

Social Environment Factors, Diet Quality, and Body Weight in 12-Year-Old Children from Four Public Schools in Puerto Rico

Mónica Serrano, LND*; Roxana Torres, MSHN, RD, LND*; Cynthia M. Pérez, PhD†; Cristina Palacios, PhD*

Objective: To explore the association of social-environment (SE) factors and diet quality (DQ) with weight status in a group of children in Puerto Rico (PR).

Methods: A cross-sectional study in a sample of 114 12-year-old children enrolled in 4 public schools in the San Juan Metropolitan area in Puerto Rico (PR) during the 2012-2013 school year. These children completed a self-administered questionnaire on socio-demographic characteristics and SE, with information on family meal patterns; parental feeding styles; parental, peer, and school support for healthy eating; physical activity (PA); and frequency of PA and sedentary times. The participants also completed a 24-hour dietary recall interview to determine DQ. This was assessed with the Healthy Eating Index (HIE)-2010, an instrument that evaluates compliance with the Dietary Guidelines for Americans. Body mass index (BMI) was calculated and categorized as healthy weight, overweight, or obese.

Results: 36% of participants were overweight/obese. In terms of DQ, 55% had “poor” DQ, 45% had diets that “need improvement”, and none had “good” DQ. Children of healthy weight (75.0%) reported more frequent family meals than did overweight/obese children (57.5%; $p = 0.05$). No other significant associations were found between SE factors and DQ or body weight status.

Conclusion: Most of the participants were of healthy weight but had poor quality diets. Having a healthy weight was positively associated with frequent family meals. [*P R Health Sci J* 2014;33:80-87]

Key words: Social-environment Factors, Diet Quality, Family Practices, Body Weight

Childhood obesity has become a major public health problem worldwide (1,2). This problem can lead to the early development of diet-related chronic diseases including diabetes, cardiovascular disease, and certain cancers (3,4). In Puerto Rico (PR), a cross-sectional study that used parent-/caregiver-reported data found that the prevalence of obesity in 436 10-19 year-old youth was 40% (5). Another cross-sectional study performed in 158 Puerto Rican children, ranging in age from 2 to 12 years, found that 56% of these children were overweight or obese and that 61% of their mothers and 75% of their fathers were also overweight or obese (6). In addition, a cross-sectional study done in Cayey, PR in children from first to sixth grade, found the highest overweight prevalence (46.8%) among children 11 to 12 years old, based on measured weight and height (7).

Child obesity risk factors include absence of physical activity (PA) (8), biological, social, and environmental factors (9,10), and poor diet quality (DQ) (11,12). Poor DQ in childhood has also been associated with an increased risk of chronic diseases (3,13) and dental caries (14).

Social environment (SE) encompasses the living and working conditions of a person as well as his or her income, educational level, and social relationships, all defined from a public-health perspective. Moreover, it includes familial, social, and cultural relationships in which groups of people interact (15). There are several SE factors that influence the DQ, dietary behavior, and

body weights of children, which factors include family practices (i.e., parental feeding styles, frequency of family meals, parental work demands, time available for meals, and watching TV while eating), socioeconomic status, the educational levels of the parents, school SE, and support for healthy eating and PA at home and school (16-18). SE factors (i.e., protective) have also been found to be positively associated with PA, and PA is negatively associated with obesity (19).

The present study aimed to explore the association of SE factors with DQ and weight status in a group of 12-year-old children from 4 public schools in PR.

Methods

Population and sample

This was a cross-sectional study that recruited a convenience sample of 12-year-old children, each one attending 1 of 4 public schools located in the San Juan Metropolitan area, PR.

*Nutrition Program and †Department of Biostatistics and Epidemiology, Graduate School of Public Health, University of Puerto Rico Medical Sciences Campus, San Juan, Puerto Rico

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Address correspondence to: Cristina Palacios, PhD, Nutrition Program, Graduate School of Public Health, PO Box 365067, San Juan, PR 00936-5067. Email: cristina.palacios@upr.edu

These schools were chosen based on the highest prevalence of overweight/obesity and caries found in a previous island-wide study of 1,550 12-year-old children in PR (20). To be eligible for participation, the potential subject had to be 12 years old, he or she had to be enrolled in one of the selected schools during the 2012-2013 school year, and he or she had to bring the signed parental consent and participant's assent forms. The study was approved by the PR Department of Education and by the Institutional Review Board of the University of Puerto Rico, Medical Sciences Campus. An estimated sample size was calculated using data from the previously named study (20). Based on an acceptable error of 0.05, a confidence level of 0.95, and a population size of 300, the estimated sample size was 168. The sample size was distributed equally among the selected schools.

Data collection

Participants were recruited at the initial visit to the selected schools. During these visits, we explained to each potential participant the purpose and duration of the study, the procedures that would be followed, the possible risks associated with participation, and the level of confidentiality that each participant could expect. Those interested in participating in the study received copies of the parental consent and participant's assent forms. During the scheduled and announced day for the data collection, those with the signed forms were invited to fill out a self-reported questionnaire, take part in a 24-hour dietary recall interview, and undergo anthropometric measurements.

Questionnaire

Socio-demographic characteristics

This section included questions pertaining to the participant's age and gender, about his or her parents' educational levels and occupations (if employed), and aimed at determining the status of the participant's family with regard to the Nutrition Assistance Program, a federal program that provides food-purchasing assistance for low- and no-income people; receiving such assistance was seen as an indicator of low socio-economic status.

SE factors

SE was assessed using the Team COOL (Controlling Overweight and Obesity for Life) survey, an instrument developed and validated to measure a number of personal, behavioral, and school-related SE factors associated with the dietary and PA practices of 12- to 17-year-old adolescents of different racial/ethnic backgrounds, including Hispanics (21). The 76-item, self-administered survey includes questions on family-meal frequency (all meals), parental, peer, and school support for healthy eating, PA and sedentary times, and parental encouragement of PA as well as questions about activities that prevent family meals, such as parental working hours or sports

practices. It also includes 3 questions on parental feeding styles (e.g. authoritarian, authoritative or permissive), 1 question for each style. The authoritarian feeding style makes few or no concessions to a child's particular food choices or preferences. A permissive feeding style is said to be permissive when a child is allowed to eat any food in any quantity, with the only limitation being availability. Finally, parents who use the authoritative feeding style encourage their child or children to eat healthy foods, while at the same time leaving some room for personal preferences (18). The feeding style was determined based on how that individual responded to the 3 questions having to do with the aforementioned feeding styles. Several questions of interest were extracted from this survey and translated into Spanish. Content validity was assessed by experts in child obesity and school health.

Physical activity

Physical activity and sedentary time were assessed with a questionnaire as previously reported (22). Participants were categorized as meeting or not the US Department of Health and Human Services recommendation of engaging in moderate/vigorous PA for at least 1 hour daily (23) and as meeting or not the guidelines of the American Academy of Pediatrics for limiting sedentary time to <2 hours daily (24).

Anthropometrics

Weight and height data were collected using the National Health and Nutrition Examination Survey Anthropometry Procedures Manual (25). The weight of each child (wearing his or her uniform without shoes, sock, or accessories) was measured twice with a calibrated digital weight scale (Seca, model 882, Germany). The scale was calibrated using a 2.3 kg weight. The height of each child (without hair accessories, if applicable) was measured twice with a calibrated stadiometer (Charter, Charter Electronic Co., LTD, Taiwan). The average of the 2 measurements was used in the analyses. BMI was calculated as weight in kilograms divided by height in meters squared (kg/m^2) and categorized as normal (5th to <85th percentile), overweight (85th to <95th percentile), or obese (≥ 95 th percentile) using the Centers for Disease Control and Prevention's age- and sex-specific growth charts (26-27).

24-hour dietary recall

Diet was assessed using the 24-hour dietary recall technique. This technique is the "gold standard" method and is used to collect information on types and amounts of food and beverages consumed in the past 24 hours (28). Food models and measuring tools were used as a reference for estimating portion sizes. The data were analyzed using the Nutrition Data System for Research (version 2011, Nutrition Coordinating Center, University of Minnesota). Part of the information was corroborated using a fruit and vegetables screener (not published), which inquired

into the frequency of the participant’s consumption of fruit and vegetables. The correlation between fruit and vegetable intake as determined by the recall and that determined by the screener was perfect ($r = 1.0$).

The Healthy Eating Index (HEI)-2010 was used to evaluate the collected recall data, resulting in a determination of DQ. The HEI is an instrument that measures compliance with the Dietary Guidelines for Americans (29). It provides a score for 12 individual components: 9 adequacy components (total fruit, whole fruit, total vegetables, greens and beans, whole grains, dairy, total protein foods, seafood and plant proteins, and fatty acids) and 3 moderation components (refined grains, sodium, and empty calories). Each component has a minimum score of 0 (no compliance with recommendations or the amount exceeds the recommendation in the given moderation component) and a maximum score of 5, 10, or 20 (perfect compliance with recommendations). All the scores are summed to calculate the HEI-2010 total score. Diet quality is considered to be poor if the score is ≤ 50 ; a score of 51 to 80 indicates that diet quality needs improvement; a score of >80 is an indication of good diet quality. The HEI has proven to be a reliable and valid measure of DQ in children (29).

Statistical analysis

To describe the variables used in the study, we used median (25th and 75th percentiles) for continuous variables and frequency distributions for categorical variables. Pearson’s chi-squared test was used to examine the associations between socio-demographic data, SE factors, PA, weight status, and DQ. Fisher’s exact test was used to examine the associations between sedentary activities, perceived parenting styles, weight status, and DQ. To assess the associations between HEI components and weight status, the Mann–Whitney U test was used; the linear-by-linear association chi-squared test was used to assess the associations between DQ and weight status. All statistical analyses were performed using the statistical software program SPSS (Statistical Package for the Social Sciences) for Windows (version 18.0). Statistical significance was set at $p < 0.05$.

Results

Of the 168 children selected to participate, 165 (98%) met the eligibility criteria; of these, 118 (71.5%) agreed to participate. We excluded 1 participant who did not complete the questionnaire. In

addition, since 3 participants were underweight, we excluded them from the analysis. Therefore, the total sample included 114 subjects (57.9% were female and 42.1% were male). Most were of healthy weight (64.0%); 36.0% were overweight/obese (16.7% were overweight and 19.3% were obese).

The HEI-2010 scores by weight status are shown in Table 1. There was no association between HEI score and weight status. However, there was an association between total vegetables and total fruit scores and gender, in that boys had lower scores than girls did ($p < 0.05$) (data not shown). The total median score was 49.1 (42.6, 54.8). According to the total score, 55.3% had poor diets, 44.7% had diets that needed improvement, and none had good diets. DQ was similar for both genders, in that 58.3% of the boys and 53.0% of the girls had poor diets (data not shown).

Parental socio-demographic characteristics are summarized in Table 2. Most of the participants’ parents had educational levels of 12th grade or lower, were currently employed, and were enrolled in the Nutrition Assistance Program. No associations were observed between parental socio-demographic characteristics and DQ or weight status.

Table 3 shows the distribution of perceived parental behavior and parenting styles (in the home) related to eating habits. According to the results, most of the participating children perceived that food preparation at home was not affected by their parents’ work hours (71.4%); this perception remained consistent regardless of the respondent’s DQ or weight status, but was found more frequently in girls (81.3%) than in boys (58.3%) ($p < 0.01$) (data not shown). Most of the children perceived that their parents’ jobs did not impede family meals (69.4%); these finding remain little changed whether

Table 1. Distribution of the HEI-2010 component scores in the sample by weight status (median (P25, P75))

HEI-2010 component score (maximum score)	All n = 114	Healthy weight n = 73	Overweight/Obese n = 41	P value*
Total fruit (including 100% juice) (5)	0.98 (0.0, 2.5)	1.1 (0.0, 2.5)	0.8 (0.0, 2.6)	0.68
Whole fruit (not juice) (5)	0.0 (0.0, 2.7)	0.0 (0.0, 2.7)	0.0 (0.6, 3.7)	0.84
Greens and beans (5)	3.2 (0.0, 5.0)	3.6 (0.6, 5.0)	2.2 (0.0, 5.0)	0.14
Total vegetables (5)	0.3 (0.16, 1.0)	0.4 (0.1, 1.0)	0.4 (0.2, 1.1)	0.32
Whole grains (10)	0.0 (0.0, 1.62)	0.0 (0.0, 0.7)	0.0 (0.0, 2.2)	0.70
Total protein foods (5)	5.0 (3.6, 5.0)	5.00 (3.3, 5.0)	5.00 (3.9, 5.0)	0.96
Seafood and plant proteins (5)	0	0	0	0.47
Dairy (10)	6.4 (3.7, 9.5)	6.4 (3.7, 9.3)	6.4 (3.8, 10.0)	0.55
Fatty acids (10)	0	0	0	0.56
Refined grains (10)	5.0 (4.03, 6.05)	4.9 (3.9, 5.8)	5.6 (4.1, 6.8)	0.21
Sodium (10)	7.02 (6.12, 7.81)	6.9 (6.0, 7.7)	7.1 (6.2, 8.2)	0.19
Empty calories (20)	19.45 (14.9, 20.0)	20.0 (15.3, 20.0)	17.6 (13.9, 20.0)	0.18
Total score (100)	49.1 (42.6, 54.8)	48.9 (42.6, 54.5)	49.8 (41.9, 55.6)	0.78
DQ (HEI-2010 categories)		P value†		
Good Diet	-	-	-	0.55
Diet Needs Improvement	51 (44.7)	31 (42.5)	20 (48.8)	
Poor Diet	63 (55.3)	42 (57.5)	21 (51.2)	

*The Mann–Whitney U test was used for weight status; †The linear-by-linear association chi-squared test was used to assess the associations between DQ and weight status.

categorizing the participants by DQ or weight status. With respect to parenting style, most of the children perceived their parents' parenting style as being authoritative, which perception was similar when the children were classified by DQ and weight status. Seventy-seven percent of the girls in the sample group perceived their parent's parenting style as being authoritative, and only 3.8% perceived it as being authoritarian; in turn, 54.1% of the boys perceived their parents' parenting style as being authoritative and 18.9% as authoritarian ($p < 0.05$) (data not shown). In addition, most children perceived that their parents encouraged them to eat healthy foods (83.2%), to perform physical activity (83.5%), and to control their body weight (74.2%) (data not shown); these perceptions were similar regardless of the DQ or weight status of the respondent.

Family meal habits by DQ and weight status are shown in Table

4. Seventy-five percent of the participating children of healthy weight reported that meals were frequently eaten in a family context; on the other hand, only 57.5% of the overweight/

Table 2. Distribution of parental socio-demographic data by diet quality and weight status

Variable	Diet needs improvement n (%)	Poor diet n (%)	P value*	Healthy weight n (%)	Overweight/Obese n (%)	P value*
Mother's level of education (n = 70)†						
≤ 12 grade	26 (83.9)	24 (61.5)	0.06	33 (76.7)	17 (63.0)	0.21
>12 grade	5 (16.1)	15 (38.5)		10 (23.3)	10 (37.0)	
Father's level of education (n = 66)‡						
≤ 12 grade	26 (76.5)	21 (65.6)	0.33	33 (76.7)	14 (60.9)	0.16
>12 grade	8 (23.5)	11 (34.4)		10 (23.3)	9 (39.1)	
Mother's employment status (n = 66)§						
Employed	18 (66.7)	29 (74.4)	0.49	30 (73.2)	17 (68.0)	0.65
Unemployed	9 (33.3)	10 (25.6)		11 (26.8)	8 (32.0)	
Father's employment status (n = 72)**						
Employed	24 (72.7)	33 (84.6)	0.21	37 (80.4)	20 (76.9)	0.73
Unemployed	9 (27.3)	6 (15.4)		9 (19.6)	6 (23.1)	
Family Participates in the Nutrition Assistance Program (n = 72)††						
Yes	16 (57.1)	26 (59.1)	0.87	28 (62.2)	14 (51.9)	0.39
No	12 (42.9)	18 (40.9)		17 (37.8)	13 (48.1)	

*Pearson's chi-squared test was used for HEI category and weight status; †Missing 44 because it was unknown; ‡Missing 48 because it was unknown; §missing 48 because it was unknown; **Missing 42 because it was unknown; ††Missing 38 because it was unknown.

Table 3. Distribution of perceived parental behavior in the home related to eating habits, lifestyle characteristics of children, and parenting style (by diet quality and weight status)

Variable	Diet needs improvement n (%)	Poor diet n (%)	P value*	Healthy weight n (%)	Overweight/Obese n (%)	P value*
Parents' jobs impede food preparation (n = 112)†						
Never/rarely	34 (69.4)	46 (73.0)	0.67	50 (69.4)	30 (75.0)	0.53
Always/frequent	15 (30.6)	17 (27.0)		22 (30.6)	10 (25.0)	
Parents' jobs impede family meals (n = 111)‡						
Never/rarely	36 (73.5)	41 (66.1)	0.40	49 (68.1)	28 (71.8)	0.68
Always/frequent	13 (26.5)	21 (33.9)		23 (31.9)	11 (28.2)	
Parenting feeding style** (n = 89)§						
Authoritative	29 (74.4)	31 (62.0)	0.50	37 (66.1)	23 (69.7)	0.65
Permissive	7 (17.9)	13 (26.0)		12 (21.4)	8 (24.2)	
Authoritarian	3 (7.7)	6 (12.0)		7 (12.5)	2 (6.1)	
Parents encourage eating healthy food (n = 101)***						
Disagree	7 (15.6)	10 (17.9)	0.75	12 (19.4)	5 (12.8)	0.39
Agree	38 (84.4)	46 (82.1)		50 (80.6)	34 (87.2)	
Parents encourage children to be active (n = 103)††						
Disagree	7 (13.7)	10 (19.2)	0.42	13 (20.0)	4 (10.5)	0.28
Agree	44 (86.3)	42 (80.8)		52 (80.0)	34 (89.5)	
Parents encourage weight control (n = 97)‡‡						
Disagree	10 (21.7)	15 (29.4)	0.38	18 (29.0)	7 (20.0)	0.33
Agree	36 (78.3)	36 (70.6)		44 (71.0)	28 (80.0)	

*Pearson's chi-squared test was used for HEI category and weight status; **Fisher's exact test was used for weight status and HEI category; †Missing 2 because it was unknown; ‡Missing 3 because it was unknown; §Missing 25 because participants did not how to answer this; ***Response from 10 participants were not included because they responded "nor agree nor disagree" and missing 3 because it was unknown; ††Response from 8 participants were not included because they responded "nor agree nor disagree" and missing 3 because it was unknown. ‡‡Response from 15 participants were not included because they responded "nor agree nor disagree" and missing 2 because it was unknown.

obese children reported the same ($p = 0.05$); this pattern was similar in terms of DQ. More girls than boys (78.5% vs. 55.3%; $p < 0.01$) reported that meals were frequently eaten in a family context (data not shown). In addition, most of the children in the sample group reported that they watched television while eating dinner (69.4%), a pattern that was similar for DQ and weight status. With regard to the importance of family meals, most of the participating children agreed that such meals were important, which was similar broken down by DQ and weight status; however, more girls than boys (85.2% vs. 69.0%; $p = 0.05$) agreed that family meals were important (data not shown). Most of the participating children reported that family meals were not affected by activities, such as sports practices (63.7%), a finding that was similar for DQ and weight status.

With respect to peer and teacher encouragement to consume healthy foods, these numbers were slightly higher in children with diets that needed improvement than they were for the children with poor diets, though inconsistent results were found for weight status; however, these results were not statistically significant (Table 5). In terms of peer and teacher encouragement to be active, the perception of such encouragement was slightly higher in healthy weight children than it was in overweight/obese children, but it was not significant (Table 5).

Table 4. Distribution of family meal habits by diet quality and weight status

Family meal habits	Diet needs improvement n (%)	Poor diet n (%)	P value*	Healthy weight n (%)	Overweight/Obese n (%)	P value*
Family meals (n = 112)†						
Never/rarely	15 (30.0)	20 (32.3)	0.79	18 (25.0)	17 (42.5)	0.05
Always/frequent	35 (70.0)	42 (67.7)		54 (75.0)	23 (57.5)	
TV during meals (n = 111)‡						
Never/rarely	18 (36.0)	16 (26.2)	0.26	23 (31.5)	11 (28.9)	0.78
Always/frequent	32 (64.0)	45 (73.8)		50 (68.5)	27 (71.1)	
Family meals are important (n = 96)§						
Disagree	10 (21.7)	11 (22.0)	0.97	13 (21.3)	8 (22.9)	0.86
Agree	36 (78.3)	39 (78.0)		48 (78.7)	27 (77.1)	
Activities prevent family meals (n = 102)**						
Disagree	32 (68.1)	33 (60.0)	0.39	40 (61.5)	25 (67.6)	0.54
Agree	15 (31.9)	22 (40.0)		25 (38.5)	12 (32.4)	

*Pearson's chi-squared test was used for HEI category and weight status. †Missing 2 because it was unknown; ‡Missing 3 because it was unknown; §Response from 15 participants were not included because they responded "nor agree nor disagree" and missing 3 because it was unknown; **Response from 9 participants were not included because they responded "nor agree nor disagree" and missing 2 because it was unknown.

With respect to PA, results have been previously reported (22) showing no association between PA and BMI categories.

Discussion

The present study showed that most students had poor DQ. The lowest HEI component scores were found for whole fruit, whole grains, total vegetables, seafood and plant proteins, and fatty acids, while the highest scores were found for total proteins, sodium, and empty calories. Poor DQ has been associated with higher BMI in children (12,30,34); however, this association was not seen in the present study. Diet is only one of the multiple

Table 5. Distribution of school social environment by diet quality and weight status

School social environment	Diet needs improvement n (%)	Poor diet n (%)	P value*	Healthy weight n (%)	Overweight/Obese n (%)	P value*
Peers encourage consumption of healthy foods (n = 95)†						
Disagree	17 (37.8)	22 (44.0)	0.53	28 (45.9)	11 (32.4)	0.20
Agree	28 (62.2)	28 (56.0)		33 (54.1)	23 (67.6)	
Peers encourage being active (n = 107)‡						
Disagree	10 (21.7)	11 (18.0)	0.63	11 (15.9)	10 (26.3)	0.19
Agree	36 (78.3)	50 (82.0)		58 (84.1)	28 (73.7)	
Teachers encourage consumption of healthy foods (n = 98)§						
Disagree	11 (26.8)	23 (40.4)	0.16	21 (32.3)	13 (39.4)	0.48
Agree	30 (73.2)	34 (59.6)		44 (67.7)	20 (60.6)	
Teachers encourage being active (n = 103)**						
Disagree	10 (21.7)	17 (29.8)	0.35	17 (25.8)	10 (27.0)	0.88
Agree	36 (78.3)	40 (70.2)		49 (74.2)	27 (73.0)	

*Pearson's chi-squared test was used for HEI category and weight status. †Response from 17 participants were not included because they responded "nor agree nor disagree" and missing 2 because it was unknown; ‡Response from 4 participants were not included because they responded "nor agree nor disagree" and missing 3 because it was unknown; §Response from 13 participants were not included because they responded "nor agree nor disagree" and missing 3 because it was unknown; **Response from 7 participants were not included because they responded "nor agree nor disagree" and missing 4 because it was unknown.

factors that lead to overweight/obesity. Dietary patterns change over time, and overweight/obese participants in this study may have had different diets (which led to fat accumulation) in the previous years. Moreover, the HEI is not specific to obesity (29,35), as it assesses compliance to dietary guidelines (29).

Parental socio-demographic characteristics were not associated with DQ or weight status. This is contrary to other self-reports in children (6,18,30,31). Children from families with low socioeconomic status and whose parents' attain relatively low levels of education tend to eat more snacks, consume fewer fruits and vegetables, and skip breakfast, resulting in increases in obesity, poor diet, and sedentarism (32,33). The lack of association between these variables in the present study could be related to the large proportion of children who did not know the answers to the questions in this section.

Parents can influence a child's weight and DQ through specific behaviors. Working parents who do not have time to prepare meals or time available for family meals tend to consume foods that are ready to eat. The types of foods that parents provide children tend to be determined according to the time available to those parents for food preparation (18). However, in the present study, most of the children did not perceive this. Furthermore, parenting feeding style may influence the development of eating and activity behaviors by controlling the foods available at home (36). The parenting feeding style with the strongest influence on DQ and weight is the authoritative, as parents who use this style tend to encourage their children to eat healthy foods and usually provide several eating options (18,36). According to our study, most of the participating children perceived their parents' feeding style as being authoritative, and most perceived that their parents encouraged them to eat healthy, perform PA, and control their body weight. However, these perceptions were not significantly associated with DQ or weight.

Excessive caloric intake and sedentary behavior are also related to overweight in children (37). The amount of time spent in front of the TV or computer is directly related to a child's weight (18,32) and to poor DQ and sedentarism (38). Although the results of our study showed that most children watched TV while eating meals and that they did not meet the recommended guidelines for PA and sedentary-type behavior, these findings were not significantly associated with DQ or weight status. Lower participation in PA may be related to neighborhood safety, less accessibility to recreational areas, and/or lack of physical education classes, factors that should be explored in future studies.

Through family meals, parents provide healthy foods, control and limit the intake of high-caloric foods, and develop healthy eating habits that persist even if the child is not eating with the family. Eating together in this way also provides an opportunity to strengthen family ties (39). Our findings demonstrated that healthy weight children had a marginally greater number of family meals than did those who were overweight/obese.

However, this was not associated with DQ. A longitudinal study in Minnesota found that adolescents who had regular family meals had healthier diets, consumed food with higher nutritional value, and usually had a greater frequency of breakfast consumption and family meals than did their counterparts who did not eat family meals on a regular basis (40). Although most children reported that family meals were important, this perception was not associated with DQ or weight status.

The school SE is also an important determinant of weight status, DQ, and PA (33). A US cross-sectional study of children at 16 middle schools in the Minneapolis–St. Paul metropolitan area found that the unhealthy food practices in place at these schools were adversely associated with weight status (41). Although in the present study we did not find such associations, most participants reported having teachers who encouraged them to eat healthy foods (65.3%) and to perform PA (73.8%). Another important determinant is a child's peers. Consuming foods similar to those consumed by the child's friends and spending time with their peers is an important part of socialization (16,18). In the present study, most perceived that their peers encouraged them to consume healthy foods (58.9%) and to perform PA (80.4%). The lack of associations between these variables may be related to a given child's perception of healthy foods or behaviors, which may be different from the perceptions of health professionals.

This is the first study to explore the association of social environment factors with DQ and weight status in Puerto Rico. Some of the limitations of the study includes that a self-reported questionnaire was used, and some participants did not know the answers to some questions pertaining to their parents' socio-demographic information. However, it has been shown that children as young as 5 years old can reliably answer health-related quality-of-life questions (42), and most studies in this area have used self-reported questionnaires for children (30,32-34). The use of a convenience sample of children and the small sample size achieved limit the generalizability of the results of this study. These issues should be addressed in future studies. A single 24-hour dietary recall does not reflect usual intake; multiple days are recommended (43); however, the interview was done by nutritionists, using food models to help estimate portion sizes, which reduced error. Finally, the Team COOL survey should be validated in Puerto Ricans. Some of the strengths of the study were that the anthropometric measurements were taken using standardized and validated procedures, its use of validated questionnaires to collect SE, and its use of the updated HEI for DQ. In addition, the response rate was similar to the response rates of other pediatric studies in PR (6).

In conclusion, more than half of the participants had poor DQ and were not meeting the recommended guidelines for PA. Healthy weight children had significantly more frequent family meals than overweight/obese children did. This suggests

that there is a need to involve parents, the community, and the school in developing, implementing, and sustaining classes and programs for promoting healthy eating and PA in children.

Resumen

Objetivo: Explorar la asociación entre los factores del ambiente social (AS) y la calidad de la dieta (CD) con el peso en un grupo de niños en PR. **Método:** Se realizó un estudio transversal en una muestra de 114 niños de 12 años matriculados en cuatro escuelas públicas del área metropolitana de San Juan, Puerto Rico (PR), durante el año escolar 2012-2013. Los estudiantes completaron un cuestionario auto-administrado sobre características socio-demográficas y AS, que incluía preguntas sobre los patrones de comidas familiares, estilo de crianza de los padres, apoyo de los padres, los compañeros y la escuela para una alimentación saludable y actividad física y frecuencia de actividad física y sedentarismo. Los participantes también completaron un registro de 24 horas; la calidad de la dieta fue evaluada con el Índice de Alimentación Saludable (HEI, por sus siglas en inglés)-2010, un instrumento que evalúa el cumplimiento de las Guías Alimentarias para los Estadounidenses. Se calculó el índice de masa corporal y se categorizó como peso saludable, sobrepeso u obeso. **Resultados:** 36% de los participantes tenía sobrepeso/obesidad. En términos de CD, el 55% de los niños tenían una CD pobre, 45% dietas que necesitan mejorar y ninguno tenía una CD buena. Los niños con peso saludable (75.0%) reportaron mayor frecuencia de cenar en familia en comparación con los niños con sobrepeso/obesidad (57.5%, $p = 0.05$). No se encontraron otras asociaciones significativas entre los factores de AS con la CD y el peso corporal. **Conclusiones:** La mayoría de los estudiantes tenían peso normal pero una pobre CD. El peso normal se asoció positivamente con cenar en familia frecuentemente.

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