Intentions to reduce sugar-sweetened beverage consumption: the importance of perceived susceptibility to health risks

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Abstract

Objective: There are numerous health effects associated with excess sugar-sweetened beverage (SSB) consumption. Interventions aimed at reducing population-level consumption require understanding of the relevant barriers and facilitators. This study aimed to identify the variables with the strongest relationship with intentions to reduce SSB consumption from a suite of variables derived from the literature.

Design: Random digit dialling of landline and mobile phones was used to survey adults using Computer Assisted Telephone Interviews. The outcome variable was 'likelihood of reducing SSB consumption in next 6 months' and predictor variables were: demographics, SSB attitudes and behaviour, health risk perceptions and social/environmental exposure.

Setting: Australia

Participants: A subsample of 1630 regular SSB consumers from a nationally representative sample of 3430 Australian adults (38% female, 51% aged 18-45 years, 56% overweight or obese).

Results: Respondents indicated that they were 'not at all' (30.1%), 'somewhat' (43.9%) and 'very' likely (25.3%) to reduce SSB consumption. Multi-variate nominal logistic regressions showed that perceiving future health to be 'very much' at risk was the strongest predictor of intention to reduce SSB consumption (Odds Ratio=8.1 [1.8-37.0], $p<0.01$). Other significant predictors ($p<0.01$) included self-perceptions about too much consumption, habitual consumption, difficulty reducing consumption, and likelihood of benefiting from reduced consumption.

Conclusions: Health risk perceptions had the strongest relationship with intentions to reduce consumption. Age and consumption perceptions were also predictors in the multivariate models whereas social/environmental exposure variables were not. Interventions may seek to incorporate strategies to de-normalise consumption practices and increase knowledge about perceived susceptibility to health risks.

Keywords: sugar-sweetened beverages, population survey, intentions to change, health risk perceptions

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The relationship between sugar-sweetened beverage (SSB) consumption and chronic disease is well established[1-10] yet consumption is high in many jurisdictions[11]. Reducing population-level SSB consumption is necessary to improve health[12]. Barriers to behaviour change include wide-spread availability and promotion[13] and lack of clear and tangible advice about how much can be consumed[14].

The Australian Dietary Guidelines recommend "limiting" food and beverages considered unhealthy without quantifying a limit[15]. Moreover, consumers find nutrition information panels, which include sugar, difficult to interpret[16]. Health Star Ratings, Australia and New Zealand's interpretive front-of-pack labelling scheme, is intended to facilitate consumer understanding, however there has been low uptake of this voluntary system[17]. Other countries have overcome such limitations with mandatory warning labels or via policies such as a taxes on SSBs[18, 19]. However, many countries, including Australia, are yet to implement regulatory change, despite the need for action to address high rates of overweight and obesity[20] and the known contributing factor of high SSB consumption.

To date, most population studies of adult SSB consumers have examined only demographic characteristics as correlates of current consumption, with higher consumption rates among males, younger adults and socio-economically disadvantaged populations[21-31]. While these studies are informative, for behaviour change to occur, it is useful to identify modifiable predictors of SSB consumption that can be targeted through public health interventions. Behavioural intention is an important antecedent to behaviour change, with the intention-behaviour pathway described in multiple theories, including the Theory of Reasoned Action[32], Theory of Planned Behaviour (TPB)[33] and the Integrated Model of Behavioural Prediction (IM)[34]. While research shows that intentions may be influenced by other cognitive influences and situational cues resulting in an intention-behaviour gap, intentions have been associated with corresponding behaviour in many contexts[35, 36].

Studies of adolescents/young people using the TPB have shown that attitudes, subjective norms and/or perceived behavioural control variables were associated with intentions to reduce consumption, which in turn, were associated with lower rates of actual consumption[37-41]. These studies also showed that more distal variables such as parental discouragement, low availability in the home and opportunity to purchase water instead of SSBs when needed, were also associated with change in SSB consumption[37, 39-41]. Non-TPB

variables (takeaway food consumption, availability of soda in home, depression diagnosis and heart disease) were also related to higher SSB consumption in an adult population, with Type 2 Diabetes related to lower consumption[31]. Using the IM, one study found nutritional knowledge (the only non-demographic predictor) predicted consumption[42]. Another found, among overweight and obese adults, perceived behavioural control, environment and intentions had the largest influence on SSB consumption[43]. These theories offer a useful framework to guide understanding of key influences on behaviour, but the literature suggests other modifiable factors may be important when targeting health behaviour change.

One such factor is risk perception, acknowledged as a key determinant of behaviour by other well-known behavioural theories, e.g., Health Belief Model (HBM)[44-46]. Increasing awareness of health risks is a key strategy that is used in emerging policy approaches to reduce SSB consumption, with intervention studies showing a reduction in SSB selections following exposure to mass media campaigns[47-49] and on-package warning labels[50]. Cross-sectional population surveys have also established associations between current consumption and knowledge of health risks[51-54] or the healthiness of various beverage types[55-58]. However, SSB-related health risk perceptions have not been assessed in population studies in relation to intention to change behaviour. Intention may be overlooked as an intermediary variable in some theories which incorporate risk perceptions as direct determinants of behaviour (e.g., HBM), and risk perception may be excluded from studies of SSB consumption among younger participants because the health risks are considered too distal to be a predictor[59]. Establishing the extent to which risk perception relates to intentions to reduce SSB consumption would add to evidence of risk perception as a potentially modifiable factor for incorporation into SSB interventions.

In the absence of large longitudinal studies to examine the relationship between predictors and behaviour change, examining intention to change can offer insight into modifiable factors to increase intentions, and potentially assist in reducing consumption of SSBs. We compiled a list of predictor variables from the literature to test which were more strongly associated with intentions to reduce SSB consumption in a sub-sample of regular SSB consumers drawn from a nationally representative population survey. Specifically, we tested four sets of variables: 1) demographics, 2) SSB attitudes and behaviour, 3) health risk perceptions and 4) social and environmental exposure.

Methods

A nationally representative sample of Australian adults (≥ 18 years; n=3,430; participant rate=44%) was surveyed in 2017, using a computer-assisted-telephone-interview (CATI) lasting approximately 20 minutes. Participants were sourced through random digit dialling of landline and mobile phones (35:65 split), in accordance with telecommunication use in Australia[60]. Full methodological details of the survey are reported elsewhere[61]. This study reports on a subsample of 1,165 participants who met the following criteria: 1) regularly (at least weekly) consumed either soda, fruit drinks, sports drinks or energy drinks and 2) consumed at least one SSB in the past week.

The self-report questionnaire (see Supplementary Material) included: intention to reduce consumption; demographic and health characteristics (i.e., age, gender, area-level socio-economic disadvantage (postcode matched to the Index of Relative Socio-economic Disadvantage based on 2011 census data[62]), Body Mass Index (BMI), ever received a diagnosis of Type 2 Diabetes, heart disease, arthritis, depression or lung condition); SSB consumption (i.e., past week and regular SSB consumption, perception of whether amount of SSB consumed is appropriate, habitual consumption and difficulty reducing consumption); health risk perceptions (i.e., perception of BMI, likelihood of benefiting from reduced consumption and current and future health risk associated with SSB consumption); and social and environmental exposure (i.e. takeaway food consumption, availability of SSBs at home and at others' homes, perceptions of others' SSB consumption and perceived pressure to consume SSBs).

The outcome variable 'intention to reduce SSB consumption in the next 6 months', was derived from responses to two questions: extent they would like to reduce SSB consumption and considering drinking less sugary drinks in the next 6 months as described in Table 1. Four sets of predictor variables (1. demographics, 2. SSB consumption, 3. health risk perceptions, and 4. social and environmental exposure) were tested against the outcome variable using nominal logistic regressions. 'Somewhat likely' was used as the reference category (i.e. 'very' vs 'somewhat' likely and 'not at all' vs 'somewhat likely' [order reversed to 'somewhat' vs 'not at all' likely to facilitate interpretation of categories relative to 'somewhat likely']). Each predictor was tested independently of other variables (unadjusted) and in combination with other variables in the same grouping while controlling for demographic characteristics (adjusted). Statistically significant associations were identified using a p-value of less than 0.05.

Results

The demographic characteristics of the sample of participants who were regular SSB consumers are reported in Table 2. Age was evenly distributed, but there were more males than females, and fewer participants in the most socio-economic disadvantaged deciles than the mid- and least-disadvantaged deciles. About one-fifth of participants had ever received a diagnosis of arthritis/gout, depression or a lung condition, but very few had Type 2 Diabetes or heart disease. These variables were controlled for in the adjusted logistic regression analyses. Regarding the likelihood of reducing SSB consumption in the next 6 months, 30.1% indicated it was 'not at all' likely, 43.9% indicated it was 'somewhat' likely and 25.2% indicated it was 'very' likely. As shown in Table 2, the variables with the strongest relationship with likelihood of reducing consumption in bivariate analyses were perceptions about benefiting from reduced consumption, future health risk and current consumption (Cramer's V >0.4).

The nominal logistic regression results are reported in Table 3. The most consistent predictors of intending to reduce consumption (across both unadjusted and adjusted results) were variables relating to perceptions of SSB consumption and health risks. Specifically, greater intentions to reduce consumption were more likely among those who perceived: themselves as consuming too much; that their consumption was habitual; that it would be fairly difficult to reduce consumption; that they would likely benefit from reduced consumption; and that their future health was very much at risk. Furthermore, those who perceived that their future health was very much at risk were 8.07 (95%CI=1.76-36.95) times more likely to indicate 'somewhat' compared to 'not at all' likely, and 4.06 (95%CI=1.84-8.95) times more likely to indicate 'very' compared to 'somewhat' likely to reduce consumption.

There were some additional statistically significant associations for predicting the likelihood of reducing consumption, but there was a different set of predictors for indicating moderate versus high likelihood of change. Based on adjusted odds ratios, moderate likelihood of change (i.e., 'somewhat' rather than 'not at all') was more common among younger participants, those classified as obese, those consuming 3-6 SSBs in the past week, those consuming soft drink or fruit juice weekly, and those perceiving their future health to be at risk. Conversely, high likelihood of change (i.e. 'very' rather than 'somewhat') was more common among those without a lung condition diagnosis, classified as obese, perceiving self as overweight and perceiving current health to be at risk. Social and environmental exposure variables had significant bivariate associations with moderate

likelihood of change, whereby increased exposure reduced intentions. However, these associations were not significant in the multi-variate analysis.

Discussion

An intention to drink fewer SSBs was more likely among those who perceived themselves as consuming too much and to be susceptible to health consequences of over-consumption than those who did not hold these views. While it is unknown whether these intentions would translate into behaviour change, these results suggest that people who consider themselves to benefit from reducing consumption may be the most responsive to interventions aimed at encouraging people to consider their personal risk. Furthermore, interventions that successfully highlight adverse consequences of consuming SSBs may be particularly influential in changing consumption intentions among regular SSB consumers. The results also indicate the importance of educating those at risk (high consumers) do not view their consumption as problematic. High consumers with low intention to change may benefit from interventions/campaigns that communicate the health risks of consumption, which may lead to consideration of behaviour change.

These findings are consistent with experimental and field studies showing that exposure to SSB-related health effects information corresponds with increased perceptions of personal health risk and reduced intentions to select an SSB from a range of drink options[47-50]. Similarly, risk perceptions have been linked to intentions and behaviour in other domains, although the direct effects of risk appraisals on behaviour are generally small[63, 64]. Also noteworthy is that the indirect route of risk perceptions via intentions may have limited impact in real-world settings due to barriers to implementation resulting in an intention-behaviour gap[35, 36]. Michie et al.'s[65] framework suggests that three essential conditions are needed for implementing successful behaviour change: capability, opportunity and motivation. Accordingly, intent is only one component of behaviour change, but this does not diminish its importance when developing public health interventions. Further research is needed to investigate what additional factors will support those intending to reduce their SSB consumption to succeed.

More broadly, for risk perceptions to have any influence, they should be conveyed in a way that limits opportunity for self-exemption, for example, well-designed social marketing campaigns[47, 66], and factual on-bottle warning labels[67-73]. Interventions/campaigns will need to address the self-exemptions that may also arise from people being unclear on what constitutes risky SSB consumption, unaided by the lack of quantified limits in the Australian Dietary Guidelines[15]. Qualitative data indicate that Australian consumers' perceptions of

excessive consumption vary substantially[14]. Moreover, while participants could name potential health effects associated with SSB consumption, they tended to see these health effects as having low personal relevance and that could be offset by 'balancing' sugary drink consumption with diet and exercise[14]. Interventions/campaigns will need to be designed to avoid dismissive reactions to information regarding unhealthy consumption behaviours which are common[74] and reinforced by industry marketing practices that downplay the risks[75].

Each of the social and environmental exposure variables-differentiated those 'somewhat' from 'not at all' likely to reduce SSB consumption in the bi-variate analyses, but not in the multi-variate analyses adjusting for demographics. Age remained a significant predictor throughout and so could have masked the relationship due to young adults being both higher SSB consumers and more influenced by social and environmental variables. Relationships between social and environmental variables and a reduction, or intended reduction, in SSB consumption were observed in studies of adolescents and university students[37, 39, 40, 76]. Moreover, population-level environmental interventions addressing SSB consumption have been effective[77].

Limitations of the study include the cross-sectional design and self-reported intentions to change. There is a noted intention-behaviour gap[35, 36], and therefore, the extent to which intentions translate into behaviour are ultimately unknown in this study. Measures were based on existing literature but were rudimentary (i.e. single item questions for complex behaviours) due to questionnaire length and telephone survey methodology. Future research would benefit from using validated measurement scales, conducting follow-up of behaviour and investigating mediators of the relationship between social and environmental factors and SSB consumption, as suggested in theoretical models of behaviour change. To truly assess predictors of change in behaviour(s), a longitudinal study is warranted, but was beyond resourcing of the current study. The results may not be generalisable to jurisdictions where population-wide interventions have already been implemented.

Obesity and other health effects associated with SSB consumption are global major burdens of disease. However, many countries have been slow to implement population-wide strategies to reduce consumption. This study showed that those who are aware of the risks and acknowledge that they consume too much have intentions to change. Capitalising on these intentions to facilitate behaviour change is possible through policy reforms that have successfully reduced SSB consumption in other countries (e.g. taxes, warning labels) and would add value to educational approaches that raise awareness of health risks associated with SSB consumption.

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Table 1. Coding of outcome variable from responses to questions about intentions to reduce sugary drink consumption

Question 1: To what extent would you like to reduce the amount of sugary drinks that you drink? (Response options: 'Not at all', 'A little', 'A lot' or 'A great deal'	Question 2: Are you considering drinking less sugary drinks in the next **six months**? (Response options: 'No' or 'Yes')	Coded outcome variable: Intention to reduce SSB consumption in next 6 months
'Not at all'	No	Not likely
'A little', 'a lot' or 'a great deal'	No	Somewhat likely
'A little'	Yes	Somewhat likely
'A lot' or 'a great deal'	Yes	Very likely

Table 2. Sample characteristics by likelihood of reducing sugary drink consumption in the next 6 months

		Likelihood of reducing sugary drink consumption in the next 6 months				
	Overall	Not at all	Somewhat	Very	Test of association	
	%	%	%	%	χ^2	Cramers V
Gender					2.65	0.048
Male	61.9	58.4	63.2	63.8		
Female	38.1	41.6	36.8	36.2		
Age					68.92***	0.245
18 to 30	25.8	15.5	33.0	27.1		
31 to 45	25.2	24.1	24.3	29.2		
46 to 60	24.1	22.6	23.3	27.8		
61 and over	24.1	37.8	19.4	15.8		
Socio-economic disadvantage					1.34	0.034
Most (decile 1-3)	24.7	26.4	25.1	22.5		
Mid (decile 4-7)	39.1	38.1	39.3	40.3		
Least (decile 8-10)	35.8	35.5	35.6	37.2		
Body Mass Index (BMI)					23.01**	0.100
Don’t know	3.9	4.3	3.7	3.1		
Overweight (25.1 to 29.9)	33.4	35.1	34.8	29.5		
Obese (30 to 75)	22.3	17.1	20.4	32.2		
Underweight/healthy (up to 25)	40.1	43.4	41.1	35.3		
Ever received a diagnosis of…						
Type 2 Diabetes	4.8	5.4	3.7	5.8	2.26	0.044
Heart disease	6.9	9.4	5.3	6.1	5.84	0.071
Arthritis or gout	19.4	24.5	15.7	19.8	10.46**	0.095
Depression	20.3	19.7	17.4	26.3	9.17*	0.089
Lung condition (e.g. asthma, COPD)	19.1	17.1	21.7	17.1	3.97	0.059

Sugary drink amount in past week					57.02***	0.158
7 or more	34.9	29.3	31.3	48.8		
3 to 6	29.3	23.3	35.2	27.0		
1 or 2	35.3	47.4	33.5	24.2		
Soft drink consumption					40.99***	0.133
Daily	17.7	13.7	16.8	24.2		
Weekly	48.7	40.7	53.4	50.5		
Monthly or less	33.6	45.6	29.7	25.3		
Energy drink consumption					27.19***	0.108
Daily	1.8	0.3	1.2	4.1		
Weekly	6.4	2.8	8.2	7.8		
Monthly or less	91.8	96.9	90.6	88.1		
Sports drink consumption					4.10	0.042
Daily	1.7	1.4	1.6	2.4		
Weekly	13.6	11.1	14.5	15.4		
Monthly or less	84.7	87.5	84.0	82.3		
Fruit juice consumption					3.60	0.056
Daily	22.6	24.8	20.9	22.9		
Weekly	45.7	42.7	48.5	44.0		
Monthly or less	31.8	32.5	30.5	33.1		
SSB consumption perception					229.94***	0.447
Too much	39.7	12.6	40.4	71.3		
Not too much	60.2	87.4	59.6	28.7		
Sugary drink consumption is habitual					62.64***	0.233
Agree	49.2	34.3	50.3	65.5		
Do not agree	50.7	65.7	49.7	34.5		
Difficulty reducing consumption					144.93***	0.251
Never intend to stop	6.7	11.7	5.9	1.7		
Fairly	21.8	7.2	21.9	39.9		
Very	5.4	3.4	3.7	10.6		

Not at all	65.8	77.7	68.5	47.8		
BMI Perception					33.58***	0.171
Overweight	47.0	41.9	41.9	61.4		
Acceptable weight or underweight	53.0	58.1	58.1	38.6		
Likelihood of benefiting from reduced consumption					294.75***	0.505
Somewhat or very likely	63.4	28.0	73.8	88.7		
Did not indicate likely	36.4	72.0	26.2	11.3		
Current health at risk					352.44***	0.391
Somewhat	30.1	15.1	40.3	31.1		
Moderately	15.6	5.1	14.1	31.4		
Very much	7.2	1.4	3.1	20.8		
Not at all	46.9	78.3	42.5	16.7		
Future health at risk					438.66***	0.436
Somewhat	33.4	17.4	47.6	28.7		
Moderately	16.6	6.0	17.2	28.7		
Very much	9.4	0.9	3.9	28.7		
Not at all	40.5	75.7	31.3	14.0		
Frequency of past week takeaway food consumption					26.24***	0.151
Not at all	30.0	40.2	25.8	24.2		
1 or more times	70.0	59.8	74.2	75.8		
Availability of soft drink in the home					10.39*	0.067
Always or almost always	30.6	29.1	29.7	34.2		
Sometimes or seldom	55.0	52.7	58.7	51.7		
Never	14.3	18.2	11.5	14.0		
Availability of fruit juice in the home					2.04	0.030
Always or almost always	55.5	58.4	54.2	54.3		
Sometimes or seldom	37.9	35.0	39.5	39.2		
Never	6.5	6.6	6.3	6.5		
Availability of sugary drinks at others' homes					10.06	0.066
Don’t know or NA	2.3	3.1	2.0	2.0		

Always or almost always	43.5	40.7	43.4	47.4		
Sometimes or seldom	50.1	50.1	51.9	47.4		
Never	4.0	6.0	2.7	3.1		
Proportion of close friends/family who consume SSBs at least weekly					25.73**	0.105
Don't know or NA	3.4	6.0	2.7	1.0		
None	4.9	5.7	4.5	3.8		
Some	27.8	31.3	27.6	23.5		
About half	19.4	18.2	19.6	21.2		
Most	28.5	23.4	30.7	31.7		
All of them	16.0	15.4	14.9	18.8		
Agreement that most people their age drink sugary drinks					24.10***	0.144
Do not agree or don't know	27.1	36.5	23.3	21.5		
Agree strongly or somewhat	72.9	63.5	76.7	78.5		
Agreement that they should drink SSBs when provided					2.67	0.048
Do not agree or don't know	81.9	83.1	80.0	84.3		
Agree strongly or somewhat	17.9	16.9	20.0	15.7		

Note: *p<0.05, **p< 0.01, ***p<0.001. Cramers V is a measure of effect size for nominal variables that can range between 0 and 1 with values closer to 1 indicating a stronger association.

Table 3. Nominal logistical regression analyses

	Likelihood of reducing sugary drink consumption in the next 6 months						
	Not at all %	Some-what %	Very %	Somewhat vs Not at all Unadjusted OR	Somewhat vs Not at all Adjusted OR	Very vs Somewhat Unadjusted OR	Very vs Somewhat Adjusted OR
Likelihood of reducing consumption in next 6 months	30.1	43.9	25.2				
Model 1 (demographic and health characteristics only)							
Age (years)							
18 to 30	18.0	55.7	26.3	4.17 (2.78-6.25)***	4.27 (2.70-6.75)***	1.01 (0.65-1.57)	1.34 (0.80-2.25)
31 to 45	28.8	42.1	29.1	1.96 (1.35-2.86)***	1.87 (1.22-2.86)**	1.47 (0.94-2.30)	1.75 (1.06-2.90)
46 to 60	28.4	42.4	29.1	2.00 (1.37-2.94)***	1.94 (1.29-2.93)**	1.46 (0.93-2.29)	1.59 (0.98-2.58)
61 and over (Ref)	47.8	35.5	16.7	1	1	1	1
Body Mass Index							
Don't know	34.9	44.2	20.9	0.92 (0.45-1.89)	1.41 (0.64-3.07)	0.96 (0.42-2.20)	0.93 (0.40-2.19)
Obese (30+)	23.3	40.3	36.4	1.27 (0.86-1.85)	1.69 (1.12-2.54)*	1.83 (1.27-2.64)**	1.66 (1.12-2.46)*
Overweight (25.1 to 29.9)	31.9	45.9	22.3	1.04 (0.77-1.43)	1.27 (0.91-1.77)	0.99 (0.70-1.40)	0.94 (0.65-1.35)
Underweight/healthy (≤25) (Ref)	32.8	45.0	22.2	1	1	1	1
Ever received a diagnosis of…(Ref=no)							
Heart disease	42.3	34.6	23.1	0.54 (0.32-0.91)*	0.81 (0.46-1.43)	1.17 (0.63-2.17)	1.16 (0.60-2.24)
Arthritis or gout	38.4	35.7	25.9	0.57 (0.41-0.80)**	0.91 (0.61-1.35)	1.33 (0.92-1.93)	1.36 (0.88-2.08)
Depression	29.4	37.9	32.8	0.86 (0.61-1.22)	0.81 (0.56-1.17)	1.69 (1.20-2.39)**	1.58 (1.10-2.27)*
Lung condition	27.1	50.2	22.6	1.35 (0.95-1.91)	1.31 (0.90-1.89)	0.74 (0.51-1.07)	0.67 (0.46-0.99)*
Model 2 (SSB attitudes and behaviour)^							
Sugary drink amount in past week							
7 or more	25.2	39.4	35.4	1.52 (1.09-2.08)*	1.07 (0.70-1.65)	2.15 (1.51-3.08)***	1.26 (0.81-1.98)
3 to 6	23.9	52.8	23.3	2.13 (1.54-3.03)***	1.61 (1.10-2.36)*	1.06 (0.72-1.55)	0.81 (0.53-1.23)
1 or 2 (Ref)	40.6	41.9	17.5	1	1	1	1
Soft drink consumption							
Daily	23.4	42.0	34.6	1.89 (1.25-2.86)**	1.39 (0.81-2.41)	1.70 (1.11-2.58)*	0.81 (0.48-1.39)
Weekly	25.4	48.4	26.2	2.00 (1.49-2.70)***	1.83 (1.26-2.66)**	1.11 (0.79-1.57)	1.00 (0.67-1.50)

Monthly or less (Ref)	41.5	39.4	19.2	1	1	1	1
Energy drink consumption							
Daily	5.3	31.6	63.2	4.35 (0.53-33.33)	4.66 (0.48-45.26)	3.59 (1.33-9.68)*	2.21 (0.73-6.71)
Weekly	13.3	56.0	30.7	3.13 (1.52-6.25)**	1.76 (0.77-4.04)	0.98 (0.58-1.67)	0.72 (0.39-1.32)
Monthly or less (Ref)	32.0	43.6	24.3	1	1	1	1
Fruit juice consumption							
Daily	33.3	41.0	25.7	0.90 (0.62-1.30)	1.45 (0.90-2.33)	1.01 (0.68-1.50)	0.94 (0.59-1.49)
Weekly	28.5	47.1	24.5	1.20 (0.88-1.67)	1.70 (1.15-2.52)**	0.84 (0.60-1.16)	1.00 (0.68-1.48)
Monthly or less (Ref)	31.1	42.5	26.4	1	1	1	1
SSB consumption perception							
Too much	9.6	44.9	45.5	4.76 (3.33-6.67)***	3.98 (2.65-5.97)***	3.67 (2.70-5.00)***	2.82 (2.00-3.98)***
Not too much (Ref)	44.1	43.8	12.1	1	1	1	1
Sugary drink consumption is habitual							
Agree	21.1	45.2	33.7	1.92 (1.47-2.56)***	1.58 (1.15-2.19)**	1.88 (1.40-2.53)***	1.54 (1.10-2.15)*
Do not agree (Ref)	39.3	43.4	17.3	1	1	1	1
Difficulty reducing consumption							
Never intend to stop	53.9	39.5	6.6	0.56 (0.34-0.93)*	0.43 (0.25-0.77)**	0.42 (0.16-1.10)	0.32 (0.12-0.87)*
Fairly	9.8	44.1	46.1	3.45 (2.17-5.56)***	2.44 (1.47-4.07)**	2.61 (1.89-3.61)***	1.91 (1.33-2.73)***
Very	19.4	30.6	50.0	1.22 (0.58-2.56)	0.88 (0.37-2.07)	4.08 (2.23-7.46)***	2.64 (1.34-5.23)**
Not at all (Ref)	35.6	46.0	18.4	1	1	1	1
Model 3 (Health risk perceptions)^							
BMI Perception							
Overweight	27.2	39.6	33.3	1.00 (0.76-1.32)	0.99 (0.65-1.51)	2.21 (1.65-2.97)***	2.42 (1.56-3.75)***
Acceptable weight or underweight (Ref)	33.2	48.4	18.4	1	1	1	1
Likelihood of benefiting from reduced consumption							
Somewhat or very likely	13.3	51.3	35.4	7.14 (5.26-10.00)***	4.85 (3.45-6.81)***	2.80 (1.85-4.23)***	1.95 (1.24-3.07)**
Did not indicate likely (Ref)	60.1	32.0	7.9	1	1	1	1
Current health at risk							
Somewhat	15.1	58.9	26.0	5.00 (3.45-7.14)***	1.20 (0.71-2.05)	1.96 (1.32-2.91)**	1.67 (0.99-2.82)
Moderately	9.9	39.6	50.5	5.00 (2.94-9.09)***	1.58 (0.76-3.30)	5.66 (3.65-8.76)***	3.50 (1.91-6.42)***

Very much	6.1	19.5	74.4	4.00 (1.45-11.11)**	0.58 (0.16-2.09)	16.88 (8.98-31.76)***	5.34 (2.35-12.14)***
Not at all (Ref)	50.7	40.2	9.1	1	1	1	1
Future health at risk							
Somewhat	15.7	62.6	21.6	6.67 (4.76-9.09)***	4.20 (2.52-6.99)***	1.35 (0.88-2.06)	0.82 (0.47-1.42)
Moderately	10.9	45.6	43.5	7.14 (4.17-11.11)***	3.80 (1.90-7.64)***	3.73 (2.36-5.87)***	1.42 (0.76-2.65)
Very much	2.8	18.7	78.5	11.11 (3.23-33.33)***	8.07 (1.76-36.95)**	16.39 (9.03-29.75)***	4.06 (1.84-8.95)**
Not at all (Ref)	56.9	34.3	8.8	1	1	1	1
Model 4 (Social and environmental exposure)^							
Frequency of past week takeaway food consumption							
Not at all	41.0	38.4	20.6	0.52 (0.39-0.69)***	0.83 (0.60-1.16)	0.92 (0.66-1.28)	0.96 (0.66-1.38)
1 or more times (Ref)	25.9	46.7	27.4	1	1	1	1
Availability of soft drink in the home							
Always or almost always	28.8	42.9	28.2	1.61 (1.05-2.50)*	1.39 (0.86-2.24)	0.95 (0.59-1.52)	0.78 (0.47-1.31)
Sometimes or seldom	29.1	47.2	23.7	1.75 (1.18-2.63)**	1.39 (0.90-2.13)	0.72 (0.46-1.13)	0.64 (0.40-1.03)
Never (Ref)	39.0	36.0	25.0	1	1	1	1
Availability of sugary drinks at others' homes							
Don’t know or NA	40.7	37.0	22.2	1.37 (0.46-4.00)	1.72 (0.52-5.71)	0.93 (0.25-3.47)	0.96 (0.24-3.89)
Always or almost always	28.4	44.0	27.6	2.33 (1.15-4.76)*	1.95 (0.90-4.22)	0.97 (0.41-2.31)	0.89 (0.36-2.22)
Sometimes or seldom	30.3	45.7	24.0	2.27 (1.12-4.55)*	2.05 (0.96-4.36)	0.82 (0.34-1.93)	0.80 (0.33-1.97)
Never (Ref)	47.7	31.8	20.5	1	1	1	1
Agreement that most people their age drink sugary drinks							
Do not agree or don’t know	41.3	38.4	20.3	0.53 (0.39-0.71)***	0.85 (0.60-1.22)	0.90 (0.64-1.28)	0.91 (0.61-1.35)
Agree strongly or somewhat (Ref)	26.4	46.4	27.2	1	1	1	1

^Controlling for demographic and health characteristics: age, gender, socio-economic disadvantage, body mass index, ever have a diagnosis of Type 2 Diabetes, heart disease, arthritis or gout, depression or lung condition.

Note: Variables included in analysis but results not reported in table as they were not statistically significant in any of the models: Gender; Socio-economic disadvantage; Ever had Type 2 Diabetes; Sport drink consumption; Availability of juice in the home; proportion of friends consuming sugary drinks; pressure to consume sugary drinks. Ref=reference category; *p<0.05, **p< 0.01, ***p<0.001.