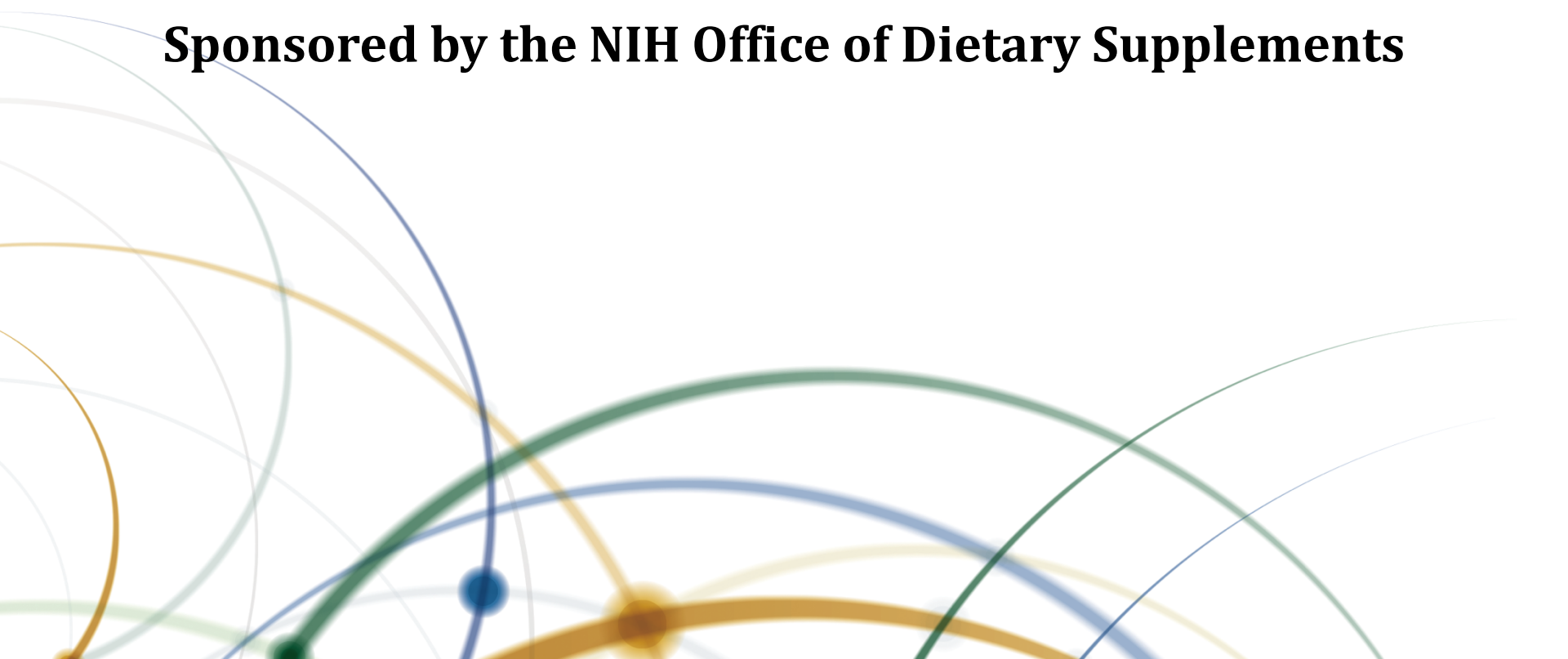


# **Approaches to Assessing Intake of Food and Dietary Supplements in Pregnant Women and Children 2 to 11 Years of Age: A Workshop**

**Sponsored by the NIH Office of Dietary Supplements**



# Planning Committee Members

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# Approaches to Assessing Intake of Food and Dietary Supplements in Pregnant Women and Children 2 to 11 Years of Age: A Workshop

| Day, Date         | Time (EST)     | Topic                                                                                                                        |
|-------------------|----------------|------------------------------------------------------------------------------------------------------------------------------|
| Thursday, May 6   | 10:00-12:00 PM | <b>Webinar 1:</b><br>Methods for Dietary Assessment during Pregnancy                                                         |
| Monday, May 17    | 10:00-12:00 PM | <b>Webinar 2:</b><br>Methods for Dietary Assessment in Children 2-5                                                          |
| Wednesday, May 19 | 10:00-12:00 PM | <b>Webinar 3:</b><br>Methods for Dietary Assessment in Children 6-11                                                         |
| Monday, May 24    | 9:00-11:00 AM  | <b>Webinar 4:</b><br>Innovations and Special Considerations in Assessing Dietary Intake During Pregnancy and Ages 2-11 Years |

|          |                                                                                                                                                                                                  |                                                                    |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| 10:00 am | Introduction to the Webinar: Dietary Assessment in Children 6-11 (10 min)                                                                                                                        | Dana Dabelea, University of Colorado Anschutz Medical Campus (AMC) |
| 10:10 am | Methods to Collect Dietary Intake in Children 6-11 years (15 min)                                                                                                                                | Emma Foster, Newcastle University                                  |
| 10:25 am | A comparison of the Remote Food Photography Method and the Automated Self-Administered 24-Hour Dietary Assessment Tool for Measuring Full Day Dietary Intake among School-Aged Children (10 min) | Traci Bekelman, University of Colorado AMC                         |
| 10:35 am | Q&A from Committee Members and Sponsors (20 min)                                                                                                                                                 | Dana Dabelea                                                       |
| 10:55 am | Objective Passive Ways to Improve Assessment of Dietary Intake in Later Childhood (10 min)                                                                                                       | Tom Baranowski, Baylor College of Medicine                         |
| 11:05 am | Best Practices for Measuring Diet Intake in Children 6-11 years (15 min)                                                                                                                         | Wei Perng, University of Colorado AMC                              |
| 11:20 am | Q&A from Committee Members and Sponsors (20 min)                                                                                                                                                 | Steve Daniels, Children's Hospital Colorado                        |
| 11:40 am | Panel Discussion with audience (15 min)                                                                                                                                                          | Steve Daniels                                                      |
| 11:55 am | Wrap up and Summary of Webinar (5 min)                                                                                                                                                           | Cheryl Anderson, University of California San Diego                |
| 12:00 pm | Adjourn                                                                                                                                                                                          |                                                                    |

# **Approaches to Assessing Intake of Food and Dietary Supplements in Pregnant Women and Children 2 to 11 Years of Age: A Workshop**

- Presentations will be followed by Q&A with committee members
- During panel discussion with the audience, send your questions via the Zoom Q&A feature
- Webinar will be recorded and published:  
<https://www.nationalacademies.org/>



# **NASEM Webinar 3**

## **Dietary Assessment in Children Age 6-11 Years**

### **Introduction: Challenges and Opportunities**

**Dana Dabelea, MD, PhD**  
**University of Colorado Anschutz Medical  
Campus**

# Challenges in Assessing Dietary Intake by Recall in Children 6-11 Year Old

- Age –Related Cognitive Aspects
  - <7-8 years: parental recall; multiple caregivers, multiple venues (school, after-school, etc)
  - > 7-8 years: cognitive abilities of children (reliance on memory, estimation of portion sizes)
  - Implications for the design of optimal tools
- Variability in nutrient intake:
  - 2-fold+ greater than in adults;
  - higher for nutrients consumed occasionally (e.g., vitamins)
  - Implications for number of recalls
  - Appropriate food databases
- Tracking of nutrient intake over time: little evidence
  - Implications for most appropriate lifestage to target nutrition interventions

# Challenges in Assessing Dietary Intake by Recall in Children 6-11 Year Old

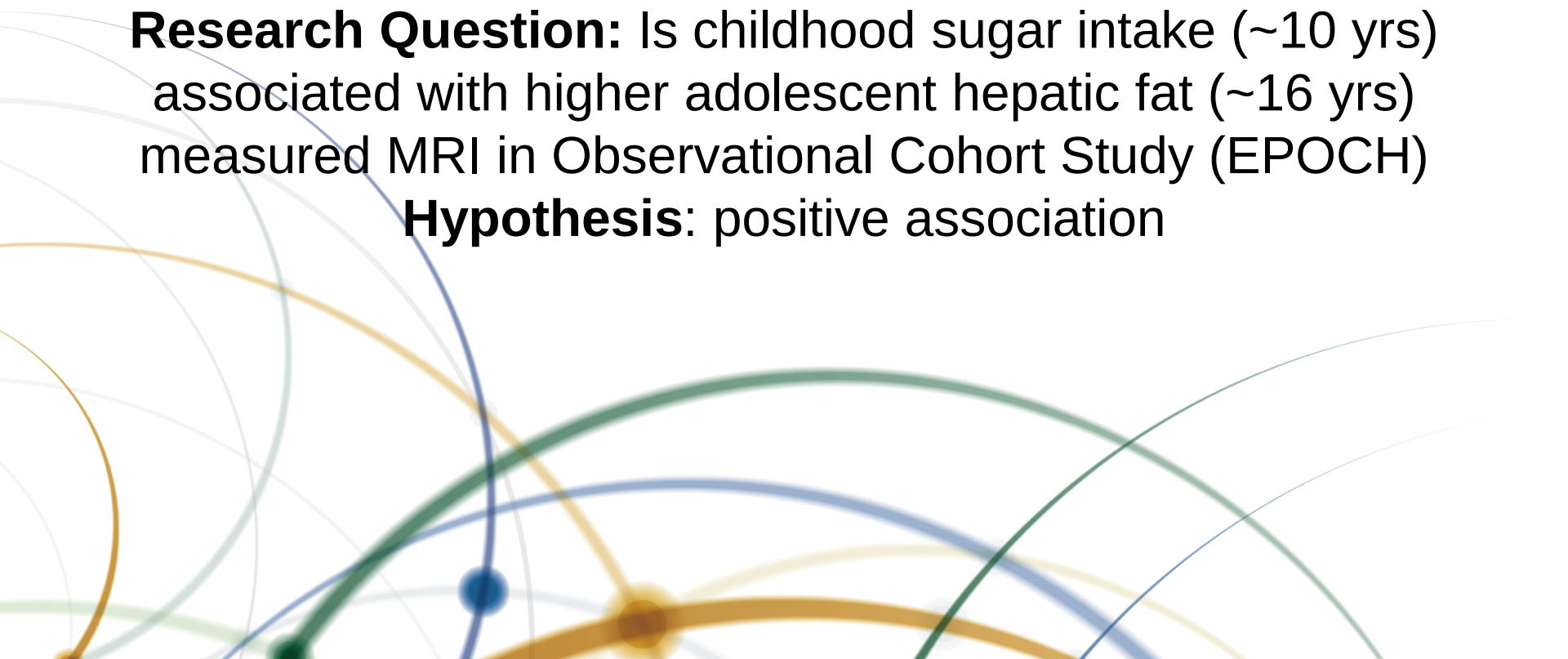
- Validity/Accuracy of Diet Reports
  - Likely Biased, usually Underreporting
  - Magnitude of bias increases with age, weight status of child and/or parent (social desirability bias)
  - Magnitude of bias varies with the dietary assessment method
  - Little variation with sex
- Biased associations between diet intake and health outcomes



# Example

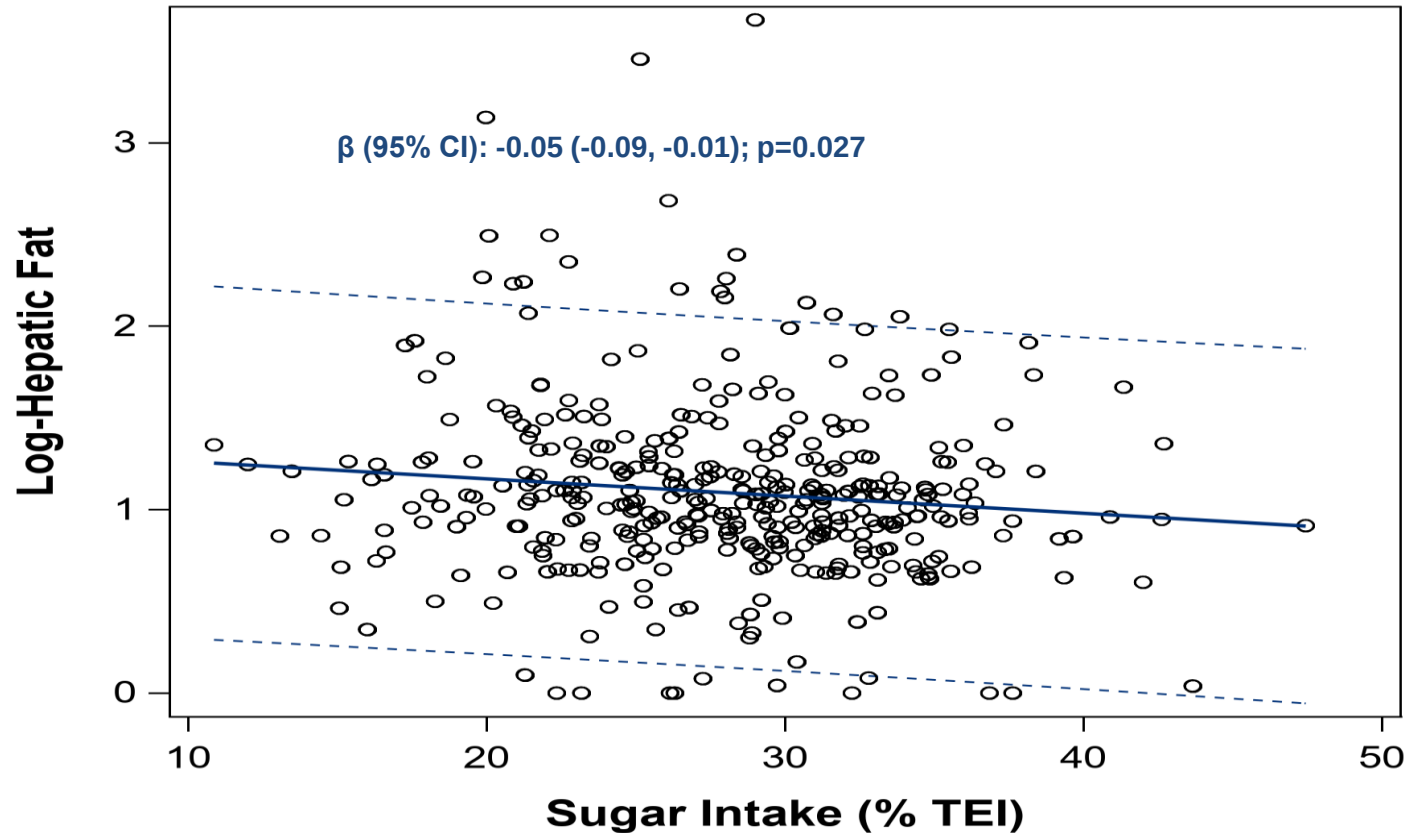
**Research Question:** Is childhood sugar intake (~10 yrs) associated with higher adolescent hepatic fat (~16 yrs) measured MRI in Observational Cohort Study (EPOCH)

**Hypothesis:** positive association



# Relationship between sugar intake (FFQ at age 10) and hepatic fat (MRI at age 16)

N=384 participants



# Assessing dietary under-reporting in the EPOCH Study

- Assessed by the **Goldberg method**, which compares the ratio of reported energy intake to estimated energy expenditure (via basal metabolic rate - BMR) (EI:EE ratio) to the 95% confidence interval of a physical activity level (PAL) constant (Black, 2000).
  - Calculate BMR = by Schofield equation
  - Assume PAL constant of 1.55 (WHO recommended for light activity)
  - Calculate under-reporting cut-off (lower 95% limit of PAL constant) as follows:

$$\text{95\% CI: } PAL \times \exp \left[ SD_{min} \times \frac{\left( \frac{S}{100} \right)}{\sqrt{n}} \right] \quad \text{Where: PAL constant}=1.55$$

$SD_{min}=-2$   
 $n=\text{number of subjects (i.e., 1)}$

$$S = \sqrt{\frac{CV_{wEI}^2}{d} + CV_{wBMR}^2 + CV_{tPAL}^2}$$

Where:  $CV_{wEI}$  = within subject variation in EI (23%)  
 $d$  = days of diet assessment  
 $CV_{wBMR}$  = within subject variation in BMR (8.5%)  
 $CV_{tPAL}$  = total variation in PAL (15%)

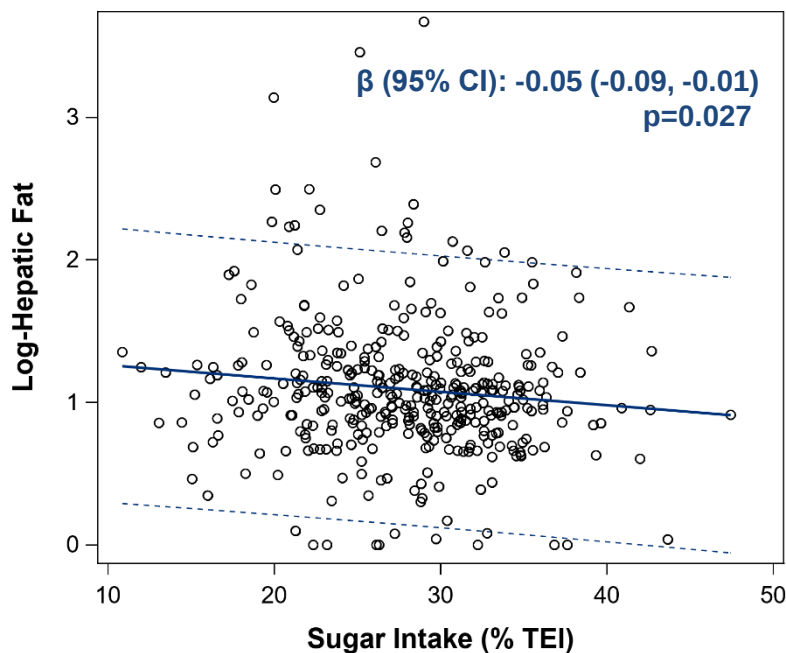
# Characteristics according to energy intake plausibility in childhood (~10 yrs): The EPOCH Study

| Acceptable Reporters                           |               |         | Under-reporters* |         |                |        |
|------------------------------------------------|---------------|---------|------------------|---------|----------------|--------|
| N=457 (76%)                                    |               |         | n=145 (24%)      |         |                |        |
| Child Characteristic:                          | Mean or Count | SD or % | Mean or Count    | SD or % | p <sup>a</sup> |        |
| Male sex, n (%)                                | 222           | 49%     | 77               | 53%     | 0.34           |        |
| Hispanic ethnicity, n (%)                      | 165           | 36%     | 67               | 46%     | 0.029          |        |
| BMI z-score, mean (SD)                         | 0.05          | 1.2     | 0.92             | 1.2     | <0.001         |        |
| Visceral Fat (mm <sup>2</sup> ), mean (SD)     | 20            | 13      | 30               | 22      | <0.001         |        |
| Subcutaneous Fat (mm <sup>2</sup> ), mean (SD) | 102           | 93      | 183              | 127     | <0.001         |        |
| Maternal Pre-preg. obesity, n (%) <sup>b</sup> | 61            | 18%     | 30               | 27%     | 0.045          |        |
| Nutrient Intakes:                              |               |         |                  |         |                |        |
| TEI (kcal/d)                                   | 1952          | 510     | 1282             | ↓       | 296            | <0.001 |
| Total CHO (% TEI)                              | 51.2          | 6.0     | 51.2             |         | 6.3            | 0.94   |
| Sugar (% TEI)                                  | 28.4          | 5.9     | 27.0             | ↓       | 6.8            | 0.027  |
| Total Pro (% TEI)                              | 14.6          | 2.0     | 14.2             |         | 2.1            | 0.06   |
| Animal protein (% TEI)                         | 10.2          | 2.4     | 9.6              | ↓       | 2.4            | 0.015  |
| Total Fat (% TEI) <sup>d</sup>                 | 35.6          | 4.6     | 35.9             |         | 5.4            | 0.57   |
| Fiber (g/1000 kcal)                            | 6.7           | 1.8     | 7.3              | ↑       | 2.1            | 0.001  |

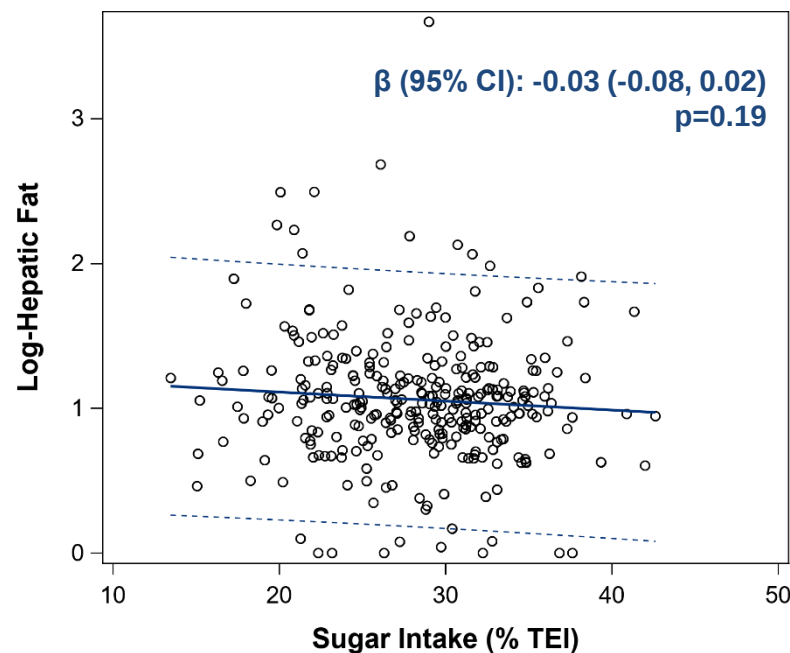
\*Under-reporters identified by the Goldberg cut-off method (Black, 2000).

# Impact of under-reporting on diet-disease association: The EPOCH Study

A) All participants (n=384):



B) Excluding under-reporters\* (n=295):



\*Under-reporters identified by the Goldberg cut-off method (Black, 2000).

# Opportunities Regarding Diet Assessment in 6-11 Year Old Children

- Improving the diet recall tools: attention to multiple dimensions of dietary assessment: accuracy, economic cost, burden (child, parents, caregivers, schools); how many diet recalls; multiple types of recall methods
- Technology-based measures: opportunities to reduce burden, improve accuracy, but also new challenges (e.g., respondents who don't have reliable internet service).
- Whether and how to validate? Role for Biomarkers?
- Assessment tools should match the research question.
  - There are research questions that may be more relevant to children than adults and assessments will need to be tailored (e.g., family meals, plate waste, meals consumed in school cafeterias, parent-child dietary concordance).

# Webinar 3 Speakers

|                                                                |                                                                                                                                                                                                  |
|----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Emma Foster, Newcastle University                              | Methods to Collect Dietary Intake in Children 6-11 years (15 min)                                                                                                                                |
| Traci Bekelman, University of Colorado Anschutz Medical Campus | A comparison of the Remote Food Photography Method and the Automated Self-Administered 24-Hour Dietary Assessment Tool for Measuring Full Day Dietary Intake among School-Aged Children (10 min) |
| Tom Baranowski, Baylor College of Medicine                     | Objective Passive Ways to Improve Assessment of Dietary Intake in Later Childhood (10 min)                                                                                                       |
| Wei Perng, University of Colorado Anschutz Medical Campus      | Best Practices for Measuring Diet Intake in Children 6-11 years (15 min)                                                                                                                         |