Using Food Reinforcer to Shape Children’s Non-Food Behavior Modifies Children’s Food Preference

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Control rules are parental practices of using food to encourage children to behave. A field study showed that children lived in families with high frequency of using control rules exhibited higher preference for highly reinforcing food, and such effect was particularly strong for boys with high reward sensitivity.

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EXTENDED ABSTRACT

Conceptualization

Food choice and preference is largely determined by the reinforcing value of food (Lappulainen and Epstein 1990), which is naturally tied to its palatability (Drewnowski 1997; Rozin 1990). Control rules are parental practice that use food as an instrumental reinforcer to encourage children to behave in a normative manner in non-food domains (Puhl and Schwartz 2003). Besides shaping behavior, enforcing control rules may modify the food reinforcing property by adding a whole spectrum of emotional, intellectual and social pleasure (Dubé and Le Bel 2003) on top of the palatability of food. Early experiments showed that repeatedly presenting snacks as a reward or with adult attention increases children’s preference for the presented food (Birch 1981). Since food high in fat or sugar is usually chosen as a reinforcer for control rules (Cooke et al. 2011), these rules may lead to children’s dietary pattern that is biased to food high in sugar/fat, and this may be moderated by individual differences regarding the efficacy of reinforcing learning.

This field study aims to examine whether control rules are associated with children’s increased fat, carbohydrate and total energy intake in everyday eating, and whether this effect is moderated by individual differences in sensitivity to reward, and by gender differences that favor reward seeking and reinforcement learning in boys as a favored learning strategy.

Method

A representative sample (North America) of parents of 207 children (97 boys and 110 girls) aged from 6 to 12 (M=8.98, SD=1.67) completed the study. A web-based Food Frequency Questionnaire (web-FFQ) was used to assess children’s dietary patterns (Labonte et al. 2012). The web-FFQ asked participants to recall their children’s food intake over the last month based on a list of 136 individual food items or food clusters. Participants were first asked to indicate how frequently their children consumed each food item and the typical portion size. Participants estimated the portion size with the visual aid of digital photographs presenting food in standardized dinnerware and utensils (Le Moullec et al. 1996). Integrating the reported frequency and portion size (Labonte et al. 2012), we calculated the energy content, the intake of lipids (fats) and carbohydrates (sugar) from the participants’ usual diet.

Parental control rules were assessed by using a subscale of food rules scale (Puhl and Schwartz 2003). The food rules scale asks parents to indicate how often they force their children to comply with certain food rules. The control rules subscale included 6 items (α=0.66) assessing how often parents used food as a reinforcer to encourage children’s behavior, such as “You (the child) received food as a reward for good behavior.” Children were divided into two groups by median split (Median=1.33) on their scores of control rules; 95 children (45 boys and 52 girls) were categorized as a low control rule group, and the high control rule group included the other 112 children (54 boys and 58 girls).

Children’s sensitivity to rewards was measured by the behavioral activation system (BAS) scales for young children (Blair, Peters, and Granger 2004). Participants indicated to what extent they agreed with 13 statements (α=0.87) regarding the characteristics of their children’s reward responsiveness, drive and fun seeking (e.g., “When my child wants something he/she goes all out to get it”). Based on the median split of the BAS score (Median=6.77), participating children were categorized into two BAS groups; 103 children were categorized as high BAS group (45 boys and 58 girls) and 104 children were in the low BAS group (52 boys and 52 girls).

Major Findings

We conducted a series of analyses to test the effect of parent control rules on children’s total daily energy (calories per day), fat and carbohydrate intake (grams per day). Each dependent variable was analyzed in a three-way ANCOVA including gender (2 levels: boys versus girls), family control rule group (2 levels: high versus low) and BAS group (2 levels: high versus low) as between-subject factors. To control for the effect of energy expenditure on food intake, participants’ daily hard physical activity was included in the models as a covariate.

In all analyses, the main effects of control rules were significant (p<0.01). Children who lived in families with a high frequency of using control rules exhibited more daily fat, carbohydrate and energy intake than did children whose parents use control rules less often. The effect of control rules on dietary pattern was particularly strong for children with high reward sensitivity and boys, as indicated by the significant interaction effects of control rules by BAS group (p<0.01) and control rules by gender (p<0.01). Post-hoc mean comparisons (Bonferroni adjusted) showed that, within the high BAS group, children from high control rule families had significantly higher energy, carbohydrate and fat intake than children with low control rules (comparisons: p<0.001), whereas within the low BAS group, the effect of control rules was not significant. As for gender difference, among boys, daily energy, carbohydrate and fat intake was higher for the high control rules group than for the low control rules group (p<0.001). The comparison of high versus low control rules among girls was not significant. In the analyses of energy and fat intake, three-way interaction of control rules by BAS by gender were found significant (p<0.05), which further pinpointed high BAS boys as the group that was particularly vulnerable to the effects of control rules. High BAS boys reported higher daily energy and fat intake if their parents enforced control rules more often compared to those with low control rules (p<0.001); no significant difference between high versus low control groups was found within low BAS boys, high BAS girls or low BAS girls. Boys with high BAS and high control rules reported a higher daily energy and fat intake than all other groups (p<0.001).

Control rules have effect on children’s food preference. The moderating effects of sensitivity to reward and gender are consistent to a reinforcement learning process – associating the high fat/sugar food consumption with social-affective pleasure – through which parental control rules contribute to children’s maladaptive dietary patterns.
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