

# Reducing Relative Food Reinforcement in Infants by an Enriched Music Experience

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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 [1]. This trend has been shown to continue throughout the individual's life and contribute to health issues. Intervention at a young age, particularly infancy, may be critical in reversing this increasing trend. Previous studies have shown a relationship between infant weight and the reinforcing value of food versus a non-food alternative (food reinforcement ratio, FRR) [3]. Food reinforcement is related to and predicts energy intake and weight gain, and it develops early in life. Overweight infants have exhibited a higher FRR primarily due to their lack of motivation to work for a non-food reinforcer. Research has shown that access to an enriching environment lowers the risk for obesity. However, there is little research on how to reduce high food reinforcement values in infants.

## Objectives

To assess the effects of an enriching music program on the food reinforcement ratio (FRR) in infants 9-16 months old.

## Methods

### Participants:

Inclusion Criteria: 9-16 month old, > 37 weeks gestation, >2500 grams birth weight, mother's age at birth >18 years of age, no known development delays

### Methods:

- Two 45 minute appointments made to individually measure food and non-food reinforcing value using a computerized task
- Food portion of the task was the infant's favorite food rated by the parent
- Non food portion of the task was 10 seconds of the song "Singin' Everyday"

## Methods

- Rewards were received after a specific required number of button presses were performed, starting with one press and increased in a progressive fixed ratio (linearly, every 2 trials)
- Infant played until visible signs of wanting to stop along with the parent's agreement
- FRR was calculated by measuring reinforcing value of food ( $\text{Food } P_{\max}$ ) compared to total responses [e.g.,  $\text{Food } P_{\max} / (\text{Food } P_{\max} + \text{Music } P_{\max})$ ]

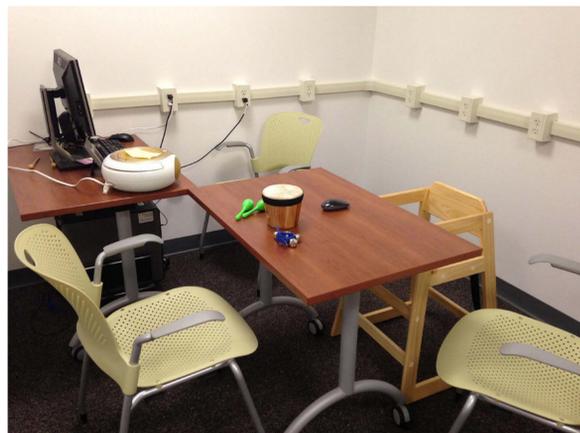


Figure 1: Laboratory set-up for the pre- and post-assessments.

### Intervention:

- Infants were randomized into one of two groups for a 6-week program with 45 minute classes: MusicTogether® or playdate group (active control)
- The families were instructed to play the CD provided by MusicTogether® or play with the given toy (Baby's First Blocks, Fischer-Price®) daily
- Level of at-home play was assessed with daily surveys sent to parents of both groups

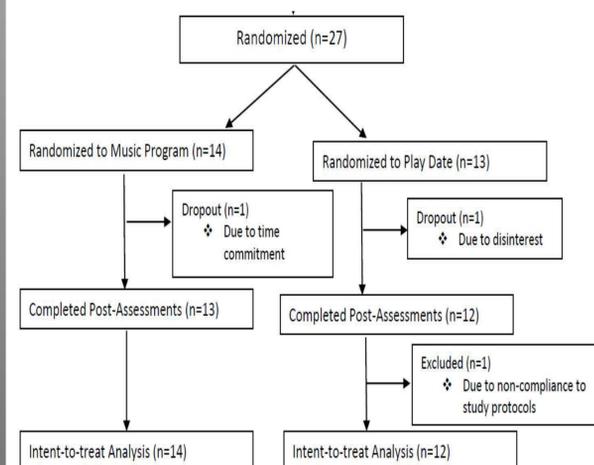


Figure 2: Participant flow chart

## Results

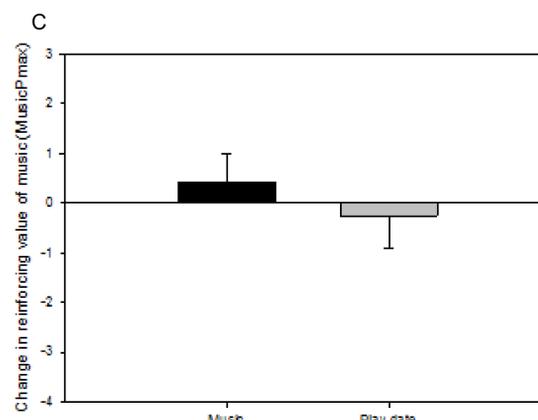
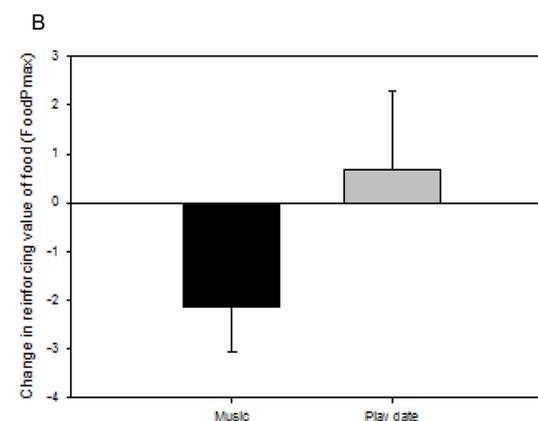
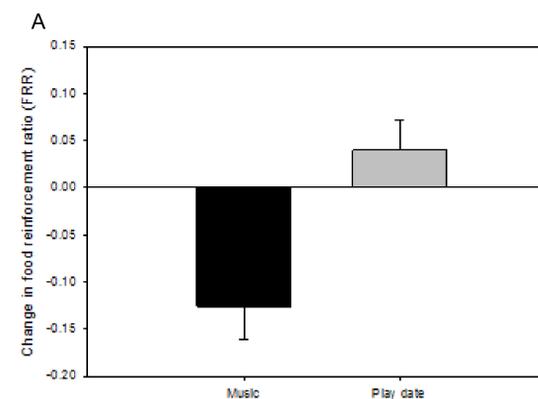


Figure 3: The effects of the 6 week intervention program on the food reinforcement ration and the relative reinforcing values

## Results

### Figure 3A:

The intervention resulted in a significant difference between group and change in FRR ( $p=0.002$ ) with a FRR reduction among the music group ( $-0.13 \pm 0.13$ ) and a slight increase in the play group ( $0.04 \pm 0.11$ )

### Figure 3B:

Reinforcing value of food was significantly decreased among infants in the music group but not the control group ( $p=0.02$ )

### Figure 3C:

Reinforcing value of music was non-significantly increased for the music group ( $p=0.43$ )

- ANOVA analysis revealed no significant differences for baseline demographic and anthropometric data between the two randomized groups.
- Daily at home practice surveys, in both the music and play group, indicated similar practice time of 1.4 and 1.6 times/day, respectively.

## Conclusions

- Infants showed reduced FFR after 6-week music program.
- Obesity may be due to a lack of pleasurable activities. Therefore, beginning as early as infancy, interventions promoting environmental enrichment could be significant in altering food choice and preventing obesity.
- Previous studies have shown that alternative reinforcers help create an enriched environment that may reduce sensitivity to rewards and impulsivity, which may be important in combating obesity [4,5,6].

## References

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