Put your money where your mouth is: preliminary evidence that oral microbiota diversity may shape later cardiometabolic health in children.

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BACKGROUND

- Emerging evidence suggests a link between the intestinal microbiota and cardiometabolic outcomes in both children and adults.
- The oral microbiota is less studied, and the association between the oral microbiota and cardiometabolic health in childhood remains largely unknown.

OBJECTIVE

To explore the associations between oral microbiota diversity measured at 8-10 yr and cardiometabolic health in childhood and adolescence.

METHODS

- Data stem from the QUALITY cohort, a prospective cohort study of 630 children with a parental history of obesity
- Oral plaque samples obtained from 78 participants underwent 16S-rRNA based microbial profiling for indices of diversity
- Measures of diversity include Shannon, Simpson, Chao1 and Observed OTU indices
- Measures of cardiometabolic health were assessed at 8-10 yrs, 10-12 yrs and 15-17 yrs, and include:
  - fasting plasma glucose (FPG),
  - glucose 2hr post oral glucose load (2hPG),
  - insulin resistance (HOMA-IR),
  - lipid profile (LDL cholesterol, HDL cholesterol, triglycerides and total cholesterol),
  - age-, sex-, height-adjusted systolic (zSBP) and diastolic (zDBP) blood pressure z-scores.
- Pearson's correlations were used to estimate associations between diversity indices and cardiometabolic outcomes.

RESULTS

Participants were on average 9.8 years old (SD 0.9), with 57 boys and 21 girls; 29 were of normal weight, 20 overweight and 29 obese.

Table 1: Average values of cardiometabolic outcomes at baseline

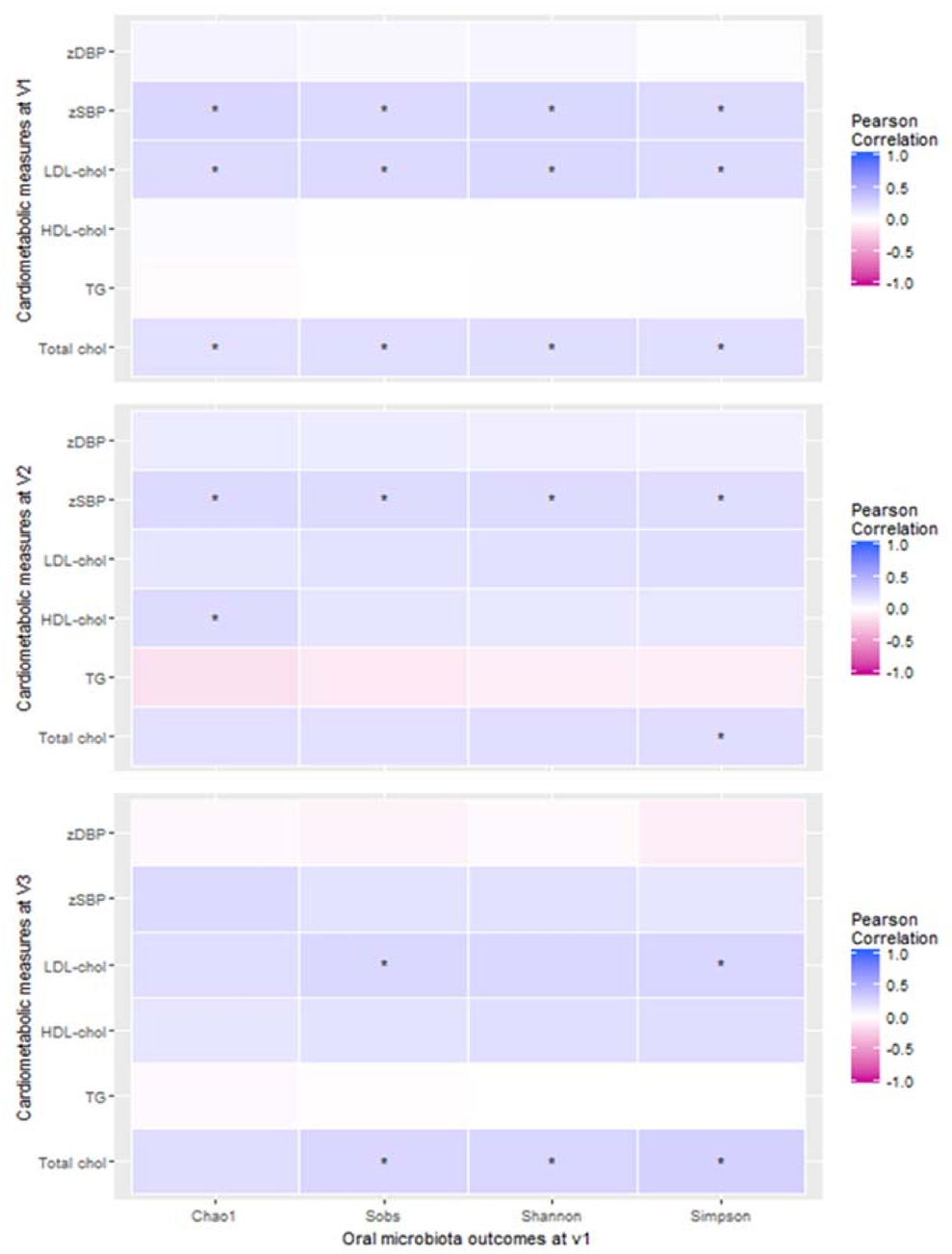
Cardiometabolic outcomes	Mean (SD)
LDL cholesterol, mmol/L	2.41 (0.55)
HDL cholesterol, mmol/L	1.12 (0.21)
Triglycerides, mmol/L	0.82 (0.34)
Total cholesterol, mmol/L	3.90 (0.66)
zSBP	-0.65 (0.67)
zDBP	-0.97 (0.45)
FPG, mmol/L	5.0 (0.3)
2hPG, mmol/L	6.50 (1.12)
HOMA-IR	1.15 (0.70)

LDL cholesterol at 8-10 yr was positively correlated with all indices of microbiota diversity (Obs OTUs r=0.23, p=0.046; Chao1 r=0.22, p=0.055; Shannon r=0.24, p=0.035; Simpson reciprocal r=0.22, p=0.049).

RESULTS

While correlations remained positive for LDL measured at 10-12 yr and 15-17 yr, they did not reach statistical significance. Similarly, microbiota diversity was positively correlated with zSBP at 8-10 yrs (r=0.22-0.25, p<0.05) and 10-12 yrs (r=0.22-0.25, p<0.05), not reaching statistical significance at 15-17 yrs.

Figure 1: Correlation heat map of oral microbiota alpha-diversity indices at 8-10 yrs and cardiometabolic outcomes at baseline (8-10 yrs), first follow-up (10-12 yrs) and at second follow-up (15-17 yrs)



Footnote: * indicates p < 0.10
V1: baseline evaluation, V2: first follow-up, V3: second follow-up
HDL-chol: high density lipoprotein cholesterol (mmol/L), LDL-chol: low density lipoprotein cholesterol (mmol/L), TG: triglycerides (mmol/L), Total chol: total cholesterol (mmol/L), zDBP: age- and sex-adjusted diastolic blood pressure z score, zSBP: age- and sex-adjusted systolic blood pressure z score. Alpha-diversity indices used to assess richness include observed OTUs (Sobs) and the Chao1 index, whereas the Shannon and Simpson indices are measures of evenness.

Indices of diversity at 8-10 yr were negatively correlated with fasting glucose (r=-0.27 to -0.31) and glucose 2hr post load (r=-0.27 to -0.29) 7 years later (at 15-17 yrs). Microbiota diversity was not correlated with HOMA-IR.

CONCLUSIONS

These preliminary data in a small sample of children followed over 8 years suggest that oral microbiota diversity in early childhood may influence cardiometabolic health in later adolescence.