

# CHILDHOOD GROWTH AND EARLY GUT MYCOBIOTA

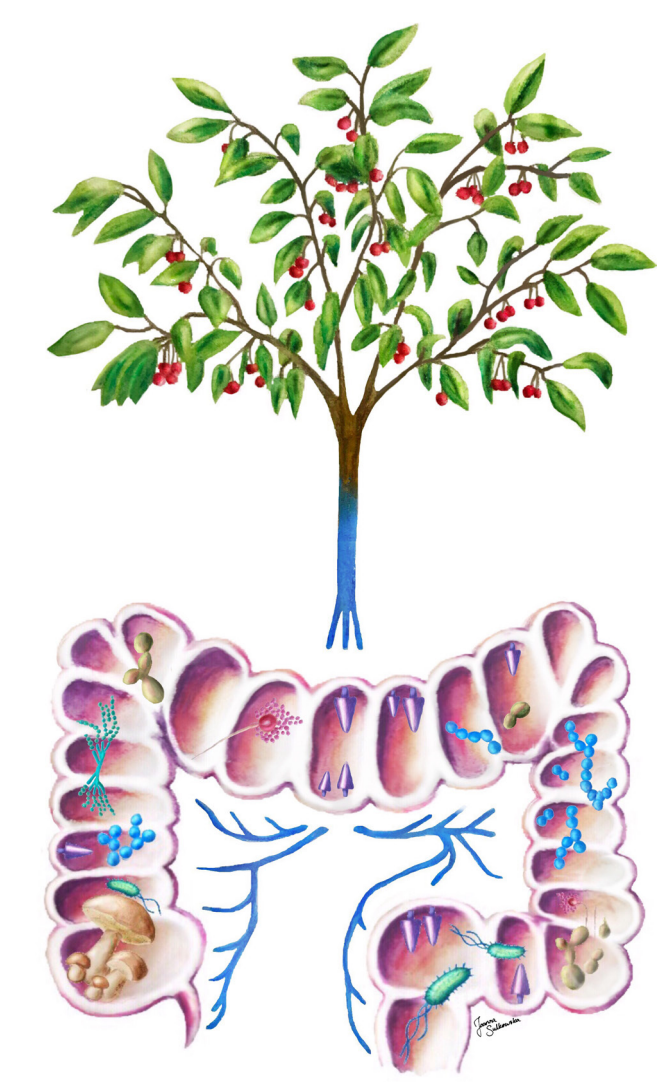
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## BACKGROUND

Healthy growth according to the genetic potential is a complex process not fully unravelled. The gut microbe community (gut microbiota) matures from birth towards adulthood<sup>1</sup>, and is observed to be more immature in stunted children and more rapidly matured in infants who later develop obesity<sup>2-3</sup>. The fungal gut microbiota (gut mycobiota) is poorly explored in children<sup>4</sup>, but could possibly affect human growth. We are studying whether the gut microbiota in the first two years of life relates to growth in childhood.

## MATERIAL AND METHOD

In a prospective cohort, we followed 298 healthy offspring from birth until 9 years and recorded their height and weight in this period. We collected faecal samples at 10 days, 3 months, 1 year and 2 years and quantified the fungal abundances by qPCR and identified fungal species by Illumina sequencing. Mixed-effect model analyses were used to account for repeated anthropometric data.

## PRELIMINARY RESULTS

- We have detected gut mycobiota in 56-76 % of children of 0-2 years, respectively<sup>4</sup>. In these children, 1-3 species prevailed the mycobiota for each child, mostly *Debaryomyces hansenii* in breastfed infants and *Saccharomyces cerevisiae* after 1 year of age<sup>4</sup>.
- The gut mycobiota appears established at 1-2 years, maturing in a manner to become more similar to the mothers' microbiota<sup>4</sup>.
- Higher fungal DNA concentration at 1 year of age was associated with decreased BMI SDS from 0-1 years ( $\beta = -0.10$ , 95 % CI: -0.18-0.01,  $p = 0.03$ ).
- Higher fungal DNA concentration at 2 years of age was associated with increased height SDS from 2-9 years ( $\beta = 0.12$ , 95 % CI: 0.01-0.23,  $p = 0.04$ ).

## DISCUSSION AND CONCLUSION

The early gut mycobiota is related to childhood height growth. It appears that a higher fungal concentration at 1 year is associated with a lower BMI curve centile trajectory in the infant growth phase (0-1 year). Also, a higher fungal concentration at 2 years of age correlates with being at a higher height curve centile in the childhood growth phase (2-9 years). It is plausible that the gut mycobiota could influence growth, and these findings support this theory.

## REFERENCES

- 1 Bäckhed, F., et al. (2015). "Dynamics and stabilization of the human gut microbiome during the first year of life." *Cell Host Microbe* 17.
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- 3 Dogra, S., et al. (2015). "Dynamics of infant gut microbiota are influenced by delivery mode and gestational duration and are associated with subsequent adiposity." *MBio* 6(1).
- 4 Schei, K., et al. (2017). "Early gut mycobiota and mother-offspring transfer." *Microbiome* 5(1): 107.

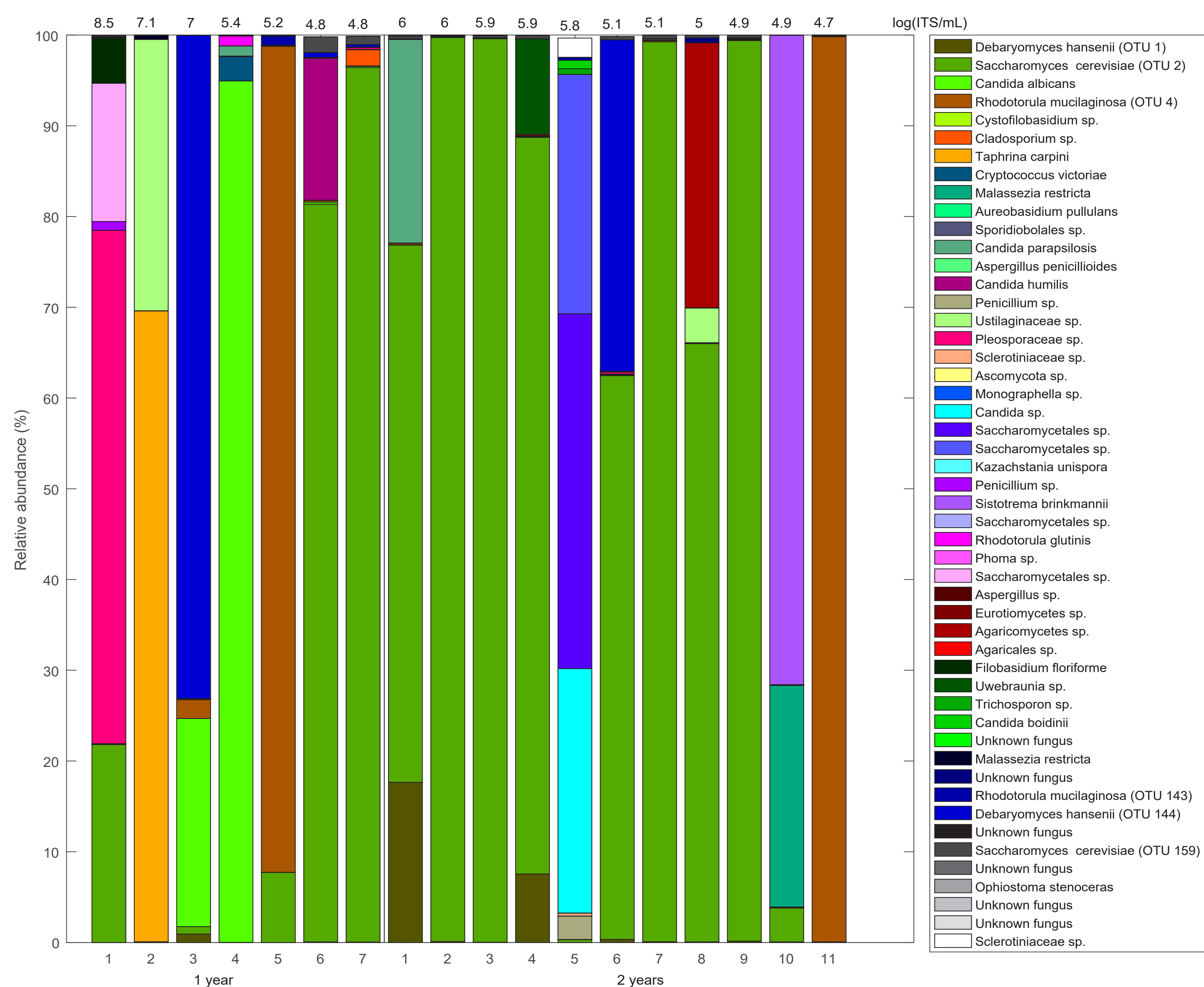


FIGURE 1 Operational taxonomic units (OTUs, equivalent to fungal species) for 1- and 2-year-old children with sequenced faecal samples. Bar charts of the relatively most abundant OTUs for each children. Each OTU is designated a distinct colour. The sample fungal concentrations are on top of each bar.

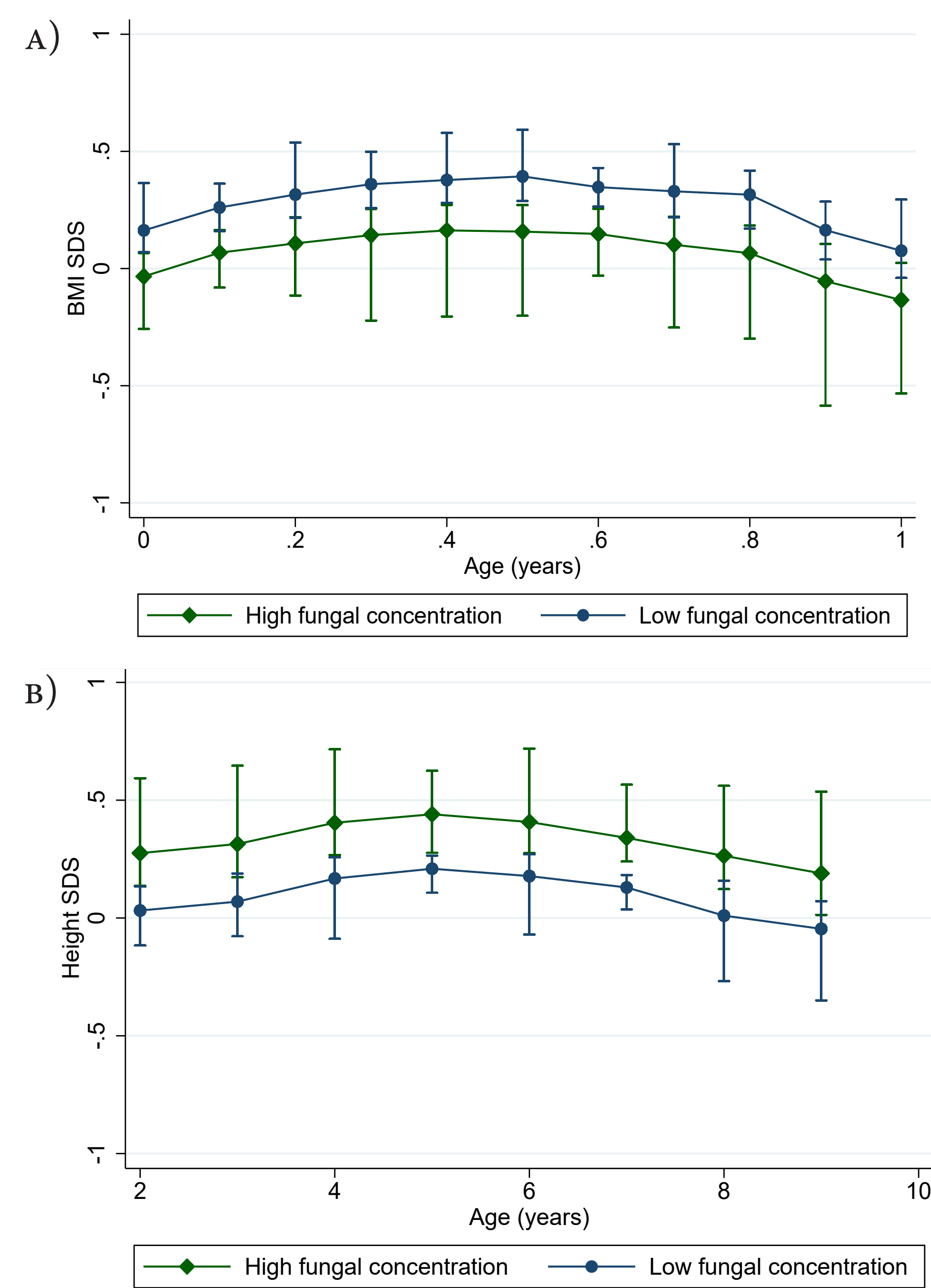


FIGURE 2AB Fitted mean trajectories modelling (a) body mass index standard deviation scores (BMI SDS) in children 0-1 years based on high or low fungal DNA concentration (cut-off log (2.028 ITS/ml) at 1 year, and (b) height SDS in children at 2-9 years based on high or low fungal DNA concentration at 2 years. Models are based on a mixed-effects model.

P1 GROWTH AND SYNDROMES

