Storybooks About Healthy Beverage Consumption: Effects in an Online Randomized Experiment With Parents

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Abstract

Introduction: Parents spend substantial time reading to their children, making storybooks a promising but understudied avenue for motivating parents to serve their children healthier

beverages. This study examines parents' reactions to messages promoting healthy beverage consumption embedded in a children's storybook.

Methods: In 2020, a total of 2,164 demographically diverse parents of children aged 6 months to 5 years participated in an online survey. Participants were randomized to view control messages (school readiness) or 1 of 3 beverage message topics (sugary drink discouragement, water encouragement, or combined discouragement and encouragement) presented as pages from the storybook *Potter the Otter*. Survey items assessed parents' reactions to the messages and their perceptions, beliefs, and intentions regarding sugary drinks and water. Data were analyzed in 2021.

Results: Compared with control messages, exposure to the beverage messages led to higher discouragement from serving children sugary drinks and higher encouragement to serve children more water (*p*-values <0.001). The beverage messages also elicited more thinking about beverages' health effects and led to stronger perceptions that sugary drinks are unhealthy (*p*-values <0.001). Moreover, the beverage messages led to higher intentions to limit serving children sugary drinks and higher intentions to serve children more water (*p*-values 0.02). Parents' reactions to the beverage messages did not differ by most demographic characteristics. Few differences in outcomes were observed among the 3 beverage message topics.

Conclusions: Embedding beverage messages in storybooks is a promising, scalable strategy for motivating parents from diverse backgrounds to serve children more water and fewer sugary drinks.

INTRODUCTION

Establishing healthy beverage consumption patterns in early childhood (age 0–5 years) remains a critical public health goal.[1] Consumption of sugary drinks and juice in childhood contributes to weight gain, obesity, type 2 diabetes, and dental caries.[2–4] Conversely, water consumption may help limit excess weight gain and these poor health outcomes.[1,5] On a typical day, however, 47% of U.S. children aged 2–5 years consume sugary drinks and 22% do not consume any water.[6] Sugary drink consumption is even higher among children whose parents have lower incomes or identify as Black or Latinx,[7] contributing to preventable health inequities.[8,9] Scalable strategies are needed to reduce sugary drink consumption and promote water consumption among young children.

Parents play an important role in influencing what young children eat and drink[10] and are therefore an important group to reach with healthy beverage interventions. Moreover, healthy eating and obesity prevention interventions may be most successful when they engage parents and children simultaneously.[11–13] One promising but understudied avenue for such interventions is children's storybooks. As an "education entertainment" intervention, storybooks can use relatable characters, entertaining narratives, and child-friendly language to promote healthy behaviors.[14] The average U.S. child aged 2–4 years spends 29 minutes/day reading or being read to,[15] providing ample opportunity for storybooks to reach families with messages encouraging healthy beverage consumption. Research suggests that communicating with parents about foods and beverages through warning labels,[16] TV advertisements,[17] and text messages[18] can change their knowledge,

intentions, and behaviors regarding the foods and beverages they serve their children. If storybooks exert similar influence, they would represent a highly scalable strategy for motivating parents to serve their children healthier beverages. However, the potential for storybooks to influence parents' beverage-related behaviors remains unknown.

Uncertainty also remains about how to design storybooks and other beverage messaging interventions to maximize their effectiveness. Some prior interventions have focused only on discouraging sugary drink consumption, others have focused only on encouraging water consumption, and others combine messages that discourage sugary drinks with messages that encourage water.[19–21] One hypothesis is that interventions focused on promoting water consumption would be unlikely to impact sugary drink consumption, and vice versa. Alternatively, messaging about one behavior could affect related behaviors if consumers interpret the message to imply something about the related behavior. For example, consumers might understand that a message promoting water consumption implies that sugary drink consumption is unhealthy.[22] Understanding which message topics are most promising could inform interventions, but limited experimental research has compared message topics.[19]

The primary objective of this study is to evaluate parents' reactions to messages about healthy beverages presented in a children's storybook. Analyses also assess whether parents' message reactions differ by demographic characteristics relevant for health disparities (e.g., race/ethnicity, income). Finally, analyses compare parents' reactions to messages that only discourage sugary drinks, only encourage water, or combined discouragement and encouragement messages.

METHODS

Prior to data collection, the analysis plan and hypotheses were pre-registered on AsPredicted.org (https://aspredicted.org/blind.php?x=dn8b5v).

Study Sample

In May 2020, a convenience sample of 2,164 adults was recruited through Dynata, a survey research firm. Participants were eligible if they lived in the U.S., were aged 18 years, and were a parent or other caregiver (hereafter "parent") of 1 child aged 6 months to 5 years. Online convenience samples can yield generalizable findings for experiments such as the one used in this study.[23] Because beverage consumption habits in young children vary by race/ethnicity,[7] this study sought to recruit a diverse sample such that 25% of parents would identify as Latinx and 25% would identify as Black (not mutually exclusive). Participants who completed the study received previously agreed upon incentives from Dynata in the form of reward points redeemable for gift cards, charitable contributions, or products. The Harvard Longwood Campus IRB approved the study.

Participants provided informed consent and completed an online survey programmed in Qualtrics. The survey asked participants to think about their child aged 6 months to 5 years. To provide an even distribution of ages, participants who had multiple children in this age range were instructed to think about the child who had the most recent birthday.

Participants first indicated how often they served this child different beverages,[24] then viewed 8 messages. To provide realism, messages were presented as pages from *Potter the Otter*,[25] a children's book series covering health and educational topics developed by FIRST 5 Santa Clara County, a nonprofit organization supporting healthy development of children prenatally through age 5 years.[25] This study adapted messages and images from the *Potter the Otter* series because it is targeted to young children and includes a book focused specifically on healthy beverages.

The survey software randomly assigned participants with a simple allocation ratio to a control condition or to 1 of 4 beverage message conditions, each focusing on a different topic: sugary drink discouragement, water encouragement, combined discouragement and encouragement messages that alternated these message topics, or combined discouragement and encouragement messages that integrated these message topics. The control condition presented school readiness messages that did not discuss beverages or health, using text and imagery adapted from the book *Potter Gets Ready for Kindergarten*. The sugary drink discouragement condition presented text and imagery from the book *Potter the Otter: A Tale About Water* modified to only discourage sugary drinks without mentioning or showing water. Similarly, the water encouragement condition presented messages from *Potter the Otter: A Tale About Water* modified to only encourage water without mentioning or showing sugary drinks. The combined discouragement and encouragement condition that alternated topics showed pages from the discouragement and encouragement conditions in a randomly alternating order. Finally, the combined discouragement and encouragement condition that integrated topics presented unmodified messages and imagery from *Potter the Otter: A Tale About Water*, which includes messages discouraging sugary drinks and encouraging water on most pages. A graphic designer prepared the messages to ensure optimal online viewing. Figure 1 depicts example pages from each condition and Appendix Exhibit 1 shows all stimuli.

Participants were instructed to imagine they were reading their assigned messages aloud to their child. After viewing the messages, participants responded to survey questions as described in the Measures section. Participants could choose to take the survey in English or Spanish. A professional translation company translated study materials from English to Spanish.

Measures

The co-primary outcomes were perceived message effectiveness for discouraging parents from serving sugary drinks to their child ("discouragement") and perceived message effectiveness for encouraging parents to serve water to their child ("encouragement"). Prior research has found that perceived message effectiveness is predictive of messages' actual effects on intentions and behavior across a variety of behaviors, including smoking,[26–28] vaping,[29,30] alcohol consumption,[31] marijuana use,[32] dental flossing,[31] and sugary drink consumption.[33] Thus, perceived effectiveness has predictive value as to messages' potential to elicit behavior change. Discouragement and encouragement were each assessed with 3 items adapted from the previously-validated UNC Perceived Message Effectiveness Scale[34] (e.g., *The messages in the book discouraged me from wanting to serve my child soda,*

juice, juice pouches, or punch). Items used 5-point response scales coded as 1 (*strongly disagree*) to 5 (*strongly agree*). Both scales showed acceptable reliability (Cronbach's α: discouragement=0.81, encouragement=0.87).

The survey also assessed outcomes from the Message Impact Framework and Tobacco Warnings Model[35,36] (hereafter "Message Impact Framework") because a randomized trial found that these constructs mediated the effect of sugary drink messages on beverage purchase behaviors,[37] meaning that these constructs hold predictive value as to messages' ability to change behavior. Outcomes from this model were: thinking about the health effects of beverages children drink, negative emotional reactions to the messages, parents' intentions to limit serving their child sugary drinks, and parents' intentions to increase serving their child water. Finally, the survey assessed positive emotional reactions to the messages, beverage healthfulness perceptions, parents' injunctive social norms about serving beverages to their child, and expectations about the consequences of drinking sugary drinks and water. These outcomes used 5- or 7-point response scales coded as 1 (low) to 5 or 7 (high). Survey items appear in Appendix Exhibit 2.

Statistical Analysis

Power analyses indicated that the target enrollment of approximately 2,100 participants would provide >90% power to detect a small effect (*d*=0.2) of any beverage message compared with control, assuming α=0.05. The analytic sample included 2,164 participants (Appendix Figure 1).

Analyses used ordinary least squares regression to examine the impact of exposure to any message about beverages (compared with control) on the co-primary outcomes, discouragement from serving sugary drinks and encouragement to serve water. These analyses collapsed across the 4 beverage message conditions and did not control for participants characteristics, which were balanced across study groups. Analyses used the same approach to examine the impact of the beverage messages on constructs from the Message Impact Framework and on other outcomes.

To examine whether the effect of beverage messages on the co-primary outcomes varied by demographic characteristics, analyses regressed the outcomes on participant characteristics, an indicator for treatment arm (any beverage message versus control), and the interaction between participant characteristics and treatment arm. Analyses used separate models for each co-primary outcome and each characteristic and examined 9 potential moderators: child's age, frequency of serving water, frequency of serving sugary drinks, education, race, Latinx ethnicity, language of survey administration, participation in the Supplemental Nutrition Assistance Program (SNAP) or the Special Supplemental Nutrition Assistance Program for Women, Infants, and Children (WIC) in the past 12 months, and household income. Analyses calculated treatment effects at each level of the moderator.

Secondary analyses assessed whether the 3 beverage message topics (sugary drink discouragement, water encouragement, or combined discouragement and encouragement) differed from one another in their impacts on the co-primary outcomes. Analyses regressed the outcomes on indicator variables for each message topic (excluding the control as the ref)

and used Wald tests to compare the impact of each beverage message topic (versus control) to one another. Combined discouragement and encouragement messages that alternated topics performed similarly to those that integrated topics (*p*-values >0.36 for differences between these conditions on co-primary outcomes), so analyses collapsed across these conditions for simplicity.

To facilitate comparisons across outcomes measured on different scales, all dependent variables were standardized prior to running analyses. Results report unstandardized regression coefficients (Bs). Analyses were conducted in Stata MP, version 16.1 in 2021.

RESULTS

Participants' average age was 30.2 (SD=9.3) years. Children's ages were approximately evenly distributed across the age categories. About half (49%) of the sample identified as Latinx. Additionally, 44% identified as Black or African American and 32% as White (regardless of ethnicity). Participants' characteristics did not differ by study condition (*p*>0.07 for all) (Table 1).

Participants exposed to the beverage messages reported higher discouragement from serving their children sugary drinks than parents exposed to the control messages (B=0.57, *p*<0.001) (Table 2). Likewise, the beverage messages led to higher encouragement to serve their children water compared with control (B=0.60, *p*<0.001).

Exposure to beverage messages also influenced constructs from the Message Impact Framework. Beverage messages elicited more thinking about beverages' health effects (B=0.63, *p*<0.001) (Table 2) and more negative emotional reactions (B=0.20, *p*<0.001) compared with control messages. Beverage messages also led to higher intentions to limit serving sugary drinks (B=0.13, *p*=0.02) and higher intentions to increase serving water (B=0.13, *p*=0.02).

Additionally, beverage messages led parents to hold stronger perceptions that sugary drinks are unhealthy (B=0.26, *p*<0.001), stronger beliefs that drinking sugary drinks leads to negative outcomes for their child (B=0.14, *p*=0.008), and stronger beliefs that drinking water leads to positive outcomes for their child (B=0.13, *p*=0.02). By contrast, no differences were observed between beverage messages and the control for positive emotions, perceptions that water is healthy, social norms to limit serving sugary drinks to their child, or social norms to increase serving water to their child (*p*>0.11 for all).

In moderation analyses, the impact of beverage messages on discouragement from serving sugary drinks was stronger among parents of children aged 1–5 years compared with parents of children aged 6–11 months (*p*=0.005 for interaction) (Appendix Table 1). Additionally, the effect of beverage messages on discouragement was stronger among participants who reported serving water more frequently than those who reported doing so less frequently (*p*<0.001 for interaction) and among parents who reported not participating in SNAP or WIC compared with those who reported participating in the prior 12 months (*p*<0.001 for interaction). The impact of beverage messages on discouragement did not differ by any of the other participant characteristics (*p*>0.05 for all).

A similar pattern of moderation emerged for beverage messages' impacts on encouragement to serve water. Beverage messages had a larger effect on encouragement among parents who reported serving their child water more often ($p<0.001$ for interaction) and among parents not participating in SNAP or WIC ($p=0.02$ for interaction) (Appendix Table 2). The impact of beverage messages on encouragement did not differ by any other characteristics ($p>0.05$ for all).

The 3 beverage message topics (sugary drink discouragement, water encouragement, and combined discouragement and encouragement) did not differ from one another in their effects on discouragement (Bs=0.51–0.61; $p>0.09$ for all comparisons of coefficients) (Figure 2) or encouragement (Bs=0.53–0.63; $p>0.09$ for all comparisons of coefficients). Beverage message topics also did not differ in their influence on most constructs from the Message Impact Framework. One exception was that water encouragement messages had a smaller effect on negative emotions (B=0.06) compared with both the sugary drink discouragement messages (B=0.29, $p=0.001$ for comparison of coefficients) and the combined discouragement and encouragement messages (B=0.22, $p=0.006$ for comparison of coefficients). No consistent pattern emerged in comparisons of the different beverage message topics' effects on other outcomes (Appendix Table 3).

DISCUSSION

Young children spend approximately half an hour each day reading or being read to,[15] making children's books a highly scalable avenue for reaching both parents and children with health messages. In this experimental study in a large, sociodemographically diverse sample of U.S. parents, messages about beverages embedded in children's books influenced parents' perceptions, beliefs, and intentions about the beverages they serve their children. Specifically, parents perceived beverage messages as likely to discourage them from serving their children sugary drinks and likely to encourage them to serve their children water. The beverage messages also elicited beneficial changes in thinking about health effects, negative emotions, and behavioral intentions. Evidence indicates that changes in perceived message effectiveness,[26–33] thinking about health effects,[35,37] emotions,[35,37] and intentions[38] are associated with actual behavior change. Thus, these findings offer preliminary support for using children's books as a strategy for motivating parents of young children to serve healthier beverages.

Beverage messages elicited similar impacts regardless of participants' income, education, race, ethnicity, language of survey administration, and frequency of serving sugary drinks. These results suggest that storybooks about beverages are a promising strategy for reaching parents from diverse backgrounds. One exception was that beverage messages did not lead to higher discouragement from serving sugary drinks among parents of children aged 6–11 months, despite beneficial impacts among parents of older children. This result could be because infants are less likely to consume sugary drinks than older children,[6] making sugary drink messages less salient for parents of infants. Additionally, beverage messages had a smaller impact on both discouragement and encouragement for parents who reported serving their children water less often, perhaps because of defense processing[39] or concerns about water safety. Finally, although the beverage messages' impacts did not differ by

income, the messages had a smaller impact for SNAP and WIC participants compared with non-participants. This finding may reflect that SNAP and WIC participants often receive nutrition education via those programs, making the beverage messages less novel. Although this study found few differences in beverage messages' effects by demographics, prior research indicates that children's time spent reading or being read to varies by characteristics such as income and education.[40] Thus, for storybook interventions to have equitable impact, additional interventions may be needed to support all parents' ability to read regularly to their children.

Interventions to encourage healthier beverage consumption can focus on promoting water, discouraging sugary drinks, or both. Limited research has assessed which of these approaches is most promising.[19] This study found some evidence that messages about one type of beverage spilled over to also influence perceptions and intentions about the other type of beverage. For example, messages that focused only on encouraging water elicited encouragement for serving children water and discouragement from serving children sugary drinks, and vice versa. These results offer preliminary evidence that beverage messages could elicit similarly beneficial reactions from parents regardless of the message topic. However, other studies have found that water-focused interventions do not consistently reduce sugary drink consumption or purchases.[19] Studies using factorial designs in larger samples will help clarify the independent and joint effects of water promotion and sugary drink reduction messages.

Limitations

Strengths of this study include the randomized design, large and diverse sample, and realistic stimuli adapted from an existing children's book. There were several limitations. First, although research indicates that perceived effectiveness, thinking about health effects, negative emotions, and intentions have predictive value for identifying messages likely to change a variety of personal health behaviors,[26–33,35,37,38] studies have not evaluated whether these constructs predict parents' behaviors toward their children. Future studies examining parents' behaviors are therefore warranted.[41] Second, this study was conducted online, and generalizability to populations lacking Internet access or computer literacy remains to be established. Third, sample size needs were estimated to detect effects of any beverage message compared with control and analyses may have been underpowered to detect differences between beverage message topics. Fourth, outcomes were self-reported, and results could be driven by social desirability bias. However, the survey was anonymous, which should reduce such bias.[42,43]

CONCLUSIONS

Embedding messages in children's storybooks holds promise for encouraging parents from diverse backgrounds to serve their children more water and fewer sugary drinks. Future studies should assess storybook interventions' impacts on parents' and children's health behaviors and outcomes.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

ACKNOWLEDGMENTS

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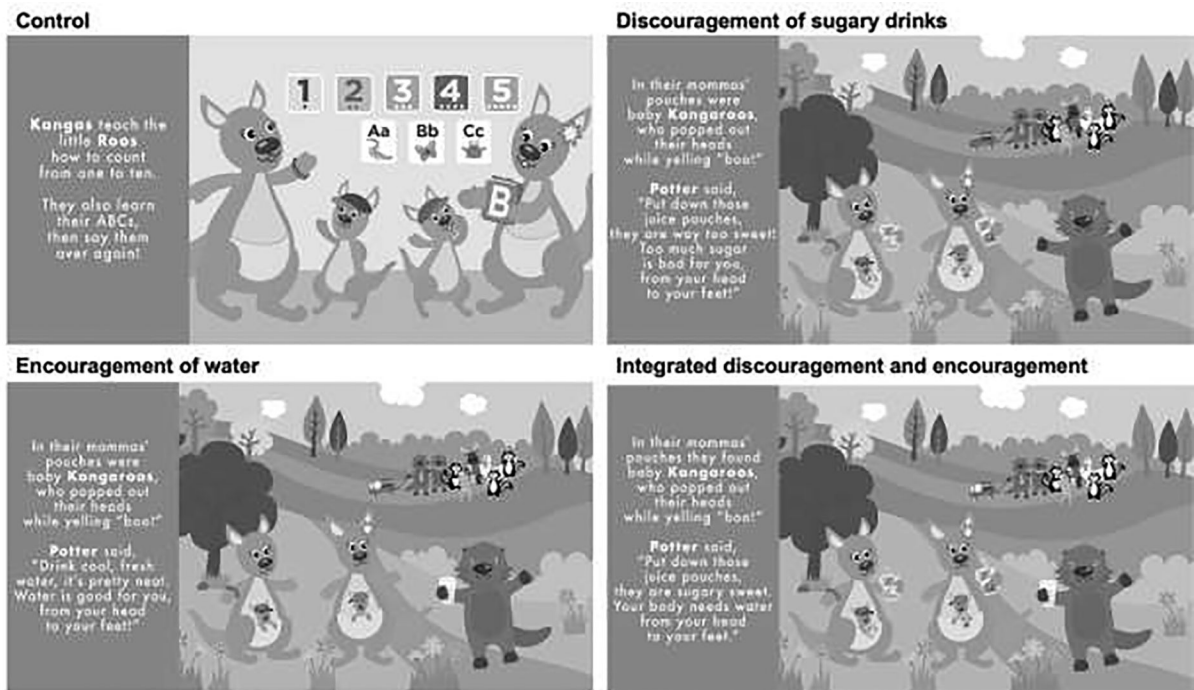
Figure 1.
Examples of stimuli used in randomized experiment of beverage messages embedded in a children's storybook.

Notes: Participants in the combined discouragement and encouragement, alternating messages condition, saw messages from the sugary drink discouragement condition and water encouragement condition in a randomly alternating order.
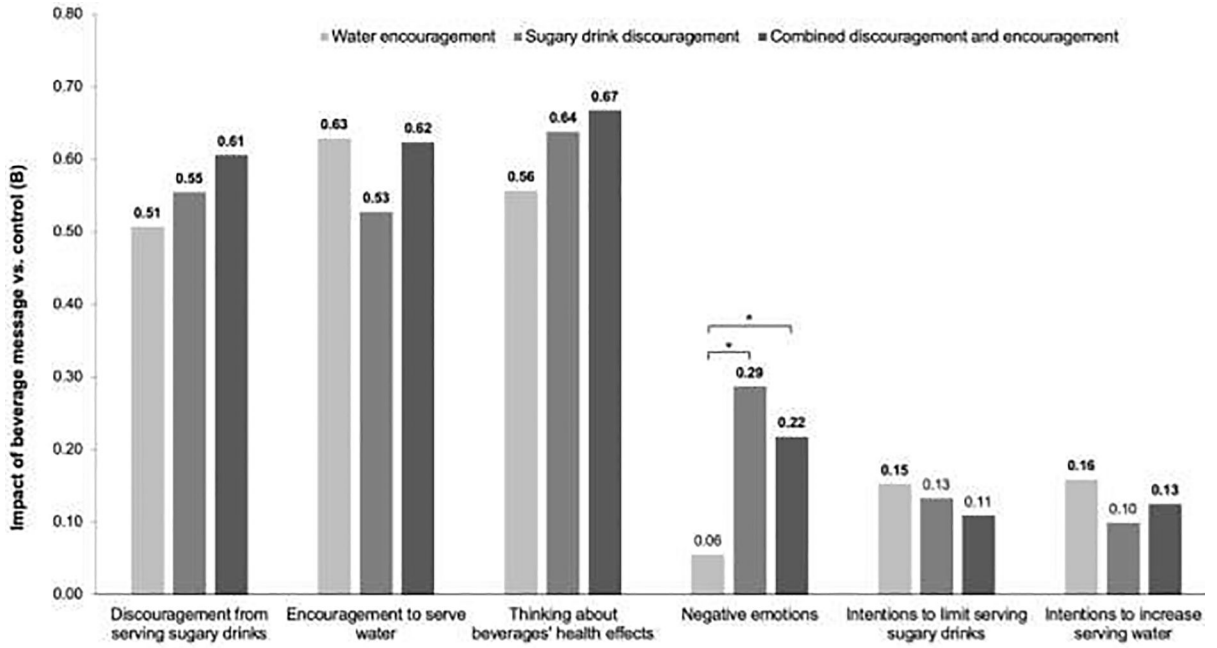
Figure 2.

Impact of beverage messages compared with control messages, by beverage message topic, 2,164 parents of children aged 6 months to 5 years.

Notes: Figure shows impacts of water encouragement messages, sugary drink discouragement messages, and combined discouragement and encouragement messages, compared with the control messages. Impacts are shown as unstandardized regression coefficients (Bs) from regressions of standardized dependent variables. Boldface indicates a statistically significant impact of the message topic compared to the control condition, *p*<0.05. *indicates message topics differed from one another in pairwise comparisons of coefficients, *p*<0.01.

Table 1.

Participant Characteristics, *n*=2,164 Parents of Children Ages 6 Months to 5 Years

	Message condition									
	Control *n*=426		Sugary drink discouragement *n*=430		Water encouragement *n*=416		Combined discouragement and encouragement, alternating messages *n*=457		Combined discouragement and encouragement, integrated messages *n*=435	
Characteristic	N	%	N	%	N	%	N	%	N	%
Child characteristics										
Age										
6–11 months	71	17%	82	19%	70	17%	75	16%	47	11%
12–23 months	71	17%	44	10%	53	13%	50	11%	60	14%
2 years	73	17%	80	19%	80	19%	82	18%	77	18%
3 years	76	18%	78	18%	71	17%	81	18%	84	19%
4 years	66	15%	68	16%	73	18%	73	16%	76	17%
5 years	69	16%	78	18%	69	17%	96	21%	91	21%
Parent characteristics										
Age										
18–24 years	110	26%	123	30%	131	32%	130	29%	116	27%
25–34 years	185	44%	185	45%	166	41%	189	42%	198	47%
35–44 years	103	25%	93	22%	83	20%	91	20%	93	22%
45 years	18	4%	14	3%	28	7%	36	8%	18	4%
Gender										
Man	134	32%	111	26%	112	27%	130	29%	112	26%
Woman	273	65%	304	71%	290	70%	314	69%	309	71%
Transgender, nonbinary, or another gender identity	16	4%	13	3%	13	3%	12	3%	14	3%
Relationship to child										
Parent	347	82%	355	83%	344	83%	363	79%	367	84%
Other caregiver[a]	77	18%	74	17%	72	17%	94	21%	68	16%
Educational attainment										
Less than high school or GED	28	7%	25	6%	20	5%	28	6%	22	5%
High school diploma or GED	81	19%	78	18%	92	22%	93	20%	91	21%
Some college	61	14%	93	22%	88	21%	89	20%	80	18%
2-year college degree or higher	253	60%	232	54%	214	52%	246	54%	242	56%
Race										
White	139	33%	136	32%	124	30%	155	34%	146	34%
Black or African American	198	47%	189	44%	185	45%	196	43%	189	44%
American Indian or Alaska Native	18	4%	12	3%	18	4%	11	2%	18	4%

	Message condition									
	Control *n*=426		Sugary drink discouragement *n*=430		Water encouragement *n*=416		Combined discouragement and encouragement, alternating messages *n*=457		Combined discouragement and encouragement, integrated messages *n*=435	
Characteristic	N	%	N	%	N	%	N	%	N	%
Asian or Pacific Islander	14	3%	13	3%	12	3%	17	4%	10	2%
Other or Multiracial	54	13%	78	18%	76	18%	75	17%	71	16%
Latino(a) ethnicity	207	49%	209	49%	209	50%	226	50%	214	49%
Language selected for survey administration										
English	379	89%	384	89%	373	90%	402	88%	395	91%
Spanish	47	11%	46	11%	43	10%	55	12%	40	9%
Participation in SNAP or WIC in past 12 months	217	51%	256	60%	244	59%	254	56%	243	56%
Household size										
1	56	13%	38	9%	35	8%	37	8%	33	8%
2	80	19%	92	21%	92	22%	90	20%	80	18%
3	110	26%	100	23%	108	26%	134	29%	118	27%
4 or more	180	42%	200	47%	181	44%	196	43%	204	47%
Annual household income										
Less than $25,000	102	24%	119	28%	107	26%	117	26%	115	27%
$25,000–49,999	107	25%	90	21%	103	25%	114	25%	111	26%
$50,000–74,999	61	14%	76	18%	73	18%	74	16%	72	17%
$75,000–99,999	60	14%	53	12%	52	13%	67	15%	51	12%
$100,000 or more	94	22%	91	21%	80	19%	85	19%	84	19%
Frequency of serving water to child										
Never or <1 time per week	32	8%	28	7%	21	5%	27	6%	20	5%
1–6 times per week	139	33%	161	38%	145	35%	162	36%	143	33%
1– <2 times per day	35	8%	31	7%	40	10%	41	9%	40	9%
2 times a day	218	51%	207	48%	208	50%	221	49%	230	53%
Frequency of serving sugary drinks to child										
Never or <1 time per week	29	7%	25	6%	33	8%	36	8%	38	9%
1–6 times per week	156	37%	155	36%	166	40%	169	37%	152	35%
1– <2 times per Day	109	26%	116	27%	99	24%	119	26%	104	24%
2 times a day	132	31%	134	31%	118	28%	133	29%	141	32%

Notes: Missing data ranged from 0 to 2.5%. Participant characteristics did not differ by experimental condition. Participant characteristics did not differ by study condition (all *p*s>0.07).

[a] Other types of caregivers included grandparents, aunts, uncles, and legal guardians.

GED, General Education Development test; SNAP, Supplemental Nutrition Assistance Program; WIC, Special Supplemental Nutrition Assistance Program for Women, Infants, and Children.

Table 2.

Impacts of Storybooks About Healthy Beverage Consumption, *n*=2,164 Parents of Children Aged 6 Months–5 Years

Outcome (response scale)	Beverage messages Mean (SD)	Control messages Mean (SD)	Impact of beverage messages B 95% CI
Co-primary outcomes			
Discouragement from serving sugary drinks (1–5)	3.7 (1.0)	3.1 (1.2)	**0.57 (0.47, 0.67)**
Encouragement to serve water (1–5)	3.9 (1.1)	3.2 (1.2)	**0.60 (0.50, 0.70)**
Message Impact Framework outcomes			
Thinking about beverages' health effects (1–5)	3.7 (1.2)	2.9 (1.5)	**0.63 (0.53, 0.74)**
Negative emotions (1–5)	2.4 (1.2)	2.1 (1.2)	**0.20 (0.09, 0.30)**
Intentions to limit serving sugary drinks (1–7)	4.6 (1.8)	4.3 (1.7)	**0.13 (0.02, 0.23)**
Intentions to increase serving water (1–7)	5.8 (1.5)	5.6 (1.6)	**0.13 (0.02, 0.23)**
Other outcomes			
Positive emotions (1–5)	3.5 (1.1)	3.4 (1.1)	0.09 (−0.02, 0.19)
Perceptions that sugary drinks are unhealthy (1–7)	4.8 (1.5)	4.4 (1.5)	**0.26 (0.15, 0.36)**
Perceptions that water is healthy (1–7)	6.3 (1.3)	6.3 (1.3)	0.03 (−0.07, 0.14)
Social norms to limit sugary drinks (1–5)	3.5 (1.0)	3.5 (1.1)	0.02 (−0.08, 0.13)
Social norms to increase water (1–5)	3.9 (1.0)	3.9 (1.1)	0.04 (−0.07, 0.14)
Beliefs that sugary drinks lead to negative outcomes (1–7)	4.7 (1.4)	4.5 (1.3)	**0.14 (0.04, 0.25)**
Beliefs that water leads to positive outcomes (1–7)	5.7 (1.3)	5.5 (1.2)	**0.13 (0.02, 0.23)**

Note: Table shows means and SDs for each outcome for participants exposed to the beverage messages (collapsed across all beverage message topics), means and SDs for each outcome for participants exposed the control messages, and impacts of beverage messages compared to the control condition. Impacts are shown as unstandardized regression coefficients (Bs) from regressions of standardized dependent variables. All response scales are Likert-type scales coded as 1 (low) to 5 or 7 (high). Boldface indicates statistically significant impact of beverage messages compared to the control condition, $p<0.05$.