



HEALTH PROMOTION

Every cockroach is beautiful to his mother's eyes"? A multicentric study on the perception of child's health status according to the parent

CHIARA SALINI¹, GABRIELE MESSINA², DANIELE MESSINA³, NICOLA NANTE^{1,2}

¹ Post Graduate School of Public Health, University of Siena, Italy; ² Department of Molecular and Developmental Medicine, University of Siena, Italy; ³ Fondazione Monte dei Paschi di Siena, Italy

Keywords

Obesity • Health promotion • Children BMI

Summary

Introduction. Childhood obesity is a social health problem in the Western World and an important goal is to analyze and correct risk factors. However, part of the problem could be determined by a different perception of the weight.

Material and methods. In October 2019, we conducted a cross-sectional study in which a questionnaire was administered to the parents of primary and secondary school children in South-East Tuscany, Italy. The aim was to determine the association between children's Body Mass Index (BMI) and the parent's perception.

Results. Analysis was carried out on 1,405 complete questionnaires. We found that most parents wrongly perceive the weight of

their children. 88.3% of parents with obese children believe that their children are of normal weight or only "a little overweight". 67.6% of parents who have overweight children think that their children are of normal weight ($p < 0.001$).

Conclusions. Our results show a misperception of the weight of the children in the parents eyes. The acquisition of healthy behaviour during childhood is extremely important for health in adulthood and for avoiding the onset of associated diseases. Therefore, food education becomes a crucial objective. Children and parents need to increase consciousness of the correct weight and diseases resulting from bad nutrition.

Introduction

Obesity was described by World Health Organization (WHO) as the worst "non-infectious epidemic" in history [1]. Globally, in recent years the prevalence of obesity among children and adolescents has been increasing, and the trend continues to grow for the coming years [2, 3].

In Italy, it is estimated that 24.7% of children between 6 and 17 years of age are overweight (average data for the years 2015-2016), 28.6% of boys and 20.5% of girls. Consumption of adequate amounts of fruit and vegetables among children and young people is still low, with 12.9% of 3-17-year-olds consuming at least 4 portions of fruit and vegetables per day in 2016 [4].

Excess body weight in childhood and adolescence is associated with a higher risk of developing diseases such as diabetes at a younger age, breathing disorders and paediatric hypertension [5-7].

Individual and societal costs related to overweight and obese conditions are numerous, including reduced quality of life, healthcare costs, decreased productivity, and premature mortality [7, 8].

It is essential to know eating habits because it can be helpful in creating healthy eating practices in children. Therefore, many studies and policies have been carried out to improve eating habits [9, 10].

Childhood is a critical period to establish eating habits that influence the future risk of cardiometabolic diseases [9], so

prevention among school-age children has become critical. Diet and lifestyle play a central role in determining a healthy life, as they contribute to causing or preventing the onset of these chronic diseases [11, 12].

Schools, due to the large number of students that are present, can be an important setting to promote a healthy lifestyle with health promotion interventions [13], for example, including nutrition education in the curriculum and promoting healthy food choices during meals (e.g., presence of fresh fruit and absence of sweet fizzy drinks and sweet or salted snacks).

It is important to carry out health promotion and lifestyle modification activities in schools to improve young people's lifestyles, eating and drinking habits and, indirectly, to raise parents' consciousness of these issues through student activities.

The aims of this study are: i) to investigate student habits and the prevalence of obesity and overweight; ii) to assess the level of agreement between the children weight and the parents perception.

Materials and Methods

This descriptive research with analytical component is derived from the "sCOOL FOOD for a remarkable future" program, a broader study promoted by the Monte dei Paschi Foundation, designed to develop global citizenship skills, education on food and nutrition, well-

Tab. I. Students' weight status and relative percentage by gender.

	Numbers (%)	Female	Male
Underweight	35 (2.5)	24 (68.6%)	11 (31.4%)
Normal weight	947 (67.4)	493 (52.1%)	454 (47.9%)
Overweight	312 (22.2)	153 (49.0%)	159 (51.0%)
Obese	111 (7.9)	41 (36.9%)	70 (63.1%)

being, healthy lifestyles and motor/sport education among young people. The project arises from the need to promote in young people correct eating habits and lifestyles, and behaviours oriented towards sustainability, from an economic, social and environmental point of view, through one hour of lessons per week during school hours.

In October 2019, we administered 4,324 questionnaires to parents (one parent per child) of children of primary and secondary schools in South-East Tuscany (Italy). The questions concerned eating habits, biometric data, their children's lifestyle, and their perception of their child's weight. Before the administration of the questionnaire, parents were asked for their consent to processing personal data, and the confidentiality of all data collected and stored was guaranteed. Parents had one month to return the filled questionnaires. The ethics committee also approved the study.

The exclusion criteria were the absence of the child's personal or biometric data, partial filling of the questionnaire and the absence of consent to personal processing data.

Body Mass Index (BMI) and weight status were classified according to the World Obesity Federation's gender-specific cut-off points for BMI [14].

Statistical analysis

The association between the variables was carried out using the Chi-square test (χ^2). The weighted Kappa coefficient was calculated to measure the agreement between the parent's perception of the child's weight status based on BMI and the parent's perception of the child's food intake and the child's weight status. Parents' perception was paired with their child's actual weight status, and any disagreement between the two was considered as misperception. Data were collected and organized using Microsoft Excel, and statistical analysis was carried out using STATA SE/14.0 (StataCorp LLC, Texas USA). Differences were considered at a statistically significant level of 95% ($p < 0.05$).

Results

We received back 1,696 questionnaires, 39.2% of those sent; 275 returned without filling any field, 7 were incomplete and 20 were submitted twice or more times; for the latter we used the most recent ones. The final analysis was carried out on 1,405 questionnaires completed by parents.

There were 694 (49.4%) males children and 711 (50.6%) females. Mean age was 8.7 (SD 1.56) years in a range 5-12 years.

Students' weight status and relative percentage by gender are presented in Table I.

Out of 1,405 complete questionnaires, 947 (67.4%) children had normal weight, 312 (22.2%) were overweight, 111 (7.9%) were obese and 35 (2.5%) children were underweight. However, when comparing the BMI range with the gender of the children, there was a significant difference, particularly with regard to obesity, which was higher in boys (70 children, 63.0%) than in girls (41 children, 36.9%) and with regard to underweight, which was higher in girls (24 children, 68.6%) than in boys (11 children, 31.4%) Table I.

Asking parents what was their perception of the children's weight, we found that 1 out of 4 had a different perception compared to the real weight; the following parents' opinions on children were recorded: 78.3% normal, 13.5% a little bit overweight, 7.3% underweight and only 1% overweight (Tab. II).

For parents with obese children (111), 55.0% believed that their children were only "a little overweight", 33.3% considered their children being at a normal weight, and only 11.7% had the perception of their child's obesity. Furthermore, we found that 67.6% of parents with overweight children believed that their children were normal weight, 32.1% were aware that their child was overweight, and only 1 parent considered his child to be underweight. However, no parents thought their children were obese. Among normal-weight children, 9.7% of parents believed that their children were underweight and 3.0% that the children were a little overweight. Among underweight children, 74.3% of parents believed

Table II. Child's BMI compared to the parental perception of the child weight status.

Perceived BMI		Real BMI			
		Underweight	Normal weight	Overweight	Obese
Underweight	102 (7.2%)	9 (25.7%)	92 (9.7%)	1 (0.3%)	-
Normal weight	1,100 (78.3%)	26 (74.3%)	826 (87.2%)	211 (67.6%)	37 (33.3%)
Overweight	1,89 (13.5%)	-	28 (3.0%)	100 (32.1%)	61 (55.0%)
Obese	14 (1.0%)	-	1 (0.1%)	-	13 (11.7%)

Table III. Child's BMI compared to parental perception of child food intake.

Perception of food intake		BMI			
		Underweight	Normal weight	Overweight	Obese
Eat little	157 (11.2%)	9 (25.7%)	139 (14.7%)	6 (1.9%)	3 (2.7%)
Eat normal	1,148 (81.7%)	26 (74.3%)	794 (83.8%)	256 (82.1%)	72 (64.9%)
Eat too much	100 (7.1%)	-	14 (1.5%)	50 (16.0%)	36 (32.4%)

that their children were normal weight (Table II). Questioning parents what their perception was about the children's weight, we found that most of them do not realize the child's wrong weight. For example, 28.6% of parents underestimated the child's weight, thus believed that their children were into the lower BMI range than the real one ($p < 0.001$), while 3.9% overestimated the child's weight. In particular, if the child was overweight or obese, their parents tend to underestimate it ($p < 0.001$); if the child is underweight, parents tend to overestimate the real weight ($p < 0.001$).

Therefore, among parents who have their children obese or overweight (423) only 113 (21.7%) of them have a real perception of the child's condition, while 310 (78.3%) underestimate the weight. Of all parents, only 67.5% have a true perception of their child's weight status, one parent out of 3 has an incorrect perception of their child's weight: 3.9% overestimate it while 28.6% underestimate it.

We also asked the parents to quantify how much their children eat. The results are shown in Table III. The majority, 64.9% of the parents of obese children, stated that their children eat "the right amount", 32.4% "too much" and 2.7% "too little". When parents of overweight children were asked the same question, 82.1% of them said their children eat "the right amount", 16.0% "too much" and 1.9% "too little". As for parents with underweight children, according to 74.3% their child eats "the right amount", according to 25.7% they eat "too little".

Discussion

Obesity is becoming a growing economic and social problem. Our study found overweight and obesity rates in line with the national and international average [15, 16]. Diet and lifestyle play a central role in determining a healthy and balanced life, as they help to cause or, conversely, prevent the onset of some of the most severe and widespread chronic diseases [17]. Eating habits play a key role, especially in preventing obesity and overweight, which are now considered two of the most critical health factors.

As shown by our results and other studies in the literature, parents tend to underestimate their children's weight status, especially among overweight children; this is worrying because parents play a crucial role in influencing positive behaviour and thus influencing future lifestyles [18]. One motivation is social desirability: parents are reluctant to label their child as "obese" and "overweight" because of prejudice and the

negative connotation associated with the words [19, 20]. The stigmatisation of obesity is often related to fear of fatness, anti-fat attitudes, low self-esteem, negative body image and poor quality of life among overweight and obese children [21]. On the other hand, the increasing prevalence of overweight or obese children has caused a change in society's attitude towards healthy weight, such that obesity is the new norm [22, 23].

Our study is similar in the findings to others [22, 24, 25], but it is the first conducted in Italy with such a large court of children (5-12 years old) that measures the misperception of the parents with the real weight of their children. A previous investigation in 2006 by Lazzeri [26] showed a correct perception of the nutritional status of the children and because of this our results raise an alarm considering that after 13 years we are witnessing a change, for the worse, in the perception of nutritional status. It may mean that proper health promotion campaigns have not been carried out in recent years.

Good eating and behavioural habits during the early years of life are decisive for health in childhood and adolescence and for health and quality of life in later life. How we did it, health promotion programmes need to be conducted on children first because interventions are more likely to lead to lasting changes in health behaviours. In addition, parental involvement in health interventions can be a key factor in their success and they are considered the most important influence on obesogenic health behaviours among children, as parents regulate the quality of food consumed in the household and active participation of the parent is important to allow habits to change [27-29]. Our results show that there is a lack of knowledge about the importance of proper nutrition within the family context, which could therefore negatively affect the child's future health status. However, there are many causes that make the onset of obesity multifactorial. One of the causes of the increase in obesity and overweight is linked to changes in society. Changes in the overall 'way of life' of people (always in a hurry and with less time to eat or eating properly) are manifested in an increase in the average amount of calories consumed, the emergence of nutritionally unbalanced eating patterns and a significant reduction in the time devoted to physical activity [3].

Currently, there is easier access to processed foods, refined sugars and fats, oils and meats, and consumption styles characterized by an increase in eating out and the use of pre-packaged [30, 31]; this, together with commercially available portions that are not exaggeratedly large (e.g., packaged snacks) but contain a high caloric content, could cause parents to perceive the amount of food intake as "low", as we found in our results. All this shows the

need to guide future consumers toward healthier eating habits and lifestyles through nutrition education.

Another problem is cultural, as several studies report, because thinness is associated with poor health, and malnutrition is seen as a worse threat than obesity [32, 33]. Also for this problem, it is important to carry out measures that make school education accessible to all.

This study has some limitations: weight and height were reported by the parent and not directly measured to avoid creating discomfort or competition among the children, which may have led to BMI estimates that may not be true due to parental errors; moreover, although the final number of questionnaires analysed was not small, 1,405, most of those sent, 67.5%, did not return; this could hide some selection BIAS; despite this, other studies have also had this problem [22, 24] and we believe that the results obtained are noteworthy.

Conclusions

Nutrition and lifestyle are essential determinants of health, and interventions in eating habits can influence the prevention of overweight and obesity and associated health problems. The dietary profile during childhood is critical in developing health status in adulthood, and schools could become an important agent for health promotion in this respect. Nevertheless, starting with a correct perception of one's nutritional status and weight is an essential element in understanding whether intervention is necessary. Our study shows that many parents do not have this perception of their children.

Ours is the first Italian study that shows a parent's scattering of their child's nutritional status: our results show that among overweight children there is a parent's misperception of the child's weight to his or her actual BMI, consistent with the data in the literature.

Having healthy behaviour during childhood is extremely important for the state of health of adulthood and avoiding the onset of associated diseases. Also, having correct eating habits and lifestyles means having behavior oriented towards sustainability in economic, social and environmental terms. Currently, there is still too much ignorance about proper nutrition, so nutrition education must become a crucial objective for our country's future and an essential goal is to create educational strategies to increase consciousness of the meaning of food, as evidenced by our study

Funding

SCOOOL FOOD program was financed by the Monte dei Paschi Foundation. The authors did not receive any personal funds for the research.

Informed consent statement

The consent to the processing of personal data was asked to every parent before starting the questionnaire and

the confidentiality of all data collected and stored was guaranteed.

Conflict of interest statement

sCOOL FOOD program was financed by the Monte dei Paschi Foundation. The authors did not receive any personal funds for the research. Monte dei Paschi Foundation had no role in the test design, data collection or analysis, decision to publish, or preparation and discussion of the test results in the manuscript.

Authors' contributions

SC performed the analytic calculations and wrote the manuscript. MG, NN verified the analytical methods, supervised the findings of this work and revised the final manuscript. MD supervised the project and conceived the original idea of the program. All authors provided critical feedback and helped shape the research, analysis and manuscript.

References

- [1] Bracale R, Milani L, Ferrara E, Balzaretto C, Valerio A, Russo V, Nisoli E, Carruba NO. Childhood obesity, overweight and underweight: a study in primary schools in Milan. *Eat Weight Disord* 2013;18:183-91. <https://doi.org/10.1007/s40519-013-0036-9>
- [2] World Health Organization. Childhood overweight and obesity 2020. Available at: <https://www.who.int/news-room/q-a-detail/noncommunicable-diseases-childhood-overweight-and-obesity> (Accessed on: 30/01/2022).
- [3] Di Cesare M, Sorić M, Bovet P, Miranda JJ, Bhutta Z, Stevens GA, Laxmaiah A, Kengne AP, Bentham J. The epidemiological burden of obesity in childhood: a worldwide epidemic requiring urgent action. *BMC Med* 2019;17:212. <https://doi.org/10.1186/s12916-019-1449-8>
- [4] ISTAT. Rapporto per il Benessere Equo e Sostenibile in Italia 2017. Available at: https://www.istat.it/it/files/2017/12/Bes_2017.pdf (Accessed on: 22/02/2022).
- [5] Wijnhoven TM, van Raaij JM, Sjöberg A, Eldin N, Yngve A, Kunešová M, Starc G, Rito AI, Hassapidou M, Martos E, Pudule I, Petrauskienė A, Sant'Angelo, VF, Hovengen R, Breda J, Duleva V. WHO European Childhood Obesity Surveillance Initiative: School nutrition environment and body mass index in primary schools. *Int J Environ Res Public Health* 2014;11:11261-85. <https://doi.org/10.3390/ijerph11111261>
- [6] Nathan BM, Moran A. Metabolic complications of obesity in childhood and adolescence: more than just diabetes. *Curr Opin Endocrinol Diabetes Obes* 2008;15:21-9. <https://doi.org/10.1097/MED.0b013e3282f43d19>
- [7] Lobstein T, Baur L, Uauy R. Obesity in children and young people: a crisis in public health. *Obes Rev* 2004;5(Suppl 1):4-104. <https://doi.org/10.1111/j.1467-789X.2004.00133.x>
- [8] Wang YC, McPherson K, Marsh T, Gortmaker SL, Brown M. Health and economic burden of the projected obesity trends in the USA and the UK. *Lancet* 2011;378:815-25. [https://doi.org/10.1016/S0140-6736\(11\)60814-3](https://doi.org/10.1016/S0140-6736(11)60814-3)
- [9] Welker E, Lott M, Story M. The School Food Environment and Obesity Prevention: progress over the last decade. *Curr Obes Rep* 2016;5:145-55. <https://doi.org/10.1007/s13679-016-0204-0>

- [10] Micha R, Karageorgou D, Bakogianni I, Trichia E, Whitsel LP, Story M, Peñalvo JL, Mozaffarian D. Effectiveness of school food environment policies on children's dietary behaviors: a systematic review and meta-analysis. *PLoS One* 2018;13:E0194555. <https://doi.org/10.1371/journal.pone.0194555>
- [11] Quercioli C, Marianelli RB, Conti S, Niccoli B, Messina G, Nante N. Nutritional counseling and its effects on diet, nutritional knowledge and status, physical activity and quality of life in a Southern Europe population: evaluation of a health promotion programme. *Ital J Public Health* 2011;8:111-8. <https://doi.org/10.2427/5653>
- [12] Kansra AR, Lakkunarajah S, Jay MS. Childhood and adolescent obesity: a review. *Front Pediatr* 2020;8:581461. <https://doi.org/10.3389/fped.2020.581461>
- [13] Gorman N, Lackney JA, Rollings K, Huang TT. Designer schools: the role of school space and architecture in obesity prevention. *Obesity (Silver Spring)* 2007;15:2521-30. <https://doi.org/10.1038/oby.2007.300>
- [14] Cole TJ, Lobstein T. Extended international (IOTF) body mass index cut-offs for thinness, overweight and obesity. *Pediatr Obes* 2012;7:284-94. <https://doi.org/10.1111/j.2047-6310.2012.00064.x>
- [15] WHO. WHO European Childhood Obesity Surveillance Initiative (COSI). Report on the Fourth Round of Data Collection, 2015-2017. Available at: <https://www.who.int/europe/publications/i/item/WHO-EURO-2021-2495-42251-58349> (Accessed on: 07/02/2022).
- [16] Stival C, Lugo A. Prevalence and correlates of overweight, obesity and physical activity in Italian children and adolescents from Lombardy, Italy. *Nutrients* 2022;14:2258. <https://doi.org/10.3390/nu14112258>
- [17] Goryakin Y, Aldea A, Lerouge A, Romano Spica V, Nante N, Vuik S, Devaux M, Cecchini M. Promoting sport and physical activity in Italy: a cost-effectiveness analysis of seven innovative public health policies. *Ann Ig* 2019;31:614-25. <https://doi.org/10.7416/ai.2019.2321>
- [18] Parry LL, Netuveli G, Parry J, Saxena S. A systematic review of parental perception of overweight status in children. *J Ambul Care Manage* 2008;31:253-68. <https://doi.org/10.1097/01.JAC.0000324671.29272.04>
- [19] Hudson E, McGloin A, McConnon A. Parental weight (mis) perceptions: factors influencing parents' ability to correctly categorise their child's weight status. *Matern Child Health J* 2012;16:1801-9. <https://doi.org/10.1007/s10995-011-0927-1>
- [20] Garrett-Wright D. Parental perception of preschool child body weight. *J Pediatr Nurs* 2011;26:435-45. <https://doi.org/10.1016/j.pedn.2010.07.009>
- [21] Queally M, Doherty E, Matvienko-Sikar K, Toomey E, Cullinan J, Harrington JM, Kearney PM. Do mothers accurately identify their child's overweight/obesity status during early childhood? Evidence from a nationally representative cohort study. *Int J Behav Nutr Phys Act* 2018;15:56. <https://doi.org/10.1186/s12966-018-0688-y>
- [22] AlHasan DM, Breneman CB, Lynes CL, Callahan-Myrick K. Factors that influence parental misperception of their child's actual weight status in South Carolina. *Matern Child Health J* 2018;22:1077-84. <https://doi.org/10.1007/s10995-018-2491-4>
- [23] Robinson E, Sutin AR. Parents' perceptions of their children as overweight and children's weight concerns and weight gain. *Psychol Sci* 2017;28:320-9. <https://doi.org/10.1177/0956797616682027>
- [24] Hochdorn A, Faleiros VP, Camargo BV, Bousfield AB, Wachelke JF, Quintão IP, Azzolina D, Gregori D. Obese children are thin in parents' eyes: a psychologically, socially, or culturally driven bias? *J Health Psychol* 2018;23:114-26. <https://doi.org/10.1177/1359105316676328>
- [25] Rodrigues D, Machado-Rodrigues AM. Parental misperception of their child's weight status and how weight underestimation is associated with childhood obesity. *Am J Hum Biol* 2020;32:E23393. <https://doi.org/10.1002/ajhb.23393>
- [26] Lazzeri G, Casorelli A, Giallombardo D, Grasso A, Guidoni C, Menoni E, Giacchi M. Nutritional surveillance in Tuscany: maternal perception of nutritional status of 8-9 y-old school-children. *J Prev Med Hyg* 2006;47:16-21. <https://doi.org/10.15167/2421-4248/jpmh2006.47.1.11>
- [27] Hunter HL, Steele RG, Steele MM. Family-based treatment for pediatric overweight: parental weight loss as a predictor of children's treatment success. *Children's Health Care* 2008;37:112-25. <https://doi.org/10.1080/02739610802006510>
- [28] Niemeier BS, Hektner JM, Enger KB. Parent participation in weight-related health interventions for children and adolescents: a systematic review and meta-analysis. *Prev Med* 2012;55:3-13. <https://doi.org/10.1016/j.ypmed.2012.04.021>
- [29] Van Lippevelde W, Verloigne M, De Bourdeaudhuij I, Brug J, Bjelland M, Lien N, Maes L. Does parental involvement make a difference in school-based nutrition and physical activity interventions? A systematic review of randomized controlled trials. *Int J Public Health* 2012;57:673-8. <https://doi.org/10.1007/s00038-012-0335-3>
- [30] Batal M, Steinhouse L, Delisle H. The nutrition transition and the double burden of malnutrition. *Med Sante Trop* 2018;28:345-50. <https://doi.org/10.1684/mst.2018.0831>
- [31] Ricchi E, Serafini A, Troiano G, Nante N, Petraglia F, Messina G. Food related risks during pregnancy: how much do women know about it? *Eur J Public Health* 2014;24(Suppl 2):E11868-1-6. <https://doi.org/https://doi.org/10.2427/11868>
- [32] Guendelman S, Fernald LC, Neufeld LM, Fuentes-Afflick E. Maternal perceptions of early childhood ideal body weight differ among Mexican-origin mothers residing in Mexico compared to California. *J Am Diet Assoc* 2010;110:222-9. <https://doi.org/10.1016/j.jada.2009.10.033>
- [33] Rosas LG, Harley KG, Guendelman S, Fernald LC, Mejia F, Eskenazi B. Maternal perception of child weight among Mexicans in California and Mexico. *Matern Child Health J* 2010;14:886-94. <https://doi.org/10.1007/s10995-009-0534-6>

Received on February 6, 2023. Accepted on October 20, 2023.

Correspondence: Chiara Salini, Department of Molecular and Developmental Medicine, University of Siena, Via Aldo Moro 3, Siena, Italy. E-mail: salini_chiara@yahoo.it

How to cite this article: Salini C, Messina G, Messina D, Nante N. "Every cockroach is beautiful to his mother's eyes"? A multicentric study on the perception of child's health status according to the parent. *J Prev Med Hyg* 2023;64:E311-E315. <https://doi.org/10.15167/2421-4248/jpmh2023.64.3.2859>

© Copyright by Pacini Editore Srl, Pisa, Italy

This is an open access article distributed in accordance with the CC-BY-NC-ND (Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International) license. The article can be used by giving appropriate credit and mentioning the license, but only for non-commercial purposes and only in the original version. For further information: <https://creativecommons.org/licenses/by-nc-nd/4.0/deed.en>