

Young adults' responses to alternative messages describing a sugar-sweetened beverage price increase

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Submitted 24 June 2015: Final revision received 31 May 2016: Accepted 6 June 2016: First published online 28 July 2016

Abstract

Objective: Many jurisdictions in the USA and globally are considering raising the prices of sugar-sweetened beverages (SSB) through taxes as a strategy to reduce their consumption. The objective of the present study was to identify whether the rationale provided for an SSB price increase affects young adults' behavioural intentions and attitudes towards SSB.

Design: Participants were randomly assigned to receive one of eight SSB price increase rationales. Intentions to purchase SSB and attitudes about the product and policy were measured.

Setting: A forty-six-item cross-sectional Internet survey.

Subjects: Undergraduate students (n 494) at a large US Midwestern university.

Results: Rationale type was significantly associated with differences in participants' purchasing intentions for the full sample ($F_{7,485} = 2.53$, $P = 0.014$). Presenting the rationale for an SSB price increase as a user fee, an effort to reduce obesity, a strategy to offset health-care costs or to protect children led to lower SSB purchasing intentions compared with a message with no rationale. Rationale type was also significantly associated with differences in perceptions of soda companies ($F_{7,485} = 2.10$, $P = 0.043$); among low consumers of SSB, messages describing the price increase as a user fee or tax led to more negative perceptions of soda companies.

Conclusions: The rationale attached to an SSB price increase could influence consumers. However, these message effects may depend on individuals' level of SSB consumption.

Keywords
Sugar-sweetened beverage
Tax
Policy
Communication

High consumption of sugary drinks (or sugar-sweetened beverages (SSB)) is an important source of empty calories in people's diets in the USA and globally⁽¹⁾. Overconsumption of SSB has been linked to negative health outcomes, including obesity, chronic diseases like diabetes and CVD, and poor dental health^(2,3). As a result, policy makers and researchers alike have sought to reduce public consumption of SSB. Excise taxes on SSB have emerged as one potentially promising strategy⁽⁴⁾. An SSB excise tax was implemented in Mexico in early 2014, a ballot initiative to implement an SSB tax in Berkeley, California passed in 2014, and the Philadelphia City Council approved such a tax in 2016. Excise taxes on SSB have been introduced (without passage) in dozens of other US states and local jurisdictions and continue to

appear on the public health policy agenda around the globe (with a planned tax in the UK, for instance, anticipated to go into effect in 2018). Traditional (i.e. neo-classical economic) theory suggests that raising the price of SSB will reduce their consumption, based on the price elasticity of demand⁽⁵⁾. In fact, emerging evidence from an evaluation of the Mexico tax does suggest some declines in demand⁽⁶⁾. While economic theory would suggest that the price increase is the primary mechanism through which consumption may be influenced by an SSB tax, literature in psychology and behavioural economics suggests that other factors also influence consumer decisions, such as how the price message is presented^(7–9).

Public health researchers, advocates and policy makers have described several alternative justifications for SSB

taxes, including their potential effect on improving diet quality or oral health, reducing obesity or health-care costs, protecting child health, and addressing state and municipal budgets^(10,11). For example, SSB tax advocates in California in 2012 emphasized the link between sugary drinks and negative health outcomes like obesity and type 2 diabetes⁽¹²⁾, advocates in Berkeley in 2014 emphasized negative industry actions⁽¹³⁾, while Mayor Jim Kenney in Philadelphia emphasized an SSB tax as an opportunity to fund social programmes⁽¹⁴⁾. People who hear a health-related rationale may feel differently about the tax than those exposed to the argument that an SSB tax is necessary to reduce a city's budget deficit. In fact, research shows that the public has varying levels of agreement with the major pro- and anti-SSB tax messages in public discourse^(15,16) and that SSB tax messages affect public beliefs about soda companies⁽¹⁷⁾. These findings – combined with abundant research evidence across multiple disciplines that strategic communication can shape attitudes as well as behaviour^(7–9,18) – suggest that messages about the rationale for an SSB tax could influence a variety of outcomes.

Messages about a price increase could influence consumption intentions directly or indirectly. For example, in addition to providing information about the price increase, messages could contribute to changes in public perceptions of beverage companies, the products or support for policies. These perceptions could shift norms surrounding sugary drinks and ultimately change the longer-term dynamics of SSB demand, a process that has been described for smoking and attitudes about cigarettes and tobacco companies⁽¹⁹⁾. However, effects are unlikely to be uniform. Individuals who regularly consume SSB may be more attentive to messages about a tax in the first place, or messages could affect consumers and non-consumers differently based on how relevant the message is to them or how much it resonates with their pre-existing knowledge, values and beliefs^(20,21).

The objective of the present study was to examine whether rationales provided for a hypothetical SSB price increase influence young adults' SSB purchasing intentions and their attitudes about SSB products, policies and the beverage industry compared with simply indicating a price increase. In addition, secondary objectives were to test the difference between messages naming a price increase as a 'tax' *v.* a 'user fee' and to compare message effects among individuals with different levels of SSB consumption.

Methods

Study participants

The study population was undergraduate students at the University of Minnesota, a large Midwestern US university, who were recruited to participate through a research programme managed by the psychology department.

Participants were told that the study was about 'Consumption of Snacks, Media and Beverages' (questions about beverages were embedded among questions about their habits on purchasing snack foods and newspapers, magazines, movies and music, to de-emphasize the focus on beverages). A total of 543 students agreed to participate in the anonymous survey, exceeding our target (determined *a priori* based on power calculations) of at least 400. The final sample size was 494, after eliminating respondents who had missing data on more than half of the survey and anyone who did not complete the key independent variable (SSB beverage consumption). Participants received extra credit points for completing the survey, and they completed it between 25 April 2013 and 6 November 2013.

Study design and methods

A forty-six-item online survey was developed (after pilot testing for usability) in which participants were asked a series of questions about their beverage consumption (described below) and then were presented with a vignette about entering a convenience store on a hot day to purchase a beverage. Respondents were told that upon entering the store, they noticed a 15-cent price increase on their favourite 16-ounce SSB (based on respondents' own report of their favourite such beverage; if they reported no favourite SSB, the vignette stated that the product subject to the price increase was 'Coke'). This increase is about a 9% increase based on the price (approximately \$US 1.69) of 16-fluid-ounce (473 ml) beverages on and around this university's campus. Following this vignette introduction, participants were randomly assigned to one of eight messages providing tax rationales (see Table 1 for the text of the messages): (i) no rationale was given; (ii) a new tax on the product; (iii) a new user fee on the product; (iv) a tax to raise revenue for state obesity prevention efforts; (v) a tax for state budget deficit improvement; (vi) a tax to offset health-care costs for oral health problems; (vii) a tax to offset the health-care costs for chronic health conditions; or (viii) a tax to protect children from harm. All participants were shown a consistent price increase of 15 cents to examine the effects of the rationale independent of the price increase. Messages (iv) through (viii) were based on past research exploring the arguments advocates have used to promote the tax^(10,12). In addition, given survey research showing low public support for SSB taxes⁽²²⁾, messages (ii) and (iii) were included to examine whether individuals respond differently if a price increase is described as a 'user fee' without the use of the word tax at all compared with 'tax'⁽²³⁾.

Measures

The primary dependent variable was a measure of intention to purchase the SSB described in the vignette and measured immediately following the vignette: 'Given

Table 1 Study design and messages randomized to study participants

Experimental group	Message
Introduction message (all participants, <i>n</i> 494)	'Imagine that you walk into a convenience store on a hot day. You are thirsty and looking to get something to drink. As you reach for the 16-ounce bottle of [favourite reported beverage] you notice that the price has gone up by 15 cents since the last time you bought it. This surprises you a little, but then you remember having recently heard (either on the radio, TV, Internet or newspaper) that prices of these beverages were increasing ...'
Control (<i>n</i> 63)	'... but the news item did not give a reason why the price was increasing'
Tax on SSB (<i>n</i> 62)	'... as a result of a new tax on these beverages'
User fee (<i>n</i> 60)	'... as a result of a new user fee on these beverages'
Reduce obesity (<i>n</i> 62)	'... as a result of a new tax on these beverages which is part of a new government effort to reduce obesity in Minnesota'
Budget deficit (<i>n</i> 62)	'... as a result of a new tax on these beverages which is intended to help the Minnesota state government address its budget deficit'
Offset oral health-care costs (<i>n</i> 61)	'... as a result of a new tax on these beverages which is intended to offset the millions of dollars these beverages cost the Minnesota health-care system due to increased prevalence of oral health problems (cavities, etc.)'
Offset chronic health-care costs (<i>n</i> 62)	'... as a result of a new tax on these beverages which is intended to offset the millions of dollars these beverages cost the Minnesota health-care system due to increased prevalence of health problems (heart disease, diabetes, etc.)'
Protecting children (<i>n</i> 62)	'... as a result of a new tax on these beverages which is intended to protect children from the negative effects of these types of beverages'

SSB, sugar-sweetened beverage.

this change in price, how likely are you to purchase [the beverage]?' Response categories included: 'much less likely to purchase', 'less likely to purchase', 'will not change purchase decision', 'more likely to purchase' and 'much more likely to purchase'.

Several secondary dependent variables that were also measured following the experimental vignette were also examined. Attitudes about sugary drinks were measured using a semantic differential scale (a measure where two words represent the opposite poles of a 7-point ordinal measure). Respondents were asked to rank sugary drinks on three dimensions. The item asked participants to 'Think about the group of beverages with added sugar (e.g. non-diet soda, energy drinks, and other sugary drinks). In my opinion, these beverages are ...' Options included three

scales: 'very bad' (= 1) to 'very good' (= 7); 'very unappealing' (= 1) to 'very appealing' (= 7); and 'very unhealthy' (= 1) to 'very healthy' (= 7). These three items formed an acceptably reliable scale (Cronbach's $\alpha = 0.68$). Perception of SSB companies was measured using an item asking participants 'How favourable is your impression about soft drink companies?', with response options measured as an ordinal scale from 1 to 5 ('very unfavourable', 'unfavourable', 'neither favourable nor unfavourable', 'favourable' and 'very favourable')⁽²²⁾. Finally, participants were asked how much they would support or oppose a strategy that would 'Require a penny-an-ounce tax on drinks with added sugar that would add 12 cents to the cost of a 12-ounce can of soda', also measured as an ordinal scale from 1 to 5 ('strongly oppose', 'oppose', 'neutral', 'support' and 'strongly support')⁽²²⁾.

Participants' reported beverage consumption was measured using the Beverage Intake Questionnaire (BEVQ-19), which was modified to focus on the drinks college students consume⁽²⁴⁾. Participants reported the number of times per week (or day, if they noted they drank that beverage daily) they drank thirteen different beverage types (see online supplementary material, Supplemental Table 1). A summary measure of consumption of SSB (defined as non-diet soft drinks, sweetened fruit drinks, sweetened tea, energy drinks and sports drinks/flavoured water⁽²⁵⁾) was created by weighting the ordinal consumption scale to make all values scaled per week (e.g. 1 for once per week; 14 for twice per day, etc.), then summing these weighted consumption values across the five SSB categories, and then reconverting the aggregate scale back to an eight-category ordinal measure. For the subgroup analyses, SSB consumption was categorized into two groups: no SSB consumption or low (once weekly or less) compared with weekly or more.

Participants also self-reported demographic and social characteristics, including age, gender, work status, race, Hispanic ethnicity and parental household income.

Analysis

The initial step in the statistical analysis was to conduct one-way ANOVA to determine if purchasing intentions were different for any of the groups in the randomized conditions, the eight SSB price increase messages to which participants were exposed. Then, to examine whether there were any specific differences between the 'no justification' control group message and the specific SSB price increase messages, ordinary least-squares regression models were estimated of the primary outcome on the message variables with the 'no justification' message serving as the reference category. (Results were consistent when estimated with ordered logit regression, but ordinary least-squares regression is presented here for ease of interpretation of coefficients and the intercept.)

Differences between the 'SSB tax' and 'SSB user fee' conditions were tested by comparing the regression coefficients using post-estimation Wald tests. Given random assignment to condition (and indeed, all observed characteristics reported in Table 2 were equally balanced across conditions), we did not include any covariates in the regression models, as per standard survey-based experimental methods⁽²⁶⁾.

The same set of analyses was re-estimated for the secondary dependent variables (SSB product attitudes, company favourability perceptions and support for an SSB tax). To explore whether the messages affected participants' outcomes differently based on their reported consumption of SSB, regression models with interaction terms by SSB consumption (once weekly or less compared

with weekly or more) and experimental condition were estimated; where interactions were statistically significant, regression models were estimated within SSB consumption subgroups. All analyses were conducted using the statistical software package Stata version 13.

Results

Table 2 displays descriptive characteristics of the sample. The majority (88 %) were between the ages of 18 and 22 years (roughly equally divided across these age groups). The sample included more women than men, more students who were working compared with not working, and three-quarters of the sample was white. About 30 % reported that their parents earned less than \$US 65 000 per annum. Study participants skewed more female than the university student body more generally, but the racial/ethnic breakdown was similar to the broader demographics of the university.

Just under 12 % of the sample reported consuming no SSB; 18.2 % consumed a little (once weekly or less); 33.2 % consumed a moderate amount (more than once weekly but less than daily); and 36.6 % consumed a high amount of SSB (daily or more).

Table 2 Descriptive characteristics of respondents (*n* 494) to an undergraduate student survey about a sugar-sweetened beverage (SSB) tax at a large US Midwestern university, April–November 2013

	<i>n</i>	%
Age (years)		
18	103	20.9
19	118	23.9
20	100	20.2
21 or 22	115	23.3
23 to 30	46	9.3
30+	12	2.4
Gender		
Female	343	69.4
Male	150	30.4
Transgender	1	0.2
Work status		
Not working	212	42.9
Working	282	57.1
Race		
White	370	74.9
Asian	112	22.7
Black	20	4.0
Alaskan Native/American Indian	20	4.0
Other	14	2.8
Native Hawaiian or other Pacific	2	0.4
Ethnicity		
Hispanic/Latino	15	3.0
Parental household income		
Don't know	53	10.7
Less than \$US 35 000 per annum	44	8.9
\$US 35 000–65 000 per annum	98	19.8
\$US 65 000–80 000 per annum	66	13.4
\$US 80 000–110 000 per annum	102	20.7
Over \$US 110 000 per annum	129	26.1
Unreported	2	0.4
Political party identification		
Republican	106	21.5
Democrat	207	41.9
Independent	61	12.4
Another party	14	2.8
No preference	105	21.3
Unreported	1	0.2
SSB consumption		
Never	59	11.9
One time per week or less	90	18.2
2–3 times per week	94	19.0
4–6 times per week	70	14.2
Once per day	53	10.7
More than once per day	128	25.9

Message effects on sugar-sweetened beverage purchase intentions

Message type was significantly associated with differences in participants' purchasing intentions ($F_{7,485} = 2.53$, $P = 0.014$). To examine differences between the control group and the specific rationales to which participants were exposed, Table 3 displays estimates from regression models of purchase intention by condition for the full sample. These results indicate that within the full sample, a message describing a user fee, a message describing the tax goal to reduce obesity, a message describing the tax goal to offset chronic health-care costs (but not oral health-care costs) and a message to protect children were each associated with a reduction in participant intentions to purchase the SSB compared with a message indicating a price increase with no justification. The 'user fee' condition was associated with lower purchasing intentions than the 'tax' condition, but this difference was not statistically significant at conventional levels ($F_{1,485} = 3.18$, $P = 0.08$). There were also no statistically significant differences in message effects by level of SSB consumption ($F_{7,477} = 0.44$, $P = 0.88$).

Message effects on attitudes, perceptions and opinions

For the full sample, the mean level of favourable attitudes about sugary drinks (on a 7-point scale) was 3.2 ($SD = 1.1$), mean level of favourability towards soda companies (on a 5-point scale) was 2.6 ($SD = 0.9$) and mean level

Table 3 Effect of sugar-sweetened beverage (SSB) price increase rationales on SSB purchasing intentions and favourability towards soda companies among respondents (*n* 494) to an undergraduate student survey about an SSB tax at a large US Midwestern university, April–November 2013

	SSB purchasing intentions		Favourability towards soda companies					
	Full sample		Full sample		Consume SSB once weekly or less		Consume SSB more than weekly	
	β	SE	β	SE	β	SE	β	SE
Tax on SSB	-0.21	0.14	-0.07	0.16	0.03	0.29	-0.07	0.19
User fee	-0.47**	0.14	-0.36*	0.16	-0.69*	0.32	-0.24	0.18
Reduces obesity	-0.42**	0.14	-0.36*	0.16	-0.66*	0.30	-0.19	0.18
Budget deficit	-0.16	0.14	-0.02	0.16	-0.15	0.35	-0.01	0.17
Offset oral health-care costs	-0.23	0.14	-0.01	0.16	-0.25	0.32	0.08	0.18
Offset chronic health-care costs	-0.42**	0.14	-0.13	0.16	-0.41	0.30	0.02	0.18
Protecting children	-0.37**	0.14	0.06	0.16	0.44	0.30	-0.10	0.18
Constant	2.98***	0.10	2.73***	0.11	2.56***	0.23	2.78***	0.12
<i>n</i>	493		493		148		345	

Estimates are coefficients (β) and their standard errors from ordinary least-squares regression models. The reference category is the group that received a message describing a price increase with no justification.

* $P \leq 0.05$, ** $P \leq 0.01$, *** $P \leq 0.001$.

of SSB tax support (on a 5-point scale) was 3.0 (sd=1.2). No significant differences by message were observed for the sugary drink attitude measure ($F_{7,485} = 0.54$, $P = 0.81$) or the soda tax policy support measure ($F_{7,484} = 1.26$, $P = 0.27$). However, message type was associated with perceptions of soda companies ($F_{7,485} = 2.10$, $P = 0.043$). In particular, Table 3 shows that in the full sample, messages describing the price increase as a user fee or as a tax to reduce obesity led to less favourable attitudes about soda companies, compared with a message describing a price increase with no justification. While the 'user fee' condition was associated with more negative perceptions of soda companies than the 'tax' condition, again this was not statistically significant ($F_{1,485} = 3.39$, $P = 0.07$).

Message effects on soda company perceptions by level of sugar-sweetened beverage consumption

Regression models fitted with interaction terms by level of SSB consumption indicate that the message had different effects depending on whether the participant had lower or higher SSB consumption ($F_{7,477} = 2.26$, $P = 0.03$). Table 3 displays message effects among consumption subgroups. Within the sub-sample of respondents who reported low SSB consumption, a message describing a user fee applied to SSB or a tax devised to reduce obesity led to less favourable perceptions about soda companies compared with a message just describing a price increase. Within the low SSB-consuming group, the effect of the user fee message was significantly different from that of the SSB tax message ($\beta = -0.69$ *v.* $\beta = 0.03$, $F_{1,140} = 6.30$, $P = 0.01$). None of the messages had a significant effect on perceptions of soda companies among those consuming SSB more than once per week.

Discussion

Economic and evaluation studies presume that the predominant or only effect of a tax increase on SSB consumption is through the change in the product's price, shifting consumers' willingness to purchase the product compared with alternatives⁽²⁷⁾. The results of the present research suggest that there could be another mechanism through which a tax has effects – via how that tax is justified in the public discourse. The present results show that the message justifying a price increase can influence intentions to purchase a sugary beverage and perceptions of soda companies; and that messages have variable effects on soda company perceptions depending on the message recipient's level of SSB consumption. These results add to previous research showing differences in public response to SSB tax rationales⁽¹⁷⁾.

By demonstrating variation in the effectiveness of the many ways of presenting SSB taxes that advocates and policy makers use, our findings offer important implications for SSB tax policy making, especially for advocates considering the appropriate pro-tax messaging approach for a particular jurisdiction. Specifically, research in communication about the environment⁽²³⁾ has indicated the potential promise of changing how an SSB tax is presented to remove the controversial and politically charged term 'tax'. In fact, the advocacy organization Coalition for a Healthy California supports a 'health impact fee' on sugary drinks (this is the term it is using to describe a price increase of 2 cents per fluid ounce, as introduced in a bill in California in March 2016)⁽²⁸⁾. The present study's findings offer weak support for the idea that people respond differently to these terms; a 'user fee' term in our study was associated with more negative perceptions of soda companies than the 'tax' term. However, at the time of the present study in 2013, the idea of

a 'fee' applied to SSB was not currently debated, so the phrase may have struck study participants as odd.

The present study also provides evidence that messages that link the SSB tax to specific health outcomes may be more effective than those that describe the tax as a method to raise revenue. This finding is important in the current policy context, since the main pro-tax message debated in Philadelphia as of spring 2016 avoided connecting the tax to obesity prevention and framed the tax instead as a tax on the industry to generate money for social priorities (in this case, for funding early childhood education)⁽¹⁴⁾. The message in the present study that connected the soda tax to obesity reduction also led to less favourable perceptions of soda companies among those who are low SSB consumers. Public health advocates planning future SSB tax campaigns should consider that SSB tax rationales (particularly those that invoke 'Big Soda', the term used by advocates to refer to the soda industry) may resonate differently with those who do or do not drink SSB.

Limitations

These results and their implications must be interpreted with some key limitations of our study design and sample in mind. First, participants were undergraduate students at a single university, so they are not representative of all young adults. Since young adults are the highest consumers of sugary drinks⁽²⁹⁾, this population is an appropriate one within which to examine potential interventions that could reduce consumption. In addition, with about 12% of our study sample never consuming SSB, one-third consuming at least weekly but less than daily and almost 37% consuming daily, our sample's SSB consumption is on par with state and national estimates^(30,31). A national survey in 2010 found, for instance, that 29.4% of 18- to 24-year-olds consumed no SSB, 32.8% consumed SSB at least once weekly and 37.8% consumed SSB at least daily⁽³⁰⁾. However, our sample is not representative of young adults in other dimensions, such as education and racial/ethnic diversity. The study's goal is not to make generalizable statistical estimates about a particular population; with an experimental study design, the study maximizes internal validity (the ability to make a causal inference that a given message shifts a given attitude or belief) at the expense of some external validity.

Second, the study leverages an online experiment, asking participants to imagine a hypothetical purchasing scenario. The key dependent variable is a self-reported intention, not an observed behaviour. A study design which exposes participants to an actual price change (such as studies measuring the effect of price changes on sugary drink consumption in real stores⁽³²⁻³⁴⁾) and observes actual purchasing behaviour will be required to confirm that these results hold up in naturalistic settings. However, given that there were eight different

messages reflective of the actual policy discourse around SSB price increases that we wanted to test, the online survey mode is an appropriate first step to examine message effects.

Finally, in the present study, the price change was kept constant at 15 cents (roughly a penny per fluid ounce). Yet, the effects of a message might interact with the magnitude of the price increase, with, for instance, certain message-price combinations more effective in shifting behaviour. Future research might test the most promising messages revealed in the current study and simultaneously manipulate other price scenarios to further advance our understanding of the many price-related and non-price related influences on consumer behaviour.

Conclusion

Policies to reduce public consumption of SSB are urgently needed worldwide, especially given the emergent science surrounding the public health harms of sugar in excess⁽³⁵⁾. It is important to consider the complex and intersecting mechanisms through which such policies might have an influence on the public. A growing body of research suggests that economic incentives may be as important for changing behaviour as shifts in norms and social beliefs⁽³⁶⁾. The findings from the present study suggest that SSB taxes may influence the public not only from the price increase⁽³⁷⁾ but also from the language used to justify such a policy. Additional research – in experimental and observational settings in the USA and other international contexts – should continue to evaluate the many intersecting mechanisms through which a heightened nutrition policy focus on reducing SSB consumption will affect the public's attitudes and behaviours.

Acknowledgements

Acknowledgements: The authors thank AnnaMarie Vu for her research assistance during survey development and implementation. *Financial support:* This research was supported by the University of Minnesota Obesity Prevention Center and the University of Minnesota Healthy Foods, Healthy Lives Institute. The funders had no role in the design, analysis or writing of this article. *Conflict of interest:* The authors have no conflicts of interest to disclose. *Authorship:* S.E.G., J.M.W., C.F.R. and A.J.R. conceived of the study, designed the survey and collected the data. X.T. conducted the data analysis along with S.E.G. All authors provided data interpretation, critical revisions of the manuscript and approved the final version to be submitted. *Ethics of human subject participation:* This study was determined to be exempt from human subjects review (exemption category 2).

Supplementary material

To view supplementary material for this article, please visit <http://dx.doi.org/10.1017/S1368980016001816>

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