Supplementary material to Implementation and sales impact of a capacity building intervention in Australian sporting facility food outlets: a longitudinal observational study

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Appendix 1: Additional details on the design and implementation of the 'Water in Sport' initiative

The 'Water in Sport' initiative was designed by The Victorian Health Promotion Foundation (VicHealth) based on prior work with local governments areas (LGA)[1] and other unpublished locally generated evidence. Local governments applied to VicHealth for funding and were selected for participation by VicHealth based on their high sugar-sweetened beverage consumption prevalence, high obesity rates and poor dental health outcomes.[2] Eligible local governments were also required to demonstrate commitment from council and facilities to make healthy outlet changes. The recruitment process and selection criteria for facilities was determined by each local government. Facilities involved in the initiative were either open all year (non-seasonal) or only open for a portion of the year (seasonal).

Project officers, who were primarily health promotion staff, assisted facilities to implement changes, including by developing healthy food and/or drink policies and refrigerator planograms to guide drink placement, negotiating with suppliers, and developing marketing materials to communicate and promote changes to customers. Most project officers were employed for approximately 2 years, with the first 6 months (from approx. March to October 2018) focused on working with facilities to implement changes, and the remaining time focused on drafting council policies, engaging sporting clubs, and capacity building with council and facility staff and helping policies to be adopted into legislation. The number of days the project officer was employed by each LGA ranged between 1 to 4 days per week depending on the number of recruited facilities and clubs.

VicHealth provided funds to the Healthy Eating Advisory Service run by Nutrition Australia (Victorian Division) to offer program delivery support to each local government project officer. The support included face-to-face and monthly phone assistance to trouble-shoot implementation challenges, local government project officer training (e.g., how to use Healthy Choices Guidelines (HCGs) and policy development) and convening a community-of-practice

meeting every six months of all project officers to facilitate sharing of resources and knowledge.

Appendix 2: 'Water in Sport' evaluation photographic audit protocol

- The following protocol is intended to be carried out immediately prior to and post changes made to drink availability.
- The aim of carrying our photo-audits is to monitor availability of beverages on display
- Please select the same day and time to repeat this audit every six months on a weekday
- Please ensure that there no people in the photo audit pictures
- Please ensure to the best of your ability that the fridge and vending machine and food items are well stocked at the time of audit.
- Please ensure this is conduct during opening hours
- This audit should be used to complete the drink assessment on FoodChecker

Check in with the café staff

- Introduce yourself if haven't previously and explain purpose of audit

Photos of overall display per fridge

- For each please take a photo of the overall fridge machine present in one frame
- Take photos in which each product line is clearly visible to allow categorisation into red/amber/green categories (e.g. this may be up to 3 photos per door of a fridge)
- Take photos of any beverage advertising or promotion (e.g. branding stickers, 2-for-1 deal signage)

- Please ensure the fridge door is open to reduce glare
- Where milkshake/ smoothie and tea/ coffee making facilities are available in the café, please take:
    - Photos of items the fridge/ freezer in which drink- specific ingredients are kept. Some of this may be on the bench. If ingredients for making milkshakes are present (e.g. syrup), please take pictures of that also
    - If milk for making tea/ coffee cannot be seen, ask staff which milk is being used as the default for tea/ coffee making.
- Please provide us with a document that provides us with the beverage menu (if available).
    - Preferably in word or PDF form, or take a photo. Please save the fridge menu image as Location_DD.MM.YY_FridgeX_Menu

Vending Machine

- For each please take a photo of the overall vending machine present in one frame
- Take photos in which each product line is clearly visible to allow categorisation into red/amber/green categories (e.g. this may be 3 photos per door of a fridge)
- Take photos of any vending advertising or promotion (e.g. branding stickers, 2-for-1 deal signage)
- Please provide us with the stock list of the vending machine. Please save the vending menu image as Location_DD.MM.YY_VendingX_Menu

Photos of food and menu

- For all food displayed please take a photo of the overall café in one frame.
- Please take detailed photos of the food items on display. If the food item is labelled please include this in the picture. Please ensure it is possible to identify what the food item is.
    - Please save the food image as Location_DD.MM.YY_Food
- Take photos of any food advertising or promotion (e.g. branding stickers, 2-for-1 deal signage) Location_DD.MM.YY_Advertising
- Please provide us with detailed description of the food menu. Where possible please provide us with a word document or PDF rather than a picture. Please save the food menu image as Location_DD.MM.YY_Food_Menu

Please save the file name as Location_DD.MM.YY_FridgeX or Location_DD.MM.YY_VendingX or Location_DD.MM.YY_Food. Please allocate each fridge and vending machine a number and keep that consistent for the duration of the study (e.g. Fridge1, Vending2). Please save all picture items as a JPG or PNG

Please email your sample audit to XXX with a subject line ‘Sample audit_Location_Date’

Appendix 3: Drinks classification based on refrigerator audit

Each drink 'facing' was counted as one drink, where a 'facing' is the drink positioned at the front of the shelf in the refrigerator that is visible to the customer (all other hidden drinks behind the front bottle/can are assumed to be the same product line). Non-drinks items in the refrigerator were not included in this assessment. Information from photographs was entered into FoodChecker [3], an online tool provide by the Healthy Eating Advisory Service, to determine the percentage of 'red', 'amber' and 'green' drinks on display according to the HCGs, over the total number of drink facings in a refrigerator [4].

HCG classifications for each drink product, including each package size, for each facility were determined by local government project officers at the earliest audit timepoint at which each product was available for sale. Free sugar content for each product (g/100mL) was determined by a research dietitian in mid-2020. For water-based and fruit-based drinks, free sugar content information was collected directly using total sugar content as reported on the manufacturer or supplier website. For flavoured milk-based drinks, which include a mixture of free sugars and intrinsic sugars, free sugar content was calculated as a percentage of total sugar content, based on the percentage free sugar content of a similar generic product in the AUSNUT database.[5] Free sugar information was identified for 95% of the 1580 drink products available for sale during the study period. The remaining products could not be identified (e.g., brand not identified in sales data). HCG classifications and free sugar information were not updated during the study period.

Appendix 4: Model specification for analysis of non-seasonal facilities sales outcomes

For non-seasonal facilities, the effect of the intervention on each outcome was assessed using a multilevel interrupted time series model [6], to account for the clustering induced by facilities and the autocorrelation (lag 3) over time. The model displayed in the following equation was used to estimate the effect of the intervention on each sales outcome Y_{it} where i represents site and t time in weeks $(t = 0,1,2, \dots ,216)$; $I(B)$ is an indicator function taking the value 1 if condition B is true and 0 otherwise; W represents mean maximum daily temperature at each site for each week; $M_{1,\mathrm{it}}$ to $M_{12,\mathrm{it}}$ are indicator variables for calendar month with July $M_{7,\mathrm{it}}$ used as the reference category

$$
\begin{aligned}
Y_{it} = {} & \beta_0 + \beta_1 t + I(113 \le t < 143)[\beta_2 + \beta_3(t - 113)] + I(t \ge 143)[\beta_4 + \beta_5(t - 143)] \\
& + \beta_6 W_{it} + \beta_7 M_{1,it} + \beta_8 M_{2,it} + \beta_9 M_{3,it} + \beta_{10} M_{4,it} + \beta_{11} M_{5,it} + \beta_{12} M_{6,it} + \beta_{13} M_{8,it} \\
& + \beta_{14} M_{9,it} + \beta_{15} M_{10,it} + \beta_{16} M_{11,it} + \beta_{17} M_{12,it} + \upsilon_i + \epsilon_{it}
\end{aligned}
$$

The model included two break points (at the start (week 113) and end of the implementation period (week 143), see Figure 1 and Table 1), assumed independent linear trends pre-, during, and post-implementation allowing for different slopes at different periods (β_1, $\beta_1 + \beta_3$, $\beta_1 + \beta_5$), and for a shift at each breakpoint (β_2, β_4). The slope and breakpoint coefficients were assumed to be the same for all facilities while the random variable υ_i represents the departure of the i-th facility's intercept from the overall population intercept term β_0. The model was used to estimate the difference between the expected outcome under the intervention and the expected counterfactual outcome (the expected outcome that would have been observed if the initiative had not been implemented) for the week beginning 3 February 2020. For all outcomes, model effects were estimated adjusted for calendar month and mean maximum daily temperature for each week (see Table 2). Models for revenue outcomes and total volume of drinks sold were additionally adjusted for outlet type.

Appendix 5: Detailed results

Table S1. Characteristics of facilities participating in 'Water in Sport' by inclusion in implementation data analysis

Characteristic	Facilities (n (%))		p-value
	Analysed (n=44)	Excluded (n=8)	
Food retail outlet type			0.089 [a]
Kiosks	14 (32)	0 (0)	
Canteens	24 (55)	8 (100)	
Cafés	6 (14)	0 (0)	
Higher disadvantage [c]	35 (80)	8 (100)	0.323 [b]
Non-seasonal	26 (59)	0 (0)	0.004 [b]

[a] Joint test of significance

[b] Fisher's exact test

[c] Local government areas are ranked from most disadvantaged (1) to least disadvantaged (10) using the decile rank within state. Higher disadvantage, SEIFA (Socio-economic Indexes for Areas) ≤5th decile; lower disadvantage, SEIFA ≥6th decile.

Table S2. Facility compliance with the *Healthy Choices* guidelines [a] over time, in 44 facilities

Audit timepoint	Facilities				Odds of compliance [b]			Percentage compliant [b]		
	Assessed		Compliant							
	n	(%)	n	(%)	Odds ratio	(95% CI)	P-value [c]	%	(95% CI)	P-value [c]
0 months	43	(98)	9	(21)	Ref			20.5	(7.07, 33.9)	
6 months	44	(100)	20	(45)	4.65	(1.36, 15.9)	0.014	46.1	(28.7, 63.3)	0.014
12 months	41	(92)	23	(56)	8.37	(2.41, 29.1)	0.001	57.2	(39.8, 74.5)	0.001
18 months	30	(68)	19	(63)	12.0	(2.41, 60.1)	0.002	63.8	(41.9, 85.8)	0.002

[a] Facility compliance with the Victorian Government *Healthy Choices* guidelines was defined as all refrigerators meeting target of ≤20% 'red' drinks (e.g. sugary soft drinks) and ≥50% 'green' drinks (e.g. sparkling waters) displayed

[b] Adjusted for season, seasonality of facility and outlet type and correlation between repeated measures at the facility-level

[c] p-value from test comparing each timepoint to first audit timepoint (0 months)

Table S3. Characteristics of facilities participating in 'Water in Sport' by inclusion in sales data analysis

Characteristic	Facilities (n (%))		p-value
	Analysed (n=24)	Excluded (n=28)	
Food retail outlet type			0.920 [a]
Kiosks	7 (25)	7 (25)	
Canteens	14 (58)	18 (64)	
Cafés	3 (11)	3 (11)	
Higher disadvantage [b]	16 (67)	27 (96)	0.008 [b]
Non-seasonal	15 (63)	11 (39)	0.164 [b]

[a] Joint test of significance

[b] Fisher's exact test

[c] Local government areas are ranked from most disadvantaged (1) to least disadvantaged (10) using the decile rank within state. Higher disadvantage, SEIFA (Socio-economic Indexes for Areas) ≤5th decile; lower disadvantage, SEIFA ≥6th decile

Box S1: Characteristics of facilities included in sales data analysis, by seasonality

Of the 12 seasonal facilities that provided sales data, 9 were included in the analysis and provided a mean of 50 weeks of data. Six had canteens and 3 had kiosks, with 5 of the included facilities selling median <50 drink units each week.

Of the 20 non-seasonal facilities that provided sales data in the period of interest, 9 were included in the analysis. Facilities provided a mean of 202 weeks of sales data (range 151 to 217). Eight of the non-seasonal facilities were canteens, 4 were kiosks, and 3 were cafés, with 5 of the facilities selling <50 drink units each week, 5 selling from 50 to 89 units, and 5 selling ≥90 units per week.

Table S4. Estimated weekly sales and change in weekly sales of refrigerated drinks between summer seasons, in 9 seasonal facilities[a]

Outcome	Summer season [b]	Weekly sales [c]		Change in sales		
		Mean	(95% CI)	β	(95% CI)	P-value [d]
Primary outcomes						
Volume 'red' drinks (%)	Summer 1 pre-implementation	45.2	(37.5 to 52.9)	3.99	(-1.06, 9.04)	0.122
	Summer 2 pre-implementation	41.2	(30.8 to 51.6)	Reference time period		
	Summer 1 post-implementation	23.0	(10.5 to 35.5)	-18.2	(-27.8, -8.67)	<0.001
	Summer 2 post-implementation	22.2	(10.2 to 34.2)	-19.0	(-28.6, -9.51)	<0.001
Refrigerated drinks revenue (AU$)	Summer 1 pre-implementation	307	(169 to 446)	-17.8	(-57.1, 21.4)	0.373
	Summer 2 pre-implementation	325	(176 to 475)	Reference time period		
	Summer 1 post-implementation	253	(124 to 382)	-72.3	(-208, 63.2)	0.296
	Summer 2 post-implementation	243	(125 to 362)	-81.8	(-123, -40.8)	<0.001
Secondary outcomes						
Volume 'amber' drinks (%)	Summer 1 pre-implementation	15.5	(7.68 to 23.3)	0.17	(-6.18, 6.52)	0.958
	Summer 2 pre-implementation	15.3	(6.99 to 23.6)	Reference time period		
	Summer 1 post-implementation	22.8	(19.2 to 26.3)	7.45	(0.20, 14.7)	0.044
	Summer 2 post-implementation	28.6	(21.4 to 35.8)	13.3	(2.66, 23.9)	0.014
Volume 'green' drinks (%)	Summer 1 pre-implementation	39.4	(31.4 to 47.5)	-3.07	(-10.7, 4.58)	0.432
	Summer 2 pre-implementation	42.5	(34.0 to 51.0)	Reference time period		
	Summer 1 post-implementation	53.2	(40.9 to 65.4)	10.6	(0.10, 21.2)	0.048
	Summer 2 post-implementation	47.4	(37.5 to 57.3)	4.88	(-0.53, 10.3)	0.077
Overall volume drinks (L)	Summer 1 pre-implementation	42.9	(23.3 to 62.6)	-1.91	(-9.44, 5.62)	0.619
	Summer 2 pre-implementation	44.9	(22.1 to 67.6)	Reference time period		
	Summer 1 post-implementation	38.8	(19.8 to 57.7)	-6.08	(-29.2, 17.1)	0.607
	Summer 2 post-implementation	36.1	(18.7 to 53.6)	-8.71	(-18.3, 0.90)	0.076
Volume water (%)	Summer 1 pre-implementation	36.0	(31.8 to 40.2)	0.34	(-6.22, 6.91)	0.918
	Summer 2 pre-implementation	35.7	(28.5 to 42.9)	Reference time period		
	Summer 1 post-implementation	45.6	(37.0 to 54.3)	10.0	(-1.46, 21.4)	0.087
	Summer 2 post-implementation	39.8	(33.8 to 45.9)	4.17	(-2.36, 10.7)	0.211
Free sugar content (g/100mL)	Summer 1 pre-implementation	4.00	(2.95 to 5.06)	0.45	(-0.06, 0.96)	0.082
	Summer 2 pre-implementation	3.55	(2.48 to 4.62)	Reference time period		
	Summer 1 post-implementation	2.55	(1.61 to 3.50)	-1.00	(-2.22, 0.22)	0.108

Outcome	Summer season [b]	Weekly sales [c]		Change in sales		
		Mean	(95% CI)	β	(95% CI)	P-value [d]
Revenue other drinks and food (AU$)	Summer 2 post-implementation	2.54	(1.52 to 3.56)	-1.01	(-2.28, 0.26)	0.119
	Summer 1 pre-implementation	1055	(696 to 1413)	-3.77	(-80.5, 73.0)	0.923
	Summer 2 pre-implementation	1058	(705 to 1411)	Reference time period		
	Summer 1 post-implementation	926	(552 to 1300)	-132	(-552, 289)	0.538
	Summer 2 post-implementation	876	(540 to 1212)	-182	(-417, 52.1)	0.127

[a] Estimated from mixed models with adjusted for maximum weekly temperature; percentage outcomes volume 'red', 'amber', 'green', water and free sugar content additionally adjusted for size of facility.

[b] Reference category of Summer 2 pre-implementation (December 2017 – February 2018) compared to Summer 1 pre-implementation (9 December 2016 – February 2017), Summer 1 post-implementation (December 2018 – February 2019), and Summer 2 post-implementation (December 2019 – February 2020)

[c] Marginal means and 95% confidence intervals estimated at the mean values of the covariates included in the multilevel model

[d] p-value from comparison of each summer season to reference summer season (Summer 2 pre-implementation)

References

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