

Televised obesity-prevention advertising across US media markets: exposure and content, 2010–2011

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Abstract

Objective: To examine levels of exposure and content characteristics for recent televised obesity-prevention campaigns sponsored by state and community health departments, federal agencies, non-profit organizations and television stations in the USA.

Design: Nielsen television ratings for obesity-prevention advertising were collected for the top seventy-five US media markets and were used to calculate household exposure levels for 2010 and 2011. Governmental advertisements were coded for content.

Setting: United States.

Results: Average household exposure to obesity-prevention campaigns was 2.6 advertisements per month. Exposure increased by 31% between 2010 and 2011, largely driven by increases in federal advertisements. In 2011, the federal government accounted for 62% of obesity-prevention exposure, non-profit organizations for 9%, community departments for 8%, state departments for 3%, and television station-sponsored public-service announcements for 17%. The greatest percentage increase between 2010 and 2011 was in community advertising, reflecting efforts funded by the Communities Putting Prevention to Work (CPPW) programme. Among thirty-four state and community campaigns, the majority advocated both healthy eating and physical activity (53%). Campaigns typically had positive or neutral emotional valence (94%). Obesity or overweight was mentioned in 47% of campaigns, but only 9% specifically advocated weight loss.

Conclusions: Exposure to televised obesity-prevention advertising increased from 2010 to 2011 and was higher than previously found in 1999–2003, apart from in 2003 during the federal VERB campaign. Nevertheless, exposure remains low relative to advertising for unhealthy foods. New federal campaigns have increased exposure to obesity-prevention advertising nationally, while CPPW grants have increased exposure for targeted areas.

Keywords
Obesity prevention
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In 2009–2010, the prevalence of obesity in the USA was 18.0% among children aged 6–11 years, 18.4% among adolescents aged 12–19 years⁽¹⁾ and 35.7% among adults⁽²⁾. Obesity represents a major public health concern given its association with serious health outcomes including CVD, diabetes mellitus and some cancers⁽³⁾, as well as social stigma⁽⁴⁾ and increased medical costs⁽⁵⁾. Interventions have typically addressed two primary causes of obesity: insufficient physical activity and over-consumption of energy-dense foods^(6,7). Interventions may be conducted in the community^(8,9), in primary health care⁽¹⁰⁾, through policy change^(11–13), or through mass-media campaigns including television⁽¹⁴⁾.

Television represents an important component of an obesity-prevention strategy. In a competitive media

environment, televised health-promotion campaigns must find effective ways to convey information and inspire behaviour change^(15,16). While the long-term impact of obesity-prevention television campaigns on body-weight outcomes remains unclear⁽¹⁷⁾, there is evidence that some recent campaigns with televised components have successfully influenced attitudes related to risk-reducing behaviours such as physical activity and healthy food choices^(18–22). The effectiveness of such campaigns depends largely on the level of exposure achieved⁽²³⁾, as well as on the persuasiveness of the messaging. For example, obesity-prevention campaigns may be more effective when they provide concrete behavioural recommendations and when they advocate both dietary change and physical activity⁽²⁴⁾. The use of certain negative emotional messages and graphic images

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in public health campaigns remains controversial⁽²⁵⁾, but has been shown to improve message salience and to increase message effectiveness in some contexts^(26,27). Both sufficient exposure and persuasive messaging are crucial, especially given the relative resources and expertise of the food industry in marketing unhealthy products such as those high in saturated fat, sugar and sodium, and with television serving as the dominant platform for such advertising^(28–31). It is crucial for the public health community to find successful ways to provide counter-information that might inspire viewers to adopt healthier lifestyles.

Historically, obesity-prevention campaigns have achieved significantly lower exposure than other televised health-promotion messages. In our prior study of public health television advertising from 1999 to 2003, we identified obesity-prevention campaigns sponsored by state or community health departments in only eight states, and overall exposure levels were far outweighed by tobacco-prevention advertising⁽³²⁾. The launch of the Centers for Disease Control and Prevention's VERB campaign in 2002 represented the first large-scale national obesity-prevention television campaign, reaching thirty-nine annual advertisement exposures per household for the top seventy-five US media markets by 2003⁽³²⁾. The VERB campaign aired through 2006.

In recent years, a number of additional obesity-prevention television campaigns have been launched by state and community health departments, the federal government and non-profit organizations. Beginning in 2010, the US Department of Health and Human Services (DHHS) awarded grants to thirty communities in twenty-two states and the District of Columbia to allocate towards obesity-prevention efforts through the Communities Putting Prevention to Work (CPPW) programme, funded by the American Recovery and Reinvestment Act. In total, \$US 230 million was allocated to obesity-prevention efforts. A number of these efforts included mass-media campaigns that began airing in 2010 or 2011^(33,34). At the federal level, First Lady Michelle Obama led the Let's Move campaign, the television component of which launched in 2010⁽³⁵⁾. Additional campaigns reflected alliances between federal and state departments as well as private sector or non-profit partners⁽³⁶⁾.

There is some evidence that the focus and tone of obesity-prevention messages may be shifting among new campaigns⁽³⁷⁾. For instance, there have been recent calls for obesity-prevention efforts to address the ubiquity of energy-dense foods that are heavily marketed^(38–41). Some such efforts have focused on reducing sugar-sweetened beverage (SSB) consumption⁽²²⁾, with one advertisement from the New York City Department of Health's Pouring on the Pounds campaign illustrating the connection between SSB and weight gain with graphic images of fat poured out of soda bottles⁽⁴²⁾. Some recent campaigns have also raised controversy for their emphasis on body image as a

motivator for behaviour change^(37,43,44). However, messages that emphasize body shape are not necessarily more effective than other message types and could introduce stigma towards obese individuals^(45–47). While recent graphic and body weight-focused campaigns have generated publicity, the messaging styles used in recent obesity-prevention campaigns have not been systematically studied. In order to guide efforts to test the effectiveness of obesity-prevention advertising, research should establish the key differences between commonly used public health messages.

In the present study, we analysed the volume and content of public health obesity-prevention advertising campaigns that aired in 2010 and 2011 and reviewed the literature on public health messaging in order to consider these campaigns' potential effectiveness. As in our prior study that assessed data from 1999 to 2003, we quantified exposure for all obesity-prevention campaigns sponsored by federal, state and local governments⁽³²⁾. In the current study, we also expanded our data set to include campaigns sponsored by non-profit organizations and television stations, calculating exposure levels in each of the top seventy-five US media markets for households as well as for specific audience subgroups including adults, children and teens. Since the approaches used in government-sponsored campaigns are likely to be of particular interest to the public health community, we coded all governmental campaigns for their target audience and main message (i.e. healthy eating, physical activity or both), as in our prior study. For all state and local governmental campaigns, we also characterized additional aspects of the informational content and messaging approach, including the presence of references to weight loss and the emotional valence of advertisements. By providing an overview of exposure levels and message types among recent obesity-prevention campaigns, the present study may inform efforts by the public health community to amplify and improve obesity-prevention mass-media campaigns.

Methods

Through Kantar Media, a market research company that monitors advertising across a number of media channels including television, we reviewed a comprehensive database of television advertisements that aired in 2010 and 2011 to identify campaigns sponsored by federal, state and local governments, non-profit organizations and other unpaid public-service announcements (PSA) sponsored by television stations. Among these, we identified all advertisements that advocated healthy eating or exercise, drew attention to obesity or encouraged weight loss. We excluded any advertisements that advocated healthy eating or physical activity in support of some other concrete health goal that did not overlap with obesity prevention, such as those that encouraged healthy diet in order to prevent prostate cancer or to improve performance in school. As previously

described⁽³²⁾, identification of relevant advertisements was typically straightforward based on searches for obesity- and health-related keywords in organization and campaign names. For organizations where we captured any relevant advertisements with our keyword searches, and for all public health departments, we also manually reviewed Kantar's descriptions of all campaigns to ensure data capture was complete. For example, the Let's Move campaign was captured by review of all campaigns sponsored by the US DHHS and also by keyword searches for 'health' and 'move'. Where campaign names were ambiguous, we reviewed descriptions of individual advertisements. Typical descriptors of advertisements offered a few words, such as 'Prevent Childhood Obesity'. When there was ambiguity in this descriptor, the digital copy of the advertisement was reviewed, allowing for inclusion or elimination.

For advertisements identified for inclusion based on our relevance criteria, Nielsen Media Research provided data on gross rating points (GRP), representing the fraction of television households (used to approximate the general audience) reached by each advertisement's occurrence multiplied by the number of occurrences. We also obtained targeted rating points for viewers aged 2–11, 12–17 or 18+ years. Ratings were captured for network, syndicated and spot television. Ratings were also available for national cable, although they were not available for spot cable campaigns, the minority of cable advertising that airs only in local markets. All ratings were calculated at the level of the designated market area (DMA), a contiguous set of counties comprising a metropolitan area in which the population receives the same (or similar) television offerings. We divided GRP values by 100 to derive the average number of times each campaign was broadcast to a television household ('exposures'). We examined campaigns that aired in the top seventy-five US DMA, representing approximately 78% of the US population and encompassing all major metropolitan areas⁽⁴⁸⁾.

As in our prior study, video copies of government-sponsored obesity-prevention advertisements were coded by named sponsoring organization, including any private partners listed. We also coded campaign message (physical activity, healthy eating or both) and the target age of the audience, which was typically apparent based on the age of the main character(s) depicted. If the age of the main character(s) was not obvious and the audience was not clearly specified in the narration, the coding rules instructed to code the advertisement as 'general audience'.

We selected all state and community campaigns for additional in-depth coding, since these represented a manageable set of videos encompassing a variety of executions. We coded eighty-six unique videos representing thirty-four campaigns, with between one and six representative videos coded per campaign. A number of codes addressed the persuasive potential of advertisements, including their elicitation of an emotional response, a feature associated with campaign effectiveness in some public health contexts⁽²⁷⁾.

Specifically, advertisements were coded for their overall emotional valence, defined by whether or not the advertisement includes images or narration evoking emotion that is positive (i.e. hope, humour, laughter), negative (i.e. fear, sadness, horror) or neutral. Since graphic imagery is frequently used in fear appeals⁽⁴⁹⁾, we also coded instances where advertisements contained strikingly vivid, realistic images that illustrated the harmful and life-threatening effects of unhealthy behaviours. Given that some recent health marketing campaigns have drawn publicity for their use of humour⁽⁵⁰⁾, we also coded advertisements that had elements perceived as intended to inspire laughter. We further coded for whether advertisements presented negative health consequences of an unhealthy lifestyle, noting mentions of specific disease risks such as diabetes and heart disease; such depictions may or may not employ graphic images or evoke negative emotion⁽²⁷⁾. Since use of statistics in depicting health effects may have implications for message effectiveness⁽⁵¹⁾, we coded advertisements for inclusion of any statistics about obesity-related diseases, such as prevalence rates or risk levels among obese individuals. We also adapted codes related to adoption type⁽¹⁵⁾, focusing on whether advertisements promoted adoption/increase of healthy behaviours (such as daily physical activity), cessation/reduction of unhealthy behaviours (such as screen time or unhealthy food consumption), or did both.

We further coded advertisements for additional elements that have recently been emphasized or debated in the public health community's framing of the obesity epidemic. Given recent calls for obesity-prevention efforts to address sedentary screen time and the ubiquity of heavily marketed unhealthy foods, we coded for any explicit references to screen time and also for any images or mentions of unhealthy food products: 'fast food' products sold in restaurants or stores with preheated or precooked ingredients and served to the customer in a packaged form for take-out (e.g. burgers and fries); 'junk food' such as bags of chips, cookies, doughnuts or candy; and SSB including sodas, sports drinks, sweetened tea, sweetened fruit drinks and punches. Some messages exclusively advocated behaviours related to SSB consumption and were coded as such. Since emphasis on body weight has recently drawn controversy in obesity-prevention campaigns, we also coded messages for any reference to overweight or obesity and for whether advertisements mentioned weight loss as one of the explicit goals of lifestyle change. We noted whether advertisements focused exclusively on obesity-prevention or whether they also advocated additional behaviour changes such as vaccination or smoking cessation. Finally, we coded advertisements for whether or not they linked to specific information sources or services, such as websites, call lines, health-care providers or social media.

Coding was performed by two experienced coders who referenced a codebook. We considered and piloted some additional message features, such as whether advertisements presented and addressed counter-arguments for

behaviour change⁽⁵¹⁾, but eventually dropped codes where we could not achieve good levels of inter-rater reliability. In other cases, codes were aggregated to improve reliability. For example, positive and neutral emotional valence were initially coded separately but later aggregated since they proved difficult for coders to distinguish. In a double-coded sample of thirty-five videos, κ for our final codes ranged from 0.62 to 1.00, with an average of 0.77 across twenty variables. Since κ is an especially conservative estimate of inter-rater reliability when code frequency is unbalanced⁽⁵²⁾, we retained codes with relatively low κ (under 0.7) in certain cases where they had low occurrence in the data (use of humour and mentions of screen time). In these cases, κ may also have suffered from the subjectivity involved in identifying humour and from the variety of language through which references to 'screen time' can be conveyed. Coding discrepancies in the overlap sample were adjudicated by consensus. Content elements of individual advertisements were aggregated to the campaign level in presenting our results.

Results

Household exposure to televised obesity-prevention advertising increased from 2.3 to 3.0 advertisements per month between 2010 and 2011, a 31% increase that was driven largely by exposure to federal advertisements (Table 1). Non-profit and state-sponsored advertisements declined (by 60% and 72%, respectively), whereas community advertisements were minimal in 2010, but increased by 545% in 2011, exceeding state advertising. This increase largely reflected CPPW-funded efforts; for the year 2011, eleven CPPW-funded campaigns accounted for approximately 87% of community exposure (see Appendix). In 2011, federal campaigns accounted for 62% of exposure, television station-sponsored PSA for 17%, non-profit organizations for 9%, community health departments for 8%, and state health departments for 3%. The non-profit organizations with highest exposure during the study were America on the Move Foundation, the American Diabetes Association and the American Heart Association. The television station-sponsored PSA with the highest exposure was the More You Know campaign on NBC.

Table 2 describes variation in exposure by viewer age and DMA for 2010 and 2011. Adults (18+ years) were exposed to more monthly obesity-prevention advertisements (1.4) than children (1.2) or teens (0.9). Children were the most exposed group for federal campaigns (0.7 advertisements per month). There was wide variation in household exposure by DMA, with an SD of 1.3 monthly advertisements and a sevenfold difference between the most exposed market (Columbus, OH) and the least (Omaha, NE). Variation was highest for community advertising and lowest for federal advertising. Although exposure to state and community campaigns was low when averaged across all seventy-five DMA, mean exposure was considerably higher when considering only the DMA with non-zero exposure levels, with 0.6 state advertisements per month across thirty DMA and 0.5 community advertisements per month across twenty DMA. State and community campaigns represented at least a third of obesity-prevention exposure in a number of markets, reflecting a combination of efforts through CPPW, Champions for Change (in California and Arizona) and other programmes. These markets were: Tucson, AZ; Los Angeles, CA; Fresno, CA; San Antonio, TX; Phoenix, AZ; Sacramento, CA; and Flint, MI.

Table 3 shows exposure, main message and targeting of federal campaigns. Increasing federal exposure from 2010 to 2011 corresponds largely to the late 2010 launch of the Let's Move campaign, which accounted for 69% of federal exposure by 2011. A number of additional federal campaigns were associated with modest ratings and were typically targeted towards youth. Physical activity was advocated in 83% of federal campaigns and dietary change in 67%, with 50% advocating both.

Of a total of thirty-four state and community campaigns that we content-coded (Table 4), nineteen were community efforts, fourteen were state efforts and one was sponsored by the Cherokee Nation in Oklahoma. Only three (9%) targeted youth while the rest targeted general audiences (47%) or parents (44%). Healthy eating was advocated in 85% of campaigns and physical activity in 65%, with 53% advocating both. Fifty-six per cent of campaigns included specific nutritional recommendations, such as counting calories, reducing SSB, drinking low-fat milk, or eating fruits, vegetables or whole grains. Three campaigns (9%) focused primarily on SSB consumption. The

Table 1 Monthly obesity-prevention advertisements viewed by US households, 2010–2011

Sponsoring organization	Advertisements per month, 2010	Advertisements per month, 2011	Change (%)
Federal	0.8	1.8	128
Non-profit organization	0.7	0.3	–60
Television station	0.4	0.5	40
State	0.3	0.1	–72
Community	0.0	0.2	545
Total*	2.3	3.0	31

*Exposure levels by sponsoring organization may not sum to total row numbers due to rounding.

Table 2 Monthly obesity-prevention advertisements viewed by US households, by age and designated market area (DMA), 2010–2011

Sponsoring organization	Average exposure for top 75 DMA				Variation in household exposure by DMA*				
	Age 2–11 years	Age 12–17 years	Age 18+ years	Households	sd	sd/mean (%)	Minimum	Maximum	Markets
Federal	0.7	0.5	0.6	1.3	0.4	31	0.8 (Charlotte, NC)	2.5 (Tulsa, OK)	75
Non-profit organization	0.3	0.2	0.3	0.5	0.5	93	0.2 (Charlotte, NC)	2.9 (Denver, CO)	75
Television station	0.1	0.1	0.3	0.4	0.6	145	0.2 (Omaha NE)	5.7 (Columbus, OH)	75
State	0.0	0.1	0.1	0.2	0.7	124	0.003 (Tulsa, OK)	2.5 (Tucson, AZ)	30
Community	0.0	0.0	0.1	0.1	0.8	156	0.004 (Seattle, WA)	3.5 (Tucson, AZ)	20
Total	1.2	0.9	1.4	2.6	1.3	51	1.3 (Omaha, NE)	9.3 (Columbus, OH)	75

*Calculated for DMA with exposure.

Table 3 Gross rating points (GRP) and content for federal televised obesity-prevention campaigns, USA, 2010–2011

Campaign name	Department(s)	Partners	Target audience	Main message(s)	Exposed markets	Average annual GRP*	
						2010	2011
Small Step	DHHS	Ad Council	General, youth	Healthy eating, physical activity	75	412.8	347.3
Let's Move	DHHS, USDA	Ad Council	Youth	Healthy eating, physical activity	75	237.3	1526.2
MyPyramid	USDA	Ad Council	Youth	Healthy eating, physical activity	75	153.8	55.9
WIC	USDA		Parents	Healthy eating	18	314.5	233.6
Spot the Block	DHHS		Youth	Healthy eating	75	33.0	69.7
Play 60	USDA	National Dairy Council, NFL, Ad Council	Youth	Physical activity	75	25.5	61.4
5 a day	USDA		General	Healthy eating, physical activity	75	23.0	0.1
Be a Player	DHHS	Ad Council	Youth	Physical activity	26	16.2	14.3
Action Hero Alliance	DHHS		Youth	Physical activity	75	1.2	57.6
The Heart Truth	DHHS	Cheerios	General	Healthy eating, physical activity	3	8.4	5.0
Healthier US Veterans	VA		Veterans	Healthy eating, physical activity	9	1.1	1.7
We Can!	DHHS		Parents	Physical activity	37	0.0	40.5

WIC, Special Supplemental Nutrition Program for Women, Infants, and Children; DHHS, US Department of Health and Human Services; USDA, US Department of Agriculture; VA, US Department of Veterans Affairs; NFL, National Football League; DMA, designated market area.

*Calculated for DMA with exposure; advertisements per month can be derived by dividing GRP by 100.

Table 4 State and community televised obesity-prevention campaign characteristics, USA, 2010–2011

	<i>n</i>	%
Sponsor		
State	14	41
Community*	20	59
CPPW-funded	12	35
Private partners named	4	12
Resources provided		
Website	30	88
Call line	12	35
Seek health care/advice	4	12
Social media	1	3
Target audience		
General	16	47
Parents/expectant parents	15	44
Youth	3	9
Main message(s)		
Healthy eating	11	32
Physical activity	4	12
Both	18	53
Neither	1	3
Nutritional recommendations	19	56
Additional public health messages	10	29
SSB focus	3	9
Emotional and graphic content		
Positive or neutral emotional valence	32	94
Negative emotional valence	2	6
Humour	5	15
Graphic imagery	1	3
Health consequences		
Long-term health consequences	12	32
Includes disease statistics	5	15
Obesity/overweight mention	16	47
Weight loss mention	3	9
Adoption type		
Commencement/increase	21	62
Cessation/reduction	4	12
Both	8	24
Neither	1	3
Factors in obesity		
Image or mention of fast/junk food	7	21
Image or mention of SSB	6	18
Mention of screen time	5	15

CPPW, Communities Putting Prevention to Work; SSB, sugar-sweetened beverages.

*Includes Cherokee Nation, Oklahoma.

majority of these campaigns directed viewers to additional resources, typically websites. Twenty-nine per cent of campaigns included additional public health messages such as alcohol awareness, breast-feeding benefits or anti-smoking.

The long-term consequences of an unhealthy lifestyle were mentioned in twelve campaigns (32%); these included diabetes (29%) and heart disease (15%). Five campaigns (15%) included statistics about obesity-related diseases. Obesity or overweight was mentioned in sixteen campaigns (47%), but only three of these campaigns (9%) directly encouraged weight loss.

Campaigns typically encouraged initiation of new behaviours (62%) rather than cessation/reduction of unhealthy behaviours (12%). Eight campaigns (24%) did both. The emotional valence of campaigns was neutral or positive in thirty-two campaigns (94%) and negative in two (6%). Humour was used in five campaigns (15%) and graphic imagery was present in only one (3%).

Discussion

Despite its association with increased sedentary screen time and exposure to advertising for unhealthy foods⁽⁵³⁾, ironically television may also play a role in obesity prevention by providing information that empowers viewers to make healthier choices. However, our previous research showed that between 1999 and 2003, average household exposure to televised obesity-prevention advertising was low, with state and community obesity-prevention campaigns airing in a small minority of DMA⁽³²⁾. While federal obesity-prevention campaign ratings in 2010 and 2011 were exceeded by the VERB campaign in 2002 and 2003, state and community ratings were consistently higher in the current study (a 100% increase between 2003 and 2010). By 2010–2011, average household exposure to governmental obesity-prevention campaigns was 1.6 advertisements per month. Additional exposure came from non-profit campaigns (0.5 exposures per month) and television station-sponsored PSA (0.4 exposures per month). In total, the average household exposure to public health obesity-prevention messages was 2.6 advertisements per month in 2010–2011. Exposure increased by 31% across the two years from 2.3 advertisements per month in 2010 to 3.0 in 2011.

The present study suggests some recent shifts in the sponsorship of obesity-prevention messages. Increases in exposure from 2010 to 2011 were driven largely by the introduction of the federal Let's Move campaign. Between 2010 and 2011, there were declines in advertising sponsored by non-profit organizations and state health departments, but increases in advertising funded by community health departments. Declines in state advertising in part reflect the wane of the Champions for Change campaign in California and Arizona, which garnered high ratings in 2010. The declines in state and non-profit exposure in 2011 also may reflect substitution effects as the federal government and community departments play a larger role in obesity-prevention efforts. Non-profit organizations may increasingly serve as partners for governmental campaigns rather than acting as primary sponsors of advertising⁽³⁶⁾. Different sponsoring organizations were associated with different messaging strategies, with federal campaigns typically targeting youth and state/community campaigns targeting general audiences or parents; this targeting is consistent with our finding that youth were more exposed than adults to federal campaigns. Compared with state/community campaigns, federal campaigns advocated physical activity more (83% *v.* 65%) and advocated dietary change less (67% *v.* 85%).

Beyond achieving sufficient levels of exposure among target populations, public health television campaigns rely upon effective communication strategies to transform attitudes and behaviours. Our content analysis of state and community campaigns reveals several features of these campaigns that may be associated with effectiveness. First,

whereas most state campaigns from 1999 to 2003 featured either a physical activity or dietary change message⁽³²⁾, we found that most campaigns in the current study referenced both obesity-prevention strategies (53%). Most campaigns also included concrete messages about which foods to seek out or to avoid (56%). These characteristics have been associated with effectiveness⁽²⁴⁾. Campaigns were more likely to encourage commencement/increase of healthy behaviours than cessation/reduction of unhealthy behaviours, a characteristic associated with larger effect size among health campaigns⁽¹⁵⁾. A number of campaigns referenced unhealthy foods (21%) or SSB (18%), although implications of the food industry in rising obesity rates varied in explicitness. Among tobacco-prevention campaigns, those highlighting the role of industry have been associated with effectiveness⁽⁵⁴⁾.

Other campaign elements may not be optimal. For example, while the vast majority of advertisements referenced websites, social media resources were provided by only one campaign. Health departments underutilize new media relative to food companies⁽⁵⁵⁾, and may be losing out on an important avenue of communication.

The effectiveness of other campaign elements we examined is unclear. In particular, it remains unknown whether negative emotion and graphic imagery in obesity-prevention advertisements are associated with greater persuasive potential than other approaches, although evidence from other areas of public health messaging suggests that such appeals may sometimes be particularly effective, especially when they motivate fear in the context of viewers' high levels of efficacy^(56–58). While a few recent obesity-prevention campaigns drew controversy for fear appeals⁽³⁷⁾, we found that the majority of state and community campaigns in the present study had positive or neutral emotional valence. Campaigns were in fact more likely to include humour (five campaigns), an approach that is substantially less studied in the context of public health messaging but well established in other areas of advertising⁽⁵⁹⁾. The only campaigns identified with a negative emotional valence were the Change the Future, West Virginia campaign and the Pouring on the Pounds campaign from New York City Department of Health. The latter was the only campaign that included graphic imagery (fat poured from a soda bottle and images of heart attack and amputation). While some prior studies have focused on depiction of negative health effects as a pathway to achieving an emotional reaction or fear response⁽⁶⁰⁾, we further found that a number of campaigns mentioned obesity-related diseases without achieving an overall negative valence and without use of graphic imagery. Even where they do not produce substantial negative emotional arousal, appeals related to the long-term effects of unhealthy behaviours may nevertheless be effective in some contexts⁽²⁷⁾.

Controversy has also emerged over whether campaigns that advocate healthy lifestyles should do so with or

without reference to body image and weight⁽⁴⁶⁾. Recently, some obesity-prevention advertising generated controversy for its tone with regard to weight status. For example, the Stop Sugarcoating it, Georgia campaign by Children's Healthcare of Atlanta, which launched in 2010, drew controversy for its portrayal of obese children as victims of bullying and low self-esteem. While some maintain that the campaign's message is consistent with the serious consequences of childhood obesity, others argue that the advertisements reinforce fat stigma^(37,44). Campaigns that emphasize weight or size without specifying concrete behaviours such as food choices or physical activity may not only elevate stigma but could also mislead viewers regarding the relationship between weight and health^(4,43,61). Such campaigns may also be less motivating than those focused on concrete behaviour changes⁽⁴⁶⁾. In the present study, we found that nearly half of the thirty-four content-coded state and community campaigns mentioned obesity or overweight; yet, most advocated behavioural change across the board regardless of weight status, with few advocating weight loss specifically. It is unknown whether non-profit or television station-sponsored PSA campaigns were more likely to emphasize body image.

We found that a number of campaigns reflected alliances between health organizations and private partners. Public-private partnerships reflect the desire of public entities to disseminate their messages more widely and of companies to gain credibility or to position products as healthful⁽⁶²⁾. Although we did not examine them in the present study, some food companies have produced their own campaigns emphasizing the importance of health. Industry-sponsored healthy lifestyle initiatives and corporate social responsibility campaigns have potential to inspire positive changes, but may also obscure the health impacts of commercial products^(63,64). This ambiguity extends to television stations, with one study showing that, despite Nickelodeon's role in sponsoring healthy lifestyle campaigns such as Let's Just Play, eight of ten foods, beverages and restaurant meals advertised through its television station, magazine or characters were unhealthy⁽⁶⁵⁾. Likewise, the character Shrek is featured in the DHHS Be a Player campaign, but has also been noted as a spokesperson for companies such as McDonald's, M&Ms and Kellogg's, all of which market unhealthy foods to children⁽⁵³⁾. It is unknown how dual associations of characters and brands may dilute health-promoting messages.

Considerations of television's role in obesity have typically focused on the unhealthy effects of increasing screen time and the pervasiveness of obesogenic advertisements. In the USA, youth are exposed to frequent television commercials for foods and beverages, which have been associated with consumption behaviours and body-weight outcomes^(66–69). The Federal Trade Commission recently reported that forty-eight food and beverage companies spent \$US 1.8 billion on youth-targeted marketing in

2009⁽²⁸⁾. Despite industry self-regulation through the Children's Food and Beverage Advertising Initiative, nutritional content analyses show that the vast majority of food and beverage advertising seen by children is for unhealthy products^(70,71). In a recent study of children's programming, over 95% of such advertisements were for products high in saturated fat, *trans*-fat, sugar or sodium⁽³⁰⁾. The Rudd Center reported that, in 2010 and 2011, individuals aged 2–11, 12–17 and 18–49 years were exposed to thirteen, sixteen and twenty advertisements for food and beverages per day, respectively⁽⁷²⁾. By comparing these exposure levels with the obesity-prevention exposure levels from the present study, we estimate that food and beverage advertisements were viewed over 300 times as often as obesity-prevention advertisements among children aged 2–11 years, over 500 times as often for teenagers aged 12–17 years and over 400 times as often among adults.

Despite increasing exposure between 2010 and 2011, it remains unclear whether public health obesity-prevention campaigns have achieved levels of exposure sufficient to produce significant effects in target populations. In a review article examining effects of anti-tobacco television advertising, researchers argued that campaigns require an average of 4800 GRP per year (forty-eight exposures) in order to achieve significant reductions in adult smoking prevalence⁽⁷³⁾. In the current study, we note that the only state/community campaigns to achieve a comparable threshold were the Champions for Change campaign in Los Angeles in 2010 and the CPPW-funded Healthy Pima campaign in Tucson in 2011. No federal obesity-prevention campaign achieved this threshold in any of the top seventy-five media markets. Taking all obesity-prevention advertising together, fourteen markets achieved the 4800 GRP threshold in one or more study years, but on average – across all media markets – exposure levels were much lower (thirty-six annual exposures in 2011). Without further research on the relationship between campaign exposure and population obesity rates, it is difficult to evaluate whether obesity-prevention campaigns are achieving appropriate exposure levels. It is important to note that obesity-prevention efforts differ substantially from anti-smoking efforts in that exposure may inspire more incremental changes related to a number of behaviours encompassing both physical activity and dietary choices; these changes may have important impacts on individuals' health.

The present study has several limitations and raises questions for future research. First, it is a descriptive study of campaign exposure and content, and we do not know whether or how campaigns impacted viewers' attitudes and behaviours; nor do we capture interventions in the community that may have been made in concert with media campaigns. Second, the present research focused on aggregate exposure and did not examine relative exposure by race or ethnicity. Such examinations would be useful given variation in rates of obesity and targeted food advertising⁽⁷⁴⁾, as well as possible variation in

response to advertising. Third, our two-year study period does not allow us to look longitudinally at changes in advertising content over time. Furthermore, while we capture some CPPW-funded efforts, additional campaigns have subsequently launched through CPPW as well as the DHHS Community Transformation Grant Program, which allocated \$US 103 million to sixty-one state and local government agencies, tribes and territories, and non-profit organizations in thirty-six states in 2011⁽⁷⁵⁾. Fourth, our data set excludes advertisements that were aired only via spot cable, including the Philadelphia Department of Public Health's campaign focused on SSB consumption⁽²²⁾. For this reason, we may have underestimated the true extent of obesity-prevention advertising; however, spot cable likely represents a small minority of such advertising, and we were able to locate all other campaigns from the study period that we identified through our literature review. Fifth, we did not content-code non-profit or television station-sponsored campaigns, which accounted for a non-trivial fraction of obesity-prevention advertising. It is unknown to what extent these campaigns incorporate evidence-based health communication strategies. Finally, although television remains the most dominant advertising medium, it nevertheless provides a limited window by which to estimate the amount of food and obesity-prevention advertising to which households are exposed, with new media playing a growing role especially for youth^(28,76). Fast-food marketers increasingly leverage websites such as Facebook and Twitter to network with customers and offer promotions, and some have also developed advergames and smart phone applications^(77,78). While some state and community health departments have adopted social media platforms^(79,80), they underutilize them relative to food companies⁽⁵⁵⁾.

Exposure to televised obesity-prevention advertising appears to be increasing through efforts such as the federal Let's Move campaign and the CPPW grant programme. Nevertheless, exposure is extremely low relative to food advertising and varies widely by DMA. Despite recent controversy surrounding graphic or potentially stigmatizing obesity-prevention campaigns, we found that most state and community campaigns had neutral or positive emotional valence, advocated concrete behaviour change and did not advocate weight loss specifically. Further assessments of obesity-prevention and obesogenic media messages should examine the behavioural impact of these advertisements in target populations at high risk for obesity and must also account for the increasing role of new media.

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Appendix

State and community televised obesity-prevention campaigns, USA, 2010–2011

Campaign	State	Community	CPPW	2010 GRP	2011 GRP
Champions for Health	AL	Jefferson County	yes	662	715
Champions for Change	AZ			5047	4198
Healthy Pima	AZ	Pima County	yes	0	8515
Champions for Change	CA			15039	211
Healthy Works	CA	San Diego	yes	0	748
Flat 14ers	CO	Tri-county	yes	153	313
Cuidandose de la Diabetes*	CO	Weld County		1	19
Moderate exercise message	FL	Escambia County		73	0
Make Healthy Happen Miami	FL	Miami-Dade	yes	0	2032
Fit City	IN	Marion County		14	0
Eat Smart Play Hard	KS			0	229
Healthy Hometown	KY	Louisville	yes	0	1133
Healthy ageing message	MA			271	270
SugarSmarts	MA	Boston	yes	0	1266
Breastmilk: Every Ounce Counts	MI			3872	1401
Get Growing with WIC	MI			0	95
Eat Smart, Move More	NC			218	1
Smart Start	NC			13	0
Healthy Moms Have Healthy Babies	NC	Guilford County		0	13
10 pounds in 10 weeks	NV	Clark County (Southern Nevada Health District)	yes	218	0
WIC breast-feeding message	NY			898	0
Pouring on the Pounds	NY	New York City		87	937
Healthy Ohio	OH			1742	199
GetUp	OH	Dayton & Montgomery County		430	0
Tulsa Play	OK	Tulsa		1008	1703
Diabetes Prevention Program	OK	Cherokee Nation	yes	0	692
Diabetes Prevention and Management	OR	Baker County		0	18
Cut Back the Sugar	RI			0	1467
Eat Smart, Move More	SC			920	0
Breastmilk: Every Ounce Counts	TX			2952	0
SABalance	TX	San Antonio	yes	0	2492
Power Your Life	UT			363	0
Step Up Spokane	WA	Spokane		95	127
Let's Do This! King County	WA	King County	yes	0	9
Change the Future WV	WV	Mid-Ohio Valley	yes	412	1009
All state and community				34 488	29 811

CPPW, Communities Putting Prevention to Work; GRP, gross rating points; WIC, Special Supplemental Nutrition Program for Women, Infants, and Children.
 *Spanish-only campaign, not coded for content.