



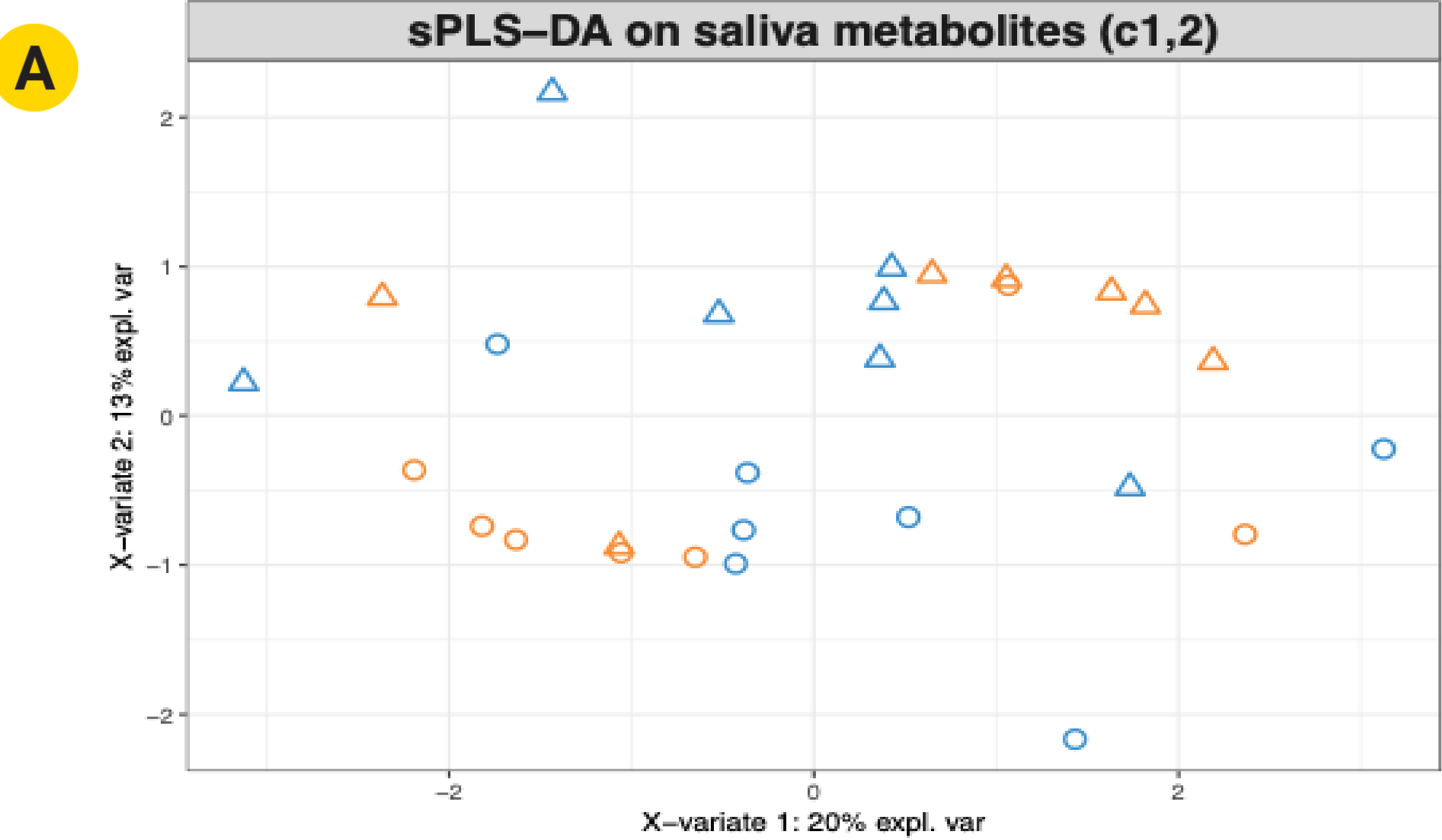
Introduction

- The oral metabolome undergoes dynamic changes in response to physiological and environmental factors.
- Saliva serves as a dynamic and easily accessible biofluid, reflecting metabolic changes that offer insight into host-microbiome interactions, immune responses, and energy metabolism. It is also a non-invasive medium for investigating age-related biochemical changes.
- This study investigates metabolomic shifts in healthy adolescents and adults following dental prophylaxis, focusing on changes in amino acid metabolism, energy pathways, and microbial activity.
- **Aim:** Identify age-related differences in metabolic adaptations and their potential implications for oral and systemic health post dental prophylaxis

Methods

- **Participants:** Fourteen individuals (7 healthy adults, 7 healthy adolescents) were included in the study, matched for sex distribution.
- **Recruitment:** Patients were recruited from pediatric and adult dentistry clinics at the University of Iowa.
- **Exclusion Criteria:** Participants with active caries, periodontal disease, unhealthy BMI (as defined by the CDC: adults BMI <25, adolescents BMI 5th–85th percentile), prior dental cleaning in the last 3 months, or any antibiotic use in the past 3 months were excluded.
- **Saliva Collection:** Baseline and post-prophylaxis (3 months) saliva samples were collected.
- **Metabolomic Profiling:** Metabolomic analysis was performed using Gas Chromatography-Mass Spectrometry (GC-MS) and Liquid Chromatography-Mass Spectrometry (LC-MS).
- **Data Analysis:** Longitudinal metabolite changes were assessed using spline modeling to determine statistical significance.

Results



- **A:** Sparse partial least squares discriminant analysis (sPLS-DA). This shows the separation between adolescents and adults in their individual metabolic profiles.
- **B:** Change in individual metabolic activity for adolescents at base line and 3 months post dental prophylaxis
- **C:** Change in individual metabolic activity for adults at base line and 3 months post dental prophylaxis

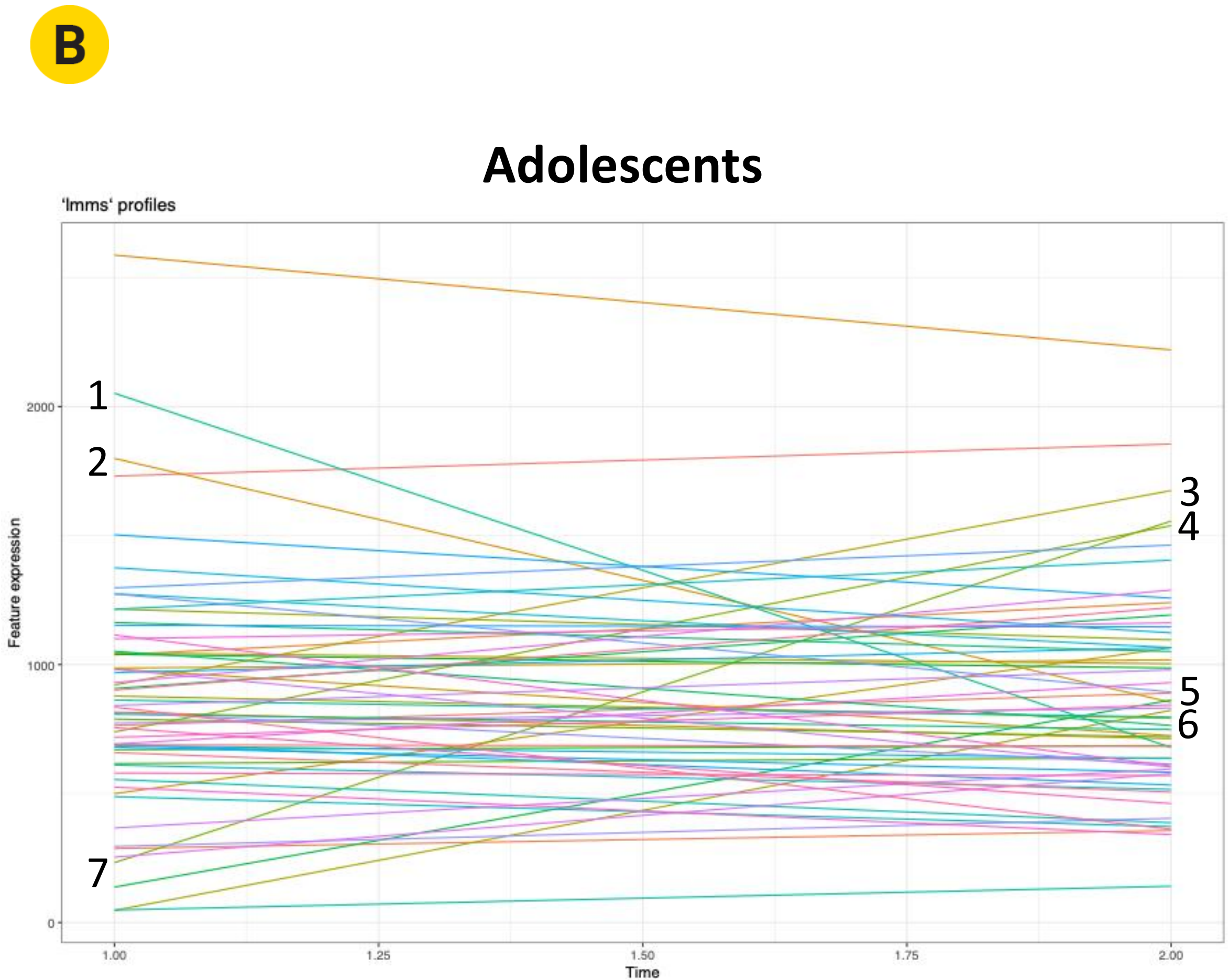


Figure 2: 1. Indole acetate, 2. Beta-hydroxybutyrate, 3. Glucose, 4. Gluconate, 5. Succinate, 6. Uracil, 7. Fructose

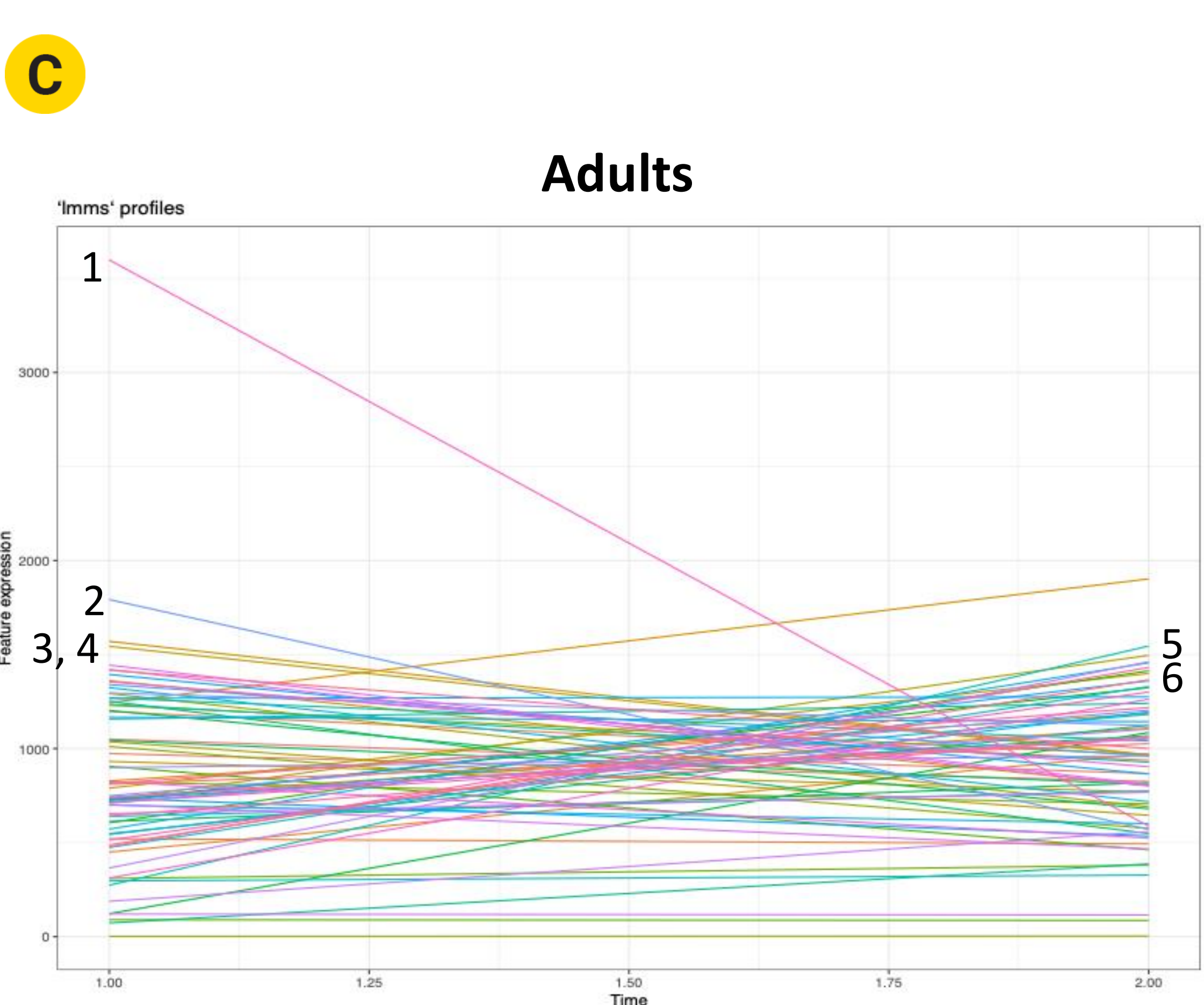


Figure 3: 1. Taurine, 2. Pantothenate, 3. Xanthine, 4. Pentose Phosphate Pathway, 5. Isoleucine, 6. Glycerol

Conclusion

- The **upward shift** in the sPLS-DA plot for both adults and children **suggests a common metabolic response to prophylaxis.**
- A shared metabolic adaptation across age groups, despite distinct metabolite shifts.
- **Common trend:** Decreased succinate suggests reduced inflammatory/anaerobic microbial activity.
- **Adults:** Ribulose 5-phosphate and ribose 5-phosphate suggest enhanced nucleotide turnover.
- **Children:** Increased glucose and fructose indicate carbohydrate metabolism shifts.
- These findings highlight the systemic impact of oral hygiene interventions and their potential role in broader metabolic health.

Future Directions

- Investigating the influence of specific microbial populations on oral and systemic metabolic shifts after dental prophylaxis.
- Linking metabolite changes post-prophylaxis to personalized strategies for maintaining optimal oral and systemic health, possibly through tailored hygiene recommendations.

Acknowledgements

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