Screen use versus relative reinforcing value of food and demographics in preschoolers

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Background

- Screen use is the total amount of time spent using screens such as televisions, computers, iPads/tablets, and cell phones. High screen use is associated with childhood obesity[1].
- Reinforcing value is how hard one will work to obtain a stimulus.
- Relative reinforcing value of food (RRV_{food}) relates the reinforcing value of a food stimulus to a non-food stimulus, such as music. A high RRV_{food} is also linked to childhood obesity[2].
- The Infant Toddler-Home Observational Measurement of Environment (IT-HOME) is a valid measure that assesses the quality of a home environment in a laboratory setting[3].
- The IT-HOME describes 6 dimensions of a home environment: responding to child's behavior (RES), accepting child's behavior/ avoiding punishment (ACC), organizing family schedule (ORG), providing learning/play materials (LRN), being involved in child's learning (INV), and integrating various experiences in child's life (VAR).

Objectives

1. Identify the relationship between screen use and RRV_{food}
2. Identify possible correlations between screen use and home environment dimensions

Participants

- Participants were 20 3-4-year-old-children from Buffalo, NY
- Average child age was 3.55 years (range of 3.08 − 3.90 years)
- See Table 1 for additional participant characteristics

Methods

- Screen use was collected via parent interview. Parents reported on how much time their child spent using screens on weekdays and weekends. Parents also provided child and parental demographics.
- RRV_{food} was collected using a task developed in this lab. The child is trained to press a computer mouse button to receive a reward. For the food version of this task, the child earns a piece of their favorite food. For the non-food version of this task, the child earns 15-seconds of song play. Children play the task until they show signs of disinterest. The max number of sessions are recorded.
- Task schedule: 1, 4, 8, 12, 16, 20,..., 30 (n+4)

- For the first session, the child presses the mouse button one time for the reward. Next, four button presses are needed to earn the reward. For the third session, eight button presses are needed. This pattern continues to a maximum of 30 button presses.

Figure 1. Set up of the reinforcement task

Data Analysis

- Calculation of RRV_{food}

$$\frac{\text{max \# of food sessions}}{\text{sum of max food \& non-food sessions}}$$

- Pearson correlations were performed to identify correlations between variables of interest.

Results

Table 1. Child characteristics (n=20)

Variable	Mean (SD)	N (%)	Range
Sex, female		14.0 (70%)	
Age, years	3.55 (0.30)		3.08 – 3.90
Race			
Caucasian		15.0 (75%)	
Non-Caucasian		5.0 (25%)	
Weight for length z-score (zWFL)	0.72 (0.85)		-0.73 – 2.93
Screen time weekdays, > 1 hour		10.0 (50%)	
Screen time weekends, > 1 hour		15.0 (75%)	
Participating parents' education level			
College graduate or higher		17.0 (85%)	

Table 2. Correlations between child screen use and RRV_{food}, LRN, and zWFL (n=20)

Relationship	Correlation	p-value
Screen use (weekday) & RRV_{food}	-.084	.725
Screen use (weekend) & RRV_{food}	-.114	.632
Screen use (weekday) & LRN	-.245	.298
Screen use (weekend) & LRN	-.429	.059
Screen use (weekday) & zWFL	.386	.093
Screen use (weekend) & zWFL	.133	.576

Figure 2. Screen use vs. RRV_{food} on weekdays

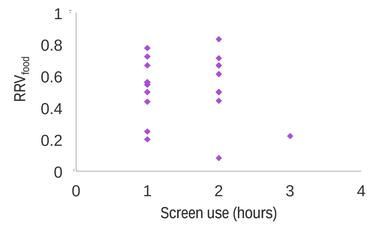
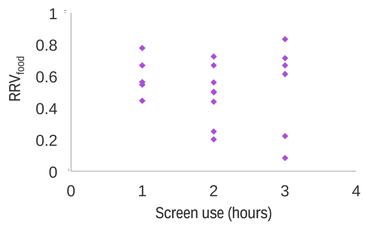


Figure 3. Screen use vs. RRV_{food} on weekends



Discussion

- Consistent with previous literature, screen use was related to the child's weight status. Children with higher screen use had a higher weight for length z-score.
- There was no relationship between screen use (weekdays or weekends) and RRV_{food}.
- Screen use was marginally correlated with the presence of age-appropriate learning and play materials on both weekdays and weekends with a stronger correlation on weekends.
- This data suggests that parents of children with high screen use can integrate appropriate screen use (that which aids child learning and development) as an alternative to traditional learning and play materials.

Future Directions

- A larger sample size may be useful to identify trends not visible in this data.
- Providing children with age-appropriate learning materials may lower their screen use. This correlation should be explored in future research as it may have useful implications.

1) Robinson, T. N. (1998). Does Television Cause Childhood Obesity? *JAMA, 279*, 959-960.
2) Rollins, B. Y., Loken, E., Savage, J. S., & Birch, L. L. (2014). Measurement of food reinforcement in preschool children. Associations with food intake, BMI, and reward sensitivity. *Appetite, 72*, 21-27.
3) Bradley, R. H., & Caldwell, B. M. (2003). *Home Observation for Measurement of the Environment: Administration manual.* Little Rock, AR: University of Arkansas