Repeatability of the infant food reinforcement paradigm: Implications of individual and developmental differences

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Background
The obesity epidemic is a prominent issue in today's society. The Center for Disease Control and Prevention reports that about 17% of children 2—19 years old are obese. This trend has been shown to continue throughout the individual's life and contribute to health issues. [1] Our laboratory recently developed a paradigm to measure the reinforcing value of food versus an alternative stimulus in infants, namely the food reinforcement ratio (FRR) paradigm. This measure may be important in obesity treatment and prevention. The primary purpose of this study was to examine the short-term repeatability of this measure. The secondary aim was to examine whether temperament dimensions related to novelty responsiveness and infant age influenced the repeatability of the paradigm.

Objectives
1. Examine the short term repeatability of the FRR task in infants 9-18 months old.
2. Examine the roles of temperament reflecting novelty responsiveness and infant age in influencing the repeatability of the FRR task over time.

Methods
Participants: 37 infants 9-18 months old
Inclusion Criteria: 9-18 month old, > 37 weeks gestation, >2500 grams birth weight, no developmental delays. Mother's age at birth >18 years of age, no alcohol, smoking, or illicit drug use during pregnancy

Laboratory Visits:
• Four appointments— the first two visits were scheduled two days apart, measuring either the food or non food task. This was repeated for the second two visits.
• Food portion of the task was the infants favorite food rated by the parent
• Non food portion of the task was blowing bubbles
• Infants were first given time to play to become comfortable with the environment, then played the computerized task (figure 1).
• The infant and mom’s height and weight was taken at the last visit

Results

<table>
<thead>
<tr>
<th>High Intensity Pleasure</th>
<th>Approach</th>
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<tbody>
<tr>
<td>Food Pmax1</td>
<td>2.044</td>
</tr>
<tr>
<td>Food Pmax2</td>
<td>1.566</td>
</tr>
<tr>
<td>BUB Pmax1</td>
<td>3.212</td>
</tr>
<tr>
<td>BUB Pmax2</td>
<td>1.017</td>
</tr>
</tbody>
</table>

**Figure 2:** Infant participant playing with bubble FRR task

**Figure 3:** Comparison of reinforcing value of food and non-food alternative measured at two time points.

- Infant temperamental factor of high intensity pleasure, but not approach, significantly predicted BUB Pmax1 (β = 3.21, p = 0.001), based on linear regression models
- Participants with stronger positive responses to novelty were more likely to work for bubbles at time 1, but not time 2
- Food Pmax1 and Pmax2 were not significantly predicted by either high intensity pleasure or approach

**Figure 4:** The age moderated the relationship between the reinforcing value of bubbles at time 1 (BUB Pmax1) and time 2 (BUB Pmax2) (p<0.03).

- The slopes reveal an effect of reinforcing value of bubbles at time 1 among older infants (β = 0.52, p = 0.002); this effect is not seen with younger infants (β = 0.04, p = 0.80)
- Among older infants, a low BUB Pmax1 predicts a low BUB Pmax2

Conclusions
- In regards to the reinforcing value of food, bubbles, or the overall FRR between repeat assessments, there were no differences
- No differences in FRR (0.53 ± 0.12 vs. 0.56 ± 0.12) were observed over time

References