

Effects of Sugary Drink Countermarketing Videos on Caregivers' Attitudes and Intentions to Serve Fruit Drinks and Toddler Milks to Young Children

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Objectives. To test the effects of countermarketing videos addressing common misperceptions about ingredients and claims on children's sugary drinks.

Methods. We conducted an online randomized controlled experiment in January 2021 with US caregivers (n = 600) of young children (aged 8–37 months) to assess the effects of watching countermarketing versus control videos on intentions to serve sugary and healthy drinks (6-point scales) and attitudes (10-point scales) about fruit drinks and toddler milks.

Results. The countermarketing videos significantly reduced positive attitudes about fruit drinks (mean difference = 0.92) and toddler milks (mean difference = 2.10), reduced intentions to serve both (mean difference = 0.50 and 0.92, respectively), and increased intentions to serve plain milk (mean difference = 0.52) versus control videos (all *P*s < .001). Intentions differed by individual characteristics, but the videos remained effective after we controlled for these characteristics. Moreover, the videos were more effective for toddler milks versus fruit drinks, and effects on fruit drink intentions were greater for Black versus White caregivers and caregivers of children aged 24 months or younger.

Conclusions. A countermarketing campaign aimed at diverse caregivers of young children designed to correct misleading children's drink marketing presents a promising public health approach for reducing sugary drink consumption in the first 1000 days. (*Am J Public Health.* 2022;112(S8):S807–S816. <https://doi.org/10.2105/AJPH.2022.307024>)

Reducing high levels of sugary drink consumption by young children represents a critical public health goal to prevent obesity and other diet-related diseases. Consumption of sugary drinks increases rapidly from 9% of infants (6–12 months) to 46% of children aged 2 to 4 years.¹ Higher sugary drink consumption, especially fruit drinks, among Black children also contributes to health disparities affecting

their communities.² The first 1000 days is a critical time to establish healthy dietary preferences, and sugar consumption at this age may condition long-term sweet preferences and reduce acceptance of plain milk and water.^{1,3,4} Therefore, experts recommend public health strategies to promote water and plain milk and reduce sugary drink consumption among infants and toddlers.^{2,5} Media campaigns to educate

consumers about health consequences of sugary drink consumption have successfully reduced soda sales,⁶ and a media campaign aimed at parents of young children could also help reduce sugary drink consumption during the first 1000 days.

Two sugary drink categories raise special concerns for young children. Fruit drinks (fruit-flavored drinks with added sugar, nonnutritive sweeteners,

or both and little or no juice) represent the majority of sugary drinks consumed by children aged younger than 5 years¹ and the greatest source of added sugar in the diets of toddlers.⁷ Although toddler milks (typically milk-based powdered beverages containing added sugars and vegetable oil) are a relatively recent product category, more than 40% of toddler caregivers reported serving toddler milk,⁸ and volume sales almost tripled over 10 years (2006–2015).⁹ In addition to added sugar, toddler milks contain less protein and more sodium and cost more than plain cow's milk²; thus, health experts recommend against serving them.⁵

Marketing also contributes to misperceptions of product healthfulness and benefits.^{10–13} Parents often believe that popular brands of children's fruit drinks are healthy¹⁰ and that toddler milks provide nutrition not available from other food and drinks.⁸ Parents look for nutrition-related claims such as "vitamin C" and "real/natural" when choosing children's drinks,¹⁰ which average 4 such claims on product packages.^{14,15} Child-development claims on toddler milk packages, together with common advertising messages, also imply benefits for children's growth, cognitive development, and picky eating.¹⁶ Moreover, cross-branding of fruit drinks and toddler milks with healthier products (100% juice and infant formula) contributes to misperceptions about product healthfulness and confusion between different drinks offered by the same brands.^{11,17} Caregivers' trust in infant formula brands also spills over as trust and positive attitudes about cross-branded toddler milks.¹¹

Therefore, an educational campaign aimed at caregivers of young children (9–36 months), the age when most first

consume sugary drinks, may be an effective strategy for reducing consumption. Focus groups with parents of infants and toddlers identified common misunderstandings about fruit drinks and toddler milks that led to misperceptions about the healthfulness of these products for young children, including confusion about product ingredients, what qualifies as a "sugary drink," and incorrect inferences about the meaning of product claims.¹¹ In the groups, participants received information to correct these misperceptions, which led to more negative attitudes about the drinks and some anger at companies for their misleading marketing tactics.

In this study, we tested the effects of viewing 2 short videos designed to counteract common misperceptions about fruit drinks and toddler milks that could be disseminated on social media. We hypothesized that viewing these videos would reduce positive attitudes about fruit drinks and toddler milks and intent to serve these drinks. We also tested whether they increased parents' intent to provide plain milk or water and reduced positive attitudes about companies. We also explored potential individual differences in video effectiveness.

METHODS

We conducted an online randomized controlled experiment with 600 US caregivers of young children (aged 9–36 months) in January 2021. Participants were randomly assigned to view either 2 sugary drink countermarketing videos or 2 control videos. They then completed a survey to assess effects of viewing the countermarketing videos compared with the control group (the Video Experiment Survey is available as

a supplement to the online version of this article at <https://www.ajph.org>). The study was registered with AsPredicted.org (https://aspredicted.org/blind.php?x=KB7_W7M).

Participants

An online panel company (InnovateMR)¹⁸ invited panel members with a child aged 9 to 36 months to participate, with quotas for Hispanic and Black (150 participants each) and oversampling of Asian American caregivers. InnovateMR recruits panel members from diverse online sources through banner ads on social media and special-interest Web sites. It provides points for participation on the panel to be redeemed as online gift cards. InnovateMR sent an e-mail to eligible panel members with a link to the survey via Qualtrics survey software (Qualtrics, Provo, UT). Interested panel members first read a screen that provided the study information and checked a box to indicate agreement to participate.

Stimuli

The sugary drink countermarketing videos were adapted from a previously successful healthy eating campaign aimed at parents of infants.¹⁹ Addressing caregivers of toddlers, the videos presented information to counteract common misperceptions about children's fruit drinks and toddler milks in a positive and entertaining manner. The fruit drink video provided information about ingredients, including added sugar, fruit juice, and diet sweetener content. The toddler milk video defined the products and stated that they contain added sugar, cost 4 times as much as plain milk, and their marketing claims are not supported by science.

Both videos stated that pediatricians do not recommend them and concluded with the message that plain milk and water are the only drinks that toddlers need. Pretesting with an online sample of caregivers ($n = 146$) confirmed understanding of video messages (unpublished data).

The control videos conveyed information about limiting screentime and caregivers co-viewing screens with their child. They were selected to match the sugary drink videos in tone, age of child, and production quality. All videos were less than 60 seconds and designed to be shared on social media. See Appendix (available as a supplement to the online version of this article at <https://www.ajph.org>) for screenshots of the videos in both conditions. The actual videos are available at <https://uconnruddcenter.org/healthydrinksfortoddlers>.

Survey and Measures

After completing eligibility screening questions, participants provided information about their 9- to 36-month-old child. If they had more than one child in this age range, they were instructed to answer questions about the child whose name came first in the alphabet. They first answered questions to assess frequency of serving fruit drinks, toddler milks, plain water, plain and flavored milk, and other sugary drinks to their young child in the past week, and their own consumption of sugary drinks. Responses ranged from "Never" to "3 or more times per day" (7-point scale). To disguise the intent of the survey, participants answered similar questions about their child's use of TV and other screens.

Participants were then randomly assigned to view the countermarketing or control (screentime) videos. After

watching each video, participants rated how much they liked the video; if they thought it was boring, believable, informative, and relevant; and if they would share it on social media. Responses ranged from strongly disagree (1) to strongly agree (6). Following viewing of both videos, all participants then answered questions to measure the dependent variables in the experiment, including behavioral intentions, attitudes, and normative beliefs about fruit drinks and toddler milks. Participants in both conditions answered similar questions about their child's TV viewing and other screen usage and attitudes and normative beliefs about screen usage.

Participants answered 5 questions each to assess attitudes about fruit drinks and toddler milks using 10-point semantic differentiation scales: from harmful to beneficial, foolish to wise, bad to good, inconvenient to convenient, and waste of money to good value for money. Next, participants indicated whether they planned to serve fruit drinks and toddler milks to their child in the next month and their plans to serve more plain water and plain milk. Those who had reported serving fruit drinks, toddler milks, or both in the past month also indicated whether they planned to cut back on serving the drink. Three normative belief questions asked whether family, friends, and community members often serve fruit drinks or toddler milks to their young children. Participants then indicated agreement with 3 positive statements about food and beverage companies and the importance of looking closely at nutrition labels. Responses to behavioral intentions, normative beliefs, and other attitude questions ranged from strongly disagree (1) to strongly agree (6). Finally, participants provided demographic information.

All questions were adapted from measures used in previous studies, including frequency of serving drinks,²⁰ ratings of public service videos,^{21,22} and attitude, behavioral intentions, and normative beliefs questions.^{21,23} Pretesting with a small convenience sample ($n = 20$) confirmed that survey questions were clear and easy to answer.

Analyses

We averaged participants' responses (from harmful to beneficial, foolish to wise, and bad to good) to create positive attitude scales for fruit drinks (Cronbach's $\alpha = 0.96$) and toddler milks (Cronbach's $\alpha = 0.96$). We also averaged answers to the normative beliefs questions to create scales for fruit drinks (Cronbach's $\alpha = 0.90$) and toddler milks (Cronbach's $\alpha = 0.92$), as well as the food company attitude questions (Cronbach's $\alpha = 0.84$). Responses to convenience, value, and nutrition label questions remained as separate variables.

Categorical variables used in the analysis included caregiver gender, education, Hispanic ethnicity, race, and participation in Supplemental Nutrition Assistance Program (SNAP) and Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). Children's ages were coded into 3 groups: 8 to 12 months, 13 to 24 months, and 25 to 37 months. We excluded participants who provided a birth date for their child that was more than 1 month outside of the specified age ranges (i.e., < 8 or > 37 months) from the final sample. Participants who reported serving fruit drinks or toddler milks to their child 1 or more times in the past week were coded as "served fruit drinks" or "served toddler milks," respectively.

We used the χ^2 test to assess equal random assignment of individual characteristics between conditions. We used the independent sample *t* test to measure differences between conditions in video ratings and all dependent variables. We calculated effect sizes by using Cohen's *d*. We used multivariate analyses of variance to explore potential individual differences and interaction effects on intent to serve fruit drinks and toddler milks, with condition and different demographic characteristics as fixed factors.

RESULTS

Of the 1330 panel members who responded to the survey invitation, 587 declined to participate or did not meet eligibility criteria. An additional 107 participants did not complete the survey, 24 answered questions about a child who did not meet the age range requirements, and 12 were excluded for implausible responses: an 81% completion rate. The Consort Flow Diagram is available as a supplement to the online version of this article at <https://ajph.org>. The final sample (*n* = 600) was two thirds female, and approximately one third had a 4-year college degree or higher (Table 1).

Quotas ensured a diverse sample: 26% self-identified as Hispanic, and less than one half identified as White race only. Approximately one third each participated in SNAP and WIC. Of the children described in the survey, 20% were 12 months or younger, with the remainder approximately evenly divided between 13 to 24 months and 25 to 37 months. Overall, 66% reported serving fruit drinks to their child in the past week, and 50% reported serving toddler milks. Serving fruit drinks increased with child's age ($\chi^2[2, n = 600] = 19.78$;

TABLE 1— Demographic Characteristics of Survey Participants (n = 600): United States, January 2021

| | Frequency (%) ^a |
|--|----------------------------|
| Condition | |
| Control (screentime videos) | 298 (49.7) |
| Experiment (sugary drink countermarketing videos) | 302 (50.3) |
| Caregiver characteristics | |
| Gender | |
| Male | 163 (27.2) |
| Female | 414 (69.0) |
| Age, y | |
| 18–24 | 96 (16.0) |
| 25–34 | 318 (53.0) |
| ≥ 35 | 184 (30.7) |
| Education | |
| High school or less | 161 (26.8) |
| Some college or 2-y degree | 223 (37.2) |
| 4-y college degree | 135 (22.5) |
| Higher or professional degree | 80 (13.3) |
| Born in United States | 536 (89.3) |
| Hispanic ethnicity | 155 (25.8) |
| Race | |
| White only | 276 (46.0) |
| Black only | 195 (32.5) |
| Asian only | 60 (10.0) |
| Mixed or other | 47 (7.8) |
| SNAP participation | 209 (34.8) |
| WIC participation | 205 (34.2) |
| Child characteristics | |
| Age, mo | |
| 8–12 | 122 (20.3) |
| 13–24 | 231 (38.5) |
| 25–37 | 247 (41.2) |
| Gender | |
| Boy | 295 (49.2) |
| Girl | 304 (50.7) |
| Sugary drink provision (in past week) | |
| Served fruit drinks to their child, by age, mo | |
| 8–12 | 62 (50.8) |
| 13–24 | 152 (65.8) |
| 25–37 | 183 (74.1) |
| Served toddler milks to their child, by age, mo | |
| 8–12 | 73 (59.8) |
| 13–24 | 126 (54.5) |
| 25–37 | 100 (40.5) |
| Caregiver drank a sugary drink | 503 (83.8) |

Note. SNAP = Supplemental Nutrition Assistance Program; WIC = Special Supplemental Nutrition Program for Women, Infants, and Children.

^aNot all percentages add up to 100% because of missing responses.

$P < .001$, whereas serving toddler milks decreased with age ($\chi^2[2; n = 600] = 15.57; P < .001$). Nearly all participants (84%) reported that they themselves had consumed sugary drinks in the past week.

Equal numbers of participants were randomly assigned to watch the screen-time videos (control condition; $n = 298$) and the sugary drink countermarketing videos (experimental condition, $n = 302$). Comparisons of demographic characteristics by condition demonstrated successful random assignment (all P s $> .22$), with 1 exception. More participants in the control condition participated in WIC (37.6%) compared with the experimental condition (30.8%; $\chi^2[1, n = 600] = 3.07; P = .08$), although this difference was not statistically significant.

Evaluations of the control and sugary drink videos did not differ on liking, believability, informativeness, likelihood to share, and relevance (all P s $\geq .47$). Participants were less likely to rate the countermarketing videos as boring (mean = 1.44 out of 6; $SD = 1.37$) compared with the control videos (mean = 1.64; $SD = 1.33$; $t(598) = 1.86; P = .06$), although this difference was not statistically significant. Averaged video attitudes did not differ; participants rated both the control videos (mean = 4.86; $SD = 0.82$) and the countermarketing videos (mean = 4.89; $SD = 0.85$) positively, and overall ratings did not differ by condition ($P = .65$).

Effects of Viewing Countermarketing Videos

Watching the sugary drink videos had the hypothesized effects on most dependent variables (Table 2). The countermarketing videos significantly reduced caregivers' overall positive

attitudes about fruit drinks (mean difference = 0.92; 95% confidence interval [CI] = 0.52, 1.32) and toddler milks (mean difference = 2.10; 95% CI = 1.67, 2.53), as well as perceptions of product convenience and value. Watching the countermarketing videos also reduced positive attitudes about food and beverage companies (mean difference = 0.26; 95% CI = 0.06, 0.45). Effect sizes ranged from small (Cohen's $d \leq 0.28$) for reductions in food and beverage company attitudes and fruit drink convenience to large (Cohen's $d \geq 0.69$) for reductions in value and positive attitudes about toddler milks.²⁴

The sugary drink countermarketing videos also significantly reduced intentions to serve both fruit drinks (mean difference = 0.50; 95% CI = 0.22, 0.77) and toddler milks (mean difference = 0.92; 95% CI = 0.63, 1.21). Effect size was greater for reduced intent to serve toddler milks versus fruit drinks. Among caregivers who reported serving the drinks in the past week, the countermarketing videos significantly increased intentions to cut back on toddler milks (mean difference = 0.62; 95% CI = 0.24, 1.00), and increased intentions to cut back on fruit drinks, but the difference was not statistically significant (mean difference = 0.24; 95% CI = -0.18, 0.67). Viewing the countermarketing videos also significantly increased intentions to serve more plain milk (mean difference = 0.52; 95% CI = 0.30, 0.87), and increased intentions to serve more water, but the difference was not statistically significant (mean difference = 0.17; 95% CI = -0.03, 0.37; $P = .10$).

The videos did not significantly affect normative beliefs about serving either drink nor agreement that it is important to look closely at nutrition labels for children's drinks.

Potential Individual Differences in Video Effects

Across all individual characteristics tested, main effects of watching the sugary drink videos remained significant, indicating that the videos reduced intent to serve these drinks across diverse demographic groups. However, exploratory analyses identified some individual differences in intent to serve fruit drinks (Table 3) and toddler drinks (Table 4).

WIC participants reported higher intent to serve fruit drinks (mean = 3.61; 95% CI = 3.37, 3.84) compared with nonparticipants (mean = 3.27; 95% CI = 3.10, 3.43), but differences in intent to serve toddler milks were not significant. Caregivers who currently served fruit drinks also reported significantly higher intentions to serve the product (mean = 3.99; 95% CI = 3.84, 4.13) than those who did not serve them (mean = 2.20; 95% CI = 1.99, 2.40), and caregivers who served toddler milks (mean = 4.33; 95% CI = 4.06, 4.40) had higher intentions to serve them versus those who did not (mean = 2.20; 95% CI = 2.03, 2.37). Caregivers' intent to serve fruit drinks increased with child's age (mean = 3.06; 95% CI = 2.76, 3.36 [8–12 months] vs mean = 3.62; 95% CI = 3.41, 3.83 [25–37 months]). Intent to serve toddler milks declined by child's age, but the difference was not statistically significant (mean = 3.45; 95% CI = 3.12, 3.78 [8–12 months] vs mean = 3.02; 95% CI = 2.79, 3.24 [25–37 months]). Black caregivers also reported higher intentions to serve fruit drinks (mean = 3.68; 95% CI = 3.44, 3.91) compared with White caregivers (mean = 3.30; 95% CI = 3.10, 3.50). However, Black and White caregivers did not differ in intent to serve toddler milk products, and intent to serve both products did not differ by Hispanic ethnicity.

TABLE 2— Effects of Viewing Sugary Drink Countermarketing Videos: United States, January 2021

| | Screening Videos (Control; n = 298), Mean (SD) | Sugary Drink Videos (Experiment; n = 302), Mean (SD) | t(598) | P | Cohen's d |
|---|--|--|--------|--------|-----------|
| Attitudes about fruit drinks (1–10 scale)^a | | | | | |
| Overall positive ^b | 5.67 (2.48) | 4.74 (2.50) | 4.53 | < .001 | 0.37 |
| Convenient | 6.62 (2.72) | 5.81 (3.00) | 3.46 | .001 | 0.28 |
| Good value | 5.71 (2.83) | 4.58 (2.89) | 4.86 | < .001 | 0.40 |
| Attitudes about toddler milks (1–10 scale)^a | | | | | |
| Overall positive ^b | 6.98 (2.36) | 4.88 (2.93) | 9.66 | < .001 | 0.79 |
| Convenient | 6.67 (2.71) | 4.92 (3.27) | 7.15 | < .001 | 0.58 |
| Good value | 6.27 (2.86) | 4.18 (3.19) | 8.44 | < .001 | 0.69 |
| Intent to serve (1–6 scale)^c | | | | | |
| Fruit drinks ^d | 3.63 (1.69) | 3.13 (1.70) | 3.58 | < .001 | 0.29 |
| Toddler milks ^d | 3.67 (1.78) | 2.75 (1.86) | 6.18 | < .001 | 0.51 |
| Cut back on fruit drinks ^e | 4.01 (1.46) | 4.25 (1.43) | 1.69 | .09 | 0.17 |
| Cut back on toddler milks ^e | 3.52 (1.73) | 4.14 (1.63) | 3.20 | < .01 | 0.37 |
| More water ^d | 4.83 (1.23) | 5.00 (1.24) | 1.66 | .10 | 0.14 |
| More plain milk ^d | 4.27 (1.53) | 4.75 (1.50) | 3.92 | < .001 | 0.32 |
| Normative beliefs (1–6 scale)^{c,f} | | | | | |
| Fruit drinks | 4.42 (1.27) | 4.41 (1.27) | 0.11 | .92 | 0.01 |
| Toddler milks | 3.82 (1.50) | 3.62 (1.56) | 1.60 | .11 | 0.13 |
| Other attitudes (1–6 scale)^c | | | | | |
| Food and beverage companies (overall positive) ^g | 3.90 (1.13) | 3.64 (1.29) | 2.62 | .01 | 0.21 |
| Importance of reading nutrition labels ^h | 4.93 (1.18) | 5.03 (1.15) | 1.06 | .29 | 0.09 |

^aSemantic differentiation scale, "I think serving [fruit drinks/toddler milks] to my child is. . ."

^bAverage of harmful to beneficial, foolish to wise, bad to good.

^cAgreement scale (1 = strongly disagree to 6 = strongly agree).

^d"In the next month, I plan to serve [fruit drinks/toddler milks/more water/more plain milk] to my child."

^e"In the next month, I plan to cut back on serving [fruit drinks/toddler milks] to my child" was asked among those who reported serving fruit drinks (n = 397) or toddler milks (n = 299) in the past week.

^fAverage of "Members of my family," "My friends," and "Members of my community" "often serve [fruit drinks/toddler milks] to their young children."

^gAverage of "Food and beverage companies" "make nutritious products for children," "care about children's health," and "make it easy for parents to make healthy choices for their kids."

^h"It's important to look closely at the nutrition label on the drinks I buy for my child."

The only significant interaction between individual characteristics and video condition occurred in the model that assessed intent to serve fruit drinks by race. The effect of countermarketing videos on intent to serve fruit drinks was greater for Black versus White caregivers (mean difference = 0.78 and 0.12, respectively). The interaction between condition and child's age for intent to serve fruit drinks indicated that effects of the countermarketing videos may decline with child's age, but it was not statistically

significant. However, there were no other significant interactions between individual characteristics and condition for intent to serve fruit drinks and no interactions for toddler milks. Therefore, the countermarketing videos similarly reduced intentions to serve the products across most demographic groups.

DISCUSSION

Viewing videos designed to educate caregivers of young children about the

healthfulness of fruit drinks and toddler milks significantly reduced positive attitudes about these drinks and intentions to serve them to their child. The videos also reduced positive attitudes about food and drink companies, indicating a potentially effective countermarketing message. Countermarketing campaigns that highlight industry manipulation of consumers and negative health consequences of marketing practices have been used effectively to counteract tobacco advertising and can

TABLE 3— Intent to Serve Fruit Drinks: Effects of Sugary Drink Countermarketing Videos by Individual Characteristics, United States, January 2021

| | Mean (95% CI) | | Main Effect, F (P) | | Interaction, F (P) |
|--------------------------|-------------------|-------------------|---------------------------|-------------------------|----------------------|
| | Control | Experiment | Individual Characteristic | Condition | |
| WIC status | | | F(1596) = 15.60 (.02) | F(1596) = 26.99 (.002) | F(1596) = 0.72 (.62) |
| Participant (n = 205) | 3.80 (3.48, 4.11) | 3.42 (3.08, 3.76) | | | |
| Nonparticipant (n = 395) | 3.53 (3.28, 3.77) | 3.01 (2.78, 3.23) | | | |
| Served in past month | | | F(1596) = 199.75 (<.001) | F(1596) = 17.43 (<.001) | F(1596) = 0.23 (.63) |
| Yes (n = 397) | 4.22 (4.01, 4.43) | 3.75 (3.55, 3.96) | | | |
| No (n = 203) | 2.49 (2.21, 2.77) | 1.90 (1.61, 2.19) | | | |
| Child age group, months | | | F(2594) = 5.20 (.006) | F(1594) = 18.45 (<.001) | F(2594) = 2.79 (.06) |
| 8–12 (n = 122) | 3.62 (3.21, 4.01) | 2.51 (2.07, 2.95) | | | |
| 13–24 (n = 231) | 3.53 (3.23, 3.84) | 3.00 (2.69, 3.31) | | | |
| 25–37 (n = 247) | 3.73 (3.42, 4.04) | 3.51 (3.22, 3.79) | | | |
| Ethnicity | | | F(1596) = 0.97 (.32) | F(1596) = 6.69 (.01) | F(1596) = 1.16 (.28) |
| Hispanic (n = 155) | 3.62 (3.25, 3.99) | 3.38 (2.99, 3.77) | | | |
| Non-Hispanic (n = 445) | 3.63 (3.41, 3.86) | 3.06 (2.83, 3.27) | | | |
| Race | | | F(1467) = 7.57 (.02) | F(1467) = 8.55 (.004) | F(1467) = 4.39 (.04) |
| Black (n = 203) | 4.07 (3.74, 4.40) | 3.29 (2.95, 3.63) | | | |
| White (n = 284) | 3.36 (3.09, 3.64) | 3.24 (2.96, 3.52) | | | |

Note. CI = confidence interval; WIC = Special Supplemental Nutrition Program for Women, Infants, and Children. Intent to serve fruit drinks assessed with “In the next month, I plan to serve fruit drinks to my child.” Responses ranged from 1 (strongly disagree) to 6 (strongly agree).

potentially address misleading food marketing practices as well.²⁵ Our results confirm that videos that provide accurate information about product ingredients and address potentially misleading marketing claims used to promote fruit drinks and toddler milks may help reduce widespread provision of these sugary drinks to young children.¹¹

Although the videos reduced behavioral intentions and positive attitudes about both types of sugary drinks, effect sizes were consistently higher for toddler milks. This finding supports other studies showing widespread confusion about toddler milks.^{8,11,17} It also suggests that factors beyond misperceptions about product healthfulness may explain caregivers’ decisions to serve fruit drinks. Previous research has shown that widespread availability,

low cost, and provision and consumption by other family members all contribute to high levels of fruit drink consumption by young children.^{26–28}

The videos reduced intentions to serve both fruit drinks and toddler milks when we controlled for a range of individual characteristics, including caregivers who currently served the products and across age groups, indicating that these messages resonated with a wide audience of caregivers. However, they appeared to be more effective with caregivers of infants and young toddlers (8–24 months) compared with older toddlers (25–37 months), which confirms the importance of reaching infant caregivers with messages about avoiding sugary drinks before their child develops a strong preference for sweet drinks.² The videos also affected Hispanic and

non-Hispanic caregivers similarly, but the videos were significantly more effective in reducing intent to serve fruit drinks for Black versus White caregivers. Therefore, countermarketing messages, such as these, may provide an opportunity to reduce high levels of sugary drink consumption by Black children and address health disparities affecting communities of color.²

The videos were somewhat less successful in encouraging healthy drinks than discouraging sugary drinks. They increased intentions to serve more plain milk, but not plain water. Intent to serve more plain water may be subject to ceiling effects as it was higher than other intentions in the control condition. However, this finding may also indicate that caregivers do not consider water to be a substitute for fruit drinks or toddler milks and that providing

TABLE 4— Intent to Serve Toddler Milks: Effects of Sugary Drink Countermarketing Videos by Individual Characteristics, United States, January 2021

| Individual Characteristics | Mean (95% CI) | | Main Effect, F (P) | | Interaction, F (P) |
|----------------------------|-------------------|-------------------|---------------------------|-------------------------|----------------------|
| | Control | Experiment | Individual Characteristic | Condition | |
| WIC status | | | F(1596) = 0.33 (.86) | F(1596) = 36.06 (<.001) | F(1596) = 0.32 (.57) |
| Participant (n = 205) | 3.74 (3.40, 4.08) | 2.71 (2.34, 3.08) | | | |
| Nonparticipant (n = 395) | 3.62 (3.36, 3.89) | 2.77 (2.52, 3.02) | | | |
| Served in past month | | | F(1596) = 271.70 (<.001) | F(1596) = 58.16 (<.001) | F(1596) = 2.01 (.16) |
| Yes (n = 299) | 4.78 (4.54, 5.03) | 3.67 (3.43, 3.91) | | | |
| No (n = 301) | 2.58 (2.34, 2.82) | 1.82 (1.58, 2.06) | | | |
| Child age group, months | | | F(2594) = 2.61 (.008) | F(1594) = 35.44 (<.001) | F(2594) = 0.54 (.58) |
| 8–12 (n = 122) | 3.62 (3.21, 4.01) | 2.51 (2.07, 2.95) | | | |
| 13–24 (n = 231) | 3.53 (3.23, 3.84) | 3.00 (2.69, 3.31) | | | |
| 25–37 (n = 247) | 3.73 (3.42, 4.04) | 3.51 (3.22, 3.79) | | | |
| Ethnicity | | | F(1596) = 0.89 (.35) | F(1596) = 28.68 (<.001) | F(1596) = 0.00 (.96) |
| Hispanic (n = 155) | 3.78 (3.38, 4.17) | 2.88 (2.46, 3.29) | | | |
| Non-Hispanic (n = 445) | 3.63 (3.39, 3.87) | 2.71 (2.47, 2.95) | | | |
| Race | | | F(1467) = 0.98 (.32) | F(1467) = 23.97 (<.001) | F(1467) = 0.33 (.56) |
| Black (n = 195) | 3.63 (3.28, 3.99) | 2.90 (2.54, 3.27) | | | |
| White (n = 276) | 3.56 (3.27, 3.86) | 2.64 (2.34, 2.94) | | | |

Note. CI = confidence interval; WIC = Special Supplemental Nutrition Program for Women, Infants, and Children. Intent to serve toddler milks assessed with “In the next month, I plan to serve toddler milks to my child.” Responses ranged from 1 (strongly disagree) to 6 (strongly agree).

information about reasons to reduce sugary drink consumption may not directly increase water consumption (or vice versa).

Moreover, the countermarketing videos did not change perceived descriptive norms about family, friends, and other community members often serving fruit drinks and toddler milks. The videos were not designed to specifically address these beliefs, but successful health behavior change may also require changing normative beliefs.²⁹ In this study, beliefs that others often serve fruit drinks was higher than beliefs about serving toddler milks; thus, efforts to reduce fruit drink consumption must specifically address these perceptions. In addition, the videos did not increase perceived importance of examining nutrition labels. This finding could also be attributable to

ceiling effects but suggests that caregivers may not have confidence in their ability to obtain ingredient information by reading nutrition facts labels.

Limitations

Strengths of this study include a randomized controlled experimental design to assess causal effects of viewing countermarketing videos; control videos closely matched on likability, believability, informativeness, and relevance; inclusion of screentime survey questions to help disguise study intent and reduce demand effects; and data collection via mobile devices or computer to reproduce the digital environment where videos would be disseminated. However, this study does have limitations. Behavioral measures assessed changes in intent to serve

drinks, not actual provision, and intentions expressed in an online experiment may not be representative of real-world behaviors. However, intentions can predict actual health behavior change.²⁹ In addition, quota sampling ensured a diverse sample, but the study did not have enough power to measure interactions between individual characteristics. Additional research is needed to assess how well the videos worked with caregivers of other underrepresented demographic groups, as well as whether changes in attitudes and behavioral intentions translate to actual sustained reductions in sugary drink provision.

Public Health Implications

Experts from leading US health organizations advise that promoting healthy

beverage consumption by young children, including avoiding sweetened fruit drinks and toddler milks, is a public health priority.^{2,5} However, the majority of caregivers provide such drinks to their toddler-age children while common marketing practices mislead parents to believe these drinks are healthy and benefit their children.^{8,10} This study demonstrates that a public health education campaign has the potential to reduce positive attitudes and intent to serve these products among diverse infant and toddler caregivers, as well as to address health disparities attributable to high sugary drink consumption by children in communities of color.² Moreover, counter-marketing messages that demonstrate how companies take advantage of caregivers' desire to provide the best nutrition for their young children may also provide a powerful motivation to resist misleading marketing messages.^{25,30}

However, widespread reductions in sugary drink provision to young children will likely require a full array of public health initiatives.³¹ Education campaigns could also enlist health providers to address caregiver misperceptions about serving fruit drinks and toddler milks. The US Food and Drug Administration could strengthen labeling requirements, including requiring consistent reporting of added sugar, nonnutritive sweeteners, and juice content on fruit-flavored drink package fronts; establishing requirements for toddler milk labeling; and regulating potentially deceptive claims.^{16,32} Companies should not market sweetened fruit drinks directly to children in advertising or through brand characters and other child-directed features on product packages.^{16,32} Formula manufacturers should comply with the World Health Organization's Code of

Marketing Breastmilk Substitutes and discontinue all direct-to-consumer marketing of infant formula and toddler milks.³³ Consumer education, regulation, and responsible marketing practices are all required to promote healthy beverage intake by young children. **AJPH**

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PUBLICATION INFORMATION

Full Citation: Harris JL, Phaneuf L, Fleming-Milici F. Effects of sugary drink countermarketing videos on caregivers' attitudes and intentions to serve fruit drinks and toddler milks to young children. *Am J Public Health*. 2022;112(58):S807–S816. Acceptance Date: July 1, 2022. DOI: <https://doi.org/10.2105/AJPH.2022.307024>

CONTRIBUTORS

J. L. Harris designed the study, supervised data collection, conducted data analysis, and wrote the first draft of the article. L. Phaneuf developed the survey, implemented data collection, and conducted preliminary data analyses. F. Fleming-Milici conceptualized the study, obtained funding, and supervised survey development and data collection. All authors provided revisions and approved the final article.

ACKNOWLEDGMENTS

This research was supported by a grant from Healthy Eating Research (grant 76374), a national program of the Robert Wood Johnson Foundation.

We would like to thank our colleagues at 1,000 Days for their guidance and assistance with this project: Carol Dreibelbis, Blythe Thomas and Allison Garner.

Note. The views expressed here do not necessarily reflect the views of the Robert Wood Johnson Foundation.

CONFLICTS OF INTEREST

The authors have no conflicts of interest to report.

HUMAN PARTICIPANT PROTECTION

This study was determined to be exempt by the institutional review board of the University of Connecticut.

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CANNABIS

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