

Citation:

Albertson AM, Franko DL, Thompson D, Eldridge AL, Holschuh N, Affenito SG, Bauserman R, Striegel-Moore RH. Longitudinal patterns of breakfast eating in black and white adolescent girls. *Obesity* (Silver Spring). 2007 Sep;15(9):2282-92.

PubMed ID: [17890497](#)

Study Design:

Prospective cohort study

Class:

B - [Click here](#) for explanation of classification scheme.

Research Design and Implementation Rating:

POSITIVE: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

The aims of this project were to describe the pattern of breakfast eating over time; to examine the relationships between breakfast history, BMI and physical activity; to better understand the specific types of physical activity associated with breakfast eating; and to test the hypothesis that energy intake and physical activity partly explain the relationship between breakfast history and BMI.

Inclusion Criteria:

The National Growth and Health Study (NGHS) recruited black and white girls at three sites who were 9 or 10 years old at study entry. They were attending public or parochial schools, or members of a HMO or local Girl Scout troop. The girls and their parents gave consent.

Exclusion Criteria:

NA

Description of Study Protocol:

Recruitment NGHS recruited 2379, 9 or 10 year old, black and white girls from schools or (in Maryland/Washington DC only) from an HMO and local Girl Scout troops. Detailed procedures were reported elsewhere.

Design: Trend study

Blinding used NA

Intervention NA

Statistical Analysis BMI for age z-scores in year 10 were modeled (linear regression) as a function of breakfast history. Baseline values were used for race and parental education; physical activity scores and energy intake were averaged across all study years, and EDI subscales were taken from the final study year. Path analysis was done to examine if differences in breakfast habits might lead to differences in physical activity and energy intake, affecting BMI in the final study year.

Data Collection Summary:

Timing of Measurements Data were collected annually. Food records were completed in years 1-5, 7, 8, and 10, along with physical activity records.

Dependent Variables

- BMI, calculated from height and weight
- Physical activity, estimated from 3-day diaries
- EDI: Two subscales (Body Dissatisfaction and Drive for Thinness subscales) of the Eating Disorder Inventory (EDI) were used to determine tendencies toward dieting behavior.

Independent Variable Breakfast history (estimated from 3-day food records)

Control Variables

Description of Actual Data Sample:

Initial N: 2379 girls

Attrition (final N): Due to variable annual participation rates, sample sizes varied from visit to visit. Retention rates were very high at visits 2-4 (96%, 94% 91%), declined to a low of 82% at visit 7, and increased to 89% at visit 10. Data analysis included 2371 (99.7%) who completed at least one food record.

Age: Subjects started the ten year data collection at ages 9 or 10.

Ethnicity: Black (N=1210) and white (N=1161)

Other relevant demographics:

Anthropometric:

- mean (SD) baseline BMI = 18.6 (3.8) kg/m² (range: 11.2 to 35.3)
- mean (SD) BMI, study year 10 = 25.6 (6.8) kg/m² (range: 15.8 to 55.6)

Location: Berkeley, CA; Cincinnati OH; Rockville, MD.

Summary of Results:

Key findings:

- Mean BMI at baseline was 18.6, increasing to 25.6 in year 10.
- % of days eating breakfast was 70.6.
- 1/4 of the girls ate breakfast on >85% of the days.

- Girls who ate breakfast tended to consume more energy at breakfast time over the years (increase of 5.1 kcals/year, P<0.0001)
- Girls who ate breakfast consumed more sucrose (0.39 g/year P<0.0001), caffeine (1.6 mg/year, P<0.0001) and sodium (4.9 mg/year, P<0.0001), less calcium (-1.4 mg/year, P=0.005) at breakfast time.
- Quality of food consumed at breakfast tended to decrease over the years, with older girls eating more caffeine, sucrose, and sodium, and less calcium.
- Among girls with a high BMI for age at baseline, those who ate breakfast more often had lower BMI for age at year 10, compared with those who ate breakfast less often. Eating breakfast was associated with decreased BMI, but only among girls who had a relatively high BMI at the beginning of the study.
- Results of the model of BMI for age in year 10 indicate that both physical activity and energy intake were associated with BMI. Eating breakfast more often predicted significantly greater physical activity (standardized coefficient=0.063, P=0.004) and very high physical activity predicted lower BMI.
- Eating breakfast more often predicted greater overall energy intake (standardized coefficient=0.096, P<0.0001), which was associated with BMI in year 10.
- Girls who were more physically active consumed significantly more calories. After these associations were taken into account, breakfast did not exert any additional direct influence on year 10 BMI (P=0.31.)

Author Conclusion:

Findings indicate a relationship between breakfast consumption and moderation of body weight among girls of relatively higher BMI. The pattern of results suggests that both physical activity and breakfast history were associated with BMI for age z-scores in the final year. It is possible that, holding breakfast history constant, increased physical activity over the 10 years is associated with decreased BMI z-scores in the final year, at least at very high levels of physical activity. Simple linear associations poorly represent the relation between breakfast and BMI; instead the relation is complex and likely to differ across groups.

Reviewer Comments:

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions

- | | | |
|----|---|------------|
| 1. | Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies) | Yes |
| 2. | Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about? | Yes |
| 3. | Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice? | Yes |
| 4. | Is the intervention or procedure feasible? (NA for some epidemiological studies) | Yes |

Validity Questions

- | | | |
|------|---|------------|
| 1. | Was the research question clearly stated? | Yes |
| 1.1. | Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified? | Yes |

1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	Was the selection of study subjects/patients free from bias?	Yes
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	Yes
2.3.	Were health, demographics, and other characteristics of subjects described?	Yes
2.4.	Were the subjects/patients a representative sample of the relevant population?	???
3.	Were study groups comparable?	Yes
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	Yes
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	Yes
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	Yes
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	Yes
3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	Yes
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	Was method of handling withdrawals described?	Yes
4.1.	Were follow-up methods described and the same for all groups?	Yes
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	Yes
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	Yes
4.4.	Were reasons for withdrawals similar across groups?	N/A

4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	Was blinding used to prevent introduction of bias?	N/A
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	N/A
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	N/A
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were intervening factors described?	Yes
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	N/A
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	Yes
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	Yes
6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	Yes
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	Were outcomes clearly defined and the measurements valid and reliable?	Yes
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	Yes
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	Yes

7.5.	Was the measurement of effect at an appropriate level of precision?	Yes
7.6.	Were other factors accounted for (measured) that could affect outcomes?	Yes
7.7.	Were the measurements conducted consistently across groups?	Yes
8.	Was the statistical analysis appropriate for the study design and type of outcome indicators?	Yes
8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	Yes
8.6.	Was clinical significance as well as statistical significance reported?	Yes
8.7.	If negative findings, was a power calculation reported to address type 2 error?	N/A
9.	Are conclusions supported by results with biases and limitations taken into consideration?	Yes
9.1.	Is there a discussion of findings?	Yes
9.2.	Are biases and study limitations identified and discussed?	Yes
10.	Is bias due to study's funding or sponsorship unlikely?	Yes
10.1.	Were sources of funding and investigators' affiliations described?	Yes
10.2.	Was the study free from apparent conflict of interest?	Yes

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