MAXWELL SCHOOL OF INDUCTIVE HEALTHY EATING IN CHILDREN:

An Investigation of the “Ripple” and “Temporal” Effects of Reward-Based Interventions

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Background: The latest CDC figures indicate that nearly one-in-five children and adolescents between the ages of 2 to 19 are obese. The problem is even more acute among black children, Hispanic children, and children from low-income families. The use of small reward-based incentives may be a cost-effective means by which healthier dietary choices could be induced among young children.

Objective: Although previous studies have established the effectiveness of using small reward-based incentives in inducing the consumption of healthier foods among children, little is known about their impact outside of experimental settings—the “ripple” effects—or their effectiveness over time when administered daily—the “temporal” effects. This poster presents the results of a field experiment conducted to provide insight on these matters.

Methods: The study employs a pretest-posttest within-subjects design and is conducted as a school program catering to low-income children between the ages of 5 and 12 over the course of four weeks. Children were offered a small prize (worth on average roughly 10 cents) for choosing a fruit cup (~85 grams) for dessert after lunch in lieu of cookies during the intervention period. Pre-intervention and post-intervention parent surveys were used to assess the effects of the incentives on fruit preferences outside of experimental settings.

Timeline:
- Week 1: baseline observations
- Week 2 & 3: intervention period
- Week 4: post-intervention observation

Participants: The intervention was administered to, and dessert choice data collected for, all attending children. Panel data on the dessert choice and consumption was collected for 23 children between the ages of 5 and 8, the particular age group of interest, thereby constituting 460 student-day observations. Parent survey data was also collected for this sample.

Results: The introduction of small reward-based incentives dramatically increased the proportion of children choosing a fruit cup in lieu of a cookie cup for dessert after lunch, both among participating children and all attending children, with no evidence of a “crowd out” effect. These effects for the former are depicted in Figure 1. The results from the linear probability model regressions are shown in Table 1.

Table 1. Intervention and Post-Intervention Effects

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
<th>Week 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prop. Choosing Fruits (%)</td>
<td>40</td>
<td>68</td>
<td>89</td>
<td>81</td>
</tr>
</tbody>
</table>

Note: All models include fixed-effects and clustered standard errors (both at the individual level). Standard errors in parentheses p < 0.05, ** p < 0.01, *** p < 0.001

Further analysis also indicates that their effect wanes over time, as shown in Figure 2. As seen on Table 2, the effect of the incentives on the likelihood of choosing a fruit cup declined by 37% between Weeks 2 and 3. Similarly, between the first half of Week 2 and the second half of Week 3, the effect of the incentives declined by nearly half. The response rate for the pre- and post-intervention surveys was ~70%. The survey results, depicted in Figure 3, suggest the absence of any adverse effects related to the introduction of reward-based incentives.

Table 2. Week and Day Intervention Effects

<table>
<thead>
<tr>
<th>Week</th>
<th>Day</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Omitted</td>
<td>0.451***</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>0.494***</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>0.387**</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>0.296**</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>0.264*</td>
</tr>
</tbody>
</table>

Note: LPM with fixed-effects and clustered standard errors (both at the individual level). The baseline week is omitted in model (1) and, similarly, the baseline day is omitted in model (2). Standard errors in parentheses: *** p < 0.001, ** p < 0.01, * p < 0.05

Conclusions:
- Small reward-based incentives dramatically increased the proportion of children choosing a fruit cup in lieu of a cookie cup for dessert after lunch, both among participating children and all attending children.
- The effect of the reward-based incentives on the likelihood of choosing a fruit cup waned over time, suggesting a negative trend in the "temporal" effect of such interventions.
- Survey results suggest that there may be no “ripple” effects related to the introduction of rewards-based incentives.

Figure 1. Proportion Choosing Fruits (Participants Only)

Figure 2. Day Effects (Participants Only)

Figure 3. Parent Survey Results

Note: Difference in means between each week is statistically significant at the 5% level or lower in each case, with the exception of the difference between the proportion choosing fruits in Week 1 and Week 4.