

**Citation:**

Johnson L, Mander AP, Jones LR, Emmett PM, Jebb SA. Is sugar-sweetened beverage consumption associated with increased fatness in children? *Nutrition*. 2007 Jul-Aug;23(7-8):557-63.

**PubMed ID:** [17616342](#)

**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:**

To assess if the consumption of sugar-sweetened beverage consumption (SSB) at the age of 5 or 7 years of age increased fat mass in children at the age of 9.

**Inclusion Criteria:**

- Children 5 and 7 years old whose mothers participated in the Avon Longitudinal Study of Parents and Children.
- Needed to complete 3 day diet record and follow up for body composition at 9 years of age.

**Exclusion Criteria:**

None specifically mentioned.

**Description of Study Protocol:****Recruitment**

All pregnant women expected to deliver from April 1, 1991 and December 31, 1992 were included. Children in Focus was a subsample of this population and were randomly selected. They were invited for clinical assessments from birth.

**Design:** Prospective cohort study. Data collected came from questionnaires, medical records, biological samples and clinical data. They were invited for clinical assessments from birth. The analysis for this study included the diet at ages 5 and 7 years and body composition at age 9 years. Dietary data was collected using unweighed 3 day diet diaries (2 week days and 1 weekend day). Body fat was assessed using a dual x-ray absorptiometry.

**Blinding used (if applicable)** not applicable

**Intervention (if applicable)** not applicable

### **Statistical Analysis**

- Variables were presented using mean SD if the data was symmetric and median /interquartile for other data.
- Spearman's correlation coefficients were computed to assess the relationship between BMI and drink consumption.
- Linear regression analysis was used for assess the impact of drink consumption and fat mass at 9 years of age.
- Fat mass was the dependent variable and height was always used to adjust for body size.
- Covariate analysis was completed for confounding variables such as television watching, socioeconomic status, and parental BMI.
- Analysis was completed using SPSS 11.0.

### **Data Collection Summary:**

#### **Timing of Measurements**

At age 5 and 7 years of age for dietary habits and 9 years of age for fat mass.

#### **Dependent Variables**

- Fat mass and fat mass index

#### **Independent Variables**

- Sugar sweetened beverages (fruit squashes, cordials, and fizzy drinks with added sugar); 100 % fruit juice was analyzed separately.

#### **Control Variables-**

- Television watching
- Mother education
- Socioeconomic status
- Parental BMI

### **Description of Actual Data Sample:**

**Initial N:** 5 year old: n= 521, and 7 year old: n=682

**Attrition (final N):** Complete data for diet and body composition for ages 5 and 9 n=521 and 7 and 9 n=682.

**Age:** 5-7 year olds beverage consumption (dietary pattern) and at the age of 9 to assess body fatness (body composition).

**Ethnicity:** not reported

**Other relevant demographics:**

## Anthropometrics

**Location:** United Kingdom

### Summary of Results:

#### Key Findings

- SSB accounted for 15% of all drinks consumed and 3% of total energy intake at both ages.
- There was no evidence of an association between SSB consumption at 5 or 7 years of age and fatness at age 9.
- Height and weight increased as expected across the ages - the prevalence of overweight increased by 5% between the ages of 5 and 9 with the mean fat mass of  $8.47 \pm 4.98$  kg and fat mass index was  $1.21 \pm 0.63$  kg/m.
- Both BMI and FMI measured at 9 years of age were correlated ( $r=0.80$ ,  $P<0.0001$ )
- 33% of children age 5 y and 38% of children 7 y consumed SSB and energy consumed from SSB equaled 3% of the total energy intake (EI) for both ages.
- There was no association found between SSB and fat mass at 9 years in either the unadjusted or adjusted linear regression models.
- The consumption of low energy drinks at both ages (5 and 7 years) was positively correlated with log FMI (age 5 y,  $p=0.21$ ,  $p<0.0001$ ; age 7,  $p=0.15$ ,  $p<0.0001$ )
- Milk consumption was negatively associated with fat mass at 9 years of age with the completely adjusted model but not the unadjusted model (age 5 years - 1 serving of increase of milk was associated with a  $-0.52$  kg ( $-0.97$  to  $-0.07$  kg) change in fat mass at age 9 and at 7 years a 1 serving of milk consumption was associated with a  $-0.48$  kg ( $-0.88$  to  $-0.08$ ) change in fat mass at age 9 years.

#### Other Findings

- Macronutrient composition and fiber content of the diets were similar at both ages (5 years and 7 years)
- Those children of mothers with a vocational education consumed more low energy drinks as compared to the those of mothers degree education. Children of degree mothers consumed more fruit juice.

### Author Conclusion:

There is no evidence of an association between SSB consumption at age 5 or 7 and changes in body composition or fatness at age 9. Therefore overweight children could benefit from consuming low-energy beverages as part of an ineffective weight control program.

### Reviewer Comments:

*Strengths: Data came from large population prospective study collecting dietary pattern data for 9 years. Included good measurements of a range of potential confounders. Adiposity was based on direct measurement of fat mass rather than BMI*

*Limitations: This study was not representative of non-white and less affluent families, too small a population was included. Only 36% and 48% of the original random sample had a complete set of*

*data for this study at ages 5 and 7 years, respectively.*

### **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) | N/A |
| 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)  | N/A |

#### **Validity Questions**

- |           |   |     |
|-----------|---|-----|
| <b>1.</b> | <b>Was the research question clearly stated?</b>  | 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 |
| <b>2.</b> | <b>Was the selection of study subjects/patients free from bias?</b>   | 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?  | No  |
| <b>3.</b> | <b>Were study groups comparable?</b>  | 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.)	N/A
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
<b>4.</b>	<b>Was method of handling withdrawals described?</b>	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
<b>5.</b>	<b>Was blinding used to prevent introduction of bias?</b>	Yes
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.)	Yes
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	Yes
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
<b>6.</b>	<b>Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were intervening factors described?</b>	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?	Yes
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	N/A
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	N/A
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
<b>7.</b>	<b>Were outcomes clearly defined and the measurements valid and reliable?</b>	<b>Yes</b>
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
<b>8.</b>	<b>Was the statistical analysis appropriate for the study design and type of outcome indicators?</b>	<b>Yes</b>
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?	No
<b>9.</b>	<b>Are conclusions supported by results with biases and limitations taken into consideration?</b>	Yes
9.1.	Is there a discussion of findings?	Yes
9.2.	Are biases and study limitations identified and discussed?	Yes
<b>10.</b>	<b>Is bias due to study's funding or sponsorship unlikely?</b>	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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