

Does food advertising influence snacks consumption in Chilean children? Results from an experimental *ad libitum* study

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SUMMARY: The present study aimed at assessing the impact of food advertising on snack consumption in Chilean children using an experimental, *ad libitum*, design. Forty children were enrolled in urban, middle class, school setting. They underwent anthropometric assessment, brand awareness evaluation, and their lifestyle and habits were recorded through a validated questionnaire administered to their parents. A 5-arm design was adopted, consisting in the exposure to five different levels of TV spots and advertising. No significant differences were identified in caloric intake among children randomized to different levels of TV spots and commercials exposure. No significant effects on caloric intake, caloric intake per BMI, and or glycemic load were detected, even after adjustment for confounding factors. This study suggests the need for a better analysis of the contribution of non-traditional factors to obesity onset in children, which can provide high-quality evidence in order to develop effective public health strategies to face childhood obesity epidemic.

Key words: Children, food advertising, television, snack consumption, Chile.

RESUMEN. ¿Influye la publicidad de alimentos en el consumo de colaciones en los niños chilenos? **Resultados de un estudio experimental *ad libitum*.** El presente estudio tuvo como objetivo evaluar el impacto de la publicidad de alimentos en el consumo de colaciones en los niños chilenos mediante la utilización de un diseño experimental basado en la voluntad de los participantes (*ad libitum*). Se realizó la inscripción de cuarenta niños en el contexto de una escuela urbana de clase media. Se les realizó una evaluación antropométrica, un examen de reconocimiento de marca y se procedió a registrar información sobre su estilo de vida y hábitos mediante un cuestionario validado que fue entregado a los padres y firmado por los mismos. Se adoptó un diseño de 5 grupos, que consistía en evaluar la exposición a cinco niveles diferentes de publicidad y clips televisivos. No se identificaron diferencias significativas en cuanto a la ingesta calórica entre los niños asignados aleatoriamente a diferentes niveles de exposición a clips televisivos y a anuncios publicitarios. No se detectaron efectos significativos en tanto a la ingesta calórica, ingesta calórica por IMC, o la carga glucémica, incluso después de realizar el ajuste por factores de confusión. El presente estudio sugiere la necesidad de un mayor análisis respecto de la incidencia de factores no tradicionales en la aparición de la obesidad en los niños, que proporcione evidencia de alta calidad con el fin de desarrollar estrategias eficaces en materia de salud pública ante la epidemia de obesidad infantil.

Palabras clave: Niños, publicidad de alimentos, televisión, consumo de colaciones, Chile.

INTRODUCTION

Obesity prevalence in childhood has been rising worldwide (1, 2), both in developed and in newly industrialized countries.

Childhood obesity represents a severe public

health burden given its well-known association with metabolic and cardiovascular impairments. Understanding factors associated with obesity in children is crucial, in order to implement public health policies addressing obesity contributors,

reducing obesity (and its comorbidities) burden. Several predictors have been identified, and they are distinguished usually in modifiable and non-modifiable. Among non-modifiable ones, genetics play an important role in predicting obesity onset (3). Among modifiable predictors, different contributors have been identified, including: dietary patterns (4); behavioral factors (physical activity levels, sedentary behaviors (5), daily sleep hours (6)); perinatal characteristics (7) (mother's body mass index (BMI), birth weight, smoking during pregnancy, gestational diabetes); non-traditional risk factors (8) (food advertising, marketing of snacks with gadgets); and psychological ones (parents' perception of child body shape (9), stressful events, quality of family relationship).

Recently, researches on obesity predictors have concentrated especially on non-traditional factors. It has been suggested that TV viewing and exposure to unhealthy food and beverages advertising are associated with increased caloric intake, and, consequently, to increased obesity likelihood (10, 11). However, when looking at the association between marketing of snacks with gadgets (in order to capture children's attention) results are controversial. Experimental studies failed to identify a significant relationship between the exposure to food packaged with come-ons (e.g., toys) and increased caloric intake (12, 13), while observational ones seemed to suggest that the restriction in the use of gadgets for the promotion of energy-dense food results in healthier food choices (14).

Several governments worldwide have implemented interventions for obesity prevention by regulating advertisement aimed to children, and the marketing of food with come-ons, even if evidence from literature are controversial. Some examples of such regulations are represented by the Santa Clara County CA Ordinance (the first U.S. jurisdiction to prohibit the marketing of toys and other incentives with foods that do not meet

nutritional recommendations), and the recent Chilean law on food labelling and advertising. The recent Chilean regulation has prohibited the advertisement of food and beverages (high in sodium, total sugar, saturated fat, and energy) and the use of come-ons, such as toys, stickers etc., in the promotion of such products to children under the age of 14. The adoption of such measures is motivated by the concerning high prevalence of childhood obesity, especially in Chile, where a recent report of the Chilean Health Ministry has shown that about 30% of preschoolers are overweight/obese (15).

Considering such framework, characterized by the urgent need to deal with childhood obesity epidemic, but the lack of evidence available on non-traditional obesity predictors, the aim of this study is to assess the impact of food advertising on snack consumption in Chilean children using an experimental, *ad libitum*, design.

METHODS

The present experimental study was a spin-off of the OBEY-AD (OBESogeneity of gADgets marketed with snacks) study, aimed at assessing the contribution of non-traditional factors on obesity development in children.

Children aged 6-12 years were recruited from an urban, middle-class, school setting in the city of Santiago (Chile). Children suffering of allergies, cognitive disorders or metabolic diseases were excluded. Parents' informed consent was obtained prior to children participation to the study. Subjects' treatment was consistent with the guidelines of the American Psychological Association (APA) (16). Appropriate permissions were obtained by the Institutional Review Board. A detailed description of the study is given elsewhere (12).

Experimental design and procedure

The experimental study was 5-arm *ad libitum* eating design (study procedure is reported in Figure 1). Children were exposed to ten different

snacks (Table 1) that could be eaten ad libitum during the experimental session. The experimental factor was represented by the exposure to TV and advertising, organized in five levels: “no exposure to TV” (NoFilmNoSpot), “exposure to TV without advertising” (FilmNoSpot), “exposure to TV and one advertisement” (FilmLowSpot), “exposure to TV and two advertisements” (FilmMediumSpot), and “exposure to TV and three advertisements” (FilmHighSpot).

The film was a non-spoken cartoon lasting 22 minutes. It consisted of a set of episodes with Disney Pluto® as main character.

The experimental session took place in a quiet room of the school facility during the afternoon break. Children participating to the study received the same meal and had consistent physical activity patterns. They were sitting at a table in front of a monitor (except to those randomized to the NoFilmNoSpot level), while the investigator was in a back-screen position to not interfere with children performance, but to be easily reachable from their requests. The session was videotaped using two hidden HD cameras. Parents were asked to not attend the experimental session; if they refused, they were asked to sit at the back of the room without being seen by the child.

Once enrolled in the study, children underwent anthropometric assessment and lifestyle habits recording (through a validated questionnaire). After baseline assessment, kids were randomized. Randomization was blocked by age and gender, and was performed using an ad hoc software integrated with data collection and study conduction system. Subsequently, the investigator administered the International Brand Awareness Inventory (IBAI) (17) to children, and explained the next study's steps.

Ten different snacks were presented to children (Table 1), and at the same time it was started the cartoon movie (when applicable, according to participants' allocation). The snacks were placed on a tray, with their branded packages directed upwards. All children were asked to choose the

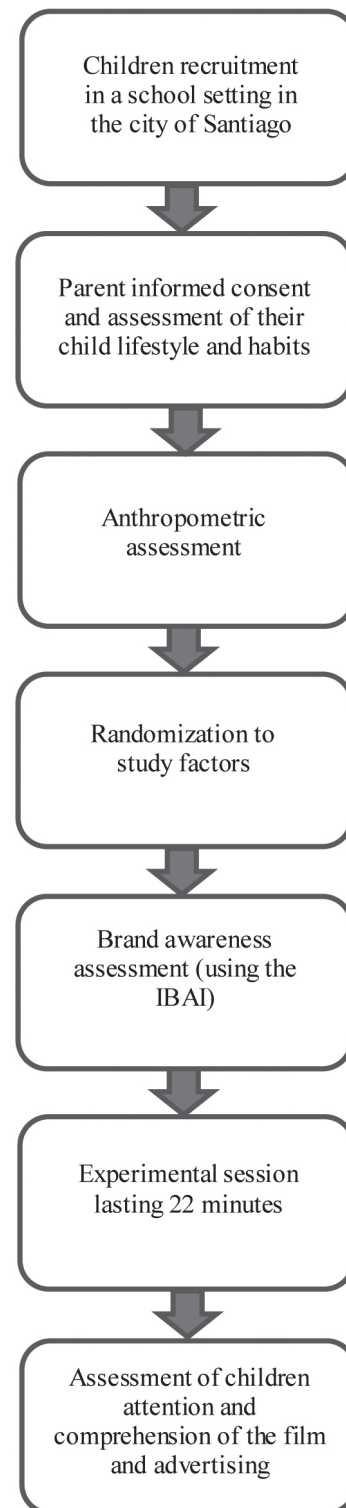


FIGURE 1. Flow-chart of the study procedure.

TABLE 1. Nutritional facts of snacks presented to children in the experimental session.

Product Name	Packaging Weight	Carbohydrates g available	sugars	Proteins g	total	Fats g saturated	trans	M	P	Cholesterol mg	Sodium mg	Kcal
Twix©	50,7g	33	/	2	12	9	0	2,2	0,7	5	100	250
Rollo©	25g	15	11	1,4	2,8	2,2	0	0,3	0,2	15	72	92
Mini Oreo©	50g	32	19	3	12	6	0,3	4	1	5,3	212	244
Snickers©	58,7g	35	/	4	14	5	0	5,5	2,4	5	140	280
Rayita©	40g	24	18	1,7	5,4	2,6	0	1,7	0,4	10	99	152
Alfajor	20g	13,4	/	1,5	2,9	1,2	0	1,4	0,3	0,2	18	83
M&M'S©	47,9g	34	/	2	9	6	0	2,6	0,3	34	35	230
Mini kuky©	40g	26,5	/	2,3	9,8	5,8	0,19	2,4	0,68	1	136	203
Museo©	40g	30,9	/	2,3	5,6	2,9	0,11	1,6	0,64	1	132	183
Kinder Joy©	20g	11	10,6	1,6	6,6	2,8					0,017	110

M=monounsaturated; P= polyunsaturates

snacks they preferred and to eat *ad libitum*.

In order to calculate the amount of snacks eaten by each child, the residuals were weighed at the end of the experimental session and data were entered in the study software (each snack was identified with a code reported in the study's system program together with its weight, assessed at the beginning of the study).

Anthropometric measurements

Children's were weighed and measured barefoot and wearing light clothes. Weight and height were assessed using a balance scale and a body meter with a wall stop. BMI was calculated as weight divided by height squared. Children were considered to be overweight/obese with a BMI ≥ 85 th and underweight with a BMI < 5 th, according to CDC growth standards (18).

Study questionnaire

A cultural-specific questionnaire was administered to children's parents in order to assess their son/daughter habits and lifestyles.

The tool was made of different parts. The first one aimed at assessing family characteristics (number of siblings, age/weight/height/physical activity levels of parents and siblings, with whom

the child lived); socio-economic status (parents' working status and educational level, number of rooms in the house); time spent watching TV/ videogames (hours the child spent each day watching TV and playing with videogames, number of TVs in the house, presence of the TV in the child room). The second section assessed child's eating habits (food frequency, if the child usually had breakfast/snacks/lunch/dinner) and feeding practices in early childhood (if the child was breastfed and how long). The third part consisted on a projective test investigating mother's perception of child's body size, and the last one assessed child's physical activity levels.

Brand awareness

Children's brand awareness was evaluated by administering the IBAI questionnaire. It is a validated instrument, consisting on 12 images of food products (both international and country-specific). Children were asked to: recognize the brand, match the brand with the corresponding food product and name the product. Details of the instrument are given elsewhere (17, 19).

Power calculation

Basic assumptions for powering the study were a consumption in the baseline groups

(NoFilmNoSpot) of 200 Kcal, roughly corresponding to the consumption of a snack during the experimental session. Standard deviation of the regression errors has been set to 100 Kcal based on previous pilot observations. If the true slope of the line obtained by regressing Kcal consumption against experimental arm levels is 5.5 (trend analysis), 32 subjects were needed to be able to reject the null hypothesis that this slope equals zero with probability (power) 0.8. The Type I error probability associated with this test of this null hypothesis is 0.05. Sample size has been increased to 8 for accounting for non-experimental variations in the study subjects. Sample size has been estimated using PS (20).

Statistical analysis

Basic descriptive data analysis has been performed on the sample and reported using median (I-III quartile) for continuous variables and percentages (absolute numbers) for categorical variables, whenever appropriate.

Further exploratory data analysis has been conducted to highlight the differences in the co-primary endpoints (Kcal and Kcal/BMI and Glycemic Load) across the study regimes, reporting the median and the interquartile range for both, stratified by NoFilmNoSpot, FilmNoSpot, FilmLowSpot, FilmMediumSpot and FilmHighSpot. These results can be further visualized graphically in the corresponding boxplot. (see Figure 2, Figure 3 and Figure 4).

Main analysis has been based on a linear model where blocking factors (sex and age) and FilmSpot have been inserted in the model. This is the base model used in the analysis, where specific investigations on single factor-level effects have been conducted using appropriate linear contrasts.

To further check for additional confounding factors, adjusted model has been developed, using the AIC criterion in the backward fashion. For each model, significance of the

main experimental factor (exposure to TV or spot) has been assessed.

Children were classified as “high consumers” if their energetic intake during the sessions exceeded the III quartile of the distribution. Basic descriptive data analysis has been performed on the stratified sample and reported using median (I-III quartile) for continuous variables and percentages (absolute numbers) for categorical variables, were reported. Also, accordingly association tests were conducted between the probability to be a high-end consumer and selected variables (Fisher exact test for the categorical variables and t test for the continuous). Analyses has been conducted using the R System (21).

RESULTS

Forty children, balanced by gender, were enrolled. Children’s age ranged from 6 to 12 years (median age 9.5 years). More than an half of them was found to be overweight/obese according to the CDC growth charts (18), and to never do physical activity (22%) or to do it rarely (45% of children did physical activity only half an hour or an hour per week). Despite the fact that most of children were found to be physically inactive, most of them were reported to do not play with videogames (42.5%) or to play with videogames no more than an hour per week (50%), even if they spent a median time of 18 hours per week watching TV (roughly at least 2 hours per day). Median IBAI score was found to be 19 (15, 22 I-III quartile), corresponding to a medium-low/medium-high brand awareness. Sample characteristics are summarized in Table 2.

During the experimental session, children were found to eat a median of 453.7 kcal, corresponding to a median glycemic load of 24.725. Table 3 shows caloric intake (rough and per BMI) and glycemic load according

TABLE 2. Sample characteristics. Numbers are I quartile/median/III quartile for continuous variables and percentages for categorical variables.

Sample characteristics	N	Descriptive statistics
% Female	40	50
Age (years)	40	8/9.5/11
Race	40	
% Mapuche	40	0.128
% Mestizo	40	0.128
% White	40	0.743
Weight	40	34.48 / 42.10 / 48.58
Height	40	130/141/14.4
Child BMI	40	19.43/21.08/22.75
% Normal	40	0.2
% Obese	40	0.375
% Overweight	40	0.4
% Underweight	40	0.025
Weekly physical activity	40	
% none	40	0.225
% Half an hour	40	0.125
% An hour	40	0.325
% 2-3 hours	40	0.250
% 4-6 hours	40	0.075
Weekly video games	39	
% none	40	0.425
% Half an hour	40	0.175
% An hour	40	0.325
% 2-3 hours	40	0.025
% 4-6 hours	40	0.05
% Children eating at least two portions of fruit	40	0.59
% Children eating at least two portions of vegetables	40	0.542
Months breastfeeding	40	6 / 8 / 13.5
% having a TV in own room	40	0.676
Father is working	40	0.892
Father education	40	
% Complete secondary or higher	40	0.459
% Complete technical	40	0.351
% Primary school	40	0.162
% None	40	0.027
Mother education	40	
% Complete secondary or higher	40	0.35
% Complete technical	40	0.450
% Primary school	40	0.175
% None	40	0.025
Weekly hours of TV	40	14/18/25
IBAI score	40	15/19/22

to exposure to TV and advertising, and the differences in the intake of children randomized to different levels of TV/advertising exposure compared to those randomized to the NoFilmNoSpot level. Despite the fact that children allocated in the FilmMediumSpot and in the FilmHighSpot levels were reported to have higher caloric intake (rough and per BMI), and glycemic load compared to the other children (as it is depicted in Figure 2, 3, and 4), no significant differences were identified. No significant effects on caloric intake, caloric intake per BMI, and glycemic load were detected, even after adjustment for potential confounding factors using both single comparisons to the reference level NoFilmNoSpot (Table 4) and multiple comparisons between different treatment regimens (Table 5).

Looking at the

characteristics of children classified as “low consumers” and “high consumers” (according to the III quartile of the distribution of the energy intake), higher consumers were found to be more likely to be obese compared to the “low consumers”. However, referring to the study factors, no significant differences were identified according to treatment allocation.

TABLE 3. Overall energy intake according to the study factors.

Outcome	NoFilm NoSpot	Film NoSpot	Film LowSpot	Film MediumSpot	Film HighSpot	Total
N	8	8	8	8	8	40
Kcal eaten						
Median	369.8	217.7	322.6	590.5	517.8	453.7
(I-III quartile)	(238, 506)	(130.5, 496.4)	(250, 451.7)	(468, 656.6)	(460.7, 569.8)	(272.2, 613.9)
Difference with NoFilmNoSpot (p-value*)		-99.67 (0.91)	-36.92 (0.99)	154.44 (0.67)	105.8 (0.89)	
Kcal/BMI						
Median	20.05	11.4	14.65	26.54	26.82	21.22
(I-III quartile)	(14.22, 28.14)	(5.398, 25.1)	(11.89, 21.75)	(17.9, 32.99)	(21.8, 29.89)	(12.84, 29.11)
Difference with NoFilmNoSpot (p-value*)		-5.80 (0.823)	-4.45 (0.92)	5.025 (0.89)	3.94 (0.95)	
Glycemic Load						
Median	20.15	11.87	17.580	32.18	28.22	24.72
(I-III quartile)	(12.97, 27.58)	(7.11, 27.05)	(13.62, 24.61)	(25.5, 35.77)	(25.10, 31.05)	(14.83, 33.55)
Difference with NoFilmNoSpot (p-value*)		-5.43 (0.91)	-2.01 (0.997)	8.416 (0.67)	5.76 (0.88)	

p-values refer to the significance of difference in means in multiple comparison of each level of exposure to TV with or without advertising (Film NoSpot, Film LowSpot, Film MediumSpot, Film HighSpot) to the reference level (NoFilm-NoSpot)

FIGURE 2. Energy intake (Kcal) according to TV/advertising exposure.

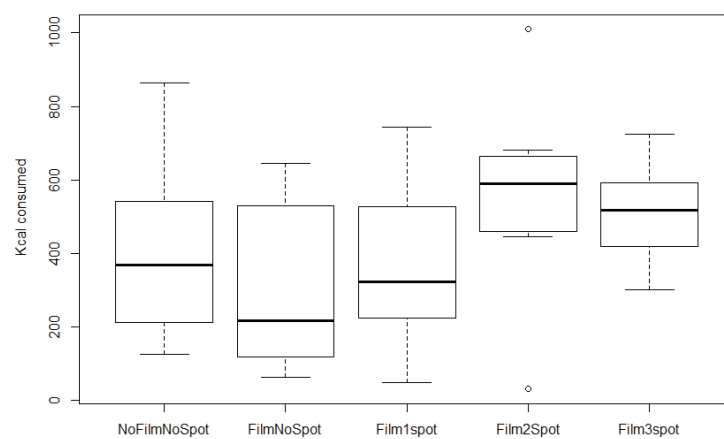


FIGURE 3. Energy intake (Kcal/BMI) according to TV/advertising exposure.

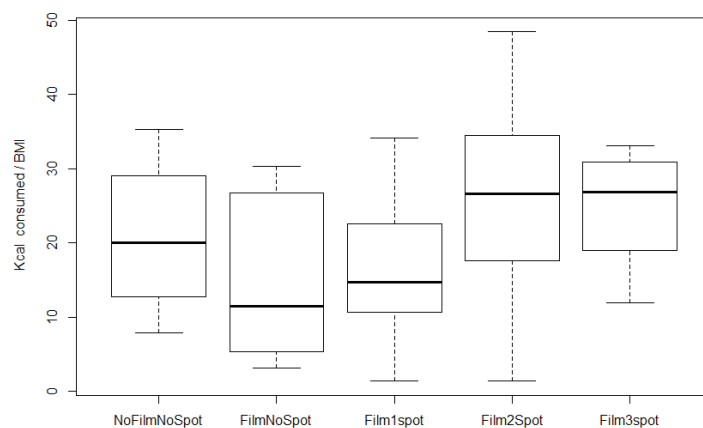


FIGURE 4. Glycemic load according to TV/advertising exposure.

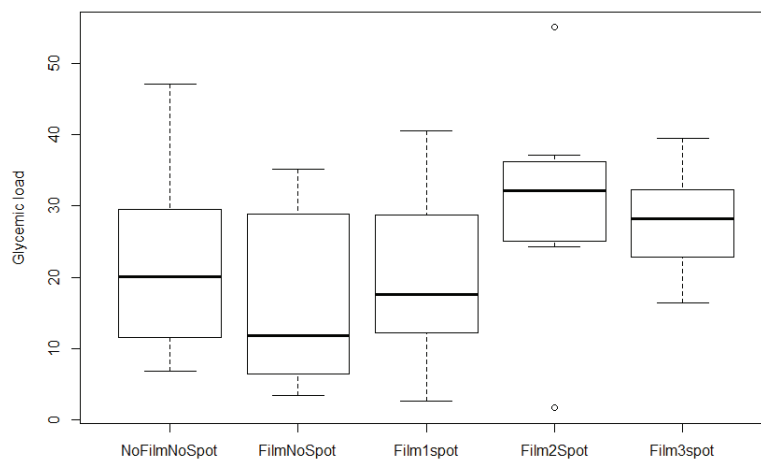


TABLE 4. Significance of the TV and spot regimes in comparison to the reference level (NoFilmNoSpot) after adjustment for several potential confounding factors.

	FilmNoSpot Vs NoFilmNoSpot	FilmLowSpot Vs NoFilmNoSpot	FilmMediumSpot Vs NoFilmNoSpot	FilmHighSpot Vs NoFilmNoSpot	p-value (F-statistic)
Kcal eaten					
Base model	-99.67 (110.43)	-36.92 (110.43)	154.44 (110.43)	105.80 (110.43)	0.103
Adjusted model	-69.253 (110.67)	-12.025 (123.08)	239.52 (126.86)	129.176 (125.52)	0.152
Kcal/BMI					
Base model	-5.803 (5.38)	-4.451 (5.38)	5.025 (5.38)	3.940 (5.38)	0.170
Adjusted model	-3.704 (5.21)	-5.43 (5.47)	5.46 (5.46)	3.46 (5.77)	0.291
Glycemic Load					
Base model	-5.431 (6.02)	-2.012 (6.02)	8.416 (6.02)	5.766 (6.02)	0.103
Adjusted model	-4.083 (6.06)	-3.195 (6.35)	9.891 (6.36)	5.352 (6.71)	0.217

In the first four columns: linear contrasts of each treatment regime with respect to the reference level, with standard errors in parenthesis. Last column represents joint significance of the treatment regime, using F-statistics. P-value is considered as significant when $p < 0.05/3 = 0.0167$ (Bonferroni correction for co-primary endpoints). Base model: Sex + Age + FilmSpot
Adjusted model: Base + BMI + Hours/Week TV + Physical activity (hours/week) + IBAI + number of TV in the house

TABLE 5. Multiple comparison of different treatment regimes. Last column reports the results of the comparison between Treatment (pooled exposure to TV with or without advertising (FilmNoSpot + FilmLowSpot + FilmMediumSpot + FilmHighSpot)) vs No treatment (no TV exposure (NoFilmNoSpot))

	FilmMediumSpot vs FilmNoSpot	FilmHighSpot vs FilmNoSpot	FilmMediumSpot vs FilmLowSpot	FilmHighSpot vs FilmLowSpot	Treatment vs No treatment
Kcal eaten					
Base model	254.11 (110.43)	205.5 (110.43)	191.4 (110.43)	142.7 (110.43)	123.6 349.2
Adjusted model	308.8 (126.7)	198.4 (122.0)	251.6 (114.0)	141.2 (112.6)	287.4 (393.6)
Kcal/BMI					
Base model	10.828 (5.383)	9.743 (5.383)	9.476 (5.383)	8.391 (5.383)	-1.289 (17.02)
Adjusted model	9.17 (5.56)	7.168 (5.66)	10.90 (5.35)	(8.90) (5.27)	-0.21 (0.99)
Glycemic Load					
Base model	13.848 (6.02)	11.197 (6.02)	10.428 (6.02)	7.778 (6.02)	6.738 (19.03)
Adjusted model	13.974 (6.46)	9.435 (6.58)	13.086 (6.22)	8.547 (6.12)	7.964 (20.45)

Linear contrasts with standard errors in parenthesis. Treatment is the average of Film or spot regimes, while No treatment is considered as NoFilmNoSpot. P-value is considered as significant when $p < 0.05/3 = 0.0167$ (Bonferroni correction for co-primary endpoints). Base model: Sex + Age + FilmSpot. Adjusted model: Base + BMI + Hours/Week TV + Physical activity (hours/week) + IBAI + number of TV in the house. Signif. codes: 0 '***' 0.001 '**' 0.0167 '*'

TABLE 6. Characterization of the High Consumers according to the main study variables.
Numbers are I quartile/median/III quartile for continuous variables and percentages for categorical variables.

	N	Low	High	Combined	p-value
% Female	40	50	50	50	
Age	40	8/9/10	9.5/11/11	8/9.5/11	0.038**
Race	40				0.58
% Mapuche		17.24	0	0.128	
% Mestizo		13.79	10	0.128	
% White		68.97	90	0.743	
Weight	40	31.78/36.45/44.45	50.18/55.15/67.30	34.48/42.10/48.58	0.0001***
Height	40	129.0/137.0/144.8	143.2/145.0/154.5	130/141/154.4	0.0054***
Child BMI	40	18.06/20.24/21.54	23.52/26.08/28.03	19.43/21.08/22.75	0.0001***
Classes of BMI	40				0.0006***
% Normal		27	0	20	
% Obese		20	90	37.5	
% Overweight		50	10	40	
% Underweight		3	0	2.5	
Weekly physical activity					0.77
% none	40	23	20	22.5	
% Half an hour		10	20	12.5	
% An hour		36	20	32.5	
% 2-3 hours		23	30	25.0	
% 4-6 hours		6.7	10	7.5	
Weekly video games	39				0.82
% none		60	33.33	42.5	
% Half an hour		20	16.67	17.5	
% An hour		20	36.67	32.5	
% 2-3 hours		0	6.66	2.5	
% 4-6 hours		0	6.67	5.	
% Children eating at least two portions of fruit	40	65.52		59.0	0.11
% Children eating at least two portions of vegetables	40	40		0.542	0.73
Months breastfeeding	34	3.00/8.00/16.50	7.5/8.0/9.0	6/8/13.5	0.164
% having a TV in own room	40	67.7	70	67.6	1
Father is working	40	93	78	89.2	0.244
Father education	40				0.95
% Complete secondary or higher		46.42	44.44	45.9	
% Complete technical		35.71	33.33	35.1	
% Primary school		14.29	22.23	16.2	
% None		3.57	0	02.7	
Mother education	40				1
% Complete secondary or higher		33.7	40	35.	
% Complete technical		43.3	50	45.0	
% Primary school		19.7	10	17.5	
% None		3.3	0	2.5	
Weekly hours of TV	40	14/18/23	12.75/21.50/36	14/18/25	0.561
IBAI score	40	15/19/23	19/19.5/21	15/19/22	0.778
Treatment regime	40				0.549
NoFilmNoSpot		23.33	10	20	
FilmNoSpot		23.33	10	20	
FilmLowSpot		20	20	20	
FilmMediumSpot		13.33	40	20	
FilmHighSpot		20	20	20	

p-values are result of Fisher exact test for the association between the two categorical variables (high end and the row variable), while they refer to t-test for difference in means across the two groups (high-end and low-end consumers) for the continuous variables.

DISCUSSION

The aim of the present study was to assess if an association existed between TV advertising and snack consumption in Chilean children. Understanding factors associated to obesity onset is relevant among kids living in Chile, given the concerning high prevalence of childhood obesity. In recent years, this country goes through a rapid economic improvement. Along with such economic improvement, a social and cultural transition has taken place, resulting in substantial changes in living conditions (e.g., adoption of better hygiene practices and food habits, but also of sedentary lifestyles and of energy-dense food consumption, instead of fruits, vegetables, and whole grains) (22). Referring specifically to nutrition transition, these changes contribute to a progressive reduction of undernutrition, but result in a dramatic growth of obesity (and its comorbidities) prevalence, especially among children and adolescents (15). Reflecting this concerning scenario, more than a half of children enrolled in the study were found to be overweight or obese, and to be scarcely physically active, which is consistent with previous research in the field (23).

The hypothesis of the existence of an association between commercials and snack consumption has been motivated by previous research suggesting that food advertising might influence food behaviors regardless subjects' awareness (24). The analysis of data from the experimental session showed no significant association between TV/food advertising exposure and energy intake. These findings differed from those reported in previous studies, which generally have demonstrated that exposure to food advertising results in higher energy intake (25, 26). However, it has been suggested the existence of an inter-regional variability influencing the association between food advertising and snack consumption (12, 13). Moreover, a recent review on clinical

trials analyzing the relationship between TV/ advertising exposure and caloric intake has shown that first-quality evidence in this field are lacking. This is because generally studies have focused on children's choice and preferences and not on their actual intake of food, even if it could not be directly translated children's preferences to their actual consumption (27).

Results of this study show that the association between advertising and caloric intake is not obvious and possibly depending from the actual context where it is evaluated. Recent regulatory activities might be important steps in limiting consumption of specific food items. In this sense, it is essential to strictly monitor both the short and long-term effects of such regulation, carefully evaluating any changes in food choices and in overweight/obesity (and their comorbidities) prevalence among Chilean population, in order to evaluate the actual effectiveness of such public health strategies against childhood obesity epidemic.

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