20.6%, p<0.001) classified their child's weight status correctly in overweight/obese group, compared to their counterparts.

Table 1. Characteristics of Chinese mothers and their children in Australia and China

Characteristic	Australia (n†=89) n (%)	China (n†=1951) n (%)	2-sided *p*-value
Age (years)			<0.001
≤30	13 (14.9)	788 (53.2)	
>30	74 (85.1)	703 (46.8)	
Educational attainment			<0.001
High school diploma or less	25 (28.1)	895 (58.6)	
University degree or higher	64 (71.9)	632 (41.4)	
Working status			<0.001
Full-time working	20 (22.5)	974 (63.4)	
Part-time or casual work	23 (25.8)	312 (20.3)	
Not employed	46 (51.7)	250 (16.3)	
Household income			0.070
Low income	40 (47.6)	760 (57.7)	
High income	44 (52.4)	557 (42.3)	
Weight status of the mother			<0.001
BMI<18.5 kg/m^2 (Underweight)	9 (10.5)	272 (15.8)	
18.5≤BMI<24 kg/m^2 (Normal)	56 (65.1)	1294 (75.2)	
24≤BMI <28 kg/m^2 (Overweight)	14 (16.3)	139 (8.1)	
BMI≥28 kg/m^2 (Obesity)	7 (8.1)	16 (0.9)	
Age of the child (years)			<0.001
2	39 (16.5)	363 (18.2)	
3	30 (12.7)	910 (45.6)	
4	20 (8.4)	678 (34.0)	
Gender of the child			0.759
Boy	49 (55.1)	1037 (53.4)	
Girl	40 (44.9)	905 (46.6)	
IOTF category of the child			0.007
Underweight	20 (22.7)	210 (11.9)	
Normal	61 (69.3)	1259 (71.4)	
Overweight	5 (5.7)	189 (10.7)	
Obesity	2 (2.3)	106 (6.0)	

† The missing values vary for each variable in both countries.

Table 2. Maternal perception of child's weight status by IOTF category of Chinese children in Australia and China

IOTF category of the child	Maternal perception	Australia n	Australia %	China n	China %	2-sided *p*-value
Underweight	Underweight	7	35.0	70	35.2	
	Normal	13	65.0	123	61.8	0.729
	Overweight/obese	0	0	6	3.0	
Normal	Underweight	8	13.1	201	17.9	
	Normal	51	83.6	767	68.4	0.024
	Overweight/obese	2	3.3	153	13.6	
Overweight/obese	Underweight	1	14.3	40	13.9	
	Normal	5	71.4	216	75.3	0.956
	Overweight/obese	1	14.3	31	10.8	

DISCUSSION

There was a high prevalence of overweight and obesity in children two to four years of age in Chengdu and Wuhan, China (16.7%), and this was significantly higher than Chinese children in Perth Australia (8.0%). The prevalence rates based on the new IOTF cut-offs are extremely close to those used previously and can be compared directly with the WHO cut-offs.[25] Two national studies based on the old IOTF cut-offs in China reported that the overall prevalence of overweight/obesity increased from 4.2% in 1989 to 7.4% in 2000 in preschool children.[28,29] A further study using the same definition found that the prevalence of overweight and obesity in children 2-18 years of age in Chongqing (*n*=23292) was 16.2% in 2004.[30]

The results of this study indicate a high rate of maternal misclassification of child weight status in Chinese mothers: 64.8% of underweight and 30.8% of normal weight and 89.2% of overweight/obese children. Although over-perception of underweight can lead to unhealthy dieting and eating disorders, underestimation on weight status can lead to overfeeding and may increase the risk of these children becoming overweight or obese.[31,32] It is important that parents have an accurate perception of their child's weight status.

Only 10% of mothers with an overweight or obese preschool-aged child correctly classified their children as overweight. Chinese parents often lack awareness of the increasing problem of obesity and its significance as a health issue. The increasing prevalence of overweight

Table 3. Correct maternal perception of child's weight status by Chinese mother and child characteristic variables

	Correct maternal perceptions					
	In underweight children		In normal weight children		In overweight/obese children	
	n (%)	*p*	n (%)	*p*	n (%)	*p*
Weight status of the mother		0.006		0.382		0.002
Underweight	11 (20.4)		111 (67.7)		2 (8.7)	
Normal	56 (44.8)		568 (67.)		12 (6.2)	
Overweight/obese	4 (28.6)		60 (75.0)		8 (22.2)	
Mother's perception of her own weight status		0.140		0.660		<0.001
Correct assessment	47 (39.5)		434 (68.0)		7 (4.2)	
Under-estimated	0 (0)		61 (64.2)		0 (0)	
Over-estimated	24 (35.3)		244 (69.1)		21 (20.6)	
Mother's age (years)		0.049		0.466		0.191
<30	26 (29.2)		303 (68.2)		18 (14.1)	
>30	35 (43.8)		327 (70.5)		10 (8.7)	
Mother's education level		0.601		0.065		0.341
High school or less	34 (34.0)		345 (66.9)		18 (12.9)	
University or higher	28 (37.8)		300 (72.5)		9 (9.0)	
Mother's working status		0.367		0.970		0.041
Full-time working	33 (31.4)		396 (69.6)		19 (12.7)	
Part-time or casual work	12 (35.3)		141 (70.5)		1 (1.9)	
Not employed	16 (44.4)		110 (69.6)		8 (16.7)	
Household income		0.765		0.350		0.276
Low	32 (35.2)		309 (70.4)		12 (9.1)	
High	22 (33.8)		262 (73.4)		11 (13.9)	
Child's age (years)		0.043		0.381		0.928
2	15 (28.8)		157 (66.5)		5 (11.9)	
3	24 (28.2)		384 (71.4)		15 (10.0)	
4	35 (45.5)		270 (67.3)		11 (11.0)	
Child's gender		0.937		0.832		0.213
Male	36 (35.0)		440 (69.3)		21 (12.7)	
Female	39 (35.1)		369 (68.7)		10 (8.1)	

children may have "normalised" this condition and contributed to the inability of mothers to recognise when their own child is overweight. Further, there is a traditional Chinese belief that "gaining weight and being fat means affluence" and this belief may predispose mothers to view weight gain in a positive light. Before the 1980s and the advent of the "one child policy", Chinese women often had several children and larger infants were more likely to survive. However with the rapid changes in the amount and composition of Chinese diets and activity/inactivity patterns, the obesity levels in Chinese children rose to Western levels.[33] The nutrition transition happened so rapidly that parents still kept their traditional culture beliefs while they and their children were becoming overweight or even obese.

In the present study, 75% of overweight/obese Chinese children were classified by their mothers as being of normal weight, suggesting that Chinese parents perceive a larger body size of their children to be healthy. Parents who recognise their children's weight as a health problem are more likely to take action on changing their children's lifestyle habits.[18] Traditional cultural beliefs are often based in historical circumstance that may no longer be applicable. Even though public health professionals try to increase public awareness about health risks, the general public may not translate this awareness into an individual level of concern.[34] In the case of Chinese mothers, the level of misclassification of their perceptions of overweight and obese child deserves special consideration in relation to development of communication and other health promotion strategies.

The present findings have implications for programs to reduce the prevalence of overweight and obesity among Chinese children. Parental education and involvement have been found to be critical in successful programs to change children's dietary and physical activity behaviours, and there is evidence that public education campaigns to foster such involvement among families can yield benefits for the children.[35,36] The first stage in any health promotion intervention has to be recognition of the problem, in this case recognition of the objective evidence that the child is overweight or obese and identification of contributing factors including, behavioural and environmental factors.[8] Parents' understanding of the severity of childhood overweight/obesity and awareness that their child's weight is in the overweight or obese range, may motivate them to consult their health care provider and take ameliorative action.

Our findings also have important implications for early childhood educators and health professionals. Regular assessment of growth, including BMI are important as a part of normal monitoring by health professionals to provide an objective measure of potential overweight or obesity.[37] However health professional often neglect to discuss a child's obesity with the parents as it can be a sensi-

tive topic particularly if the parents are obese.[38] Other research has suggested that mothers of obese children believed that concern was not indicated if their children were otherwise happy, and there was fear of stigmatisation or blame.[39,40] Childhood obesity once established often carries over into adulthood and is difficult to treat. Early identification of obesity in childhood offers the best strategy for preventing disease progression with its associated comorbidities. Health professionals should support parents and provide counselling on childhood overweight and obesity.

There are some limitations that need to be considered with interpreting the results of this study. The height and weight of mothers in China were self-reported and it is known that women may underestimate their weight status.[41] The number of overweight children in the "Australian" group is relatively small and the age distribution of the subjects from two countries in this study was slightly different, both of which may have a small influence on the results. However, those limitations do not affect the results of maternal perceptions of children's weight status. Future studies should investigate in more detail how parents assess the weight status of their children and effective strategies for increasing parents' awareness of the importance of prevention of child obesity.

Conclusion

Our study revealed a high prevalence of incorrect maternal perception of preschool Chinese children's weight status, especially in overweight or obese children. Improved efforts to educate parents about childhood overweight/obesity and its health consequences for children in order to reduce misperceptions are important in addressing the obesity epidemic, whether in a clinical or community setting.

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AUTHOR DISCLOSURES

There are no potential conflicts of interest to be reported.

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華人媽媽對他們孩子的體重和肥胖狀態的認知

本研究記錄了生活在澳大利亞和中國的華人媽媽對他們的學齡前孩子的體重的看法。有1951位生活在中國成都和武漢的媽媽，以及89位生活在澳洲珀斯的華人媽媽参与了本次调查。所有調查對象都是有2-4歲孩子的母親。調查中測量了孩子的身高和體重，他們的體重狀況用國際肥胖工作組2012年新版的兒童體脂指數界值來劃分。超重和肥胖率在中國孩子中為16.7%，在澳洲華人孩子中為8%。媽媽對孩子體重的正確認知率在低體重孩子中為35%，在正常體重的孩子中為69.2%，但在超重/肥胖孩子中僅有10.8%。在超重/肥胖的孩子中，只有14%的澳洲華人母親和10.8%的中國母親正確地認識到了孩子的超重/肥胖。在低體重孩子里，正常體重的母親(p=0.004)和有年齡大一些孩子的母親(p=0.015)更有可能正確認識孩子的體重。有更高比例的超重/肥胖的母親(p=0.002)，和過高估計了自己體重狀況的母親(p<0.001)能夠正確地意識到孩子的肥胖問題。華人媽媽中對學齡前孩子的體重的錯誤認識率很高，特別是那些有超重/肥胖孩子的媽媽。要解決兒童中的肥胖問題，未來的健康促進項目需要更加努力地教育父母肥胖和肥胖的危害，以減少對肥胖的錯誤認知。

關鍵字：兒童、超重、肥胖、父母的認知、華人