HHS Public Access

Author manuscript

Public Health Nutr. Author manuscript; available in PMC 2020 March 07.

Published in final edited form as:

Public Health Nutr. 2020 March ; 23(4): 747–755. doi:10.1017/S1368980019003355.

Evaluating the impact of Chile's marketing regulation of unhealthy foods and beverages: preschool and adolescent children's changes in exposure to food advertising on television

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Abstract

Objective: To evaluate the effects of Chile's 2016 regulation restricting child-directed marketing of products high in energy, saturated fats, sodium, and sugars on reducing children's exposure to "high-in" television food advertising.

Design: Television use by preschoolers and adolescents was assessed via surveys in the months prior to implementation and a year after implementation. Hours and channels of television use was linked with the amount of high-in food advertising observed in corresponding content analyses of food advertisements from popular broadcast and cable channels to estimate changes in exposure to food ads from these channels.

Setting: Middle-lower and lower-income neighborhoods in Santiago, Chile.

Participants: 879 preschoolers (mothers reporting) and 753 adolescents (self-reporting).

Results: Preschoolers' and adolescents' exposure to high-in food advertising in total decreased significantly by an average of 44% and 58%, respectively. Exposure to high-in food advertising with child-directed appeals, such as cartoon characters, decreased by 35% and 52% for preschoolers and adolescents, respectively. Decreases were more pronounced for children who

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Authors' contributions. TC was responsible for the television advertising analysis. MR was responsible for surveys. LST was responsible for the nutritional profiling. FRDC was responsible for exposure measures, data set linkage, analysis, and final paper. All authors provided edits.

Ethical Standards Disclosure.

This study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving human subjects were approved by the INTA Ethics Committee. Written informed consent was obtained from all subjects. Youth participants' parents or legal tutors gave written consent before starting data collection. GOCS adolescents also signed an assent form.

Conflict of Interest. None of the authors have conflicts of interest of any type with this study.

viewed more television. Products high in sugars were the most prevalent among the high-in advertisements seen by children after implementation.

Conclusions: Following Chile's 2016 child-directed marketing regulation, children's exposure to high-in food advertising on popular broadcast and cable television decreased significantly but was not eliminated from their viewing. Later stages of the regulation are expected to eliminate the majority of children's exposure to high-in food advertising from television.

Keywords

adolescents; advertising; children; child-directed; food; marketing; nutrition

Introduction

Childhood obesity and obesity-related disease is a serious concern worldwide, with prevalence rising in both developing and developed countries.[1, 2] In Chile, 52% of adults and 34% of children under age 6 were overweight or obese in 2013, compared to <10% of adults and <3% of young children who were undernourished.[3] Chile also had the highest recorded sales of sugar-sweetened beverages worldwide in 2014[4] and high intakes of sugar-sweetened beverages, ultra-processed and high-sugar foods, and sugary and salty snack foods prior to 2016.[5, 6]

Food advertising on television has been identified as an important contributor to childhood obesity, as child-directed food advertising disproportionately promotes products high in sugars, fats, and sodium[7, 8] and exposure to these commercial messages have been linked to consumption of unhealthy foods.[9–15] Global health organizations have called for regulatory measures that restrict the marketing of these foods to children,[16–20] prompting a growing number of countries to adopt statutory regulations that restrict food marketing, many of which focus on restricting advertising in children's television programs.[21] Chile's response was the 2016 implementation of regulations that required warning labels on packaged foods with added ingredients that increase the natural content of energy, saturated fats, sugars, and/or sodium above government-defined thresholds for solids per 100g and liquids per 100ml. The regulation also prohibited the sale/offering of products "high in" (above defined thresholds in) energy, saturated fats, sugars, and/or sodium in schools and nurseries, and restricted marketing of packaged and unpackaged high-in products to children.[22–24] This marketing restriction included a ban on high-in food advertising in television programs self-identified as child-targeted and in programs with a 20%+ audience makeup of children <14yo, as well as any high-in advertising with characters, toys, or other child-directed appeals. Finally, nutrient thresholds for solids and liquids were set to become increasingly strict over time, meaning the 2016 thresholds permitted a greater amount of energy, sugars, saturated fats, and sodium in products than the 2017 and 2018 thresholds would allow.

Few studies to date evaluate effects of unhealthy food marketing policies, with existing research suggesting a relative lack of effectiveness in reducing unhealthy food advertising.[25] For example, a study assessing the UK's 2007 advertising restriction found little difference in children's exposure to unhealthy food ads, based on changes in television

audience ratings for food ads whose products had been linked to their nutritional profiles.[26] Most of the existing studies assessing these types of policy effects use television ratings to evaluate children's advertising exposure,[27–29] which can capture broad changes in exposure but cannot be used to assess changes at the individual level, based on the children's typical television use. To our knowledge, only one study has provided an individualized assessment of food marketing, in which U.S. children were estimated to see between 12 and 21 food ads per day, depending on their age and their viewing of programs aimed at children and at a general audience.[30]

The present study aims to evaluate the impact of Chile's first implementation of its restriction on preschoolers' and young adolescents' exposure to unhealthy food advertising on television. Television is the focus of this study because it is a point of emphasis in Chile's regulation[24] but also because television is the dominant medium in Chile for advertising expenditures.[31] With this focus, this article presents the first evaluation of the effects of Chile's advertising restriction, as implemented in mid-2016, in reducing children's exposure to television advertising of high-in foods. By evaluating change with individual-level assessments, this study also offers the opportunity for future research to directly link reductions in exposure with changes in children's diets and caloric intake.

METHOD

Overview

This study evaluates changes in exposure to total and child-directed high-in food advertising in preschool children and young adolescents. In-person panel surveys were conducted with mothers reporting on their preschool children and adolescents reporting on themselves.[6] Through the surveys, information was gathered about the amount of television the preschoolers and adolescents used at different time periods across the week, as well as the television channels typically viewed during those time periods. Described in a separate report, [32] a quantitative content analysis of television food advertising was being conducted during the same time period to analyze advertisements that aired during the time the surveys were being administered. The survey data were ultimately connected with findings of the advertising analysis to create estimates of exposure to advertising featuring products high in energy, saturated fats, sugars, and sodium, based on an application of the nutrient thresholds from the first phase (2016) of implementation of the regulation.

Procedure

Survey data for the present report were taken from the Food Environment Chilean Cohort (FEChiC) study[33–35], focused on children born in 2012–2013, and the Growth and Obesity Cohort Study (GOCs)[6], focused on children born in 2002–2003. Details of each cohort have been previously published in detail.[6] Briefly, in 2016, the FEChiC study recruited mothers of preschool children from 55 public and voucher schools (private schools participating in Chile's educational voucher system) located in middle-lower income districts in the capital of Santiago. In 2006, children were recruited into GOCs from Santiago nursery schools that belonged to a national association of daycares (Junta Nacional de Jardines Infantiles) focusing on lower-income areas. Television use questions were added

in 2016 to the existing GOCS survey instrument to interview these participants, now adolescents, for the purposes of the present study.

Before the interviews were administered, survey instruments were pilot tested with 25 adolescents. At administration, participating mothers and adolescents were given an informed consent form to read and sign. Once consent was obtained, respondents were interviewed by a trained nutritionist, using a computer-assisted questionnaire. Wave 1 interviews were conducted between April-June 2016 prior to the regulation's first implementation phase effective June 27, 2016. Wave 2 was conducted between April-June 2017 after the regulation's implementation.

Sample

A total of 879 mothers from FEChiC and 753 adolescents from GOCS completed both waves of the survey. Table 1 describes the preschool and adolescent samples in the present study, including sociodemographic indicators such as the mother's formal education level.

Measures

Television use.—Using an adaptation of the Global Weekly Estimate of television use[36, 37], respondents reported the number of hours the child watched television on a typical weekday morning before school, weekday afternoon, and weekday night until sleep. Hours of television use were also asked for the typical weekend morning, afternoon, and night. Response choices were coded as 0 for no hours, .5 for less than an hour, 1.5 for between one and two hours, and 3 for more than two hours of viewing per time period. For each child, the number of hours the child watched television in each weekday time period was summed to calculate the hours of television used on a typical weekday. The same was done for weekend periods.

Respondents were additionally asked how many days per week the television was typically viewed. If 7 days per week were reported, the typical weekday hours were multiplied by 5, the typical weekend hours were multiplied by 2, and these two products were added to represent a full week of television use. If fewer than 7 days per week were reported, the full week's hours were adjusted to represent the lower frequency of use (e.g., by multiplying the total by 4/7 if the television was being used for only 4 of 7 days). A description of the children's television use is shown in Table 2.

Also reported were the specific television channels the child typically watched during each of the time periods the television was being used. Respondents were invited to choose channels from an exhaustive list of broadcast, cable, and satellite channels, or name channels not on the list. Reported channels and periods of use were the key data used to connect the survey responses to the prior analysis of advertising content.

Food advertising from the advertising analysis.—Preschoolers' and adolescents' hours of weekly television use were then linked with concurrent analyses conducted in 2016 and 2017 of the frequency and types of food advertising aired in eight highly viewed television channels to create individual-level estimates of unhealthy food advertising exposure. This method is detailed in a previous publication.[32] To summarize, all four major

over-the-air TV channels and the four paid TV channels with the largest child audiences were selected for analysis. Coders analyzed advertisements featured within all programming shown between 6am-12am across two constructed weeks (two randomly selected Mondays, two randomly selected Tuesdays…) in each of the eight channels. Among the programs included in this sample were the 50 television programs with the highest general audience, as well as the 50 programs with the highest 4–12yo and 13–17yo audiences, based on national television ratings data. Data on each ad included food and beverage category, nutritional content of products, regulation status of products, whether the ad contained child-directed marketing, and time and channel of airing.

To assign regulation status to each of the advertised products, each advertisement was linked at the product-level to nutrition facts panel data collected pre-regulation in 2015–2016 and post-regulation in 2017.[38] Each ad was then categorized by a nutritionist as "high-in" based on whether the advertisement contained any product whose energy, saturated fat, sugar, and/or sodium content was above thresholds described in the first implementation phase of the regulation, as described in Table 3.[22] The specific critical nutrient(s) exceeding its(their) threshold was also recorded for each high-in advertisement. To identify whether the ad contained child-directed marketing, coders analyzed each advertisement for the presence of marketing strategies defined by the regulation as being directed toward children: child actors or voices, licensed or unlicensed characters, references to school or play, gifts, games, toys, or contests. Any food advertisement with at least one of the identified strategies received the designation "child-directed."

Estimating high-in advertising exposure.—In the advertising analysis, the average number of minutes of total and child-directed high-in advertising based on energy, saturated fats, sugars, and sodium were recorded for each of the eight television channels on weekday and weekend mornings, afternoons, and nights matching the time periods assessed in the children's survey. Children who watched one of the eight channels during a time period were assigned high-in advertising minutes from that channel for the amount of time they viewed television during that period. If a child watched two (or more) of the eight channels in the analysis during a single period, the child was assigned half (or the appropriate proportion) of the high-in advertising minutes from each channel they viewed during that period, assuming the child viewed each channel for an equal amount of time in that period. If a child reported watching no television at all or if a child watched television but reported using none of the channels included in the advertising analysis during a particular time period, 0 minutes would be assigned to that child for that time period. See Table 2 for the extent to which children's television viewing was covered by the advertising analysis.

Weekly high-in advertising exposure was calculated using the same procedure used to estimate weekly television use. Minutes of high-in advertising exposure were summed across weekday and weekend time periods, and weekly use was extrapolated to the number of days the television was reportedly on. In full, six estimates of high-in advertising seen in the television channels included in the advertising analysis were derived for each child. These estimates included the total weekly minutes of high-in advertising across nutrients, the minutes of high-in advertising featuring a child-directed strategy, and the minutes of

advertising featuring a product high in energy, saturated fat, total sugar, and sodium (these were not mutually exclusive, since some ads were high in multiple critical nutrients).

Statistical Analysis

Total and child-directed high-in advertising exposure at Waves 1 and 2 were examined with descriptive statistics, including quartiles to illustrate the distribution in exposure across preschoolers and adolescents at Waves 1 and 2. Individual changes in total and child-directed high-in advertising exposure, as well as changes in high-in advertising exposure based on nutrient, were analyzed using repeated-measures analyses of variance. Child sex, mother's education, and home ownership were entered as sociodemographic control variables. Individual change in weekly hours of overall television use from Wave 1 to Wave 2 (increases or decreases in time spent viewing analyzed channels and other channels) was also entered as a control variable in order to account for changes in advertising exposure due to changes in television use, rather than the regulation. Likewise, changes in the use of channels included in the advertising analysis, relative to the use of channels outside the analysis, was included as a control variable to account for differences in the coverage of the advertising analysis at Wave 2. Results were considered significant at alpha = .05.

RESULTS

Distribution of Minutes of Exposure to High-In Food Advertising

Figure 1 shows the distribution of preschoolers' estimated weekly minutes of exposure to total and child-directed high-in advertising at Wave 1 and Wave 2. Half of this sample had very little exposure to high-in advertising at either wave. The median weekly minutes of total and child-directed high-in exposure at Wave 1 were 1.3 and 1.0 minutes, respectively. Nonetheless, 52% of the preschoolers experienced a decrease in total high-in ad exposure and just over 50% experienced a decrease in child-directed high-in ad exposure, with median weekly minutes for total and child-directed exposure near zero.

Figure 2 shows the decrease in total high-in and child-directed high-in advertising exposure for adolescents. Median minutes of total and child-directed high-in exposure at Wave 1 were 5.9 and 4.1 minutes, respectively. At Wave 2, median exposure to total and child-directed ads was 1.7 and 1.5 minutes. Just over 69% of adolescents experienced a decrease in both total and child-directed high-in advertising exposure.

Adjusted Changes in Mean High-In Food Advertising Exposure

Shown in Table 4, the average adjusted total and child-directed high-in exposure across both age groups showed significant decreases after the regulation. On average, preschoolers' total high-in advertising exposure dropped by 44%, $F(1, 873) = 5.8$, $\eta 2 = .01$, $p < .05$, and child-directed high-in advertising exposure dropped by 35%, $F(1, 873) = 4.7$, $\eta 2 = .01$, $p < .05$. Adolescents' total high-in advertising exposure decreased by an average of 58%, $F(1, 747) = 34.8$, $\eta 2 = .05$, $p < .001$, while child-directed high-in advertising exposure decreased by 52% $F(1, 747) = 25.7$, $\eta 2 = .03$, $p < .001$. Sociodemographics did not correlate with exposure estimates for any of these analyses (not shown in table).

Table 5 shows changes in exposure to high-in advertising, grouped by critical nutrient. Preschoolers experienced the largest decrease in advertising featuring a product above the regulated threshold in energy—a 92% decrease, $F(1, 873) = 36.3$, $\eta 2 = .04$, $p < .001$. Energy was the second most prevalent nutrient among high-in advertising seen by preschoolers at Wave 1. The most prevalent nutrient at Wave 1—sugars—dropped by an average of 27% at Wave 2, but this drop was not statistically significant after taking controls into account. Saturated fats, the third most prevalent nutrient at Wave 1, showed the second highest decrease at 88%, $F(1, 873) = 31.5$, $\eta 2 = .04$, $p < .001$.

For adolescents, all exposure based on nutrient significantly decreased. Sugars, the most prevalent nutrient in high-in advertising seen by adolescents at Wave 1, decreased by 60%, $F(1, 747) = 30.8$, $\eta 2 = .04$, $p < .001$. Energy, the second-most prevalent nutrient at Wave 1, decreased by 68%, $F(1, 747) = 34.1$, $\eta 2 = .05$, $p < .001$. Saturated fats showed the highest decrease at 72%, $F(1, 747) = 39.6$, $\eta 2 = .05$, $p < .001$. Not shown in the table, sociodemographics did not account for any appreciable variation in these models.

DISCUSSION

This study examined the decrease in preschool children's and adolescents' exposure to high-in food advertising from popular over-the-air and paid television channels a year after Chile implemented a regulation prohibiting high-in advertising with child-oriented appeals and/or in programs targeting children. Minutes of weekly exposure to high-in food advertising decreased significantly by an average of 44% and 58% for preschoolers and adolescents, respectively, based on estimates derived in this study. Exposure to high-in food advertisements using child-oriented appeals, such as personified figures or licensed characters, also significantly decreased for both preschoolers and adolescents. However, exposure to these child-oriented high-in food advertisements was not eliminated for the preschoolers and adolescents who regularly watched television, nor was their exposure to high-in food advertisements in general. Of the remaining advertisements seen by these children, products above the regulated threshold in sugars were most prevalent.

Findings of this study underscore two challenges in implementing an advertising restriction of this nature. First, limiting a restriction to advertisements within television programs aimed at child audiences will captures some but not all of the television children watch. The children in our sample watched a variety of television programs, including programs on weekday and weekend evenings. Many of these programs had wide appeal that attracted adults, as well as children. Considering prior research shows child-directed food advertising exists outside of children's programs[39], we are not surprised that children in our sample were exposed to high-in food advertising after the implementation of Chile's 2016 restriction, which focused on child-targeted programming.

The second challenge suggested by our findings regards the difficulties in defining child-directed marketing strategies and ensuring compliance based on those definitions. Even though the Chilean regulation banned the use of various child-targeted marketing appeals in high-in food advertising across television after mid-2016, we still detected some exposure to this type of high-in advertising after implementation. In our application of the regulation's

definition, we identified any high-in food advertisement containing any of the listed elements, such as presence of children, animations, or toys, as being child-directed. However, it is possible that the use of some strategies listed in the regulation, for example the presence of children, might be alternately interpreted by others as parent-targeted based on the type of product or context cues in the advertisement. Thus, identifying an advertisement as child-targeted based on its inclusion of certain elements (e.g., children, animation) is complicated by additional contextual factors that might lead to different interpretations of the advertisement's intended audience.

These challenges should be addressed with the amendment to the Chilean regulation, effective June 2018, which applies the restriction of advertising any products above the defined thresholds in energy, saturated fat, sugars, and/or sodium to all programming aired between 6am and 10pm.[24, 40] This ban is expected to remove the possibility of children's exposure to television advertising for high-in foods, based on the regulation's nutrient thresholds, with the exception of those children exposed to nightly programming directed primarily toward an adult audience. Also, as estimated in a baseline study of food advertising on Chilean television[32], later implementation phases of Chile's regulation will likely capture more high-in advertising as the nutrient thresholds are raised.

As we consider future evaluations of Chile's regulation, we wish to note the current study's limitations. First, this study is limited to exposure from the four broadcast and four cable channels used in the concurrent advertising analysis[32] –a similar approach used in prior research assessing advertising exposure from children's television channels.[41, 42] The channels included in our analysis covered the majority, if not all, of the television viewed by many of the adolescents sampled, but many of the preschoolers and some adolescents also viewed channels outside the advertising analysis. Therefore, the estimated exposure in this study might be an underestimate of the total amount of high-in advertising seen by children in Chile. To further err toward conservative estimates, analyses include children who reportedly did not view television, and so their corresponding lack of exposure to television advertising lowers the mean estimates of advertising exposure across the samples. We adopted this conservative approach not only to account for possible measurement error with using a sample of television programming, but also to account for the measurement error inherent in self-(or mother-) reports of television use.

Also related to sample, the children included in this study were from lower-and middle-income families within Chile's capital of Santiago. Sociodemographic indicators, such as the mother's formal education level, were controlled for within the preschool and adolescent analyses and found to have no appreciable variation with exposure estimates. However, it is possible that the regulation might have a smaller impact on exposure for high-SES children, given that children with highly educated parents watch less television than children whose parents have less formal education.[43, 44] There might also be a different impact for children in rural areas or other regions of the country. In addition, we must note that more mothers in our adolescent sample had less than a high school education, compared to mothers of the preschool sample. This difference in mother's education level might have produced cohort effects, for which we cannot control.

Finally, we assume the changes in advertising exposure are primarily due to the Chilean regulation. However, this study design is unable to address whether changes in advertising exposure might be, in part, due to marketing trends that preceded the months prior to the regulation's implementation. Likewise, this study cannot assess the extent to which changes in advertised products, such as reformulation to decrease sugar, fat, or sodium content, or changes in consumer preferences for those products influenced marketing campaigns, and therefore marketing exposure.

Due to these limitations in sample and scope, estimates of exposure in this study should be taken as relative rather than absolute measures. Using these relative measures, we were able to achieve an individual-level examination of the change in children's high-in food advertising exposure based on a regulation that evolves over time. Findings of this study will be critical in evaluating the extent to which the newer 6am-10pm advertising ban and increased nutrient thresholds combine to reduce children's exposure to high-in advertising beyond the 2016 restriction that targeted child-oriented programming and child-targeted advertising.

CONCLUSION

In 2016, Chile implemented a set of food labeling, school food environment, and food marketing regulations aimed at reducing obesity in children. After the 2016 implementation, preschoolers' and adolescents' exposure to advertising of foods high in energy, saturated fat, sugars, and/or sodium on popular broadcast and cable television decreased significantly but was not eliminated from their television diets. Products high in sugar were the most frequently seen in advertisements after implementation. Subsequent phases of the regulation are expected to eliminate the majority of children's exposure to high-in food advertising from television and lead to reduced consumption of unhealthy foods.

Acknowledgements.

We thank Chile's National Television Council for providing the recordings of television programming, Natalia Rebolledo Fuentealba and Donna Miles for their assistance with food categorization, Fernanda Mediano Stoltze for her assistance with the codebook, Camila Román and Camila Fierro for their assistance in content coding, Frances Dancy for administrative assistance, and the Carolina Population Center for general support.

Financial Support. Support comes from Bloomberg Philanthropies, International Development Research Centre (IDRC) grants 107731–002 (INFORMAS) and 108180–001 (INTA-UNC), CONICYT (Fondecyt #1161436), the Carolina Population Center (P2C HD050924), and the University of North Carolina Institute for Global Health & Infectious Diseases (2016 Explorations in Global Health grant). Funders had no role in the study design, data collection, analysis, or interpretation.

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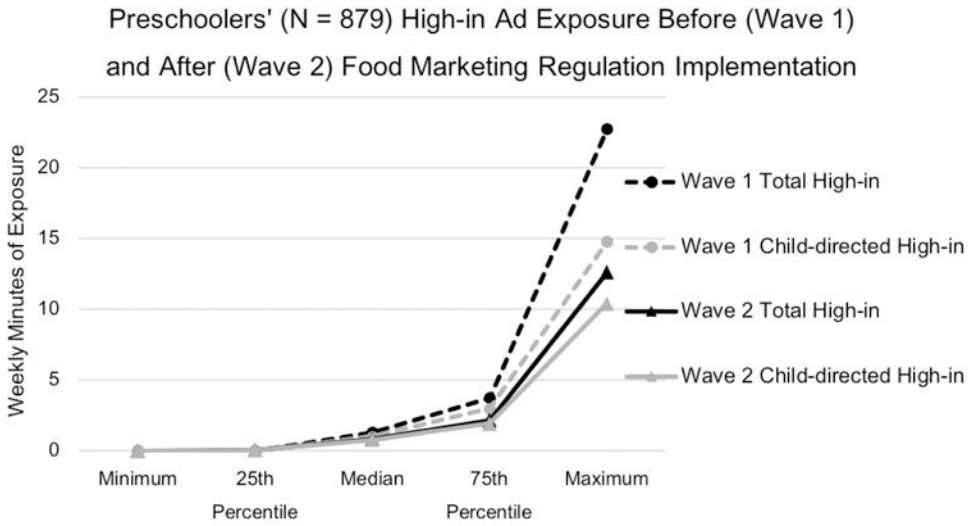

Figure 1.

Distribution (unadjusted) of preschoolers' estimated weekly minutes of exposure to total and child-directed high-in food and beverage advertising on television, assessed prior to (Wave 1) and after implementation (Wave 2) of Chile's restriction on food marketing.

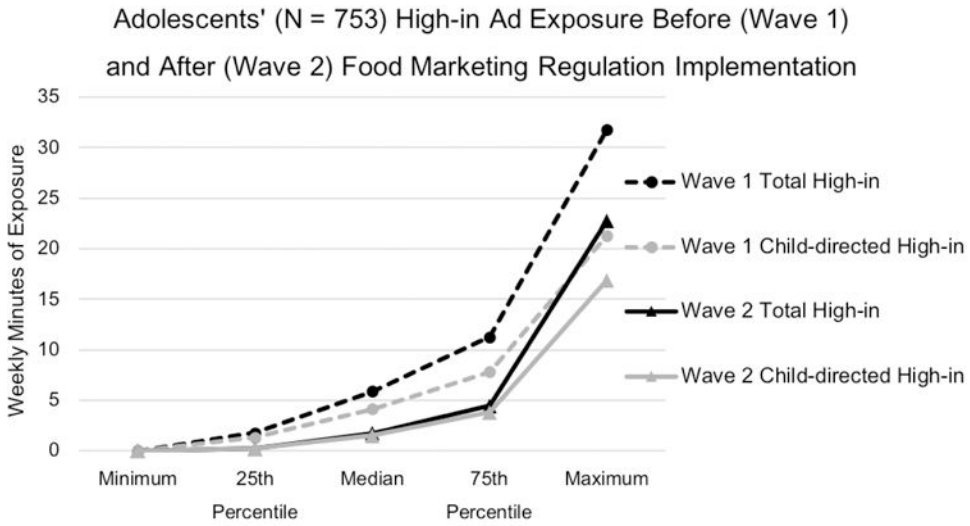

Figure 2.

Distribution (unadjusted) of adolescents' estimated weekly minutes of exposure to total and child-directed high-in food and beverage advertising on television, assessed prior to (Wave 1) and after implementation (Wave 2) of Chile's restriction on food marketing.

Table 1.

Preschool and adolescent sample characteristics and sociodemographics

Descriptors	Preschoolers	Adolescents
N	879	753
Child's mean years of age	4.8 ± .5	13.6 ± .4
Child's sex		
Percent of girls	52%	50%
Percent of boys	48%	50%
Mother's mean years of age	31.3 ± 6.7	40.9 ± 15.5
Mother's education		
Less than high school	18%	30%
Completed high school	41%	47%
Completed vocational or university degree	27%	16%
Family owns their home	54%	57%

Table 2.

Children's television usage and coverage of the advertising analysis

Television use characteristics	Preschoolers		Adolescents	
	Wave 1	Wave 2	Wave 1	Wave 2
Percentage of children who:				
Used television during the week	88%	88%	92%	83%
Increased their use at Wave 2	35%		37%	
Decreased their use at Wave 2	33%		37%	
Mean hours of television per week	10.9 ± 9.4	10.8 ± 8.5	14.4 ± 10.9	12.2 ± 10.6
Mean number of channels used within a typical viewing period	1.0 ± .9	1.1 ± .9	.8 ± .6	1.3 ± .9
Percentage of children whose television viewing was covered by the content analysis completely, partially, or not at all:				
All watched channels were in the analysis	0%	0%	43%	40%
Half or more of watched channels were in the analysis	33%	27%	78%	67%
At least one channel was in the analysis	74%	77%	89%	78%
All watched channels were outside of the analysis	14%	5%	3%	5%

Note. Wave 1 was collected in 2016 prior to the first implementation of Chile's food marketing restriction. Wave 2 was collected in 2017 after implementation. Increased/decreased television use based on movement from one quartile of use at Wave 1 (e.g., lowest 25% of viewing hours) to a different quartile at Wave 2 (e.g., highest 25% of viewing). Television use includes children with no reported television use. Channel statistics exclude children with no television use.

Table 3.

Foods subject to marketing restrictions based on nutrient thresholds

Nutrient thresholds triggering marketing restriction	Regulation Implementation Phase		
	First Phase June 27, 2016	Second Phase June 27, 2018	Third Phase June 27, 2019
Solid Foods per 100g			
Energy	350kcal	300kcal	275kcal
Saturated Fats	6g	5g	4g
Sugars	22.5g	15g	10g
Sodium	800mg	500mg	400mg
Liquids per 100ml			
Energy	100kcal	80kcal	70kcal
Saturated Fats	3g	3g	3g
Sugars	6g	5g	5g
Sodium	100mg	100mg	100mg

Note. Thresholds apply to foods with one or more added ingredients that increase the natural content of the target nutrients. Foods without additions (e.g., 100% fruit juice with no added sugar, milk with no added flavoring) are not subject to these thresholds. Thresholds apply to the use of package warning labels only for foods packaged at the time of sale. For marketing restrictions, thresholds apply to packaged and unpackaged foods. The present study examines the first phase of implementation only.

Table 4.

Changes in weekly exposure to total and child-directed high-in advertising before and after adjusting for sociodemographics and changes in amounts and channels of television use

Type of Advertising Exposure	Mean Weekly Minutes of Exposure		Mean Change in Exposure	Unadjusted		Adjusted	
	Wave 1	Wave 2		*F*	*p*-value	*F*	*p*-value
Preschoolers (*N* = 879)							
Total high-in	2.5 ± 3.2	1.4 ± 1.6	− 1.1 ± 3.4	86.0	< .001	5.8	.02
Child-directed high-in	2.0 ± 2.4	1.3 ± 1.4	− .7 ± 2.6	60.4	< .001	4.7	.03
Adolescents (*N* = 753)							
Total high-in	7.3 ± 6.6	3.1 ± 3.7	− 4.3 ± 7.5	246. 5	< .001	34.8	< .001
Child-directed high-in	5.0 ± 4.4	2.4 ± 2.8	− 2.6 ± 5.2	184. 5	< .001	25.7	< .001

Note. Wave 1 was collected in 2016 prior to the first implementation of Chile's food marketing restriction. Wave 2 was collected in 2017 after implementation. *F*-value is within-subject effect from repeated measures ANOVA. Control variables include child sex, mother's education, home ownership, change in overall television use and change in reliance on channels included in the advertising analysis. Children with no television use are included in analyses.

Table 5.

Changes in weekly exposure to high-in advertising based on critical nutrient before and after adjusting for sociodemographics and changes in amounts and channels of television use

High-in Nutrient in the Advertisement	Mean Weekly Minutes of Exposure		Mean Change in Exposure	Unadjusted		Adjusted	
	Wave 1	Wave 2		*F*	*p*-value	*F*	*p*-value
Preschoolers (*N* = 879)							
Energy	1.3 ± 1.6	.1 ± .4	− 1.2 ± 1.6	473.7	< .001	36.3	< .001
Saturated Fat	.8 ± 1.0	.1 ± .2	− .7 ± 1.0	435.7	< .001	31.5	< .001
Sugars	1.5 ± 2.1	1.1 ± 1.2	− .4 ± 2.3	28.2	< .001	1.0	.32
Sodium	.2 ± .3	.2 ± .3	+ .02 ± .4	3.1	.08	.7	.39
Adolescents (*N* = 753)							
Energy	3.1 ± 2.9	1.0 ±1.6	− 2.1 ±3.3	322.	< .001	34.1	< .001
Saturated Fat	1.8 ± 1.7	.5 ± .7	− 1.3 ± 1.8	362.	< .001	39.6	< .001
Sugars	4.7 ± 4.2	1.9 ± 2.2	− 2.9 ± 4.7	275.	< .001	30.8	< .001
Sodium	.7 ± .7	.6 ± .6	− .1 ± 1.0	17.1	< .001	7.8	.005

Note. Wave 1 was collected in 2016 prior to the first implementation of Chile's food marketing restriction. Wave 2 was collected in 2017 after implementation. *F*-value is within-subject effect from repeated measures ANOVA. Control variables include child sex, mother's education, home ownership, change in overall television use and change in reliance on channels included in the advertising analysis. Children with no television use are included in analyses.