Does How Often You Eat Matter?

Eating Frequency and Obesity in a Longitudinal Cohort of Adolescent Black and White Girls

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Introduction

- The few studies that have investigated the relationship between eating frequency and obesity in children have had mixed findings.
- The literature is complicated by the fact that there is no consensus on what constitutes a snack, meal, or eating occasion.
- Two nationally representative, cross-sectional studies found no relationship between meal frequency and adiposity.[2]
- Longitudinal studies have variously shown a positive relationship,[3] no relationship,[4,5] or an inverse relationship[6] between a measure of eating frequency and adiposity.

1. Siega-Riz et al. *J Adolesc Health* 1998;22:29-36.
2. McConahy et al. *J Pediatr* 2002;140:340-7.
3. Francis et al. *Obes Res* 2003;11:143-51.
4. Phillips et al. *Obes Res* 2004;12:461-72.
5. Field et al. *Int J Obes Relat Metab Disord* 2004;28:1210-6.
6. Franko DL et al. *Int J Obes* (London) 2008;32:23-9.

Aims

1) Use an objective definition to quantify frequency of **meals**, **snacks** and **total episodes.**
2) **Track** eating frequency in girls across adolescence from ages 9/10 to 19/20 years.
3) Assess the **longitudinal** relationship of eating frequency with **BMI** and **waist circumference**.
4) Examine **differences** between **black** and **white girls** in eating frequency & relation to adiposity.

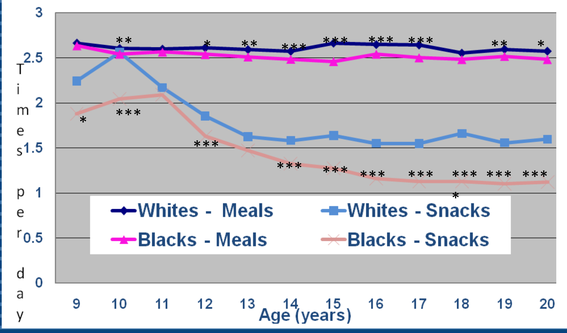
Methods

- **Dietary assessment**: 3-day diet record data collected nearly annually for 10 years
- **Participants**: 1,213 black and 1,166 white females ages 9/10 to 19/20 years in the longitudinal *NHLBI Growth and Health Study*
- **Independent variables**: aggregated number/day of
  - **Meals –** any eating episode comprising 15% or more of total calories, regardless of the time of day or composition of foods or beverages consumed
  - **Snacks –** all other eating episodes
  - **Total eating episodes –** all meals + all snacks
- **Dependent variables**: 10-yr change in measured BMI (kg/m^2) and waist circumference (cm)
- **Control variables**: Parental education, physical activity, TV/video watching, dieting for weight loss, overweight status at baseline (BMI ≥ 85th percentile)
- **Statistical analysis**: Means (±SD) computed; ANOVA followed by Tukey's Honestly Significant Difference multiple comparison tests used.

Results

1) **Average frequency of eating** aggregated across10 years:
   - 2.56 ± 0.26 meals per day
   - 1.67 ±1.06 snacks per day
   - 4.23 ±1.01 total eating episodes per day

2) **Eating frequency lower in**:
   - Older vs. younger girls
   - Blacks vs. white girls
   - On weekends vs. weekdays



Results (cont)

3) **Eating more frequently** related to:
   - Higher intakes of calories
   - Higher intake of most other nutrients.

4) **Adjusting for calorie intake**:
   - Eating more frequently related to lower intakes of fat, saturated fat and sodium, and higher intakes of fiber for white girls.
   - For black girls the results were more variable depending on how eating frequency was quantified.

5) ***Unadjusted* relationship between eating frequency and 10-year change in adiposity**

	WHITE Girls		BLACK Girls	
(#/day)	BMI	Waist Circ	BMI	Waist Circ
Meals	Inverse **	Inverse *	NS	NS
Snacks	Inverse ***	Inverse **	Inverse ***	Inverse ***
Total	Inverse ***	Inverse **	Inverse **	Inverse *

***6) Adjusted* relationship between eating frequency and 10-year change in adiposity**

	Model 1: Adjusted for race, parental education, physical activity, TV viewing		Model 2: Also adjusted for dieting for weight loss	
(#/day)	BMI	Waist Circ	BMI	Waist Circ
Meals	Inverse *	NS	NS	NS
Snacks	Inverse ***	Inverse ***	Inverse *	Inverse **
Total	Inverse ***	Inverse **	Inverse *	Inverse *

***P*<0.05, ***P*<0.01, ****P*<0.001, NS=not significant**

Study Strengths

- Prospective design with a long period of follow-up (10 years).
- Large sample size.
- Inclusion of multiple food records (as many as 24 days for each participant).
- Use of measured heights, weights and waist circumference.
- Control for multiple potentially confounding variables.

Study Limitations

- Only black and white adolescent girls limits generalizability.
- Definitions of eating episodes, although objective, may not be appropriate.
- Although controlling for baseline overweight did not alter the findings, girls more prone to weight gain may be more likely to under-report eating frequency.
- Reverse causality is possible: individuals may skip meals and omit snacks in an attempt to lose weight or prevent weight gain.

Conclusion

Greater eating frequency, particularly of snacks, predicts lower gain in adiposity in adolescent girls.

Intervention trials are needed to test if changing the frequency of eating impacts obesity risk.

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