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Reward sensitivity is a determinant of higher fat intake and BMI in Flemish children

Background

- Childhood overweight and obesity = currently major health concerns.
- Research on risk factors of overweight in children is crucial to develop new effective interventions.
- Individual differences in sensitivity to rewards (RS) of adolescents and adults, measured with the Drive subscale of the Behavioral Inhibition System/Behavioral Activation System (BIS/BAS) scale, were positively related to BMI.
- In adults, RS was associated with fast-food consumption.

Problems

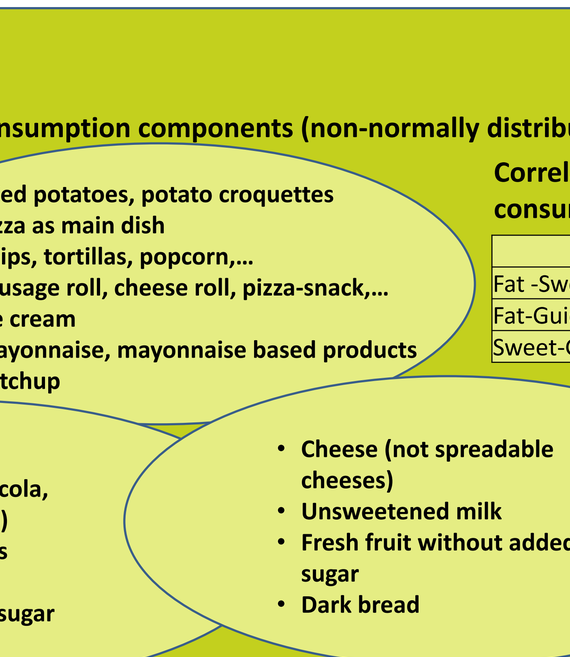
- Link between RS and food consumption frequency has never been investigated in primary school-children.
- Link between RS and body-fat percentage (BFP) has never been examined before.

Hypotheses

- Positive association between RS and unhealthy food consumption (high fat and/or sugar).
- Positive association between RS and BMI/BFP.

Methodology

- Forces study: 430 Flemish children, age=5.5 to 11.5 years, 49% boys.
- Population sample of healthy children, recruited in schools.
- Parents completed 43 item food frequency questionnaire and BIS/BAS scale . Drive-subscale was used in the current study.
- Children's weight, height were measured and BMI z-scores based on Flemish growth curves were calculated; BFP was measured with a BOD POD®.
- Statistics:
  - Principal component analyses to reduce items and define connected components, based on msa-values (>0.65), scree-plot and factor interpretability.
  - Multiple linear regression analyses with RS (Drive-subscale) as predictor, controlled for gender and age, and food components and body composition measurements as outcome.



Results

PCA revealed three food consumption components (non-normally distributed)

Fat =Foods high in fat
- **Fried potatoes, potato croquettes**
- **Pizza as main dish**
- **Chips, tortillas, popcorn,…**
- **Sausage roll, cheese roll, pizza-snack,…**
- **Ice cream**
- **Mayonnaise, mayonnaise based products**
- **Ketchup**

Sweet =Foods high in sweetness
- **Chocolate, candy bars**
- **Sweet and soft drinks (cola, limonade, Aquarius, ...)**
- **Light en zero soft drinks**
- **Candy**
- **Fresh fruit with added sugar**

Guidelines =Foods according to guidelines
- **Cheese (not spreadable cheeses)**
- **Unsweetened milk**
- **Fresh fruit without added sugar**
- **Dark bread**

Correlation between food consumption components

	Spearmans' Rho
Fat -Sweet	**0.370** (p<0.001)
Fat-Guidelines	**-0.290** (p<0.001)
Sweet-Guidelines	**-0.240** (p<0.001)

Multiple linear regression with RS, age and gender as predictors and food consumption components/BMI/body-fat percentage as outcome (Standardized regression coefficient β represented for each predictor, p-value in brackets)

Outcome	Adjusted R^2	β Reward Sensitiv.	β age	β gender
High fat	0.015	**0.111** (0.022)	**0.106** (0.027)	0.019 (0.694)
High sugar	0.002	-0.018 (0.708)	0.089 (0.065)	-0.018 (0.710)
Traditional	-0.003	-0.024 (0.626)	-0.060 (0.214)	-0.014 (0.773)
BMI z-score	0.022	**0.137** (0.004)	-0.072 (0.126)	0.067 (0.158)
BFP	0.145	0.081 (0.067)	**0.339** (<0.001)	**0.186** (<0.001)

Conclusion

The current study identifies higher sensitivity to rewards (**RS**) as a **risk factor for** higher weekly consumption frequency of **high fat foods**, but not of sweet foods. The items included in the 'fat' food consumption component can be called **palatable foods**, highly attractive and **rewarding** when consumed. Further, higher **RS** is also a **risk-factor for higher BMI** in children. The relationship between RS and BFP is nearly significant. However, the **explained variance** of RS in predicting high fat foods consumption and BMI is **small**. A possible explanation is that primary school children's food consumption is highly **controlled by the parents and not by a child characteristic**.