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Perceptions of Obesity Prevention Policies: Socioeconomic Assessment in the Turkish Capital

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ABSTRACT

Purpose: The purpose of this study was to inform public policy opportunities to reduce childhood obesity by identifying parents' perceptions of factors contributing to childhood obesity, attribution of responsibility, and the extent of their support for public prevention policies with attention to socio-economic status.
Design and Methods: In 2015, 2066 parent-child dyads across socio-economic strata from 43 randomly selected schools in Ankara completed surveys and measurements to examine perceptions, attribution, and prevention policies related to childhood obesity.
Results: Parents across the socio-demographic spectrum recognized obesity as a serious problem. Unhealthy food availability was identified as the leading cause of while industry and media were credited with having the greatest responsibility for childhood obesity. There was strong public support for policy strategies targeting schools, marketing, and the built environment, though support tempered as socio-economic status and parental education decreased.
Conclusions: This survey provided insight into parents' knowledge and beliefs surrounding childhood obesity as well as their endorsement of related prevention strategies. Educational messages that address variations in SES to describe the causes of childhood obesity and connect those causes to actionable community prevention strategies may improve community support for enhanced policy actions within and beyond school settings.

Introduction

Changes in food production, marketing, personal income, and activity levels have contributed to an upsurge in obesity rates across the globe (Ng et al., 2014). In high income countries, obesity has been concentrated among people in lower socio-economic brackets (Wang & Beydoun, 2007). The opposite has been true in low and middle income countries where the wealthiest strata have represented the highest weight categories until economic conditions improve whereupon obesity rates among those of lower SES begin to climb (Sassi, Devaux, Cecchini, & Rusticelli, 2009). Childhood obesity rates have generally followed adult trends (Wang, Monteiro, & Popkin, 2002).

Childhood obesity is associated with metabolic risk factors, asthma, dental, and behavioral health issues (Pulgarón, 2013). In Europe, obesity-related health care costs for children are estimated to account for 2% to 8% of total healthcare expenditures (Withrow & Alter, 2011). Given the robust correspondence between the onset of childhood obesity and its continuation into adulthood, the global increase in childhood obesity holds considerable implications for disease prevalence and health care costs (Guo, Wu, Chumlea, & Roche, 2002; Manios & Costarelli, 2011). The anticipated medical treatment demand and associated costs are especially problematic for developing economies, which

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may be least able to accommodate the added burden (Abegunde, Mathers, Adam, Ortegon, & Strong, 2007). As such, population-focused prevention strategies are needed (Gortmaker et al., 2011).

There are a number of child-focused prevention strategies that governments have adopted to control childhood obesity rates (Gortmaker et al., 2011). These interventions rely on political champions, dedicated resources, and public support (Gortmaker et al., 2011). For policy strategies to be successful, it is important to understand the public's perception of causal attribution for obesity and their inclination to support various policy interventions (Puricelli Perin, Frerichs, Costa, Ramirez, & Huang, 2014). Once identified, communication strategies can be developed to increase public support for population interventions (Gortmaker et al., 2011).

Adult obesity rates in Turkey are already higher than much of Europe and they continue to climb (Doak, Wijnhoven, Schokker, Visscher, & Seidell, 2012; Ministry of Health, 2013). A recent national study found that rates of overweight and obesity in men were 38.5% and 16.2%, respectively, compared to 29.4% and 31.2% for women (Ministry of Health, 2013). Importantly, although there is some variation by region, Turkish obesity rates are projected to increase to 38% for men and 50.3% for women by 2025 (World Health Organization, 2013). Even as Turkish childhood obesity rates remain lower than other parts of Europe (World Health Organization, 2013), between 20% and 25% Turkish children aged 10–19 years are overweight or obese (Cizmecioglu, Etiler, Hamzaoglu, & Hatun, 2009).

In response, the Turkish Ministry of Health updated the "Action Plan of Obesity Control Program" for years 2013–2017 (Ministry of Health, 2017). The plan supports the implementation of financial and environmental strategies, dedicated research, school and workplace programs, and engagement with the food and media industries. The national plan recommended that school staff and health care providers be informed about the importance of obesity control policies and it identified strategies that could be deployed in schools and other community settings. Recommended strategies included expansion of school canteen regulations (bans to sell sugary and soda beverages, caloric limitations, etc.) and ongoing physical activity assessments of students. The plan also recommended inter-sectoral collaborations between education and health service providers, and suggested that school administrators collaborate with their provincial health directorate (Ministry of Health, 2017). More recently, legal restrictions on the types and content of television food and beverage advertisements initiated in 2011 have been expanded ("By Law on The Procedures and Principles of Media Services," 2011; "Regulations on principles and procedures of Broadcast Service," 2018).

Prior research has explored childhood obesity in Turkey in the context of parents' socio-economic status (SES) and body mass index (BMI), but has not examined attitudes towards obesity causes, responsibility, and policies (Özcebe & Bağci-Bosi, 2014). This study sought to identify policy opportunities by identifying parents' perceptions of childhood obesity, attribution of both cause and responsibility, and extent of support for prevention policies. In addition, attitudinal variations by SES, parental education, parental and child body obesity status were explored.

Methods

Study Design and Sample Selection

A population-representative sample of 3003 parent-child dyads from 46 randomly selected schools in Ankara completed surveys and anthropometric measurements (children) in May–June 2015 (Steenson et al., 2018). To ensure economic representation, Ankara's 25 central metropolitan counties were ranked to form a three-tiered socio-economic-status spectrum (Yüceşahin and Tuysuz, 2011). The metropolis of Ankara consists of 25 counties; 8 of which are located in the city of Ankara, the others are distributed throughout in Ankara Province. Counties were ranked according to their socioeconomic status by the: number of primary school students per teacher, number of primary school students per classroom, average consumption of natural gas per household (m3), percentage of poor households (%), and unit price of new apartment (20). These rankings were combined with Yüceşahin and Tuysuz's classification of the 338 wards in Ankara city to form six social structures which were further distilled to create a tripartite socio-economic spectrum of metropolitan counties in Ankara (Yüceşahin & Tuysuz, 2011). The sample population is representative of Ankara families with children aged 9–11 years across the three SES levels.

There are 780 state schools nested within Ankara's 25 counties, 570 of the schools are located in the 8 urban counties. Public schools of Çankaya and Yenimahalle counties, both at the top of the ranked list, formed the middle SES, and public schools from Altındağ, Mamak, and Sincan counties formed the lower SES stratum sampling frames. Fifteen schools were selected from each of higher, middle and lower SES strata by using probability proportional to size (PPS) methodology (Yates & Grundy, 1953). Also, two replacement schools were identified for each sampled school for a potential case of refusal. To the extent possible, 80–100 students from each school were recruited into the study via the random selection of 2–5 classrooms with attention to the student density of class rooms within each school. All classes were included in some schools if the number of Grade 4 students fell below 80. As the selection probabilities were known, sample weights were created and applied to each participant.

Children attend public and private schools. Public school children attend schools in the neighborhood where they live. As there is no neighborhood restriction for private school attendance, all private schools ($n = 110$) formed the sampling frame for the high SES stratum. As school and grade size allowed, 80–100 *Grade 4* students (ages 9–11 years) from each participating school were recruited via the random selection of 2 to 5 classrooms. Teachers sent home surveys for parents to complete. Parent and child dyads were matched using unique identifiers. A full description of the methods appears in Yardim et al. (2017).

Data Collection and Measurements

Children's anthropometric measurements were collected by trained research staff. The research team used SECA 813 weight scales and portable SECA 213 height boards to collect weight and height per WHO recommendations (World Health Organization, 2008). The instruments and scales are appropriate for early adolescence which corresponds closely to Grade 4. BMI was calculated as weight (kg) divided by height squared (m^2). Children's overweight and obesity status was estimated using WHO cutoff points (de Onis et al., 2007). Parents reported their own height and weight.

Parental beliefs, perceptions, and obesity attribution, as well as well as questions about prevention oriented policy interventions were adapted for Turkey from other studies (Gollust, Barry, & Niederdeppe, 2014; Puricelli Perin et al., 2014). Additional policy questions were added based on their emergence in the scientific literature (Gortmaker et al., 2011). All policy related survey questions were constructed using 5-point Likert-agreement scales and pilot tested at Hacettepe University.

Analysis

After the removal of parental questionnaires with >90% missing data, a weighted sample of 2066 parent-child dyads from 43 schools was used. A sensitivity analysis indicated that the reduced sample was not affected by selection bias. Variables and scales were assessed for missing values, outliers, and tested for normality using visual assessments and the Kolmogorov-Smirnov test (Lilliefors, 1967). Likert-scale values of parents' perceptions about obesity and relevant policies were treated as continuous variables. Means of Likert-scale variables

were compared using ANOVA followed by Tukey's Honest Significant Difference (HSD) test to assess group-wise comparisons (Abdi & Williams, 2010).

Although raw data analyses are presented here, multiple imputation was conducted to address missing data. For independent variables, missing data were imputed based on other correlated variables but without the dependent variable of interest. The aforementioned statistical tests were repeated using imputed data. Results from imputed and raw data analyses were nearly identical (not shown here). Statistical software R 3.2.4 for Mac was used for both ANOVA and Tukey's test, while PROC MI in SAS 9.4 was used for multiple imputation (R Core Team, 2013).This study was approved by the Ankara Provincial Directorate of National Education and the Non-interventional Clinical Researches Ethics Board of Hacettepe University.

Results

Demographic Characteristics

As seen in Table 1, adult respondents included mothers (62%), fathers (23%), and "others" (15%), comprised mostly of grandparents and other relatives. Forty-nine percent of the sample belonged to low, 38% belonged to middle, and 13% belonged to high SES. Female children comprised 54% of the sample. Forty-nine percent of mothers and 27% of fathers were either under or at normal weight; 36% of mothers and 53% of fathers were overweight; 15% of mothers compared to 20% of fathers were obese. Forty-nine percent of mothers and 37% of fathers had less than a high school education, 27% of mothers and 30% of fathers had a high school degree, and 24% mothers and 33% of fathers had at least some college. Thirty-four percent of mothers compared to 95% of fathers were employed.

Beliefs About the Nature of Childhood Obesity

As seen in Table 2, most households indicated that obesity was a "big problem" ($\bar{x} = 4.27$, CI = 4.23–4.32) (Table 2). Those in schools from the highest SES ($\bar{x} = 4.42$, $p < .01$), under/normal weight mothers ($\bar{x} = 4.37$, $p < .05$), mothers and fathers with the highest education levels showed significantly stronger endorsement for the statement that obesity is a "big problem" for the well-being of children. With an overall response of 3.99 (CI = 3.94–4.03), parents with obese children, those of high SES, obese fathers, as well as mothers and fathers with the highest education were significantly more inclined to agree that childhood obesity was occurring with greater frequency. Similarly, with a mean of 3.66 (CI = 3.61–3.71), household respondents with overweight children ($\bar{x} = 3.78$, $p < .05$), mothers having a high school education ($\bar{x} = 3.77$, $p < .05$), and fathers with at least some college ($\bar{x} = 3.77$, $p < .01$), held the strongest belief that childhood obesity was a leading cause of peer alienation. Furthermore, with a mean score of 3.39 (CI = 3.33–3.44), parents of overweight (not obese) children ($\bar{x} = 3.54$, $p < .01$) were most persuaded that it was easier to eliminate obesity among children than adults. On average, participants were less sure ($\bar{x} = 2.9$, CI = 2.85–2.94) that obese children would become obese adults.

Table 1
Demographic characteristics among COSA study subjects.

Characteristics N = 2066		Study subjects N (%)
Age of child (N = 2066)	10.06 (9.53–10.54, 95% CI)	1952 (100%)
Gender (N = 1924)	Male	888 (46%)
	Female	1036 (54%)
Adult family respondents (N = 2066)	Mother	1273 (62%)
	Father	483 (23%)
	Other	310 (15%)
School SES (N = 1924)	Low	935 (49%)
	Medium	726 (38%)
	High	263 (13%)
Mother obesity (N = 1720)	Under/normal	845 (49%)
	Overweight	612 (36%)
	Obese	263 (15%)
Father obesity (N = 1740)	Under/normal	478 (27%)
	Overweight	918 (53%)
	Obese	344 (20%)
Mother education (N = 1853)	Less than high school	911 (49%)
	High school graduate	499 (27%)
	College & above	443 (24%)
Father education (N = 1835)	Less than high school	679 (37%)
	High school graduate	544 (30%)
	College & above	612 (33%)
Mother employment (N = 1616)	Paid job	549 (34%)
	Non-employed	1067 (66%)
Father employment (N = 1772)	Paid job	1691 (95%)
	Non-employed	81 (5%)

Attribution of Responsibility for Childhood Obesity

As displayed in Table 3, the greatest attribution of responsibility for obesity was accorded to the food and beverage industry ($\bar{x} = 4.27$, CI = 4.23–4.32), followed by media advertisements ($\bar{x} = 4.03$, CI = 3.98–4.08), parents ($\bar{x} = 3.61$, CI = 3.56–3.66), schools ($\bar{x} = 3.31$, CI = 3.25–3.36), and young people themselves ($\bar{x} = 3.23$, CI = 3.18–3.28). Parents downplayed the role of healthcare/physicians ($\bar{x} = 3.09$, CI = 3.03–3.15) and government ($\bar{x} = 2.92$, CI = 2.86–2.98) to reduce childhood obesity. The role of the food and beverage industry was ranked highest by those associated with high SES schools (4.56, $p < .001$), under/normal weight mothers (4.39, $p < .001$), overweight fathers (4.35, $p \leq .001$), as well as mothers and fathers with at least some college (4.61, $p < .001$). Similarly, there was a general trend among higher SES school respondents to attribute greater responsibility to the role of (in rank order) media advertising, parents themselves, schools, youth, and government ($p < .05$). The strong positive association between parental education and obesity attribution mirrored the SES of the school such that parental education gradients tended to correspond with school SES.

Attribution of Causes of Childhood Obesity

As seen in Table 4, most participants agreed ($\bar{x} = 4.24$, CI = 4.2–4.29) that unhealthy foods were too available. At the same time, respondents supported the belief that most people are not eager to maintain a regular diet or exercise regimen ($\bar{x} = 3.89$, CI = 3.85–3.93). Participants were least likely to suggest that obesity is inherited ($\bar{x} = 2.68$, CI = 2.63–2.73), or that people were overweight because they were born overweight ($\bar{x} = 2.22$, CI = 2.18–2.27). Higher SES schools and parents with more education, along with parents of overweight and obese children, were more inclined to identify the food environment as the cause of childhood obesity ($p < .01$). Conversely, those in lower SES schools and less educated parents were more sure that childhood obesity was a result of high birth weight (i.e., that heavy children were born as such) ($p < .05$), though this overall ranking was not high. Compared to normal weight parents, households with overweight or obese mothers and fathers reported greater endorsement of an influential hereditary factor ($p < .05$). Households with normal weight mothers, compared to overweight or obese mothers, provided the strongest endorsement for the food environment and individuals' eating behaviors, while overweight or obese mothers were more likely to indicate that ineffective diets were to blame for childhood obesity.

Support for Policy Interventions

Prevention policies targeting schools, food marketing, nutritional labeling, and the built environment were endorsed highly (Table 5). The

Table 2
Beliefs about the nature of childhood obesity.[a]

Characteristics	Overall	Child obesity			School SES			Mother obesity			Father obesity			Mother Education			Father Education		
	Mean (95% CI)	Norm	OW	OB	Low	Med	High	Under/ Norm	OW	OB	Norm	OW	OB	LT HS	HS Grad	At least some college	LT HS	HS Grad	At least some college
Total n=	2066	1215	419	290	1006	779	281	900	657	285	514	977	374	988	521	476	747	573	650
1. Obesity is a big problem for children	4.27 (4.23 – 4.32)	4.24	4.38	4.33	**4.22^**	**4.31**	**4.42^**	**4.37^**	**4.27**	**4.18^**	4.25	4.33	4.28	**4.13****	**4.38****	**4.56****	**4.12****	**4.26****	**4.52****
2. Childhood obesity observed more often	3.99 (3.94 – 4.03)	**3.91***	**4.08**	**4.19**	**3.86****	**4.06****	**4.33****	4.04	4.0	3.93	**3.86***	**4.05**	**4.07**	**3.78****	**4.11****	**4.37****	**3.79****	**3.94****	**4.31****
3. Easier to eliminate childhood obesity than adult	3.39 (3.33 – 3.44))	**3.38**	**3.54***	**3.22**	3.41	3.38	3.29	3.33	3.44	3.47	3.37	3.38	3.42	3.37	3.45	3.35	3.38	3.39	3.41
4. Childhood obesity big reason for peer alienation	3.66 (3.61 – 3.71)	3.62^	3.78^	3.72	3.61	3.73	3.72	3.67	3.65	3.78	3.58	3.69	3.72	**3.6^**	**3.77^**	**3.72**	**3.57^**	**3.69**	**3.77^**
5. Most obese children will not become obese adults	2.9 (2.85 – 2.94)	2.88	2.92	2.98	**2.96^**	2.87	**2.73^**	2.89	2.84	2.93	2.87	2.87	2.93	**2.95**	**2.9**	**2.75***	**2.98****	**2.9****	**2.79****

[a]Numbers displayed in bold are significant. Bold only = ≤0.05; light shading ≤0.01, dark shading ≤0.001. Superscript symbols indicate pairwise comparisons within each stratified variable. Three sets of symbols are used to indicate the statistical significance level: * attached to just one value = that value is significantly different from the remaining two. ** attached to all three values = each value is significantly different from the other. The ^ symbol attached to two values = those two values are not significantly different from each other but are significantly different from the third. If the values appear in bold but there are no superscripts, the values differ from the overall mean but not one another.

favorability ranking for healthy food subsidies (4.48, CI = 4.44–4.52) received the highest mean score of all, followed by bike lane extensions (4.45, CI = 4.41–4.49), and banning carbonated beverages from schools (4.39, CI = 3.35–4.44). Tax recommendations, while positively perceived, ranked the lowest [e.g., taxing carbonated beverages (3.46, CI = 3.40–3.52) and junk food (3.39, CI = 3.33–3.45)]. All policies received significantly stronger scores from high SES schools than other SES categories. Although fathers' weight was not a distinguishing characteristic, mothers' weight (underweight/normal) was associated with support for policies endorsing food labels, bike lanes, and public transportation.

Discussion

The prevalence of overweight and obese children across Turkey appears to be increasing rapidly (Ministry of Health, 2017). Participants

Table 3
Attribution of responsibility for childhood obesity.[a]

Characteristics	Overall	Child obesity			School SES			Mother obesity			Father obesity			Mother Education			Father Education		
	Mean (95% CI)	Norm	OW	OB	Low	Med	High	Under/ Norm	OW	OB	Norm	OW	OB	LT HS	HS Grad	At least some college	LT HS	HS Grad	At least some college
Total n=	2066	1215	419	290	1006	779	281	900	657	285	514	977	374	988	521	476	747	573	650
1. Caregiver/ Parent	3.61 (3.56 – 3.66)	3.59	3.65	3.61	**3.48****	**3.66****	**4.02****	**3.74****	**3.59**	**3.49**	3.61	3.67	3.58	**3.32****	**3.72****	**4.12****	**3.34****	**3.57****	**4.01****
2. Children/ Youth	3.23 (3.18 – 3.28)	3.22	3.23	3.17	**3.13****	**3.26****	**3.53****	3.25	3.28	3.16	3.19	3.26	3.16	**3.12***	**3.29**	**3.43**	**3.19**	**3.16**	**3.38***
3. Physicians/ Health personnel	3.09 (3.03 – 3.15)	3.1	3.03	3.06	3.12	3.09	3	3.06 (	3.1	3.21	3.04	3.08)	3.07	**3.21***	**2.96**	**3.02**	**3.28***	**3.05)**	**2.95**
4. Food & Beverage Industry	4.27 (4.22 – 4.31)	4.24	4.29	4.33	**4.13****	**4.36****	**4.56****	**4.39***	**4.23**	**4.15**	**4.15^**	**4.35^**	**4.28**	**4.04****	**4.42****	**4.61****	**4**	**4.28**	**4.61***
5. Schools	3.31 (3.25 – 3.36)	3.26	3.31	3.39	**3.2**	**3.33**	**3.66***	3.37	3.23	3.38	3.2	3.36	3.31	**3.13***	**3.41**	**3.57**	**3.21**	**3.28**	**3.49***
6. Government	2.92 (2.86 – 2.98)	2.92	2.89	2.91	**2.81**	**2.94**	**3.32***	3.02	2.9	2.83	**2.79^**	**3.01^**	**2.91**	**2.69****	**2.97****	**3.37****	**2.70****	**2.91****	**3.23****
7. Television & Internet Advertisements	4.03 (3.98 – 4.08)	4.	4.04	4.16	**3.84****	**4.13****	**4.4****	4.41	3.99	4.04	**3.89***	**4.11**	**4.11**	**3.7****	**4.26****	**4.44****	**3.68****	**4.07****	**4.40****

[a]Numbers displayed in bold are significant. Bold only = ≤0.05; light shading ≤0.01, dark shading ≤0.001. Superscript symbols indicate pairwise comparisons within each stratified variable. Three sets of symbols are used to indicate the statistical significance level: * attached to just one value = that value is significantly different from the remaining two. ** attached to all three values = each value is significantly different from the other. The ^ symbol attached to two values = those two values are not significantly different from each other but are significantly different from the third. If the values appear in bold but there are no superscripts, the values differ from the overall mean but not one another.

Table 4
Attribution of causes of childhood obesity.[a]

Characteristics	Overall	Child obesity			School SES			Mother obesity			Father obesity			Mother Education			Father Education		
	Mean (95% CI)	Norm	OW	OB	Low	Med	High	Under/ Norm	OW	OB	Norm	OW	OB	LT HS	HS Grad	At least some college	LT HS	HS Grad	At least some college
Total n=	2066	1215	419	290	1006	779	281	900	657	285	514	977	374	988	521	476	747	573	650
1. Too many unhealthy foods in stores/ restaurants	4.24 (4.2 – 4.29)	**4.17***	**4.32**	**4.39**	**4.12****	**4.32****	**4.56****	**4.35***	**4.2**	**4.19**	4.19	4.29	4.3	**4.06****	**4.37****	**4.56****	**4.07****	**4.21****	**4.54****
2. Obesity inherited from parents	2.68 (2.63 – 2.73)	2.66	2.68	2.69	**2.58****	**2.75****	**2.94****	**2.69**	**2.56^**	**2.83^**	**2.68**	**2.62^**	**2.79^**	**2.58***	**2.77**	**2.81**	**2.52***	**2.73**	**2.83**
3. Many diets not effective	3.14 (3.09 – 3.18)	3.14	3.13	3.13	**3.21***	**3.06**	**3.05**	**3.14**	**3.06^**	**3.25^**	3.14	3.12	3.13	**3.19**	**3.19**	**2.93****	**3.2**	**3.17**	**3.02***
4. Many people not eager to have a regular diet or exercise	3.89 (3.85 – 3.93)	3.85	3.96	3.89	**3.84^**	**3.91**	**4.05^**	3.95	3.86	3.95	3.83)	3.9	3.97	**3.79***	**4.03**	**4**	**3.82^**	**3.9**	**4.01^**
5. Many overweight people eat whatever they want	3.19 (3.14 – 3.24)	3.19	3.23	3.11	3.18	3.2	3.22	**3.27^**	**3.16**	**2.98^**	3.17	3.2	3.19	3.17	3.28	3.15	3.13	3.25	3.23
6. People are overweight because born overweight	2.22 (2.18 – 2.27)	2.23	2.25	2.16	**2.26^**	**2.22**	**2.08^**	2.18	2,26	2.21	2.18	2.18	2.29	**2.28^**	**2.19**	**2.11^**	**2.33***	**2.18**	**2.13**

[a]Numbers displayed in bold are significant. Bold only = ≤0.05; light shading ≤0.01, dark shading ≤0.001. Superscript symbols indicate pairwise comparisons within each stratified variable. Three sets of symbols are used to indicate the statistical significance level: * attached to just one value = that value is significantly different from the remaining two. ** attached to all three values = each value is significantly different from the other. The ^ symbol attached to two values = those two values are not significantly different from each other but are significantly different from the third. If the values appear in bold but there are no superscripts, the values differ from the overall mean but not one another.

perceived that the food and beverage industry, as well as television and internet advertisements, held the greatest responsibility for childhood obesity. Interestingly, the parental perceptions reflected in the 2015 survey appear to foreshadow forthcoming policy advances. In the spring of 2018, Turkey passed another set of media reforms that further restricted unhealthy food media advertising to children and created a color coding schema that bans some food advertisements and requires labeling for others ("Regulations on principles and procedures of Broadcast Service," 2018).

Although most adult respondents appeared to recognize childhood obesity as a "big problem," and were quick to endorse the role of schools in prevention, healthcare/physicians and government were not perceived as influential parties, suggesting that parents did not expect medical providers to influence children's diets or government to change the food environment. These responses may be partially explained by the strong role that schools have already played in Turkey's efforts to reduce childhood obesity (Ministry of Health of Turkey, 2012).

It is important to note that Turkey's Ministry of National Education does not employ nurses in governmental schools, although private schools often employ medical personnel. Nurses in these schools can deliver obesity control programs and provide health education and counselling to the families. While the literature suggests that nurses play an important role in implementing effective school-based obesity prevention interventions (Rabbitt & Coyne, 2012; Schroeder, Travers, & Smaldone, 2016), without school nurses, Turkish public schools will not likely adopt these strategies. However, the Turkish "Action Plan of Obesity Control Program" recommends cross disciplinary approaches to prevent childhood obesity (Ministry of Health of Turkey, 2012). Turkish officials might build upon the momentum created by the recent advertising controls to support a comprehensive school health approach, cross-sector interventions that target schools, other neighborhood settings, targeted home visiting programs for new mothers, and other evidence based interventions that call upon the skills of nurses and other professionals in low and middle income neighborhoods (de Silva-Sanigorski et al., 2010; Deschesnes, Martin, & Hill, 2003; Eisenmann et al., 2008; Sacher et al., 2010; Wen et al., 2007).

Parents attributed the strongest causes of childhood obesity to environmental factors such as the availability of unhealthy foods, and to a lesser extent, personal choices. This suggests that Turkish parents have recognized that obesity results from a complex interplay between the social environment and individual behavior (Mareno, 2014). Still, casual attribution differed by economic class. Unless targeted community strategies are undertaken within middle and lower income communities, such class differences may slow the adoption of comprehensive obesity prevention policies across Turkey.

Results from this study comport with earlier research that documented a high volume of food focused TV advertisements in Turkey, 81% of which focused on high calorie foods, most often scheduled when children were home from school (Guran et al., 2010). Furthermore, as with previous studies, policies that relied on taxing unhealthy products were viewed less favorably than non-tax interventions (Niebylski, Redburn, Duhaney, & Campbell, 2015). However, opinions about food-specific taxes remained slightly positive in this study, suggesting an opportunity to enhance public support through targeted information campaigns and other strategies (Avery, Bostock, & McCullough, 2015).

All policy interventions depend on some form of government leadership, and that leadership may depend upon political pressure from constituents (Puricelli Perin et al., 2014). As such, given that effective prevention approaches rely on multiple strategies targeting multiple settings (Gortmaker et al., 2011), most governments must be judicious in their undertakings so as not to expend political and financial capital unnecessarily. In order to reverse the obesity trend, Turkey will need to build upon existing efforts, accelerate its obesity control programing, and expand prevention policies (Ministry of Health, 2017). Findings from this study suggest that policy makers can anticipate strong and broad support for most prevention-oriented obesity policy interventions.

Table 5
Support for policy interventions.[a]

Characteristics	Overall	Child obesity			School SES			Mother obesity			Father obesity			Mother Education			Father Education		
	Mean (95% CI)	Norm	OW	OB	Low	Med	High	Under/ Norm	OW	OB	Norm	OW	OB	LT HS	HS Grad	At least some college	LT HS	HS Grad	At least some college
Total n=	2066	1215	419	290	1006	779	281	900	657	285	514	977	374	988	521	476	747	573	650
School Policies																			
Schools Mandatory Food Labeling	4.24 (4.19 – 4.28)	**4.17**	**4.35**	**4.27**	**4.13****	**4.32****	**4.48****	**4.33^**	**4.24**	**4.15^**	4.22	4.27	4.25	**4.07***	**4.35**	**4.50**	**4.02****	**4.29****	**4.49****
Ban carbonated drinks from schools	4.39 (4.35 – 4.44)	4.35	4.47	4.4	**4.33**	**4.42**	**4.59****	4.46	4.37	4.45	4.39	4.42	4.42	**4.25***	**4.53**	**4.59**	**4.25***	**4.42**	**4.58**
Ban vending machines from schools	4.33 (4.28 – 4.37)	**4.27^**	**4.46^**	**4.39**	**4.23****	**4.4****	**4.53****	**4.41^**	**4.28^**	**4.32**	4.28	4.36	4.36	**4.15***	**4.49**	**4.55**	**4.12***	**4.37**	**4.56**
Mandatory nutrition standards established for schools	4.32 (4.28 – 4.37)	**4.27^**	**4.42^**	**4.38**	**4.2****	**4.39****	**4.65****	**4.41^**	**4.28^**	**4.31**	4.31	4.34	4.35	**4.19***	**4.42**	**4.58**	**4.18***	**4.32**	**4.54**
Mandatory physical training course at school	4.37 (4.33 – 4.42)	**4.32^**	**4.46^**	**4.42**	**4.28****	**4.42****	**4.65****	**4.46**	**4.35**	**4.32**	4.35	4.40	4.42	**4.25***	**4.49**	**4.58**	**4.26****	**4.39****	**4.56****
Marketing & Labeling Policies																			
Ban all carbonated beverages & junk food ads targeting children	4.31 (4.26 – 4.35)	4.26	4.38	4.36	**4.24***	**4.36**	**4.47**	4.38	4.32	4.29	4.28	4.32	4.4	**4.19***	**4.45**	**4.51**	**4.15***	**4.38**	**4.48**
Regulate all carbonated beverages & junk food ads target children	4.30 (4.26 – 4.35)	**4.25**	**4.43**	4.36	**4.21****	**4.35****	**4.56****	**4.39^**	**4.28^**	**4.26**	4.28	4.36	4.3	**4.14***	**4.47**	**4.52**	**4.09***	**4.37**	**4.54**
Food labels on front of package	4.32 (4.28 – 4.36)	**4.26^**	**4.45^**	**4.37**	**4.24****	**4.36****	**4.54****	4.37	4.29	4.34	4.34	4.34	4.34	**4.2***	**4.45**	**4.47**	**4.22**	**4.32**	**4.47***
Built Environment Policies																			
Walking paths mandatory for new construction	4.29 (4.24 – 4.33)	**4.24**	**4.41**	**4.26**	**4.19v**	**4.34****	**4.58****	4.36	4.28	4.24	4.25	4.3	4.37	**4.13****	**4.39****	**4.58****	**4.07****	**4.31****	**4.57****
Extend public transportation	4.19 (4.14 – 4.24)	4.16	4.29	4.14–	**4.1***	**4.26**	**4.38**	**4.3^**	**4.1^**	**4.2**	4.17	4.22	4.21	**4.09***	**4.3**	**4.36**	**4.03***	**4.25**	**4.38**
Extend bike lanes	4.45 (4.41 – 4.49)	**4.39^**	**4.54^**	**4.52**	**4.34****	**4.53****	**4.69****	**4.55^**	**4.4^**	**4.42**	4.41	4.5	4.46	**4.29***	**4.64**	**4.67**	**4.25****	**4.48****	**4.69****
Fiscal Policies																			
Tax junk food	3.39 (3.33 – 3.45)	**3.33^**	**3.53^**	**3.4**	**3.25***	**3.51**	**3.64**	**3.49**	**3.34**	**3.30**	3.35	3.45	3.41	**3.25***	**3.53**	**3.61**	**3.22***	**3.42**	**3.61**
Tax carbonated drinks	3.46 (3.4 – 3.52)	**3.39^**	**3.63^**	**3.51**	**3.33***	**3.57**	**3.71**	**3.56**	**3.4**	**3.34**	3.42	3.51	3.5	**3.33***	**3.59**	**3.67**	**3.28***	**3.5**	**3.68**
Incentives to reduce price for fresh fruits and vegetables	4.48 (4.44 – 4.52)	**4.41^**	**4.61^**	**4.53**	**4.44**	**4.48**	**4.65***	**4.57^**	**4.42^**	**4.51**	4.44	4.55	4.43	**4.38***	**4.56**	**4.66**	**4.34****	**4.49****	**4.66****

[a]Numbers displayed in bold are significant. Bold only = ≤0.05; light shading ≤0.01, dark shading ≤0.001. Superscript symbols indicate pairwise comparisons within each stratified variable. Three sets of symbols are used to indicate the statistical significance level: * attached to just one value = that value is significantly different from the remaining two. ** attached to all three values = each value is significantly different from the other. The ^ symbol attached to two values = those two values are not significantly different from each other but are significantly different from the third. If the values appear in bold but there are no superscripts, the values differ from the overall mean but not one another.

The results from this study are noteworthy: 1) most parents agreed that obesity had emerged as a serious problem for Turkish children, 2) parents ranked the influence of parents and schools behind industry and media, and 3) parents strongly endorsed a variety of restrictions, regulations, and other environmental strategies to reduce childhood obesity. The widespread recognition of pre-eminent industry and media roles in addition to evidence-based physical environment interventions creates policy opportunities. As such, this study addressed a pressing need to identify Turkish parents' perceptions of obesity and the types of policy approaches that they are inclined to support.

Even as the study identified population-wide opportunities, there are some noteworthy economic differences. Respondents with higher levels of education tended to more strongly endorse environmental factors (too much unhealthy food) while downgrading personal behavioral factors (many diets not effective) compared to those with less education. Similarly, those with higher educational levels were more willing to endorse environmental policy interventions, including limits on media marketing, changes to food labels, restrictions on unhealthy foods in schools, etc. than those with less education. Indeed, across nearly all interventions, as household education levels increased, so did the support for policy strategies. Still, despite the perceived general cost savings and improved health outcomes attributed to many obesity prevention strategies, variations by SES may not automatically trigger support for specific policy interventions (Gortmaker et al., 2011). These results suggest that parents may hold cognitive and cultural antecedents that influence their perceptions of pediatric weight (Mareno, 2014). In turn, policy makers may want to consider expanding school-based policies while increasing educational campaigns and community engagement with working class neighborhoods to deepen support for more comprehensive policies (Rabbitt & Coyne, 2012).

Numerous prevention strategies have proven effective to counter rising obesity rates (Gortmaker et al., 2011). As a policy strategy, combining positively endorsed strategies, such as dedicating revenue from unhealthy food taxes to support healthy food subsidies, or using unhealthy food taxes to create parks or bike lanes, may increase public acceptability (Abegunde et al., 2007; Gortmaker et al., 2011). Public engagement about obesity risk factors and the framing of policy strategies will need to be carefully crafted to engender the greatest possible support.

This study did not ask respondents to rank obesity policy strategies relative to each other, or against other health initiatives (seat belt laws, tobacco control, etc.). The study was also limited because it did not assess price sensitivity to determine how likely respondents would be to support a strategy if it resulted in a specific tax increase (Powell, Chriqui, Khan, Wada, & Chaloupka, 2013). In addition, if the unhealthy food tax questions were reworded to assess policy support while describing the amount of harm averted, evidence suggests that participants would have responded even more favorably (Powell et al., 2013). Furthermore, there is considerable overlap between higher education parents, children in high income schools, and respondents who were normal weight (Yardim et al., 2017). Significant differences in obesity attribution and policy rankings must be interpreted in this context.

Turkey began advancing nutrition policies including school-based interventions and nutritional labeling on foodstuffs in advance of the first World Health Organization (WHO) European Ministerial Conference on Counteracting Obesity in 2006 (Ministry of Health, 2017). Yet, despite targeted policy interventions and improved access to health care services, obesity and related non-communicable disease rates continue to rise (Gortmaker et al., 2011). Unlike other OECD nations, Turkey has fewer non-governmental agencies to respond to health priorities and dedicates a lower percentage of its GDP to health, the combination of which may constrain its ability to support new interventions (Organization for Economic Cooperation and Development, 2016).

Conclusion

Parents of school-aged children in Ankara support obesity prevention policies including school-based interventions, more limitations on marketing to children, greater opportunities for physical activity, and restrictions on unhealthy foods. Additional research to assess parents' perception of the risk of childhood obesity against other public health threats, tipping points to establish residents' willingness to endure additional taxes to reduce childhood obesity, and whether parents' attitudes differ by region may be warranted. Lastly, findings from this international research partnership indicate a quickening of the epidemiological transition, and an urgency to support countries' ability to assess, harness, and maintain popular support to mount an effective policy response.

Conflict of interest

The authors declare no conflicts of interest.

CRedit Authorship Contribution Statement

Terry T-K Huang: Conceived of and co-director of the project; Critically reviewed and edited the paper. **Hilal H. Ozcebe:** Conceived of and co-director of the project; Critically reviewed and edited the paper. **Sarp Uner:** Assisted with sampling and design, data collection, data management and analysis; Critically reviewed and edited the paper. **Mahmut S. Yardim:** Assisted with sampling and design, data collection, data management and analysis; Critically reviewed and edited the paper. **Nazmi Bilir:** Assisted with sampling and design, data collection, data management and analysis; Critically reviewed and edited the paper. **Umut Arslan:** Assisted with sampling and design, data collection, data management and analysis; Critically reviewed and edited the paper. **Hande Konşuk Unlu:** Assisted with sampling and design, data collection, data management and analysis; Critically reviewed and edited the paper. **Ozgur M. Araz:** Assisted with study translation and design; Critically reviewed and edited the paper. **Sheng Li:** Primary data analyst for this paper. **Sean J. Haley:** Lead writer of the paper with significant writing contributions from Huang, Ozcebe and Araz; Critically reviewed and edited the paper.

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