

## Psychologically Informed Implementations of Sugary Drink Portion Limits

### SUPPLEMENTAL MATERIAL

#### **Discussion of Wilson, Stolarz-Fantino & Fantino (2013)**

Wilson, Stolarz-Fantino & Fantino (2013) argued that a sugary drink portion limit would backfire, on account that bundling would lead to increased purchasing of sugary drinks. In their study, participants were presented with three different drink menus: unregulated (small: 16-oz, medium: 24-oz, large: 32-oz), strictly regulated (one size only: 16-oz), and bundled (small: 16-oz, medium: 2 x 12-oz cups, large: 2 x 32-oz cups). A horizontal line was placed beside each size option on which participants indicated how many, if any, they would want to (hypothetically) order (this detail is consequential for evaluating the results, as we argue next). More ounces were “ordered” in the bundled condition relative to the unregulated condition, prompting the title of the paper: “Regulating the Way to Obesity: Unintended Consequences of Limiting Sugary Drink Sizes.”

A closer look at the methodology however, suggests that this provocative headline is unwarranted. First and foremost, the largest differences between means invoked the *regulated* menu, in which *fewer* ounces were ordered relative to both the unregulated and bundled menus. In other words, the most prominent result suggested that a strict (though implausible) implementation of the sugary drink portion limit would decrease purchasing of sugary drinks. Second, the bundled menu’s apparent uptick in ordering could be an artifact of the way orders were elicited: a person intending to order only “1” of the large size might have mistakenly written down the number “2” since the bundle consists of two (16-oz) cups – an error that would have contributed 64 ounces (i.e., 2 x 2 x 16) to the dataset (as opposed to the intended 32 ounces). Third, the study was not realistic: participants did not expend money and did not

actually obtain drinks. Finally, and relatedly, consumption was not measured, which is problematic because as noted in the main text, bundling could have opposing effects on purchasing versus consumption. In sum, it seems premature to conclude, based on this single-study paper that a sugary drink portion limit would “regulate the way to obesity.”

### **Results Excluding Participants who Failed Comprehension Check**

Participants were given a multiple-choice quiz question at the end of the sessions of Experiments 1, 2, and 3A asking them to identify the condition-specific drink choices they had been offered. In every experiment, most (at least 80% of) participants answered correctly. Below we exclude participants who failed to answer the comprehension check question correctly and compare these results with those of the entire sample.

#### **Experiment 1**

Due to an implementation error, participants in a few of the experimental sessions did not receive the comprehension check. That said, in the sessions in which the comprehension check was administered, the overall fail rate was low (7.2%), and there were no significant differences between conditions;  $\chi^2(3) = 1.88, p = .59$ .

When participants who failed the comprehension check are excluded, the p-value for the main effect of bundling in the logistic regression gets smaller: odds ratio = .56, 95% CI [.29 to 1.06],  $p = .074$  (from  $p = .09$ ; full sample). The observed pattern is consistent with the result using the full sample: 40.5% of participants ordering a large in the typical condition and 25.7% in the bundled condition. A chi square test comparing only bundled versus typical collapsed across serving style was significant: drink purchasers were 63.5 percent less likely to buy a large

in the bundled condition relative to the typical condition (percent choosing large: 25.7% in bundled versus 40.5% in typical;  $\chi^2(1) = 7.96, p = .007$ ).

With respect to calories consumed, directionally, participants in the bundled condition consumed fewer calories than those in the typical portion condition, but this difference failed to reach significance,  $F(1,321) = .72, p = .37$  (compared to  $p = .20$  in the full sample). In an intent-to-treat analysis (counting participants declining to buy a drink as having consumed zero ounces) the main effect of bundling on consumption remains non-significant,  $F(1, 574) = 1.58, p = .21$  (from  $p = .15$  in the full sample), with the pattern remaining the same: directionally, participants in the bundled condition ( $M_{bundled} = 63.54, SD = 68.82$ ) consumed fewer calories than the typical portion ( $M_{typical} = 70.85, SD = 70.43$ ).

## Experiment 2

In Experiment 2, the overall fail rate was low (7.0%), and there were no significant differences between conditions;  $\chi^2(1) = 1.06, p = .37$ . The propensity to order a large drink was consistent with the full sample: 39.4% of participants purchased a large in the typical condition compared to 37.0% in the refill condition, which was a non-significant difference,  $\chi^2(1) = .18, p = .72$  ( $p = .55$  in the full sample).

With respect to consumption, the results are nearly identical to that of the full sample: participants in the refill condition consumed 20.1 percent more calories than those in the typical condition ( $M_{refill} = 140.14, SD = 88.73; M_{typical} = 115.85, SD = 48.72; F(1, 284) = 21.31, p < .001$ ). Consumption was also greater for the larger size order relative to the smaller size,  $F(1,284) = 115.53, p < .001$  and there was a significant interaction,  $F(1,284) = 17.51, p < .001$ . In an intent-to-treat analysis this finding becomes stronger relative to when the entire sample is used: participants in the refill condition consumed 33.2 percent more calories than those in the

typical condition ( $M_{refill} = 96.96$  calories,  $SD = 98.19$ ;  $M_{typical} = 72.78$  calories,  $SD = 68.08$ ;  $t(435) = 3.01$ ,  $p = .003$ ), compared to a 26.1 percent difference ( $p = .016$ ) observed with the full sample.

### Experiment 3A

In Experiment 3A the overall fail rate was low (16.7%), and there were no significant differences between conditions;  $\chi^2(2) = 2.94$ ,  $p = .23$ . As with the full sample, there were no significant differences across conditions in the propensity to order a drink,  $\chi^2(2) = 2.84$ ,  $p = .24$  or to order a large drink,  $\chi^2(2) = 3.29$ ,  $p = .79$ .

With respect to consumption, the effect observed in the full sample is replicated with the restricted sample; if anything, it gets stronger. Specifically, there is a significant effect for condition,  $F(2,287) = 9.92$ ,  $p < .001$  ( $p < .001$  in the full sample), a significant effect for purchase size,  $F(1,287) = 97.17$ ,  $p < .001$  ( $p < .001$  in the full sample), and a significant interaction,  $F(2,287) = 14.65$ ,  $p < .001$  ( $p < .001$  in the full sample). When comparing consumption among medium orders we find a non-significant difference between conditions,  $F(2,159) = .76$ ,  $p = .47$  ( $p = .34$  in full sample), whereas with large orders, we find a significant difference between conditions,  $F(2,128) = 12.15$ ,  $p < .001$  ( $p < .001$  in full sample). The results of the pairwise comparisons among large orders remain strong: there is a significant difference between waiter-served and typical,  $t(85) = 5.31$ ,  $p < .001$  ( $p < .001$  in the full sample), and a smaller difference between self-serve and typical,  $t(91) = 2.28$ ,  $p = .03$  ( $p = .006$  in the full sample). Finally, we observe a significant difference between the self-serve and waiter-served,  $t(91) = 2.28$ ,  $p = .03$  ( $p = .054$  in the full sample).

In an intent-to-treat analysis, treating all participants who did not order a drink as having consumed zero ounces, there is a significant effect of condition on consumption,  $F(2,461) = 5.18$ ,  $p = .006$  (this effect is stronger than that observed in the full sample;  $p = .09$ ). The pairwise

comparisons also get stronger with the restricted sample: we observe a significant difference between the waiter-served and typical condition,  $t(312) = 3.17, p = .002$  ( $p = .042$  in the full sample), a significant difference between the self-serve and waiter-served conditions,  $t(301) = 2.04, p = .04$  ( $p = .11$  in the full sample), and an insignificant difference between the self-served and typical conditions,  $t(309) = .91, p = .36$  ( $p = .79$  in the full sample).

### **Experiment 3B**

In Experiment 3B the overall fail rate low (12.6%), however, there were significant differences by condition;  $\chi^2(2) = 18.51, p < .001$ . Participants in the control condition were less likely to answer the comprehension check correctly (75.8%) relative to the waiter-served (95.8%) and self-served (90.5%) conditions.

For consumption, there was a significant effect of experimental condition,  $F(2,247) = 16.87, p < .001$  ( $p < .001$  in the full sample). Pairwise comparisons are also consistent with the results using the full sample: waiter-served and typical conditions,  $t(160) = 5.41, p < .001$  ( $p < .001$  in the full sample); self-serve and typical,  $t(156) = 2.54, p = .01$  ( $p = .003$  in the full sample); self-serve and waiter-served,  $t(174) = 3.41, p = .001$  ( $p < .001$  in the full sample).

## Experimental Stimuli

**Image S1.** Drink Information Presented to all Participants (Experiment 1)



To help you decide whether you'd like to order something to drink, here is information on the available options and pricing.  
You can use the four dimes (attached to the chips) to make your purchase.

**Prices:**

\$0.20 (Medium)

\$0.30 (Large)

**Available flavors:**

 Vitamin Water Squeezed Lemonade	 Snapple Lemon Iced Tea
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**Would you like to order something to drink?**

(NOTE: The decision you make is final, you will not be able to change your mind or order additional items later in the session.)

- Yes, I want to order something to drink
- No, I do NOT want to order something to drink (note that the study won't proceed until everyone who has ordered a drink has received it).

**Image S2.** Order Form Presented to Participants in the Typical Portion Size Conditions (Experiment 1)

CLER ID: _____
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**COLD DRINK ORDER FORM**

Fill out this form and hand it to the experimenter who will give you your drink and collect your payment.

**PLEASE NOTE:**



- drinks cannot be taken home
- use the 40 cents in the envelope on your desk to pay for your purchase. Any money left over is yours to keep.

**Size options** (please check off which one you'd like)

Medium: **1 x 16oz drink**. Price: \$0.20.

Large: **1 x 24oz drink**. Price: \$0.30.

**Flavor options** (please check off which one you'd like)

<input type="checkbox"/>  Flavor: <i>Squeezed Lemonade</i>	<input type="checkbox"/>  Flavor: <i>Lemon Iced Tea</i>
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**Image S3.** Order Form Presented to Participants in the Bundled Conditions (Experiment 1)

CLER ID: _____
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**COLD DRINK ORDER FORM**

Fill out this form and hand it to the experimenter who will give you your drink(s) and collect your payment.

**PLEASE NOTE:**



- drinks cannot be taken home
- use the 40 cents in the envelope on your desk to pay for your purchase. Any money left over is yours to keep.

**Size options** (please check off which one you'd like)

- Medium: **1 x 16oz drink**. Price: \$0.20.
- Large: **2 x 12oz drinks = 24 ounces total**. Price: \$0.15 each (i.e., \$0.30 total). Note: this offer is available as a bundle only (i.e., you cannot order only one 12oz drink).

**Flavor options** (please check off which one you'd like)

**Note:** no mix-and-matching! (if you chose the large option, you will receive 2 of the same drink flavor)

 Flavor: <i>Squeezed Lemonade</i>	 Flavor: <i>Lemon Tea</i>
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**Image S4.** Drink Station in the Typical Portion Size, Self-Served Condition (Experiment 1)



**Image S5.** Drink Station in the Bundled, Self-Served Condition (Experiment 1)



**Image S6.** Order Form Presented to Participants in the Typical Portion Size Condition (Experiment 2)

CLER ID: _____
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**COLD DRINK ORDER FORM**

Fill out this form. An experimenter will come by to fill your order and collect payment.



**PLEASE NOTE:**

- drinks cannot be taken home
- use the 40 cents in the envelope on your desk to pay for your purchase. Any money left over is yours to keep.

**Size options** (please check off which one you'd like)

- 1 x 16oz drink. Price: \$0.20.
- 1 x 24oz drink. Price: \$0.30.
- I would not like a drink.

**Flavor options** (please check off which one you'd like)

<input type="checkbox"/>  Flavor: <i>Squeezed Lemonade</i>	<input type="checkbox"/>  Flavor: <i>Lemon Tea</i>
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**Image S7.** Order Form Presented to Participants in the Free Refill Waiter-Served Condition (Experiment 2)

CLER ID: _____
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**COLD DRINK ORDER FORM**

Fill out this form. An experimenter will come by to fill your order and collect payment.



**PLEASE NOTE:**

- drinks cannot be taken home
- use the 40 cents in the envelope on your desk to pay for your purchase. Any money left over is yours to keep.

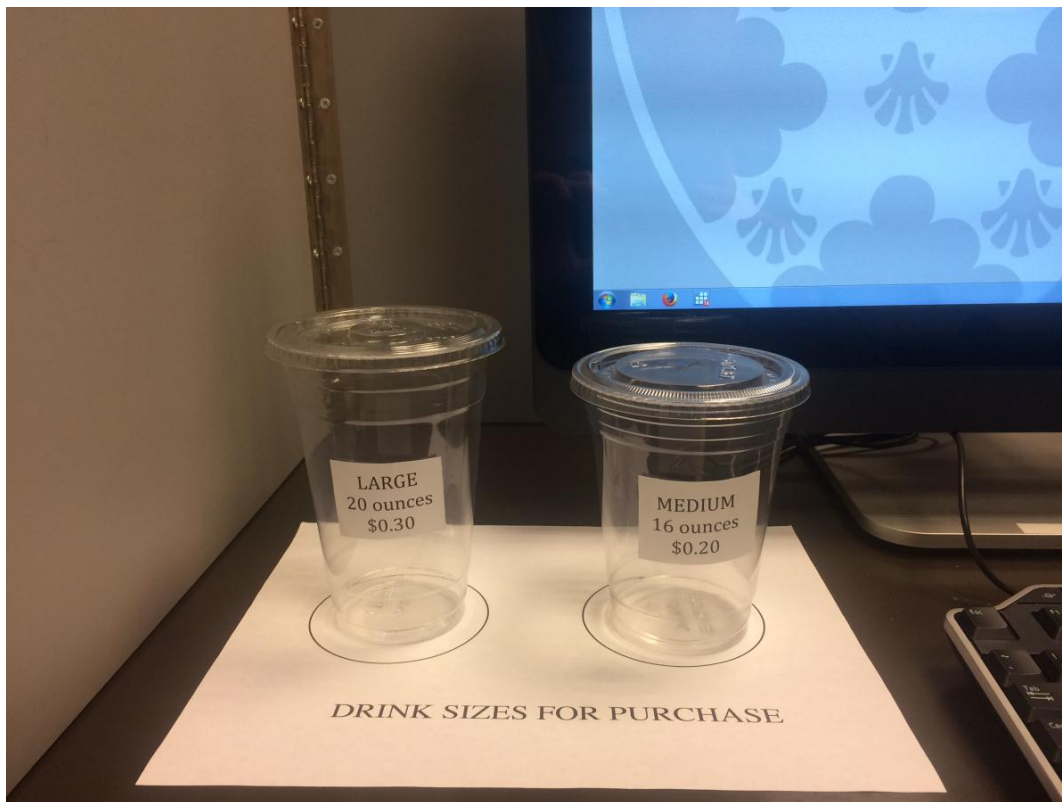
**Size options** (please check off which one you'd like)

- 1 x 16oz drink. Price: \$0.20.
- 1 x 16oz drink with unlimited refills. Price: \$0.30.
- I would not like a drink.

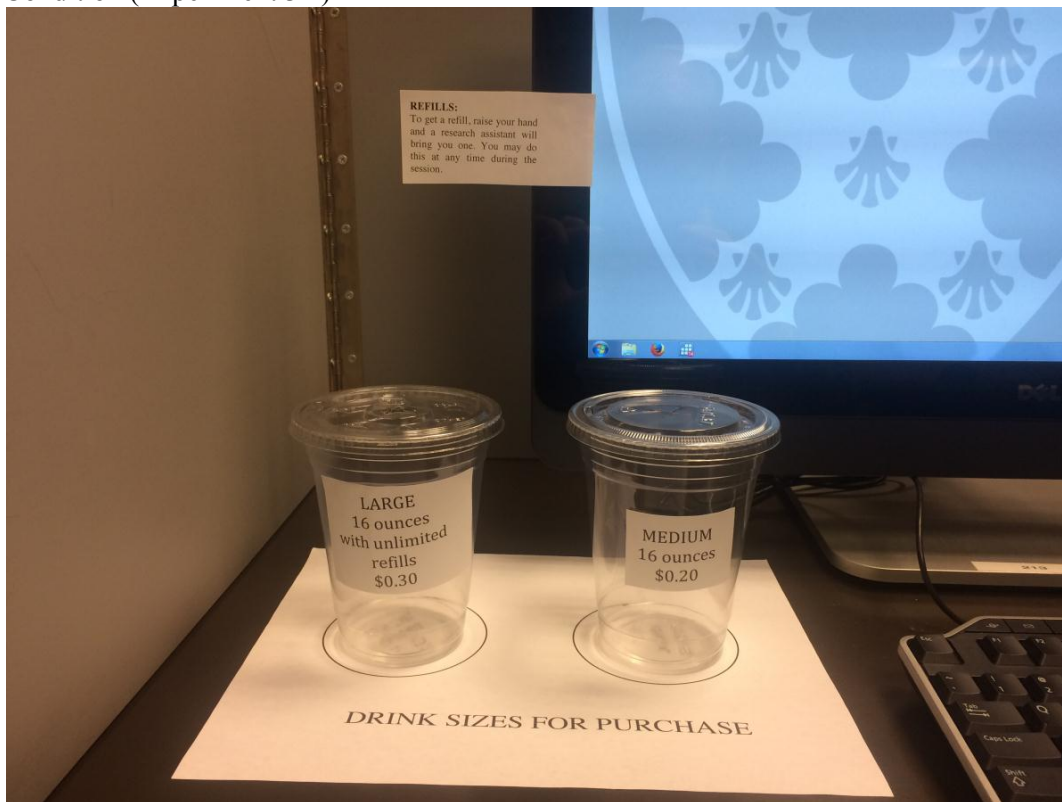
**Flavor options** (please check off which one you'd like)

<input type="checkbox"/>  Flavor: <i>Squeezed Lemonade</i>	<input type="checkbox"/>  Flavor: <i>Lemon Tea</i>
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**Image S8.** Drink Sizes Presented to Participants in the Typical Portion Size Condition (Experiment 3A)

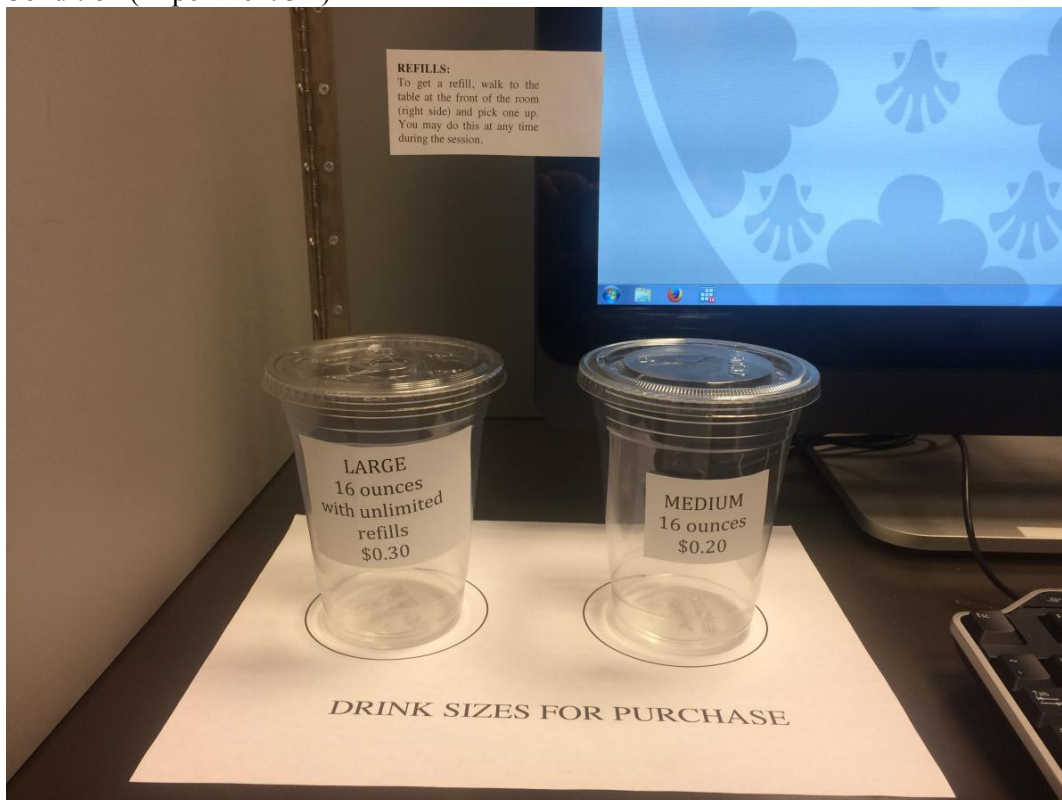


**Image S9.** Drink Sizes Presented to Participants in the Price-Inclusive Refill Waiter-Served Condition (Experiment 3A)



*Note:* The sticky note attached to the computer reads, “**REFILLS:** To get a refill, raise your hand and a research assistant will bring you one. You may do this at any time during the session.”

**Image S10.** Drink Sizes Presented to Participants in the Price-Inclusive Refill Self-Served Condition (Experiment 3A)



*Note:* The sticky note attached to the computer reads, “**REFILLS:** To get a refill, walk to the table at the front of the room (right side) and pick one up. You may do this at any time during the session.”

**Image S11.** Order Form Presented to Participants in the Typical Portion Size Condition (Experiment 3A)

CLER ID: _____
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**COLD DRINK ORDER FORM**

Fill out this form. An experimenter will come by to fill your order and collect payment.

**PLEASE NOTE:**

- drinks cannot be taken home
- use the 40 cents in the envelope on your desk to pay for your purchase. Any money left over is yours to keep.

**Size options** (please check off which one you'd like)

- Medium: 16oz drink.** Price: \$0.20.
- Large: 20oz drink.** Price: \$0.30.
- I would not like a drink.**

**Flavor options** (please check off which one you'd like)

<input type="checkbox"/> <b>vitaminwater</b> GLACÉAU Flavor: <i>Squeezed Lemonade</i>	<input type="checkbox"/> <b>Snapple</b> Flavor: <i>Lemon Tea</i>
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**Image S12.** Order Form Presented to Participants in the Free Refill Waiter-Served Condition (Experiment 3A)

CLER ID: _____
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**COLD DRINK ORDER FORM**

Fill out this form. An experimenter will come by to fill your order and collect payment.



**PLEASE NOTE:**

- drinks cannot be taken home
- use the 40 cents in the envelope on your desk to pay for your purchase. Any money left over is yours to keep.

**Size options** (please check off which one you'd like)

- Medium: 16oz drink.** Price: \$0.20.
- Large: 16oz drink with unlimited refills.** Price: \$0.30.  
To get a refill, simply raise your hand and a research assistant will bring one to you.
- I would not like a drink.

**Flavor options** (please check off which one you'd like)

<input type="checkbox"/>  Flavor: <i>Squeezed Lemonade</i>	<input type="checkbox"/>  Flavor: <i>Lemon Tea</i>
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**Image S13.** Order Form Presented to Participants in the Free Refill Self-Served Condition (Experiment 3A)

CLER ID: _____
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**COLD DRINK ORDER FORM**

Fill out this form. An experimenter will come by to fill your order and collect payment.

**PLEASE NOTE:**

- drinks cannot be taken home
- use the 40 cents in the envelope on your desk to pay for your purchase. Any money left over is yours to keep.

**Size options** (please check off which one you'd like)

- Medium: 16oz drink.** Price: \$0.20.
- Large: 16oz drink with unlimited refills.** Price: \$0.30.  
To get a refill, simply walk to the table at the front of the room and pick one up.
- I would not like a drink.

**Flavor options** (please check off which one you'd like)

<input type="checkbox"/> <b>vitamin</b> water <small>GLACÉAU</small> Flavor: <i>Squeezed Lemonade</i>	<input type="checkbox"/> <b>Snapple</b> Flavor: <i>Lemon Tea</i>
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**Image S14.** Drink and Chip Endowment (Experiment 3B)



**Image S15.** Drink Station in the Self-Service Refill Condition (Experiment 3B)

