



Youth Exposed to Caregiving Adversity Exhibit Altered Associations Between Diet and the Gut-Microbiome-Brain Axis

SRCD 2025

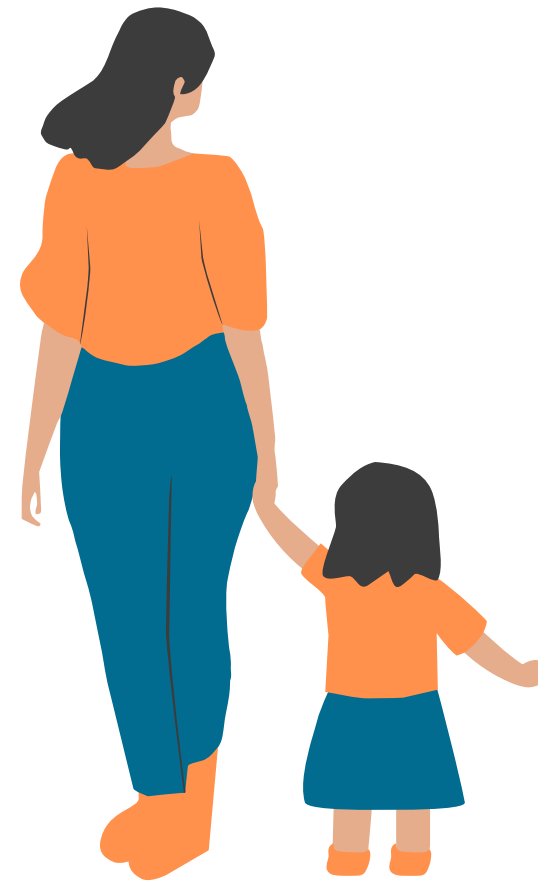
Gancz, N.N.*, Silvers, J.A., Choy, T., VanTieghem, M., Uhlemann, A-C., Park, H., Parr A., Callaghan, B.L.



Increase in youth
internalizing symptoms



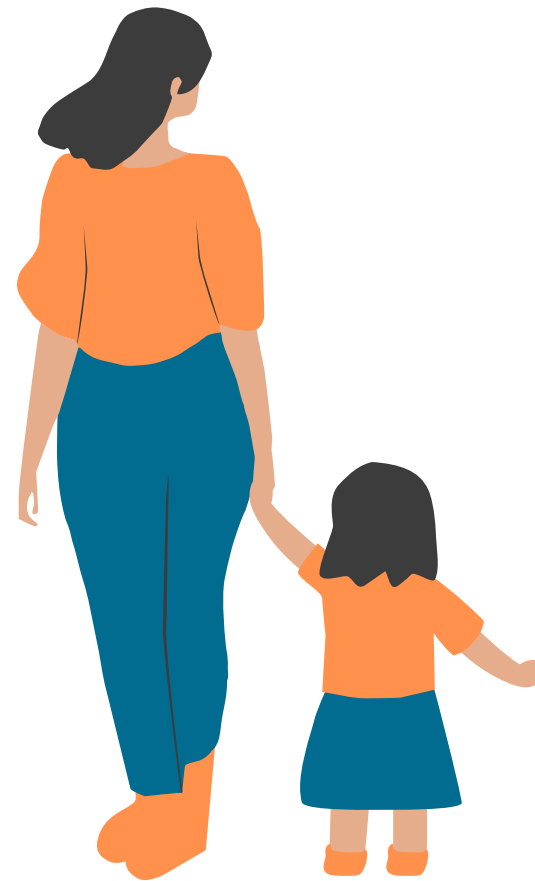
Increase in youth
internalizing symptoms



Especially following
interpersonal
adversity



Increase in youth
internalizing symptoms

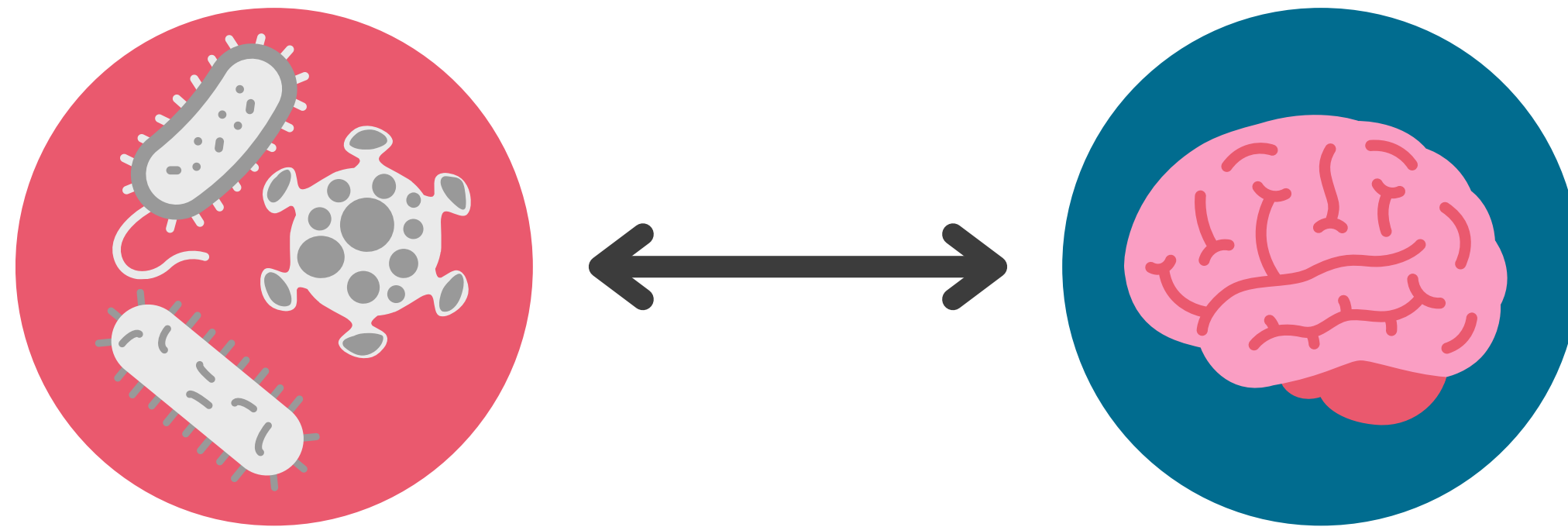


Especially following
interpersonal
adversity



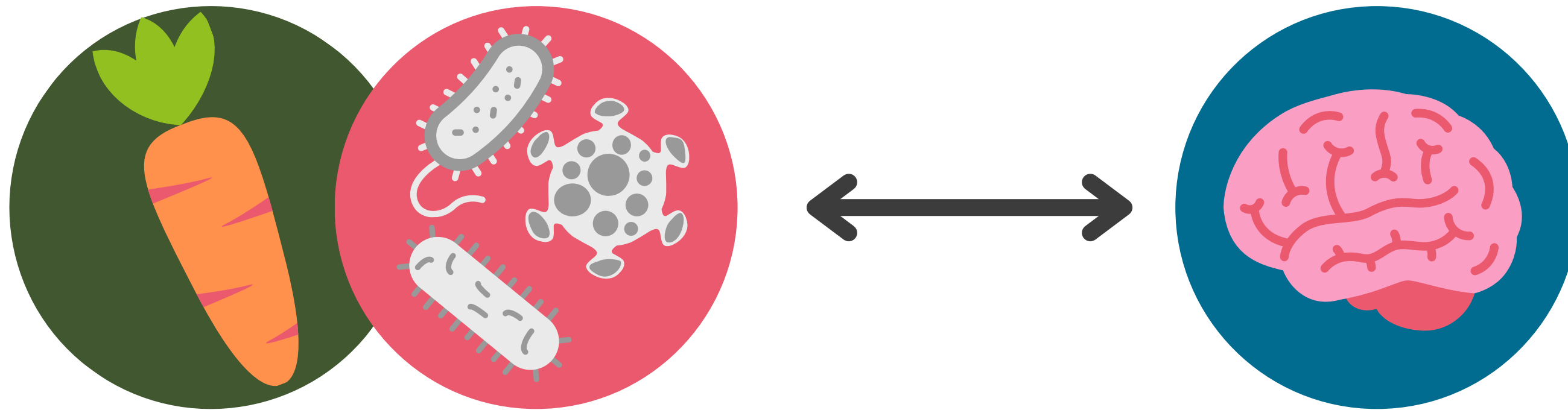
Lack of effective, well-
tolerated treatments

Can we leverage the **gut-microbiome-brain** axis?



Can we leverage the **gut-microbiome-brain** axis?

Focus: Diet

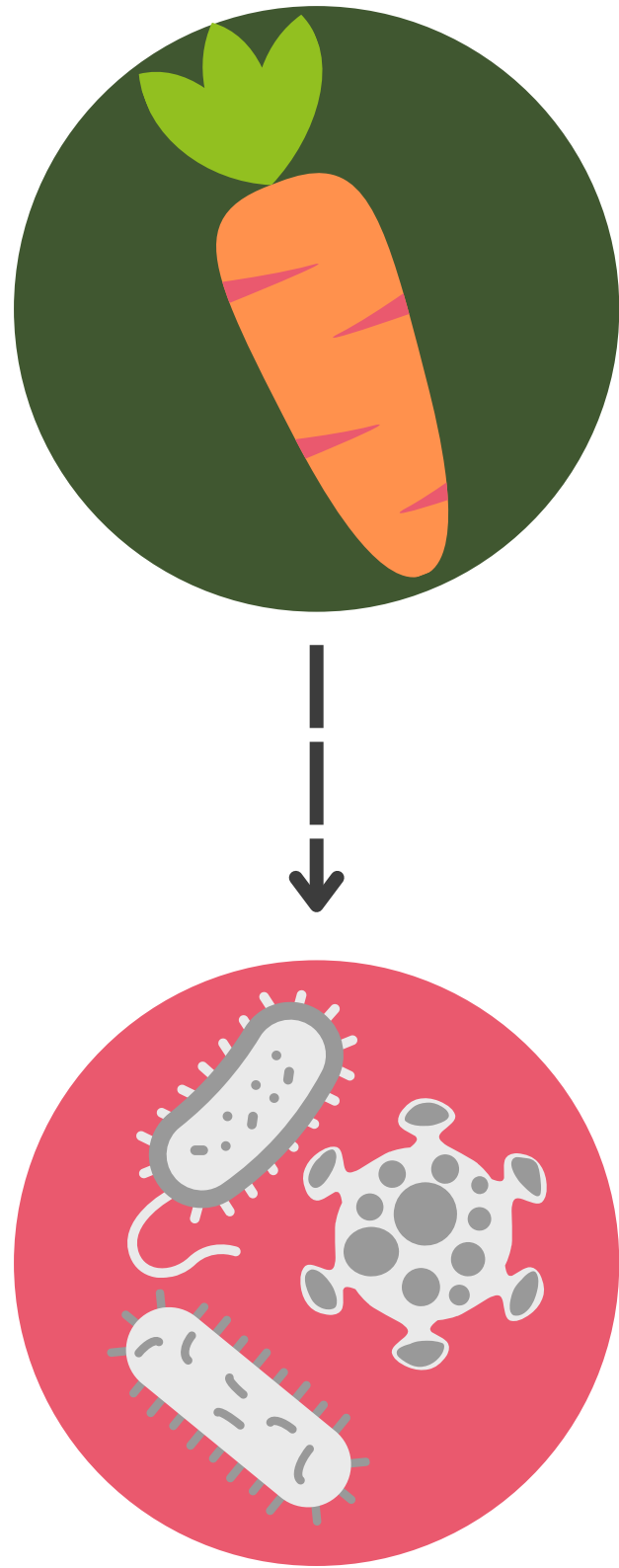


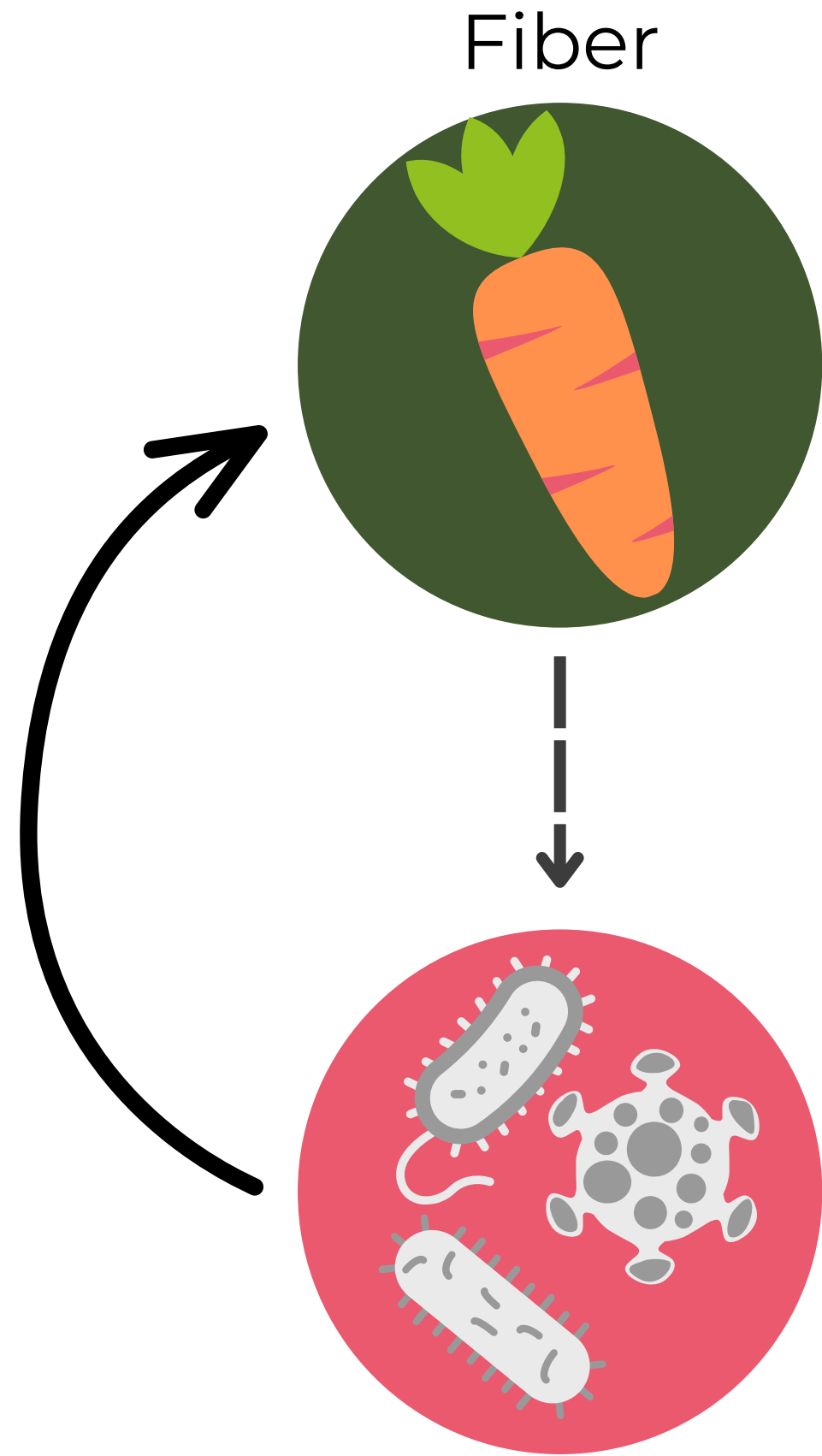
Fiber



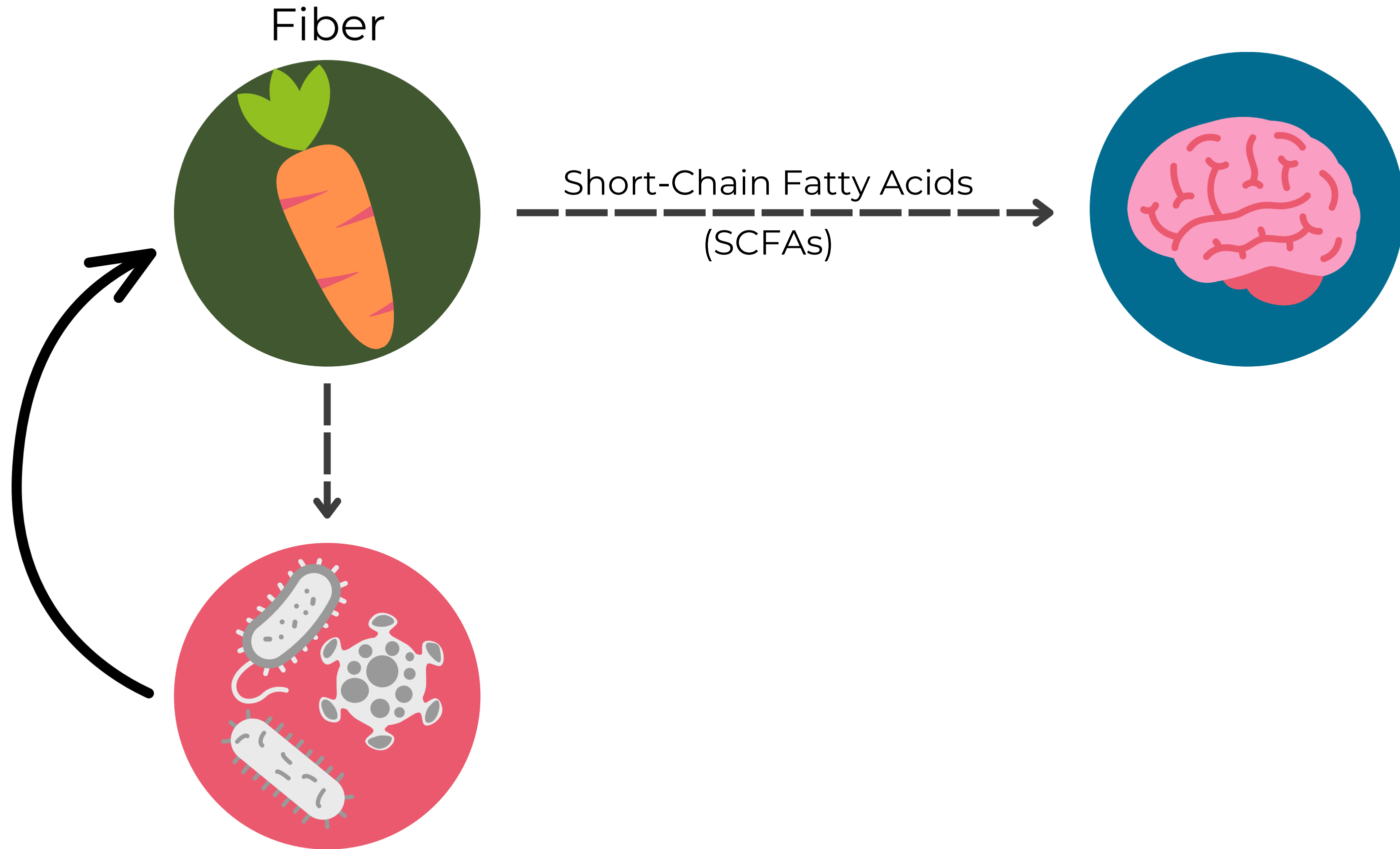
Baxter et al., 2019; Morrison et al., 2020; van de Wouw et al., 2018; De Marco et al., 2021; Noble et al., 2017

Fiber

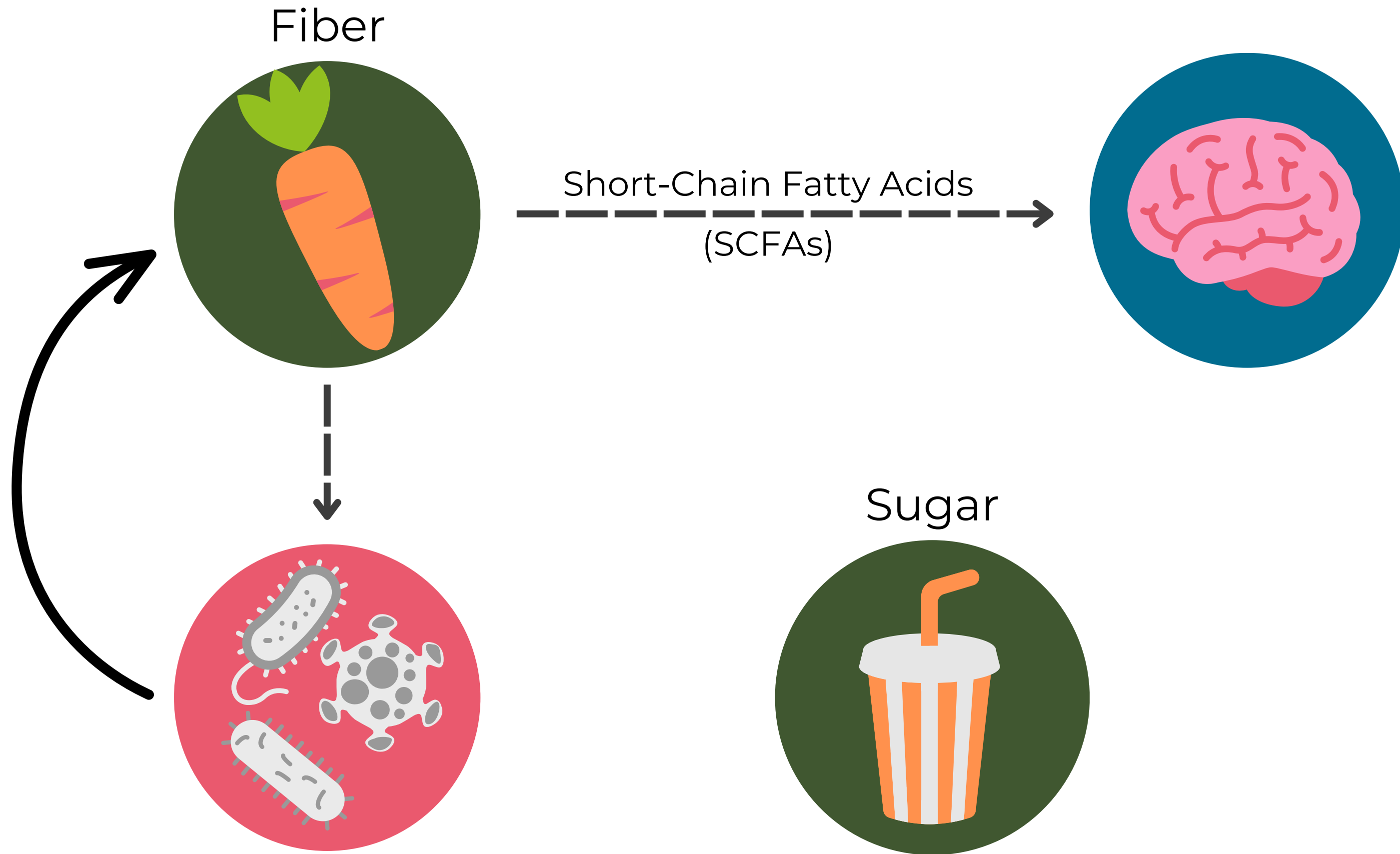


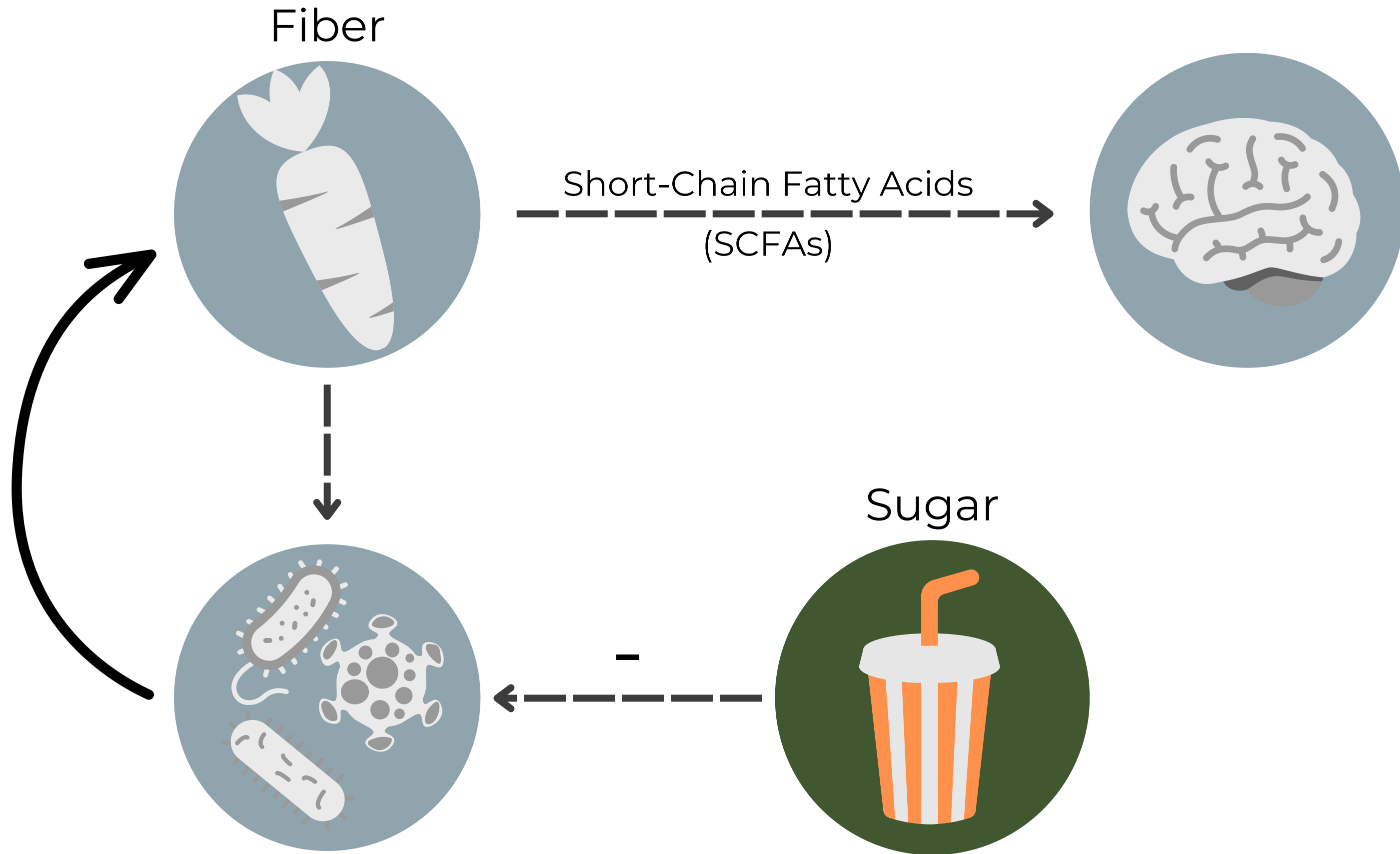


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Self-Reported
Symptoms



Self-Reported
Symptoms

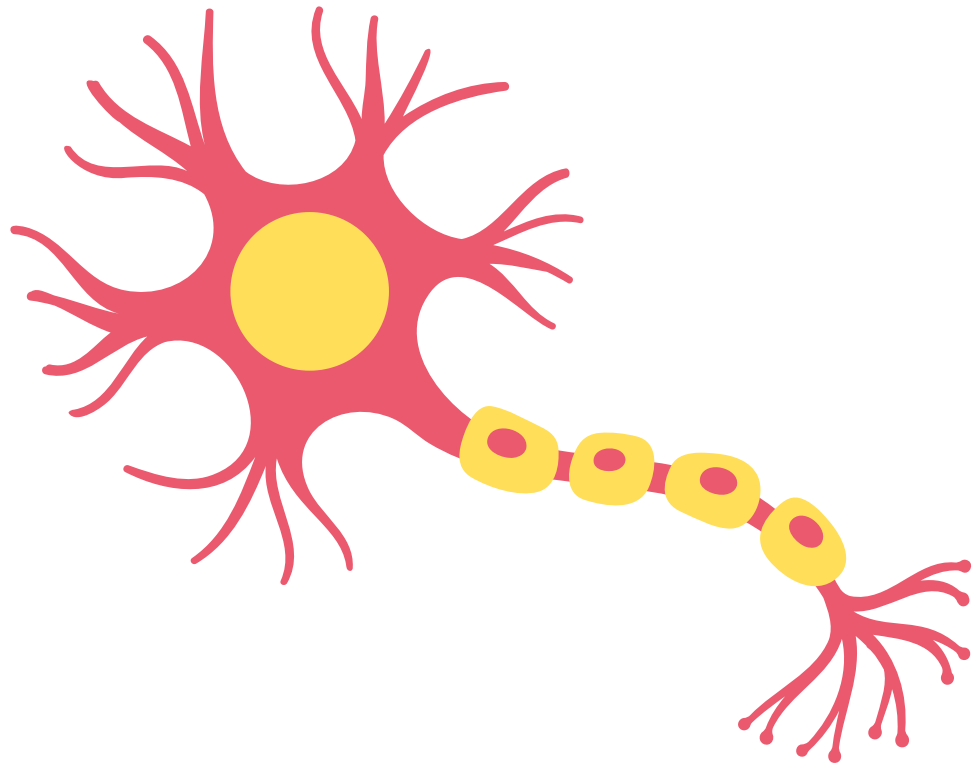


Basal Ganglia
Tissue Iron



Basal Ganglia Tissue Iron

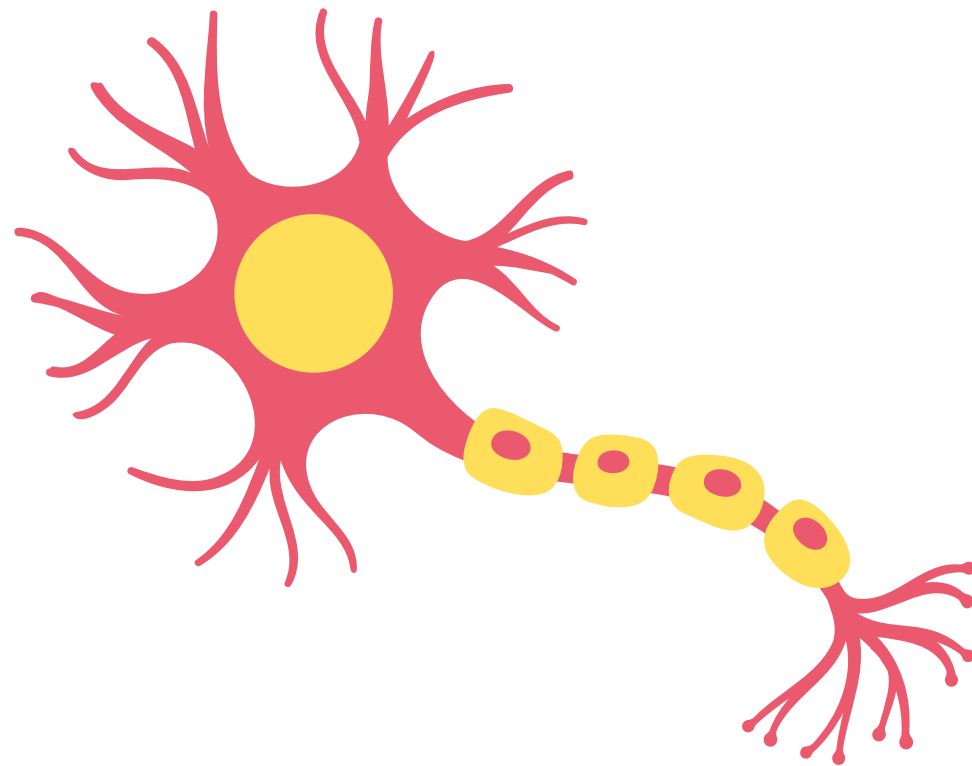
Accumulates via processes
such as dopamine synthesis





Basal Ganglia Tissue Iron

Accumulates via processes
such as dopamine synthesis



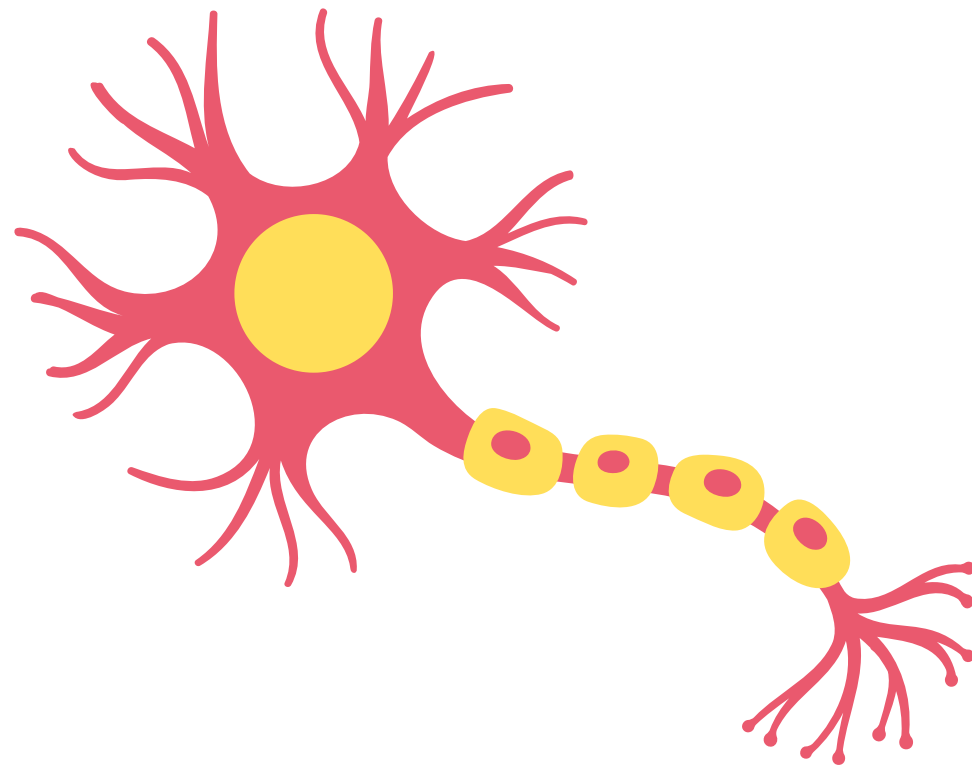
Associated w/functional
reward circuits and behavior





Basal Ganglia Tissue Iron

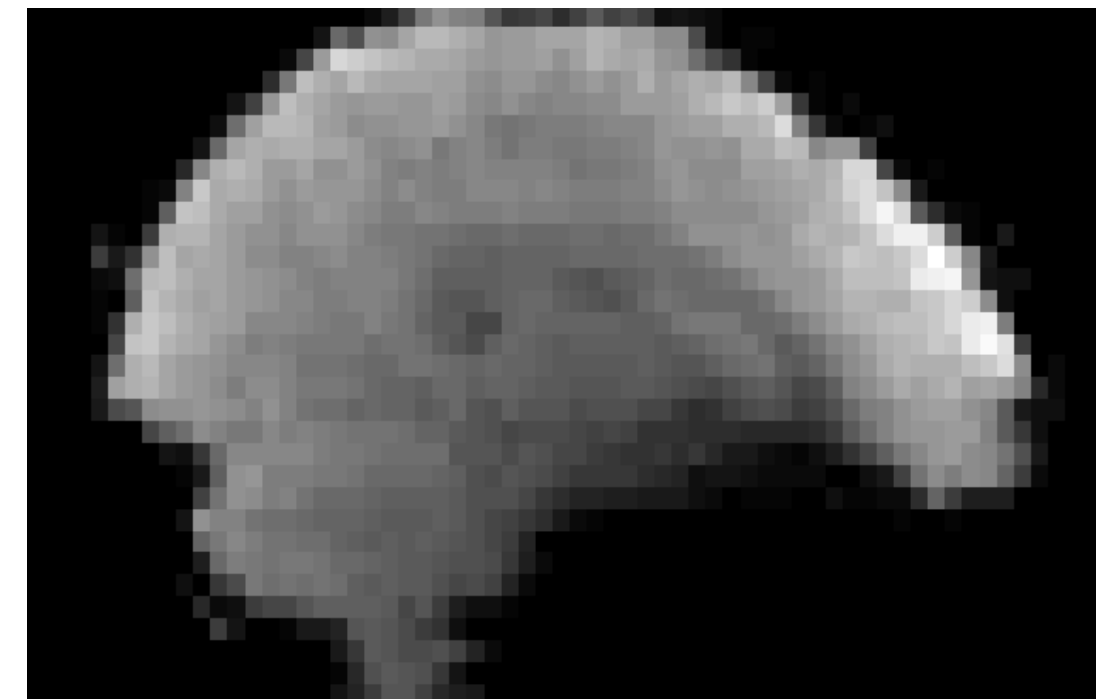
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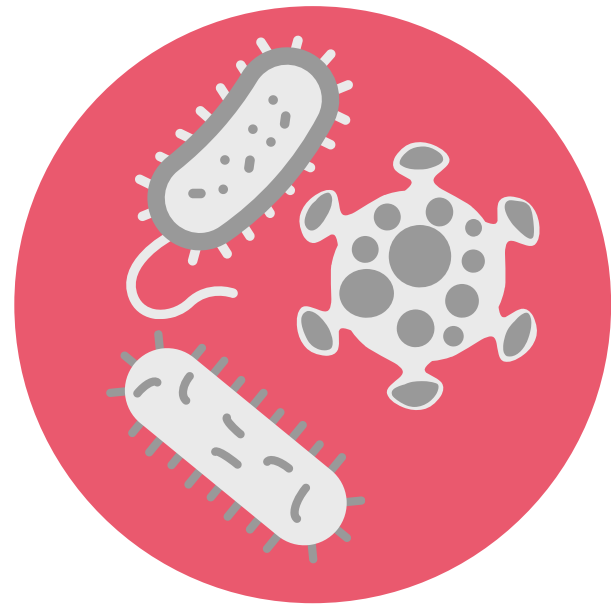


Estimated using time-averaged
& normalized T2*w image





102 Children
Age 1-17



102 Children Microbiome
Age 1-17



102 Children
Age 1-17



Microbiome



Diet



102 Children
Age 1-17



Microbiome



Diet



Internalizing
Sx



102 Children
Age 1-17



Microbiome



Diet

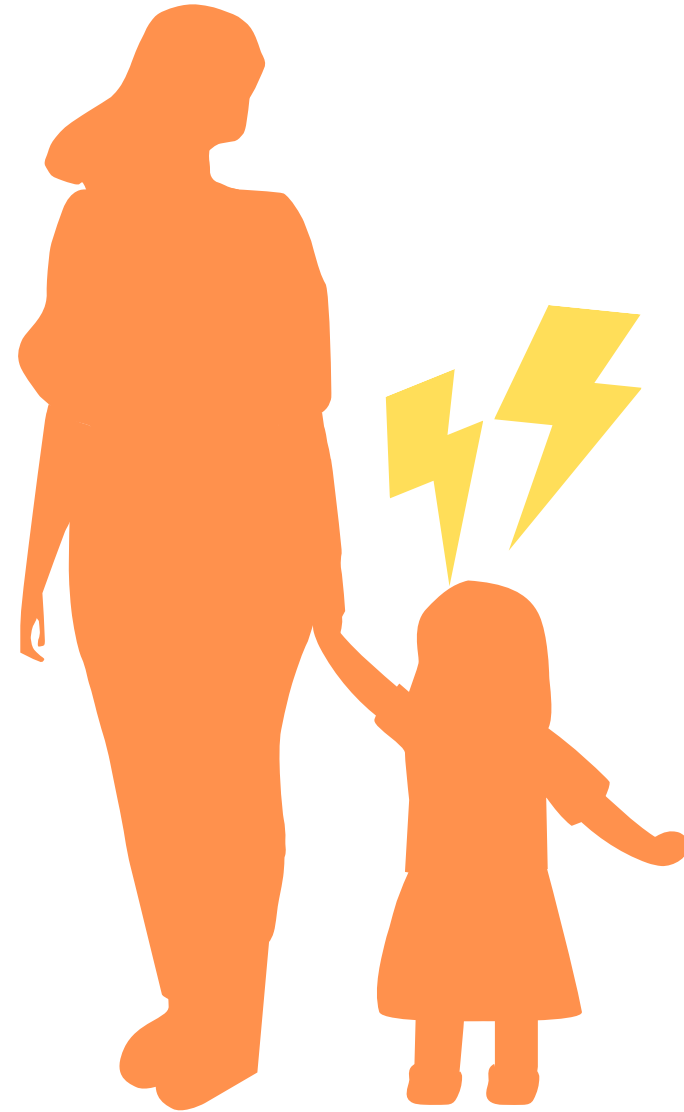


Internalizing
Sx



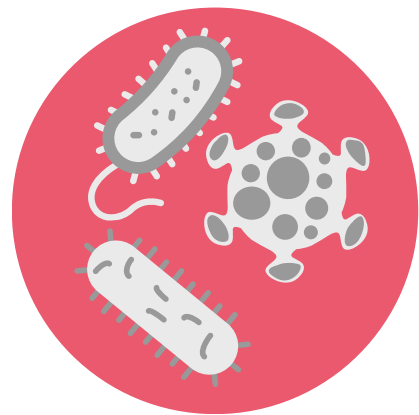
fMRI
(N = 48)

N = 49



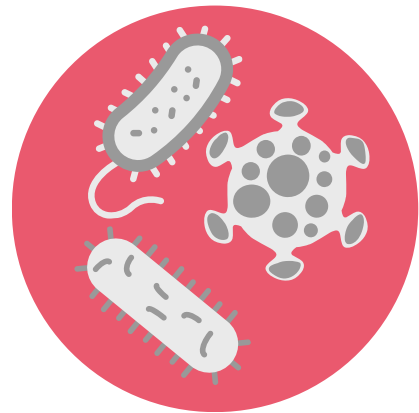
Interpersonal adversity
(Prior but not ongoing)

Aims

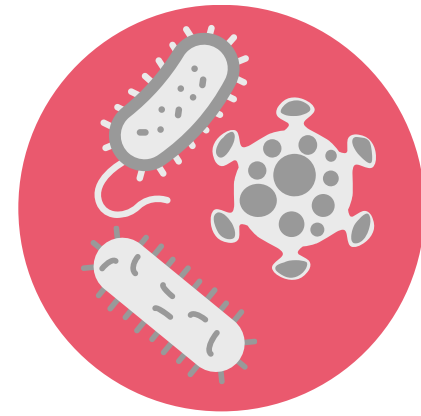


Adversity &
Microbiome

Aims

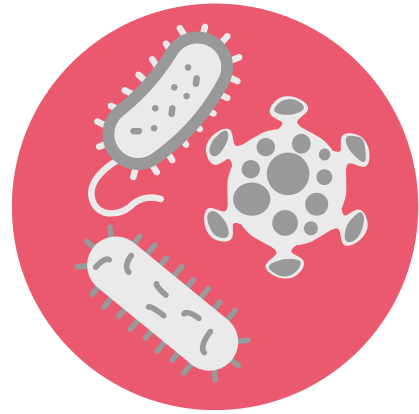


Adversity &
Microbiome

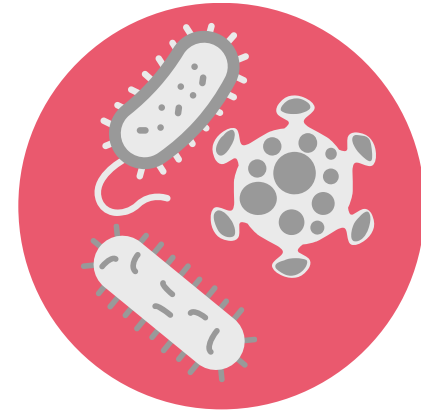


Microbiome &
Internalizing Sx

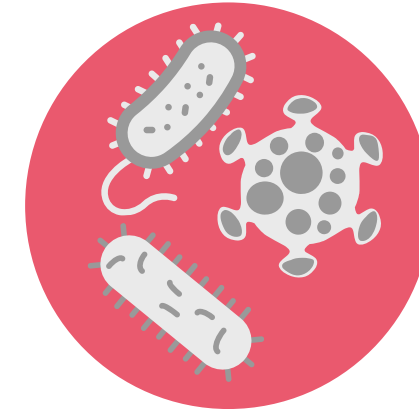
Aims



Adversity &
Microbiome

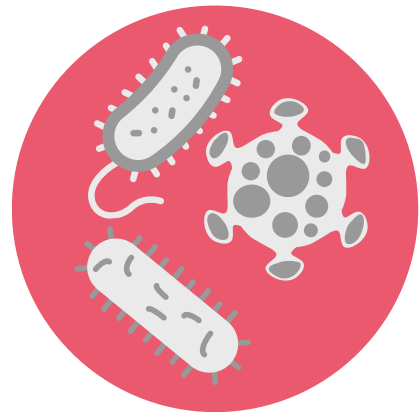


Microbiome &
Internalizing Sx

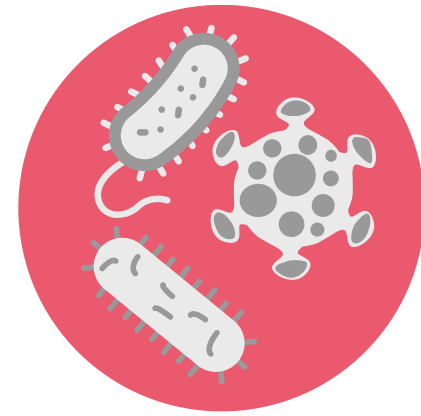


Microbiome &
Tissue Iron

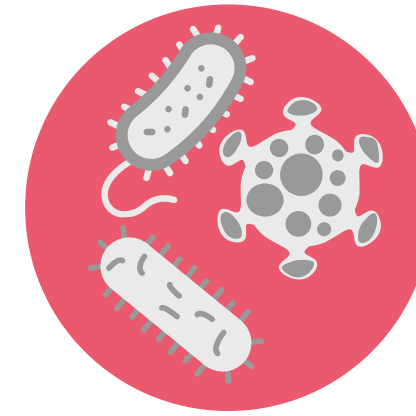
Aims



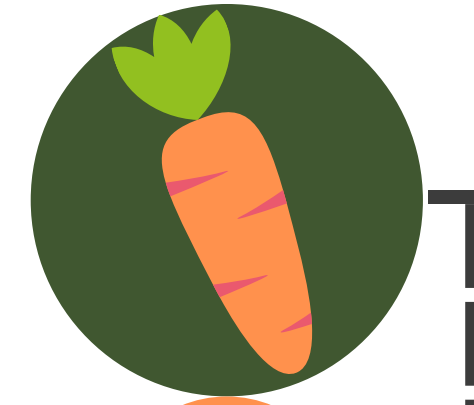
Adversity &
Microbiome



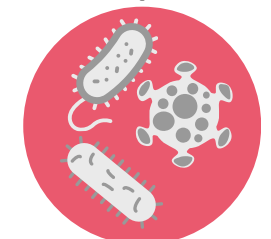
Microbiome &
Internalizing Sx



Microbiome &
Tissue Iron



x



Diet as
Mitigator

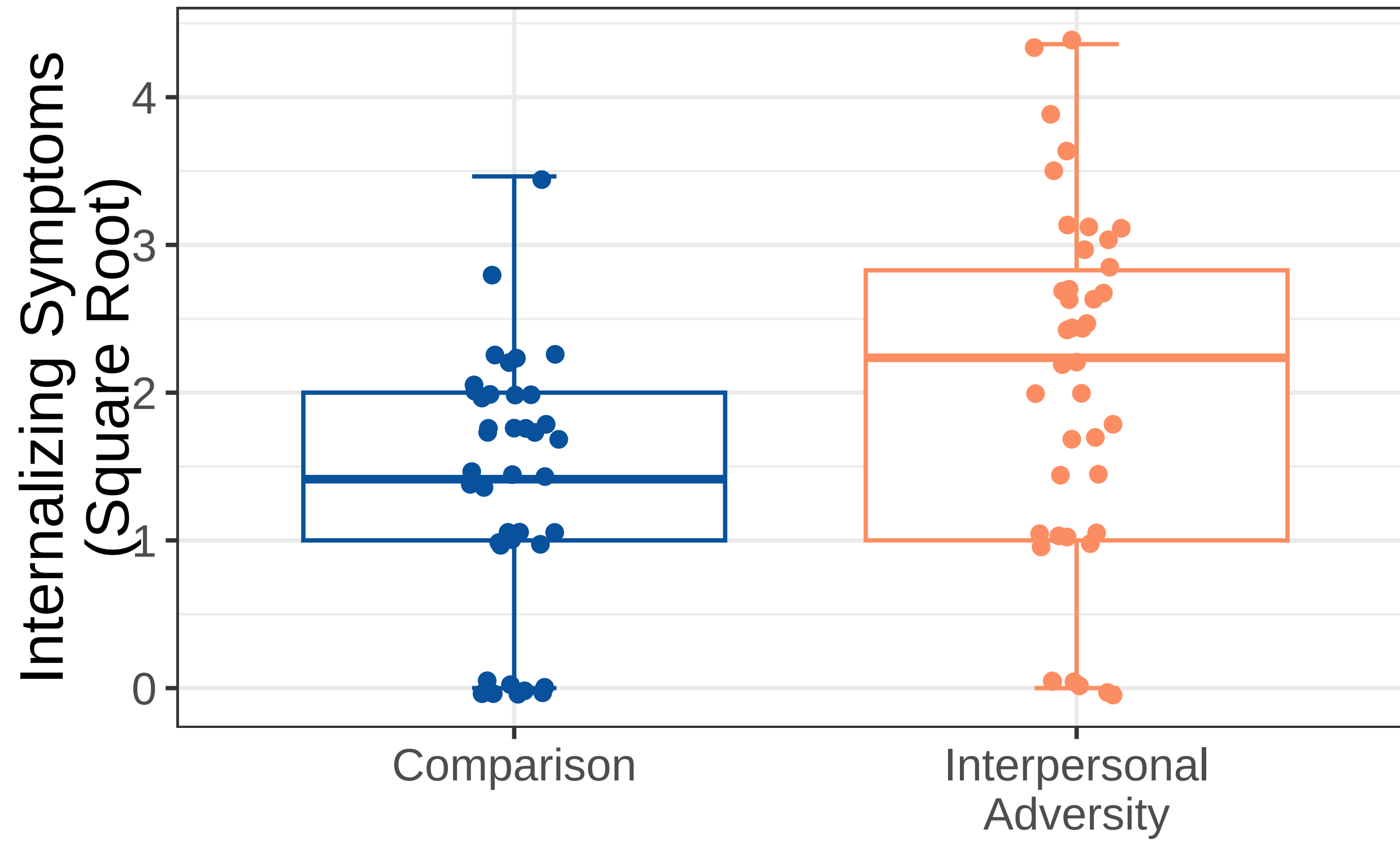


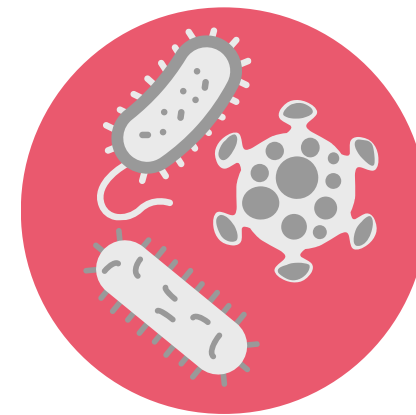
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Age	9.89 (4.96)	7.07 (4.64)	*

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Male	19 (38.78%)	29 (54.72%)	

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Male	19 (38.78%)	29 (54.72%)	
Asian American	19 (38.78%)	2 (3.77%)	
White	10 (20.41%)	16 (30.19%)	*
Other	7 (14.29%)	8 (15.09%)	

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Other	7 (14.29%)	8 (15.09%)	
Caregiver Education - Bachelor's Degree	11 (22.45%)	12 (22.64%)	



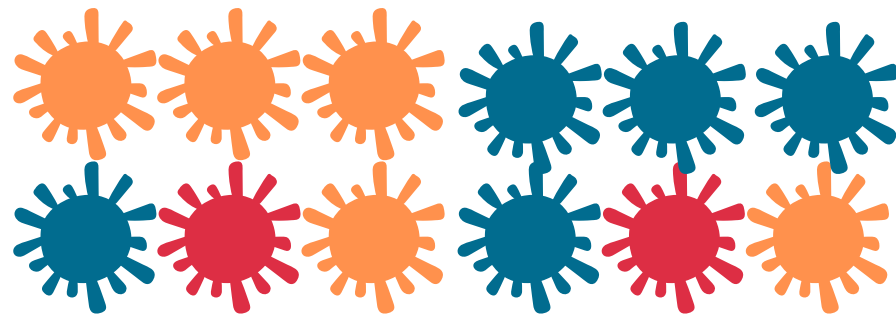


Adversity &
Microbiome

Microbiome Primer

Alpha Diversity

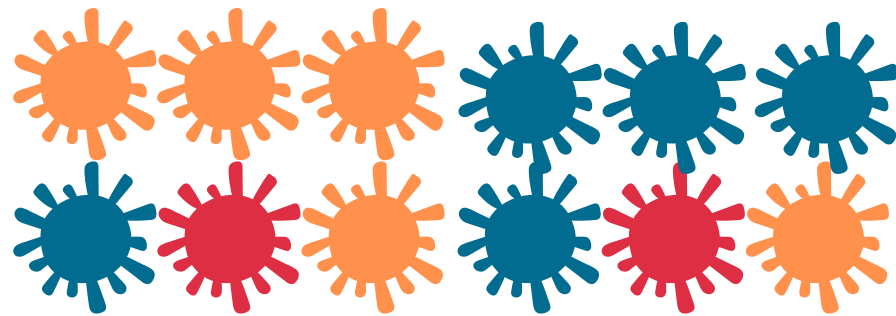
Richness



Microbiome Primer

Alpha Diversity

Richness



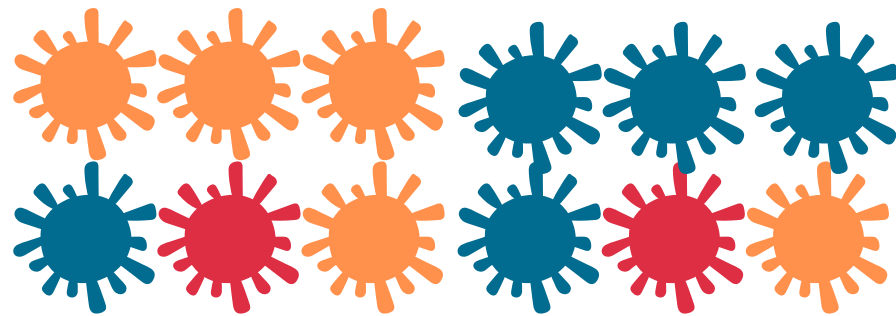
Faith's Diversity

Microbiome Primer

Alpha Diversity

Differential Abundance

Richness

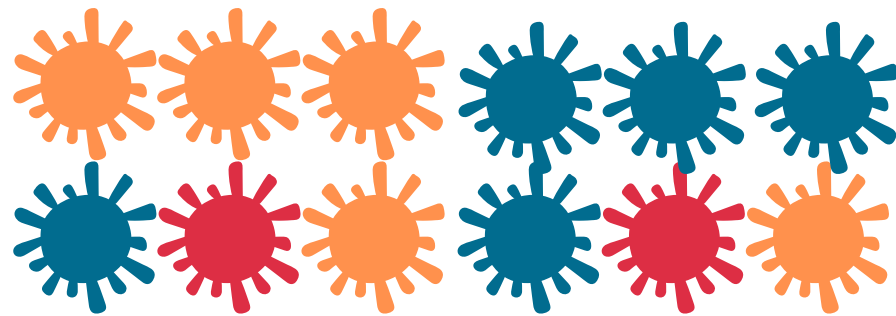


Faith's Diversity

Microbiome Primer

Alpha Diversity

Richness



Faith's Diversity

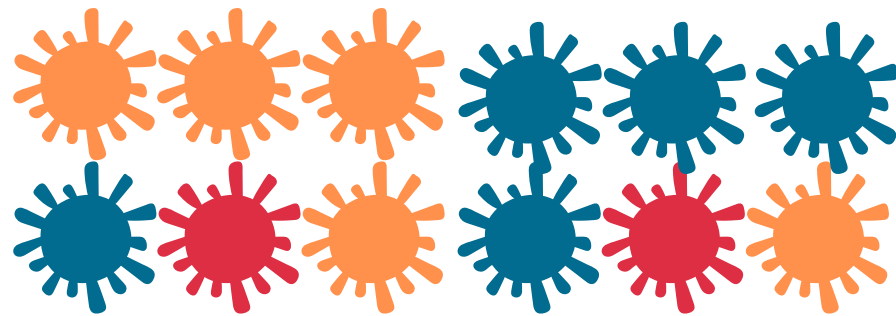
Differential Abundance

 Feature1 $\sim X + Z + W$

Microbiome Primer

Alpha Diversity

Richness



Faith's Diversity

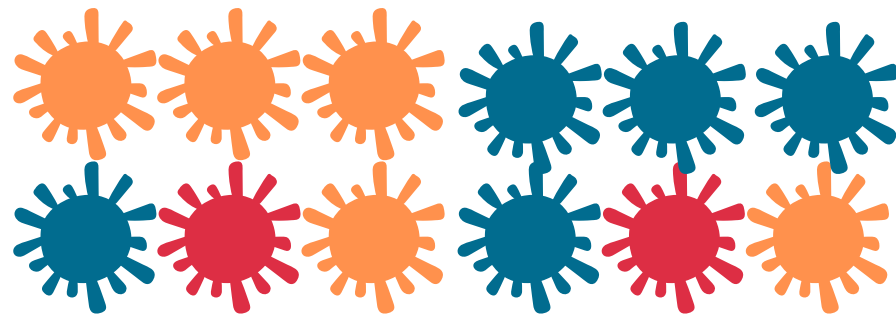
Differential Abundance

-  Feature1 $\sim X + Z + W$
-  Feature2 $\sim X + Z + W$
-  Feature3 $\sim X + Z + W$

Microbiome Primer

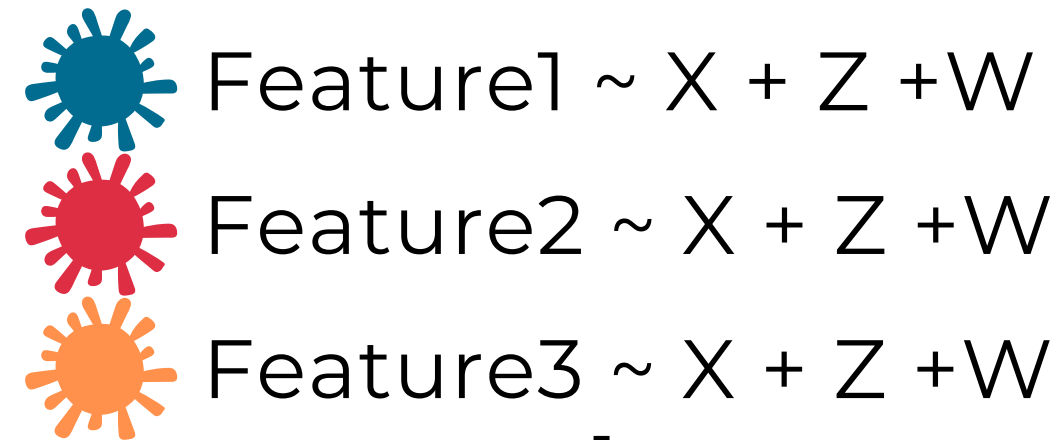
Alpha Diversity

Richness

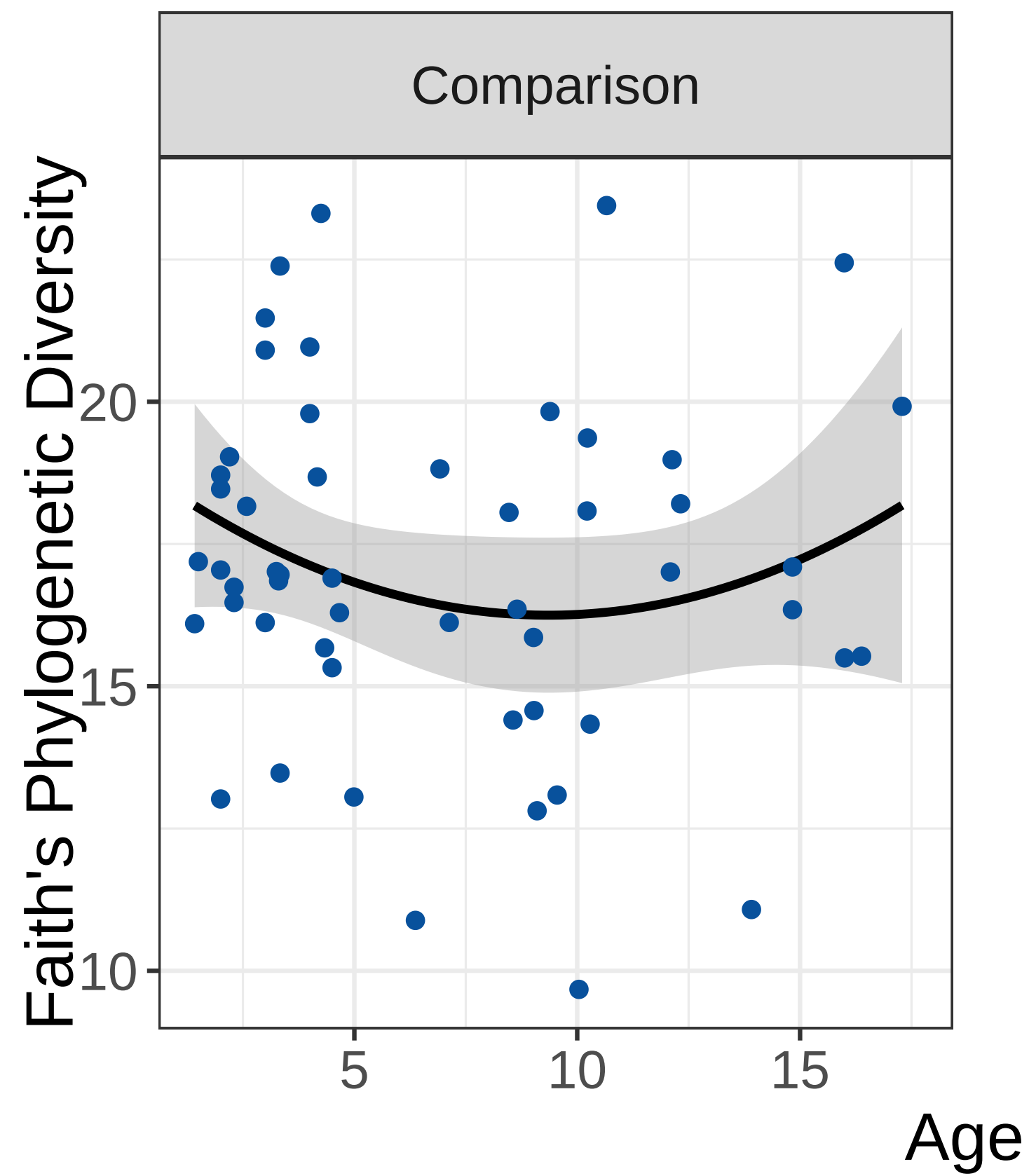


Faith's Diversity

Differential Abundance

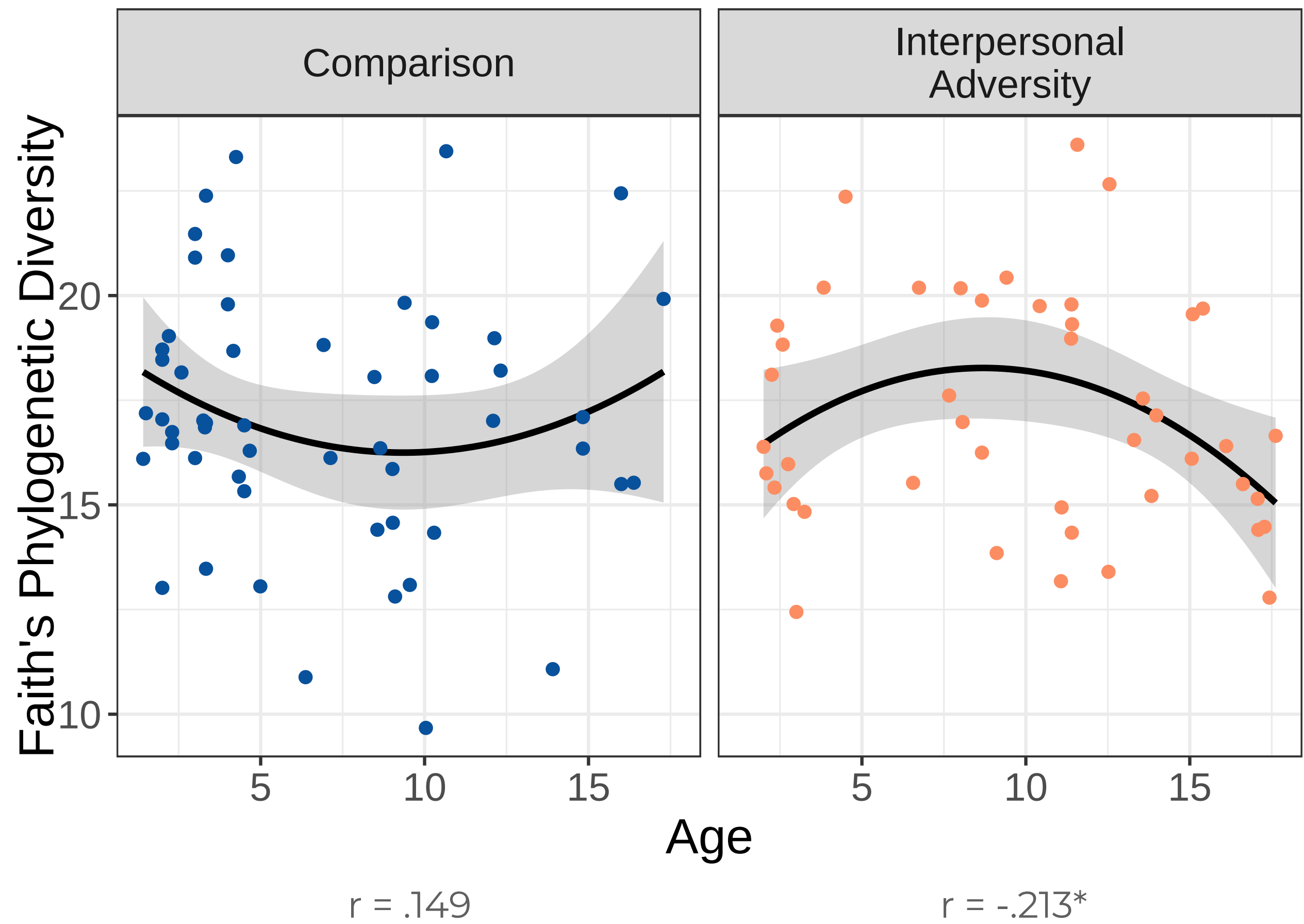


↓
Multiple comparison correction

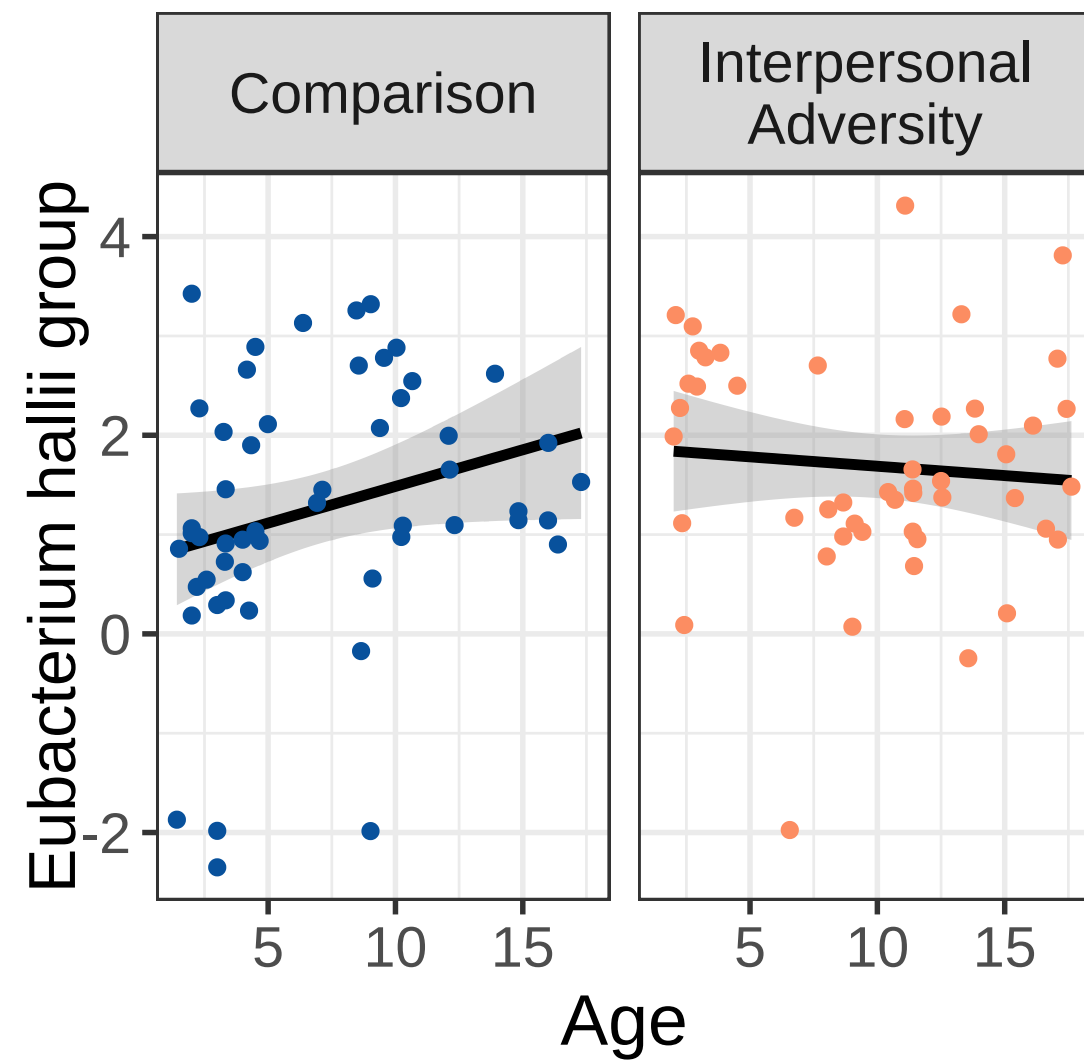


$r = .149$

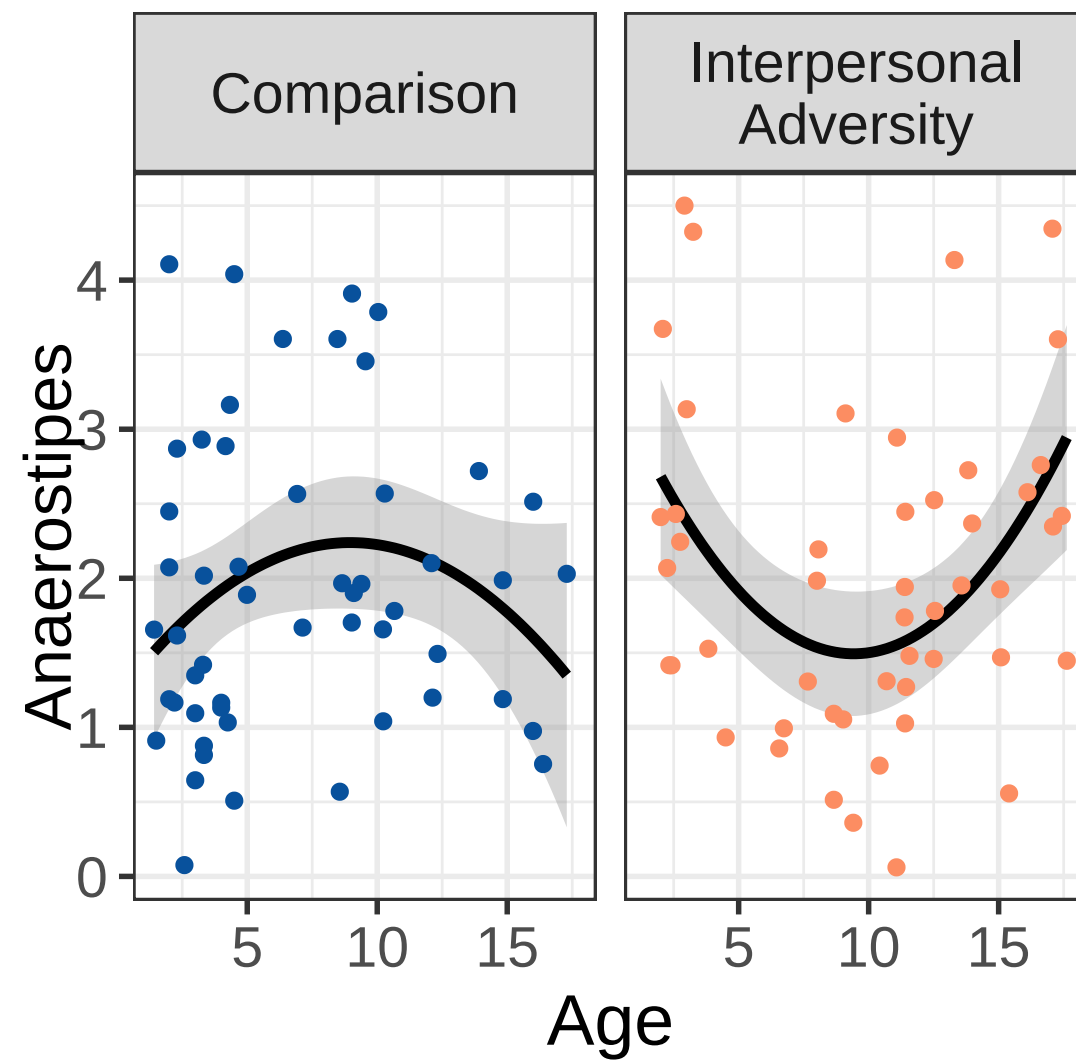
$r = -.213^*$



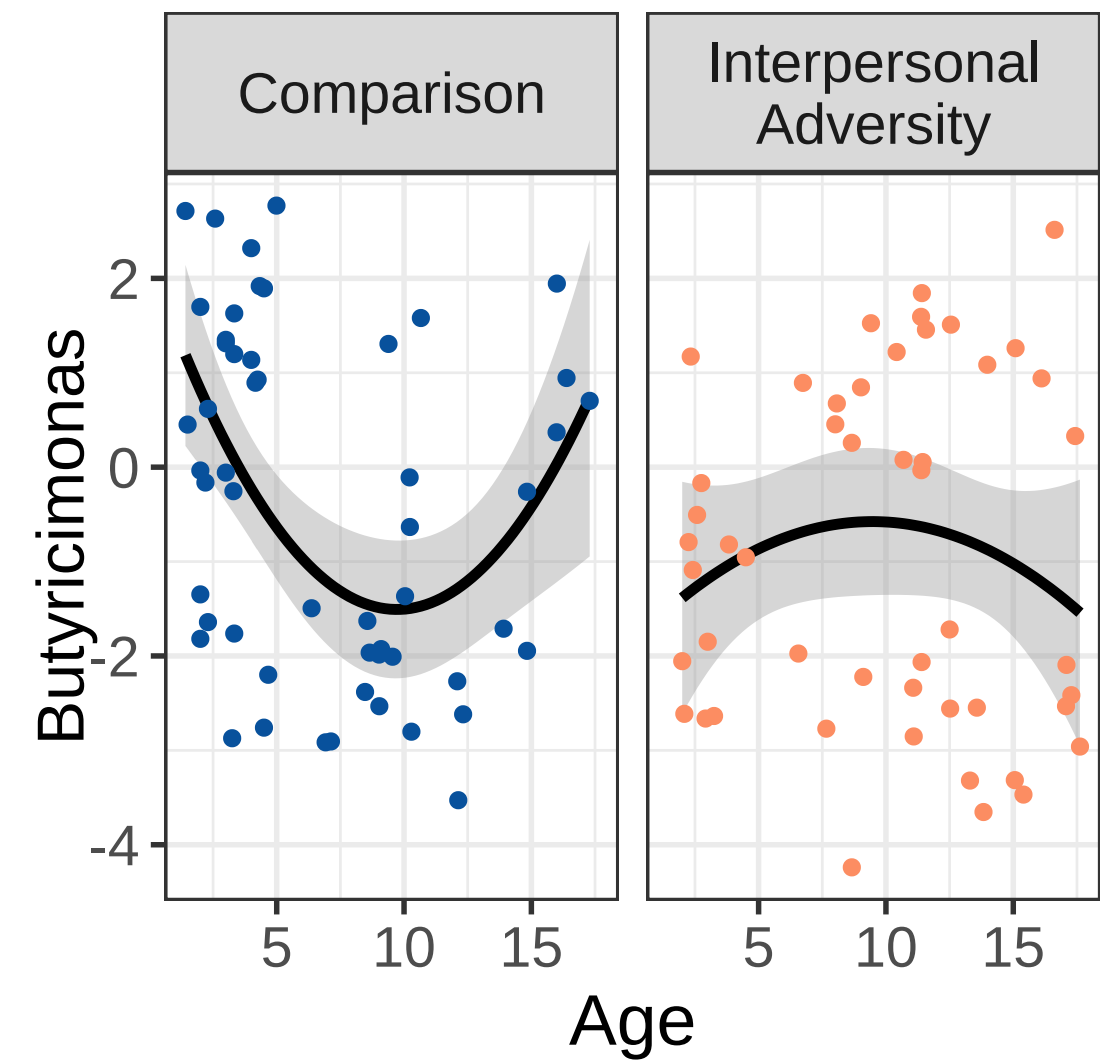
Age * IA $r = -0.303^*$

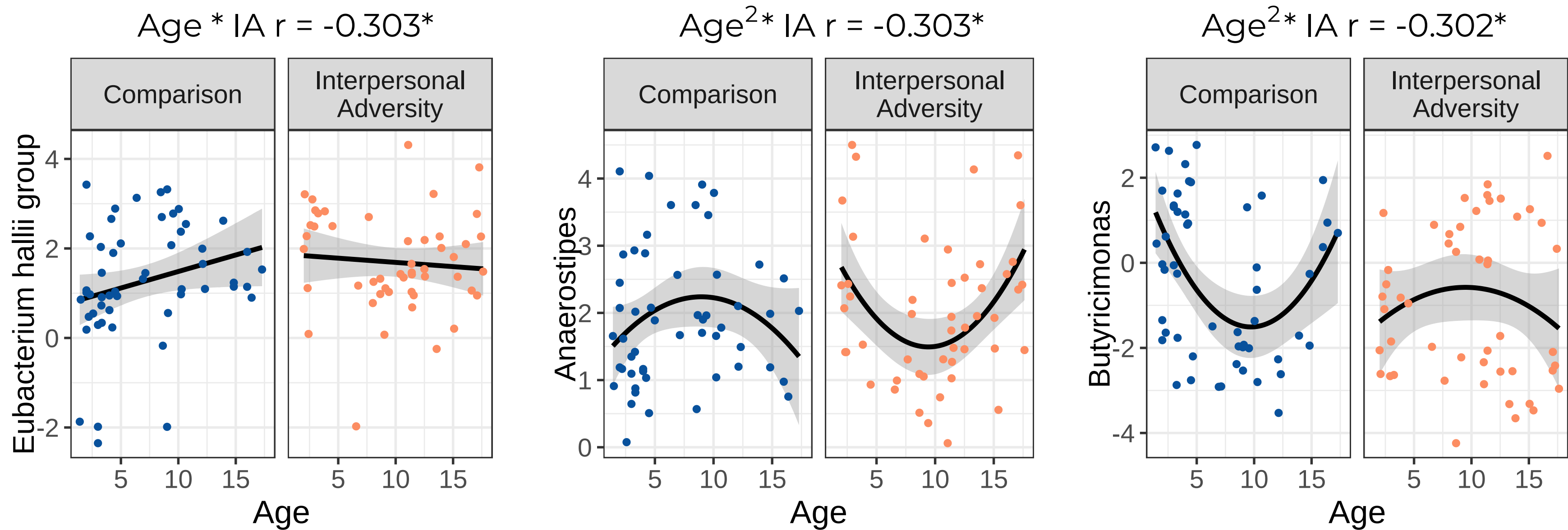


Age² * IA $r = -0.303^*$

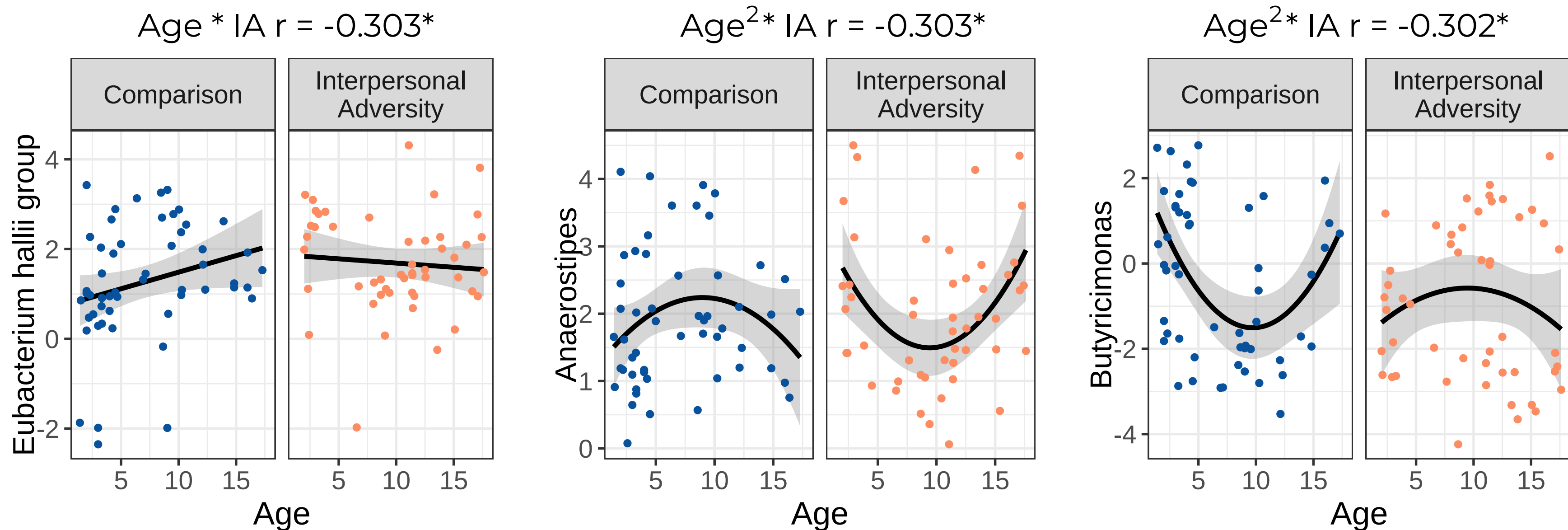


Age² * IA $r = -0.302^*$



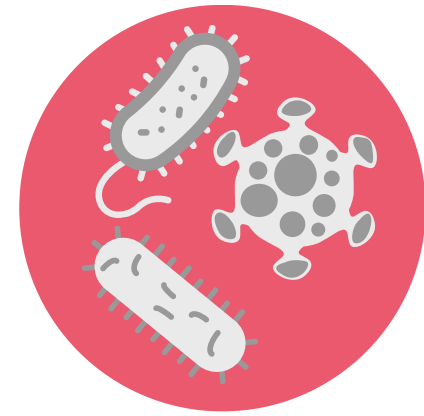


Microbiome remains age-dependent in middle childhood & adolescence



Microbiome remains age-dependent in middle childhood & adolescence

Moderated by adversity exposure

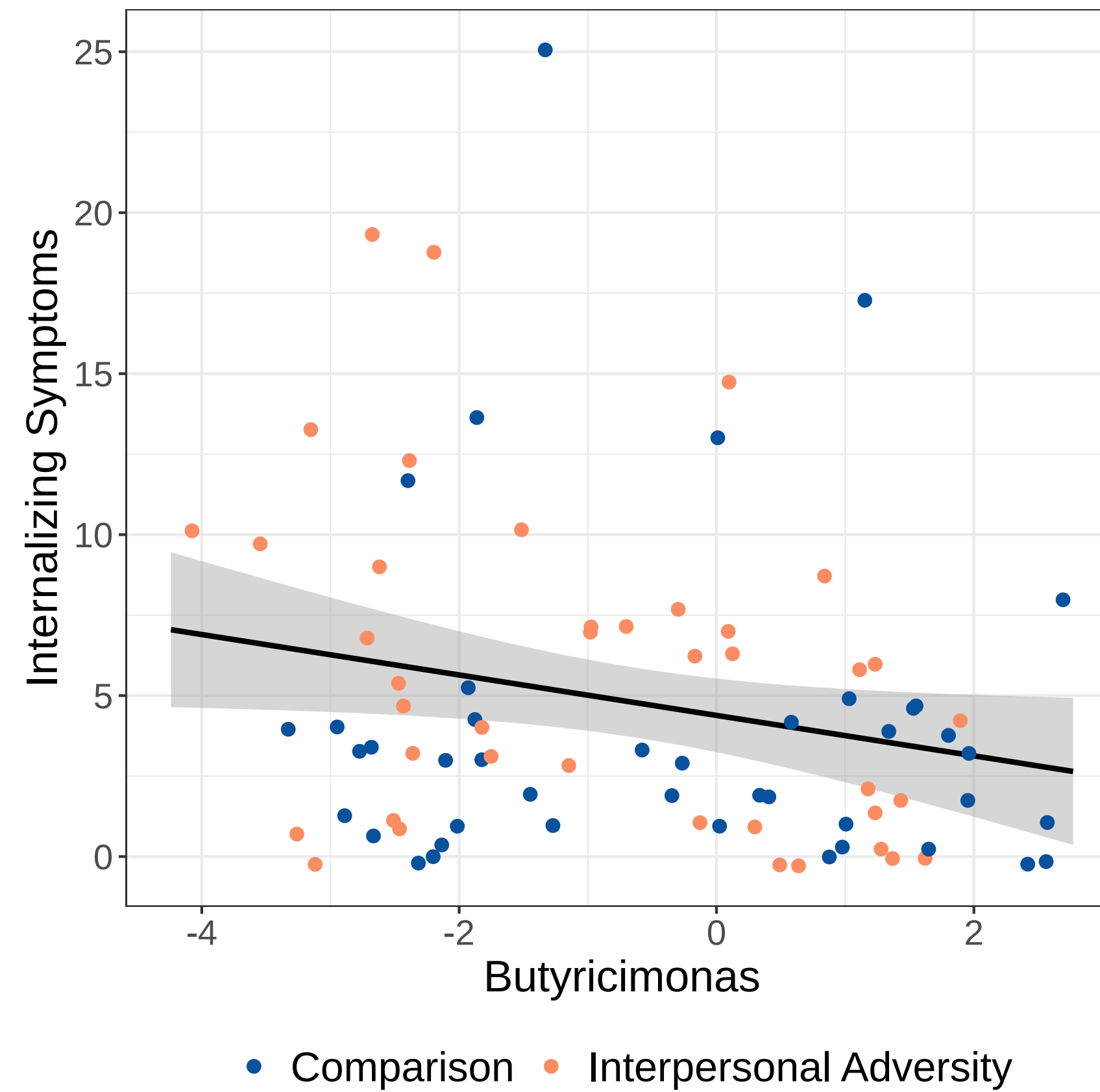


Microbiome &
Internalizing Sx

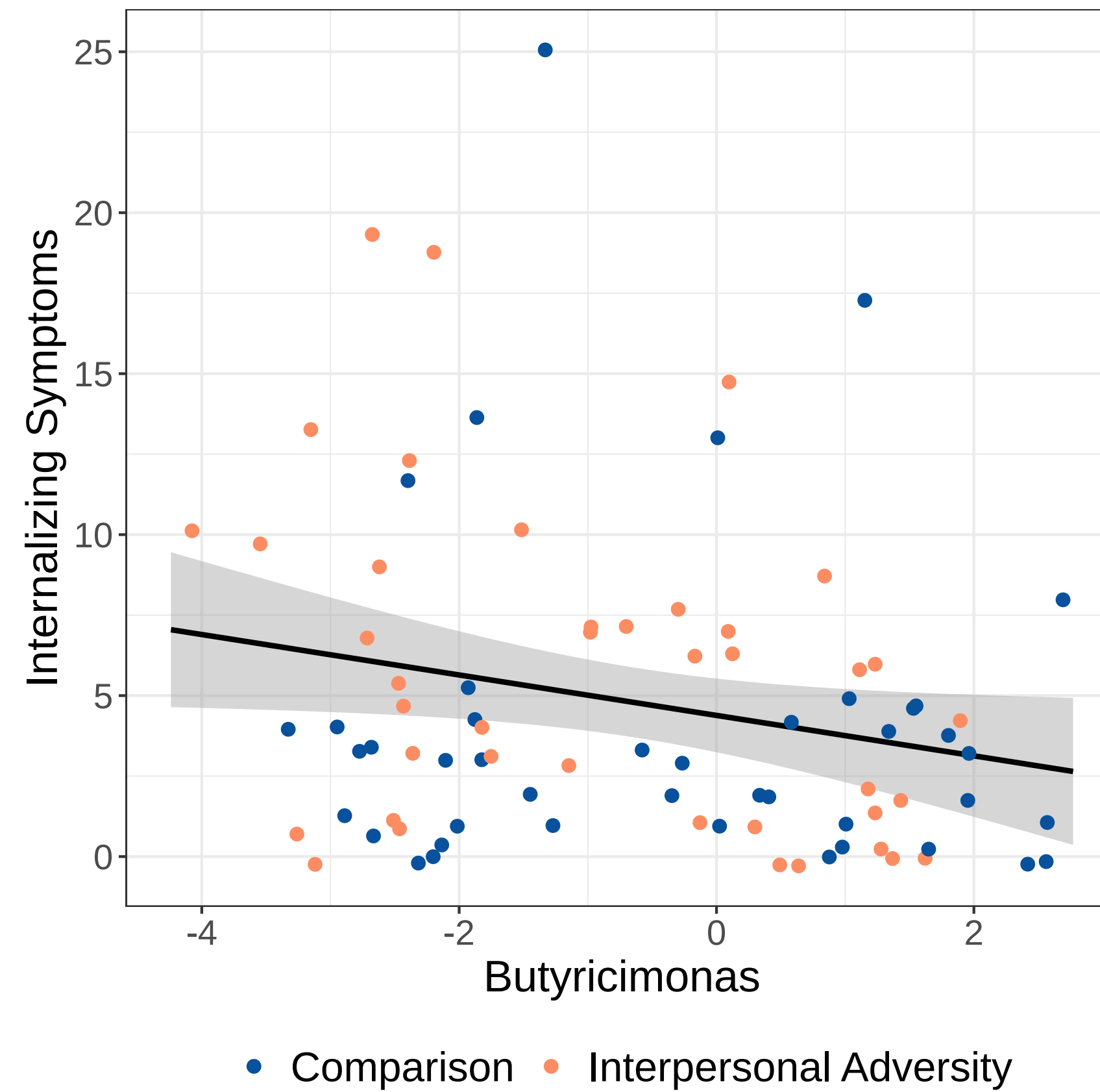


Microbiome &
Tissue Iron

$r = -0.271$



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SCFA
producer

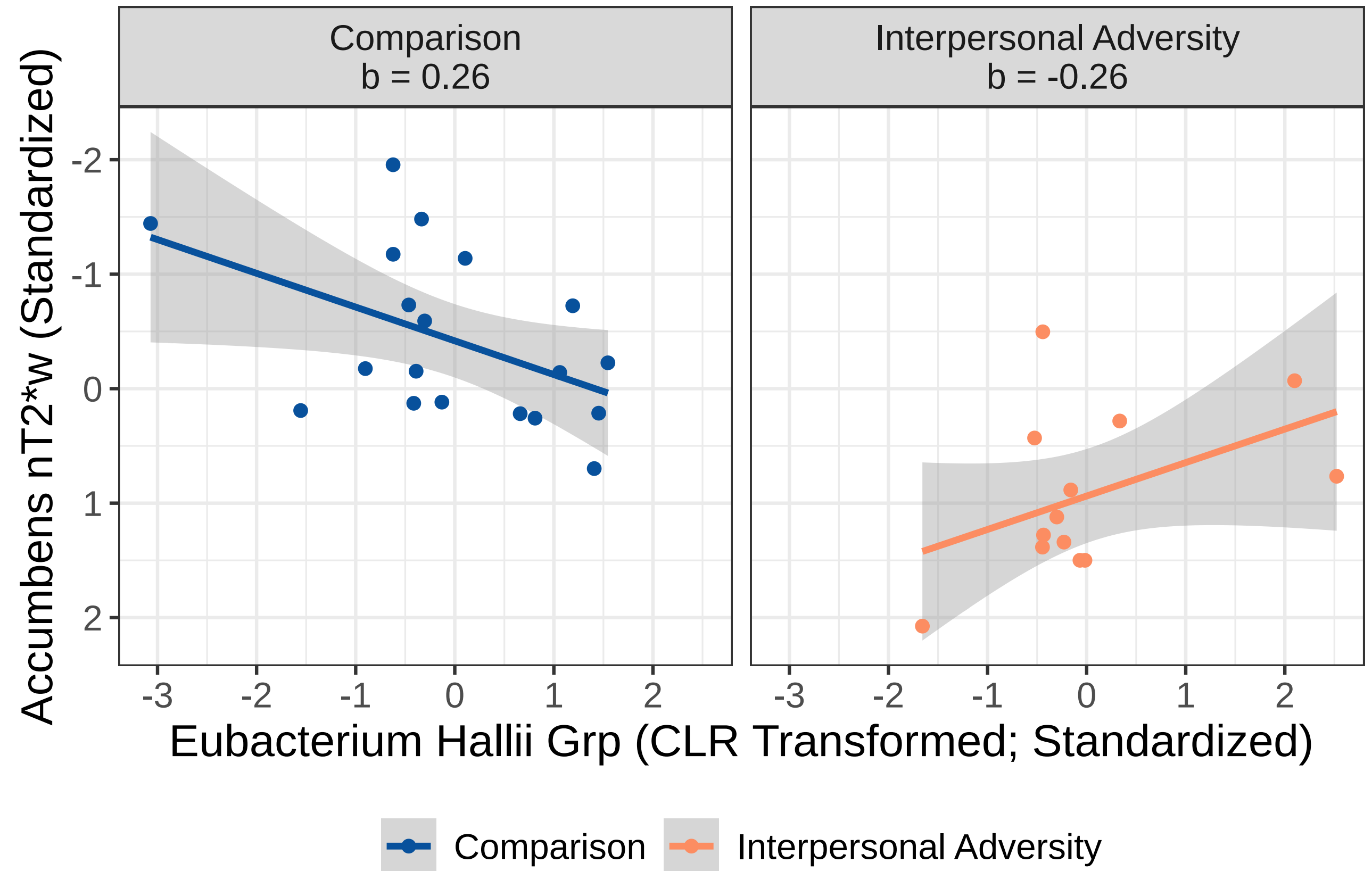
More
tissue iron

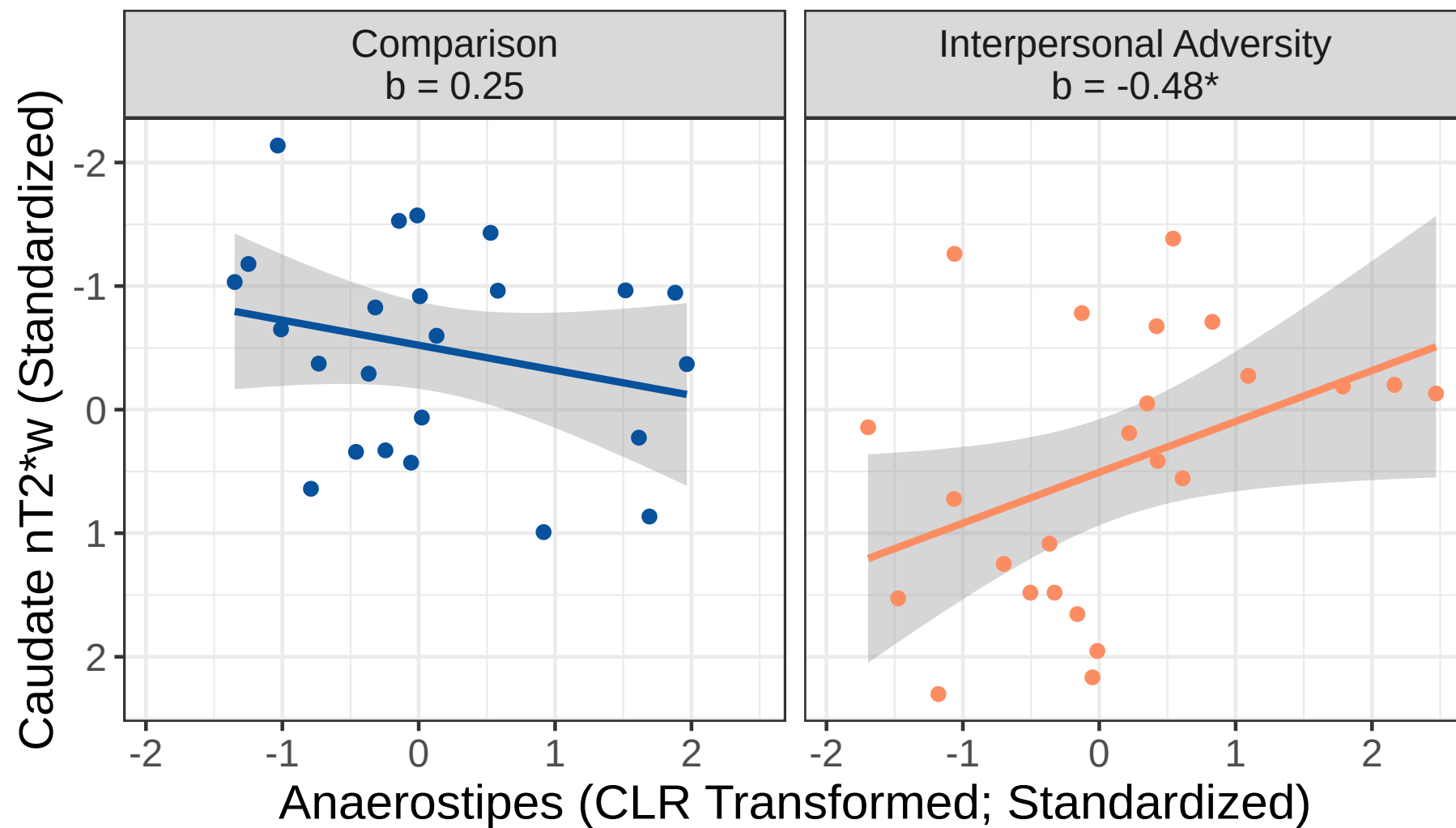


Less
tissue iron

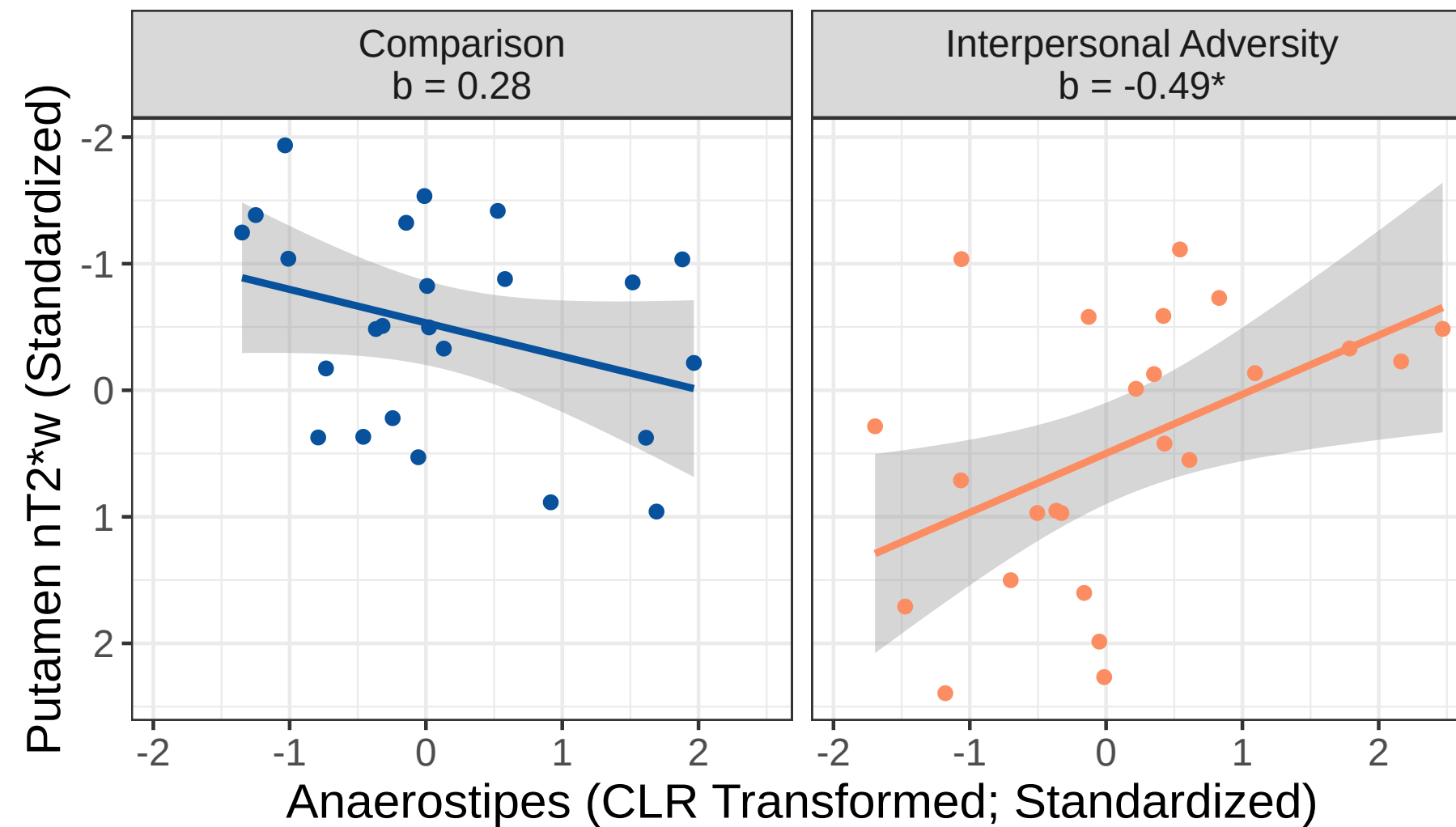
More
tissue iron

Less
tissue iron

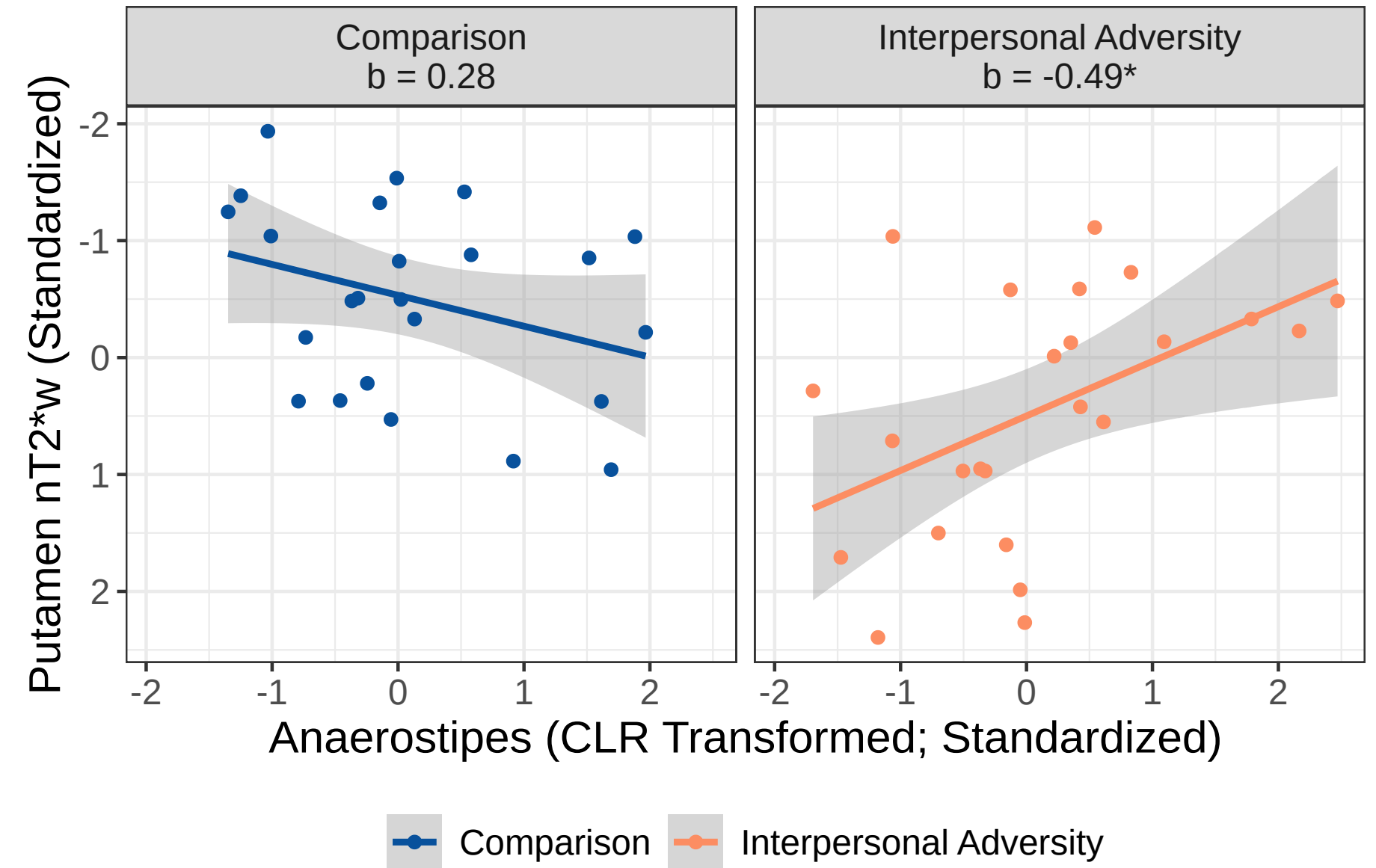
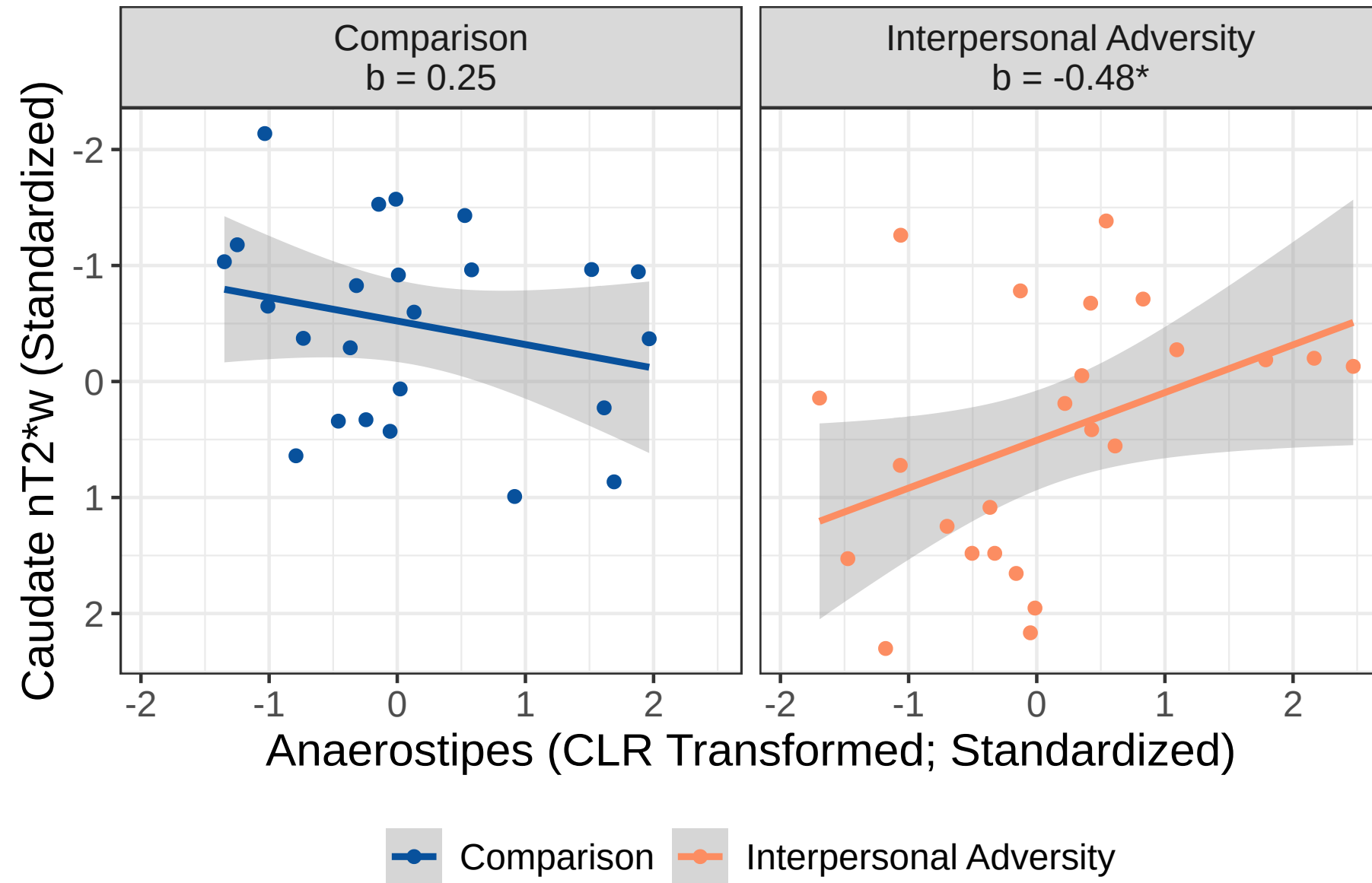




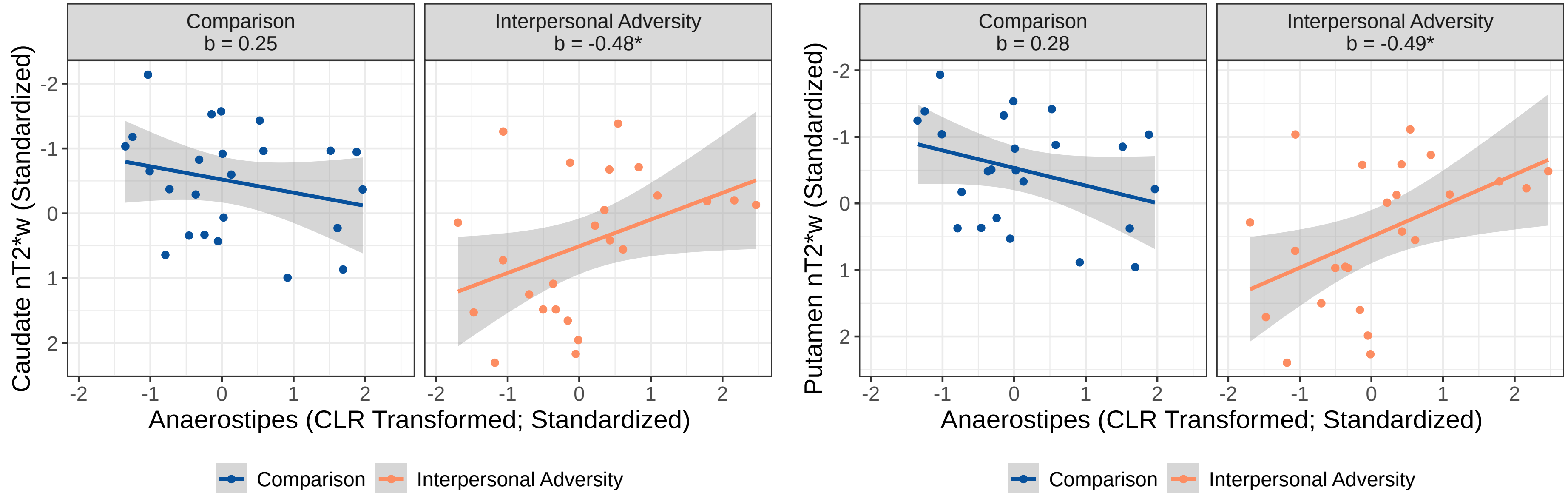
Comparison Interpersonal Adversity



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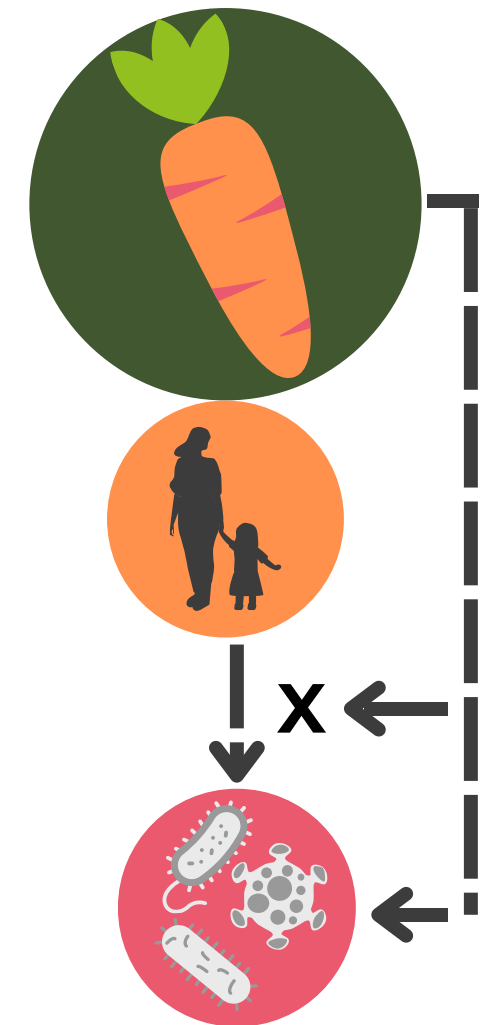


We saw this with 6 bacteria in *Clostridia* class

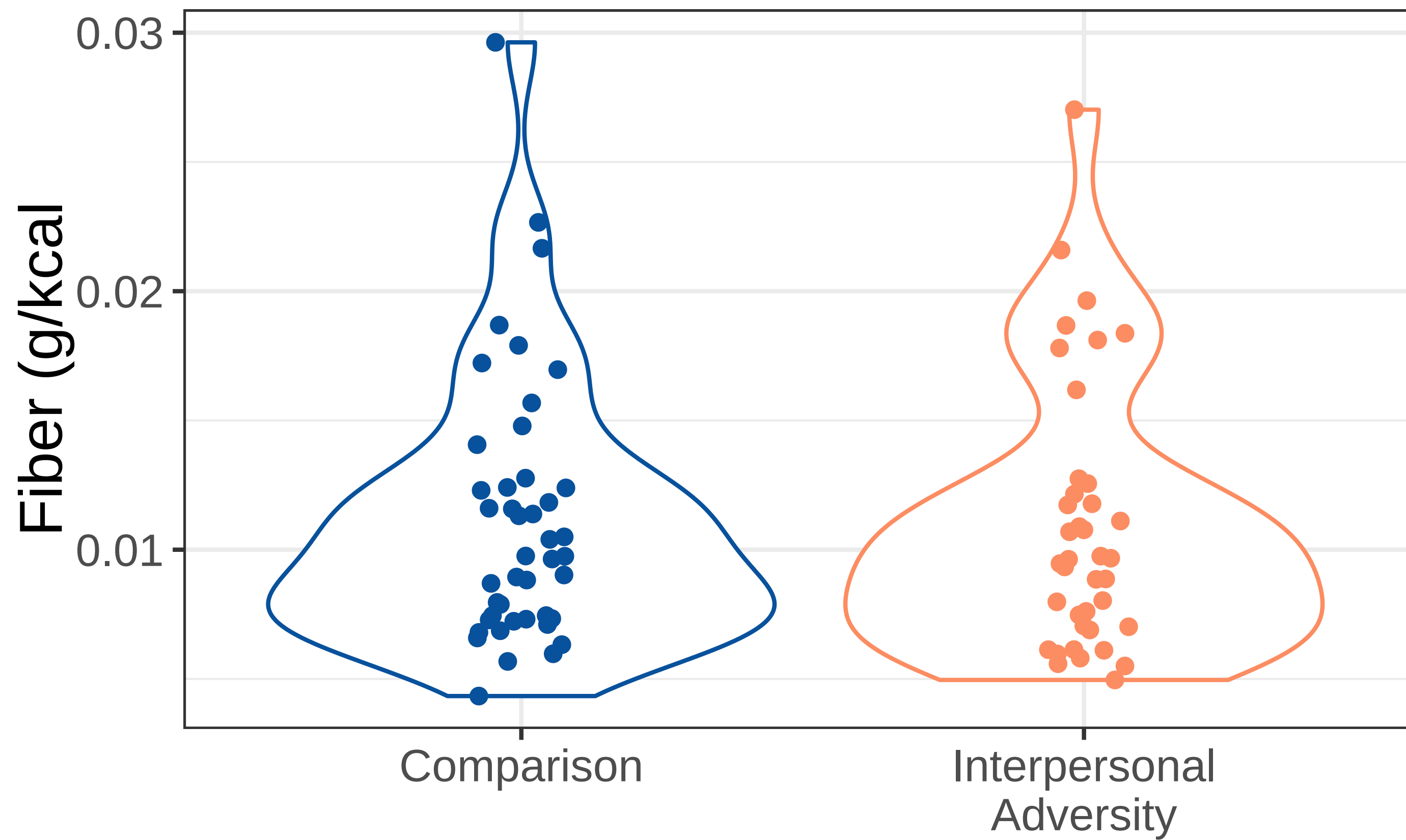


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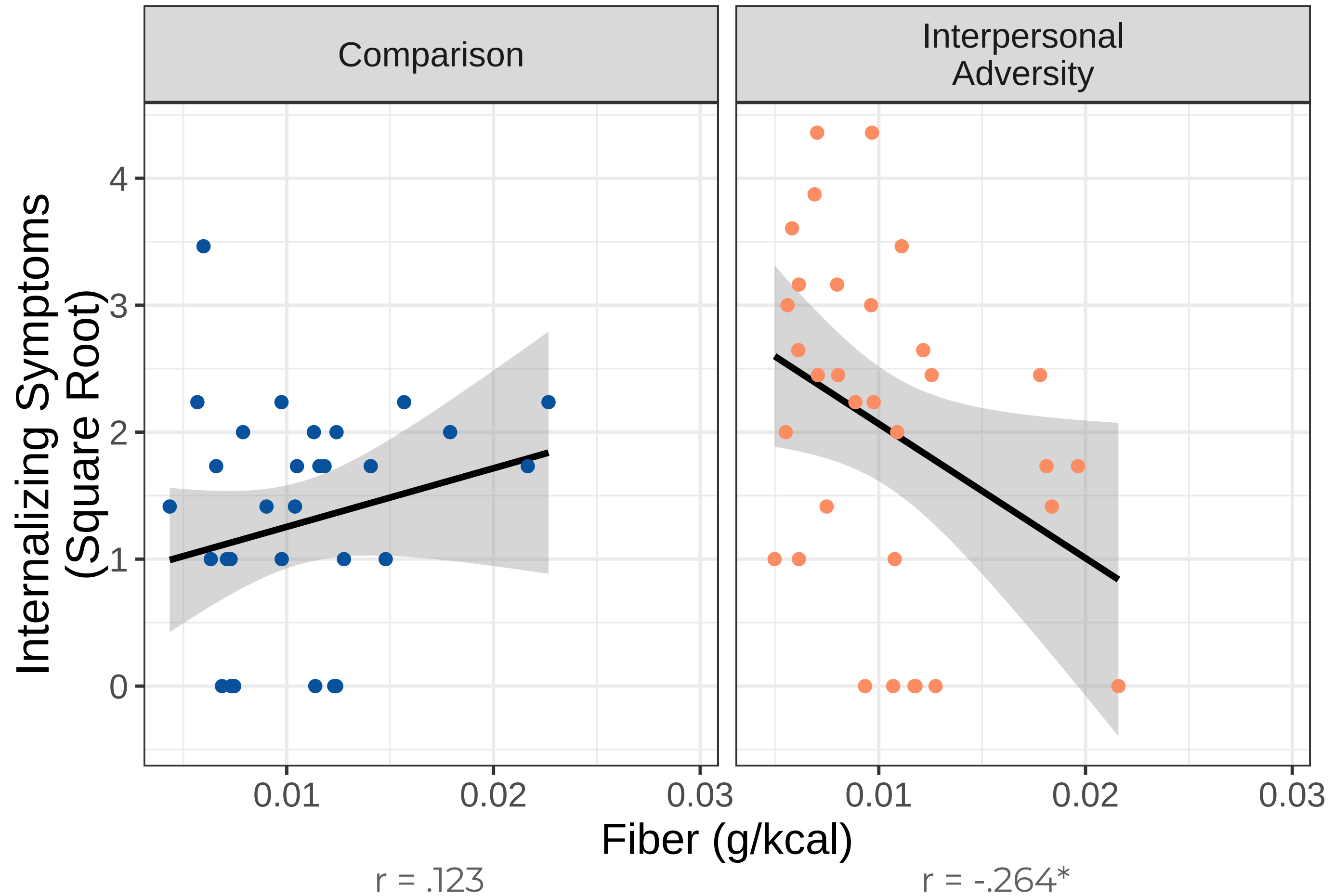
Renormalizing effect?

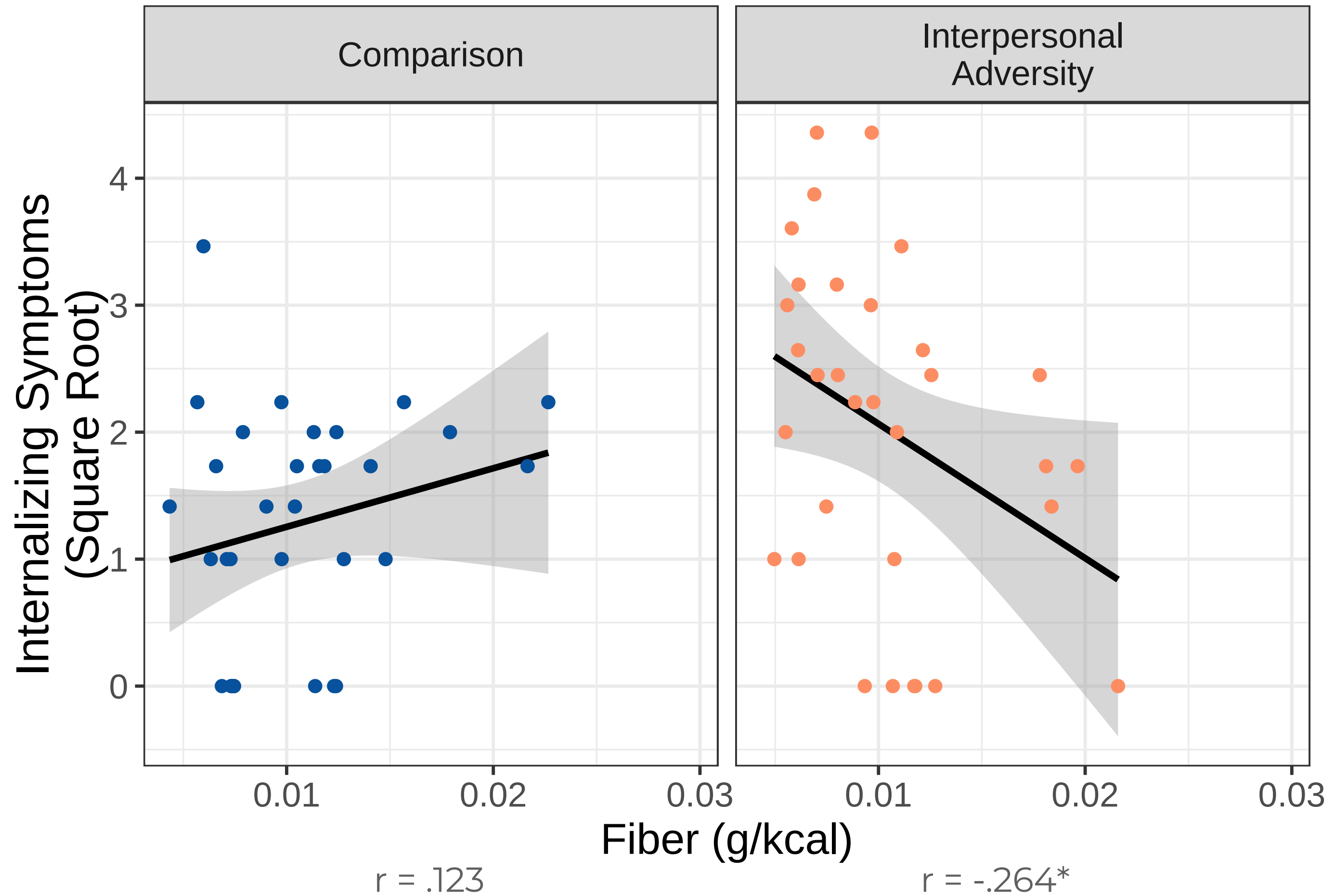


Diet as
Mitigator

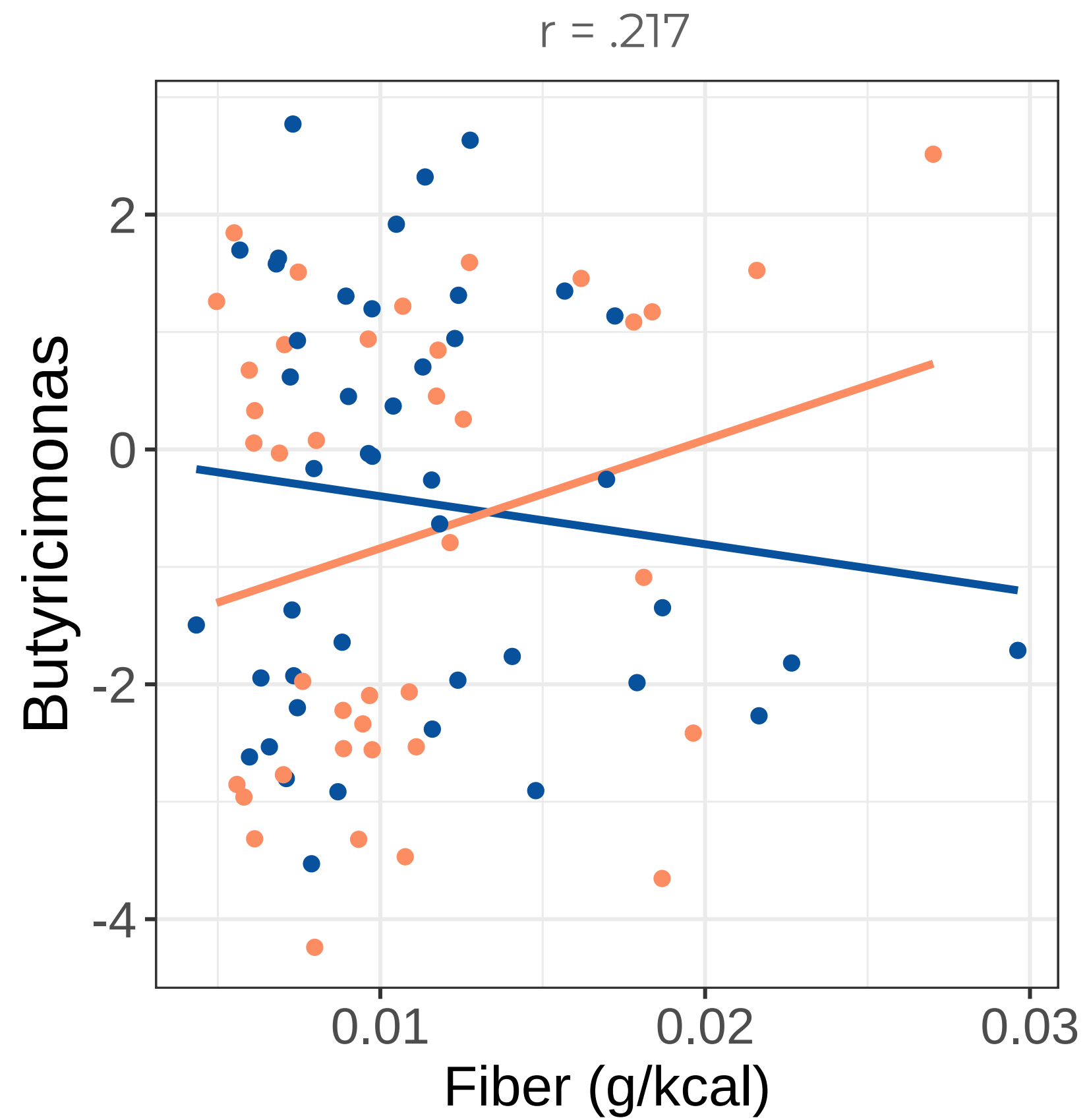


$p = .85$

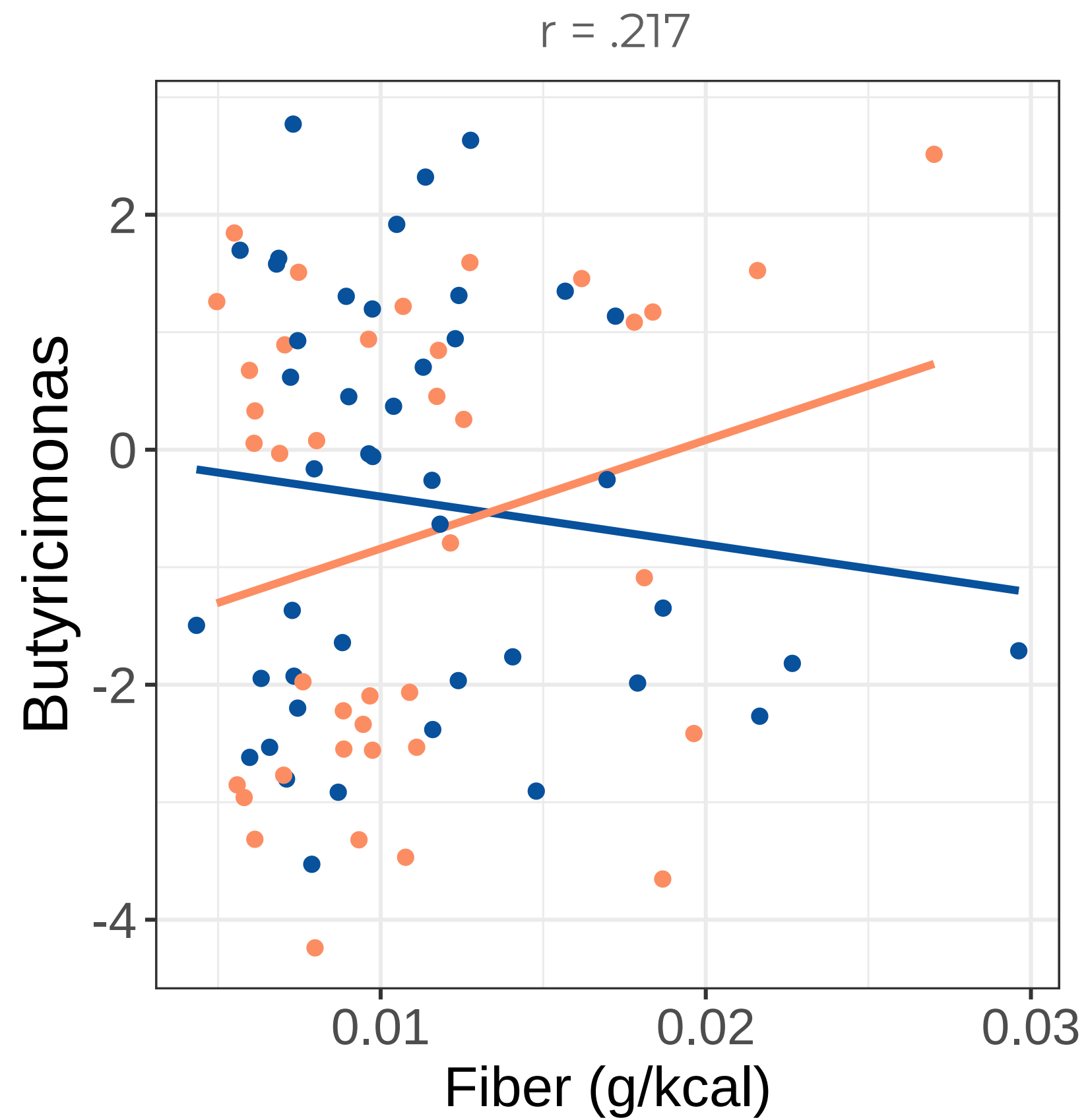




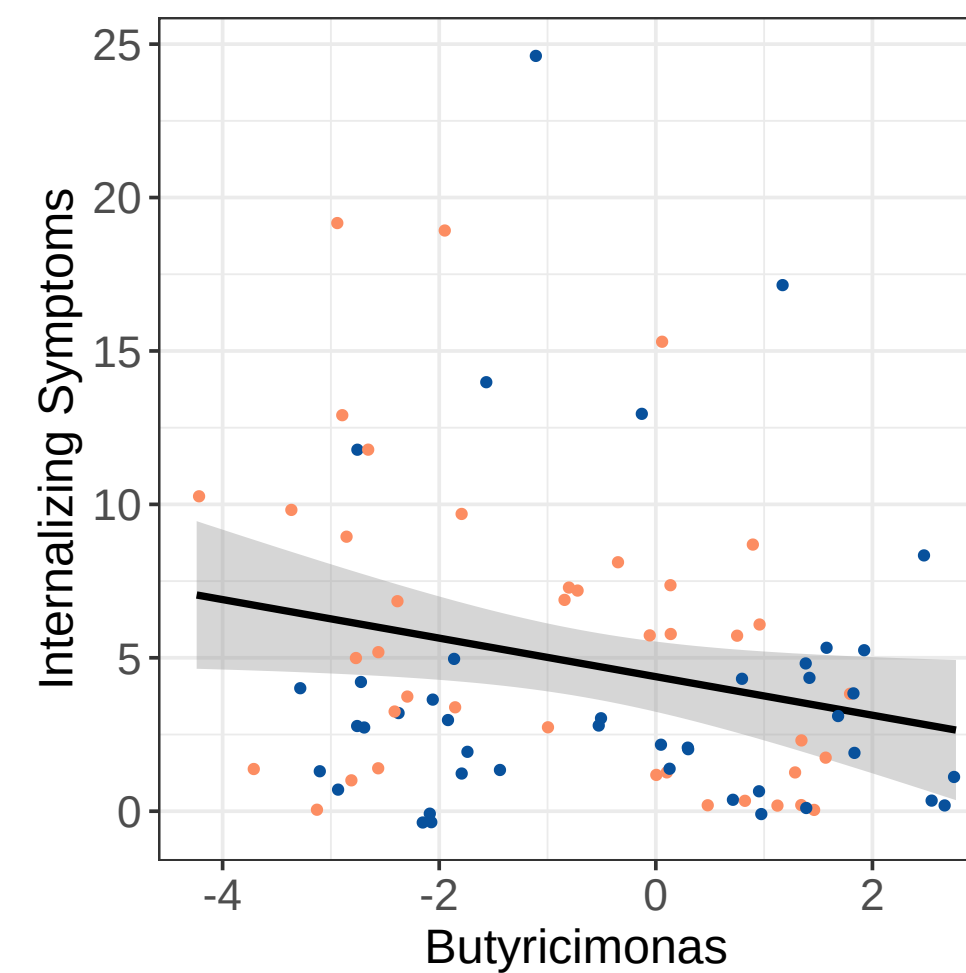
Is the gut microbiome responding differently?

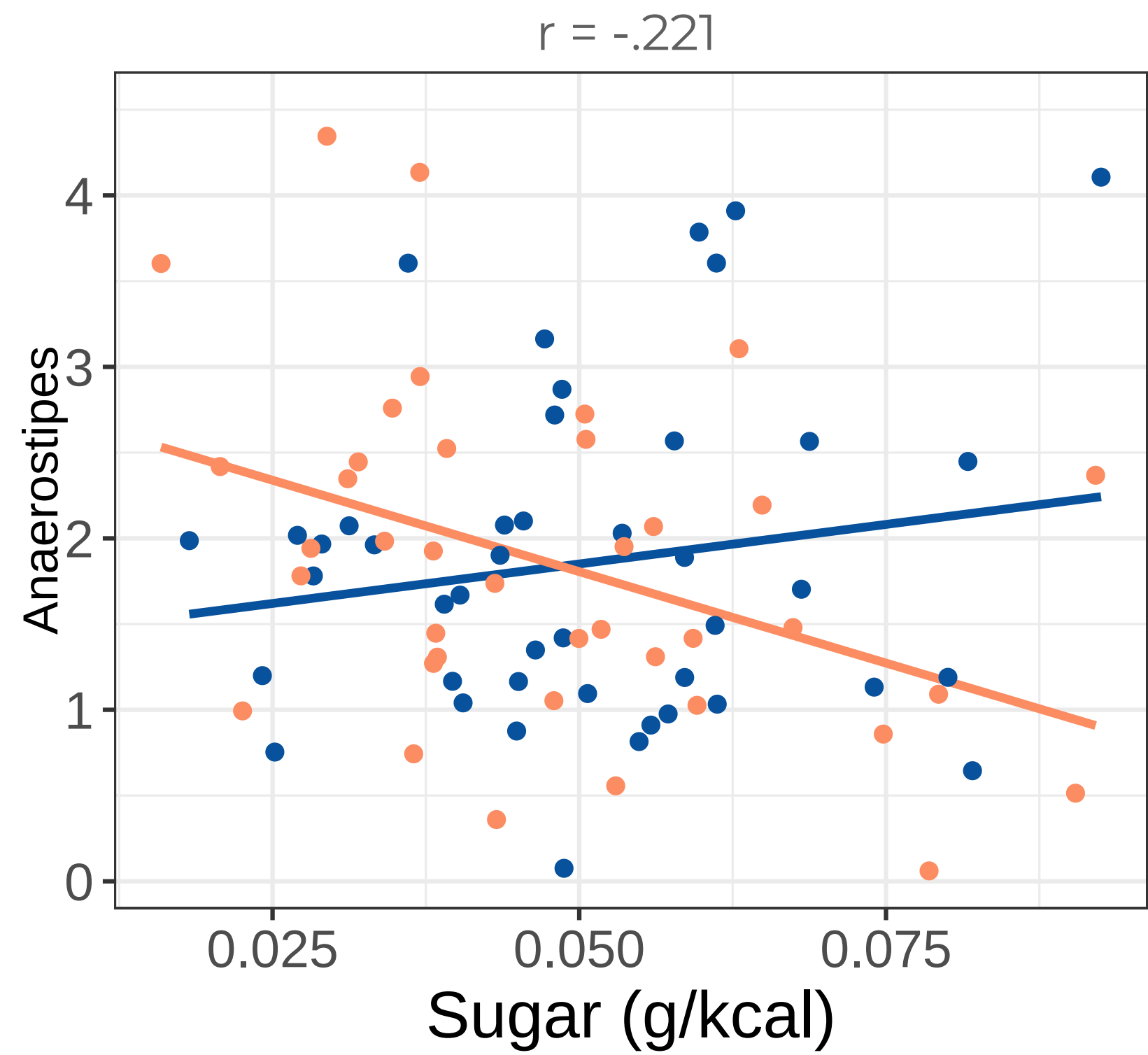


● Comparison ● Interpersonal Adversity

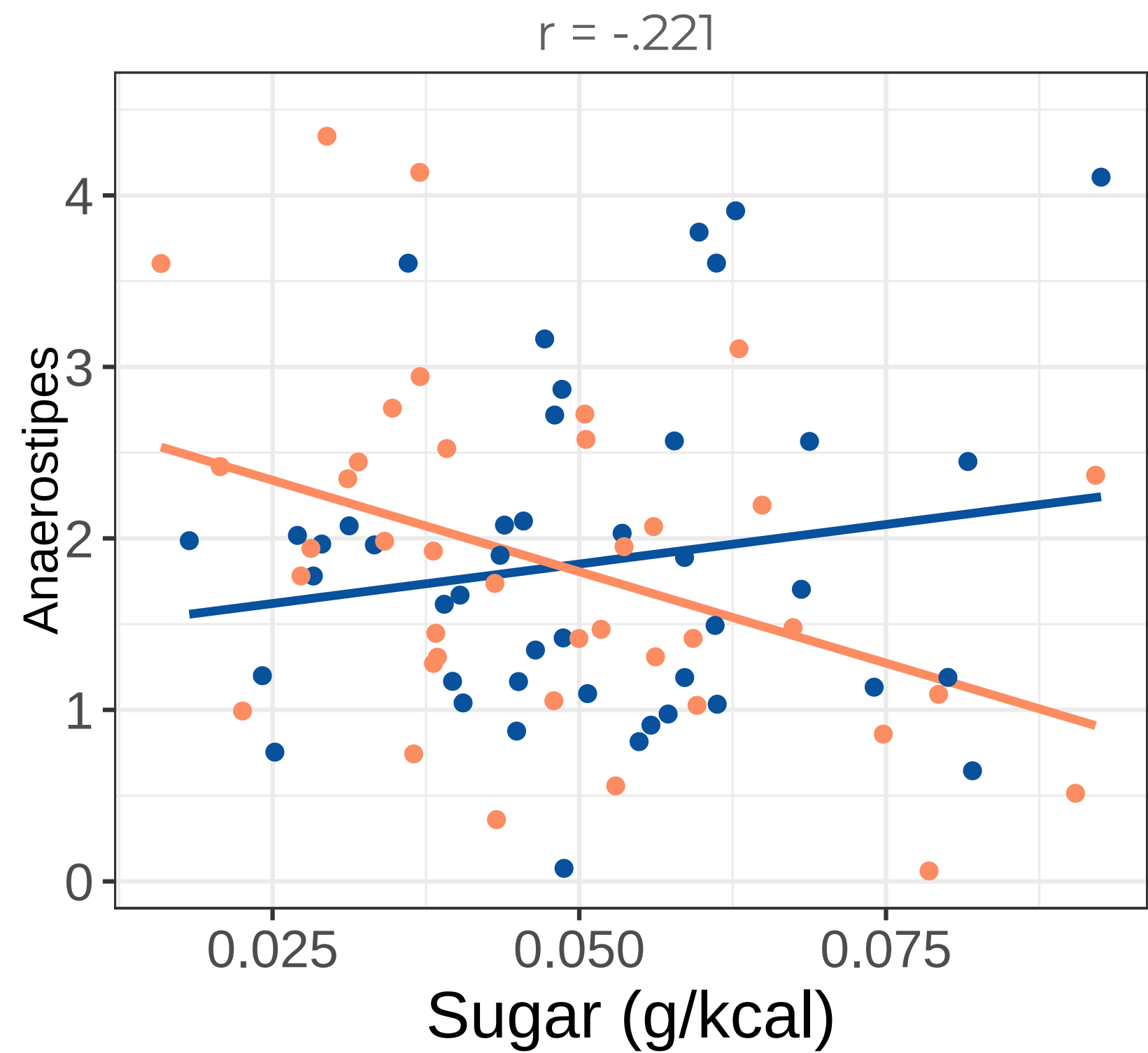


● Comparison ● Interpersonal Adversity

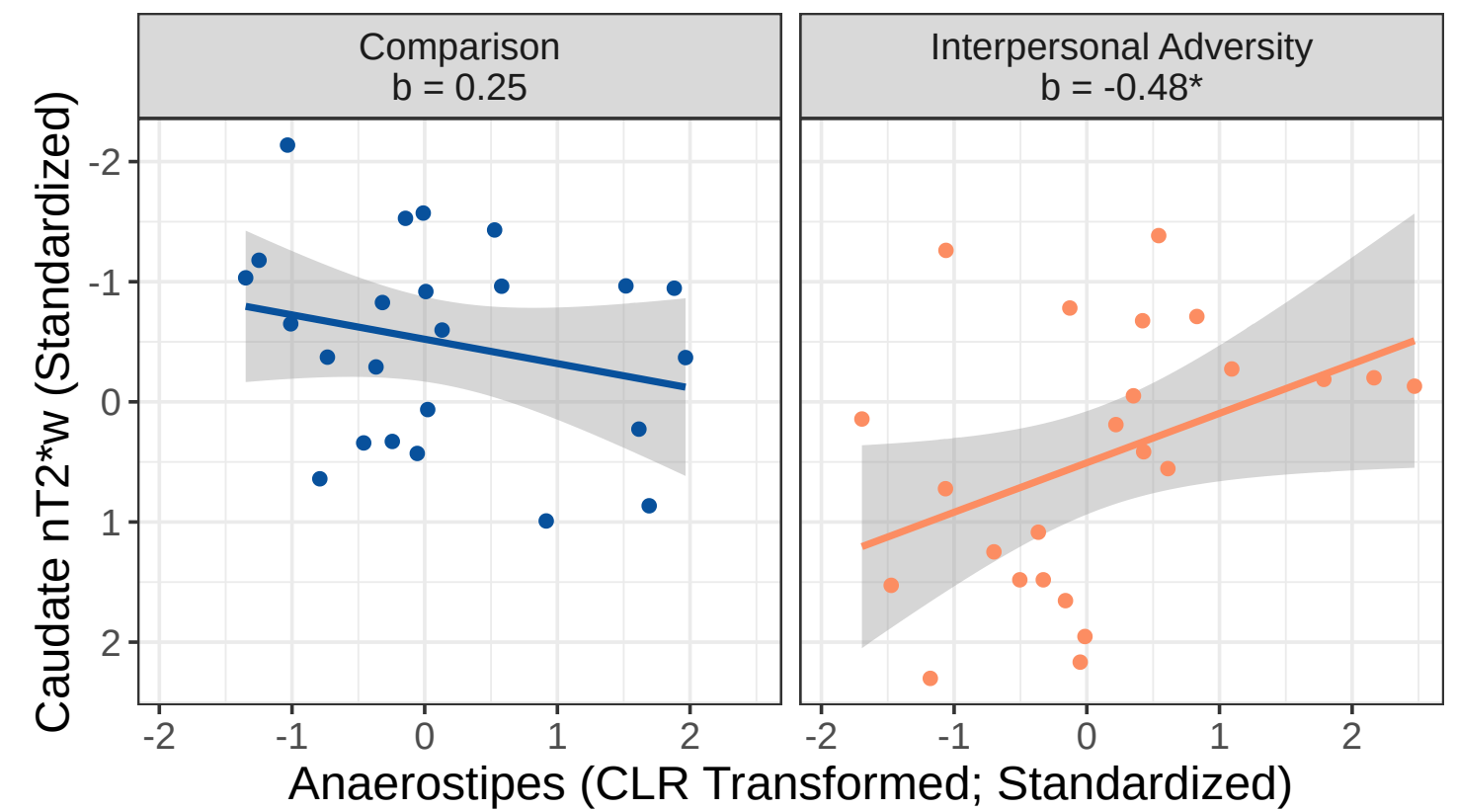




—●— Comparison —●— Interpersonal Adversity



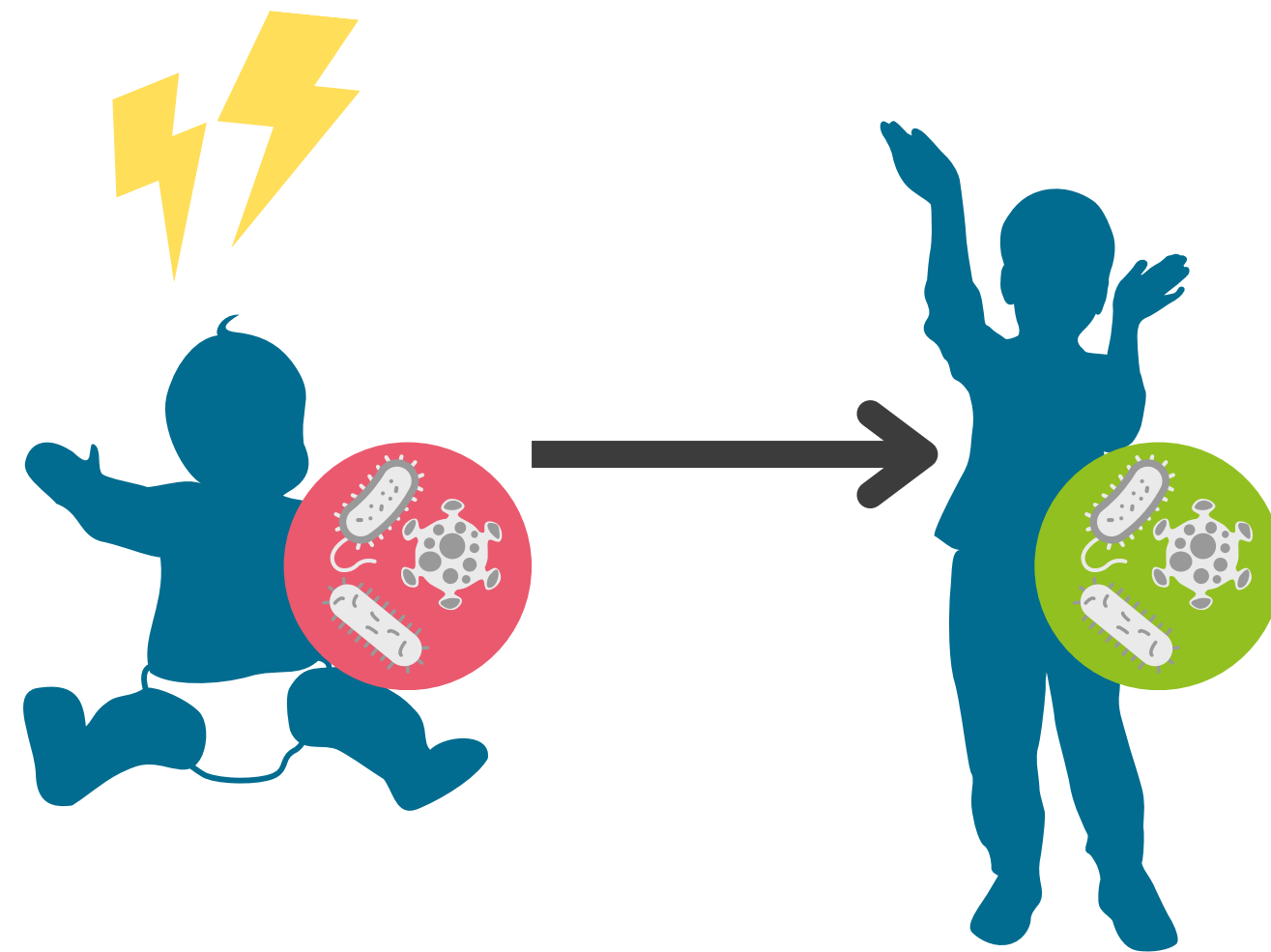
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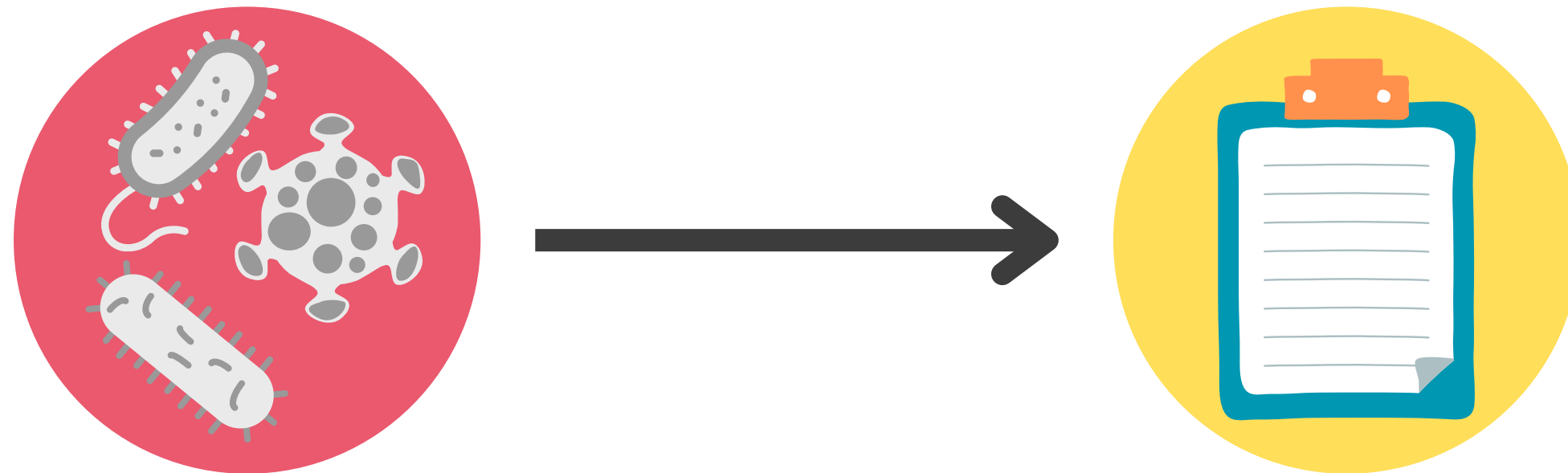
Takeaways:

- Microbiome remains age & adversity-dependent throughout middle childhood/adolescence



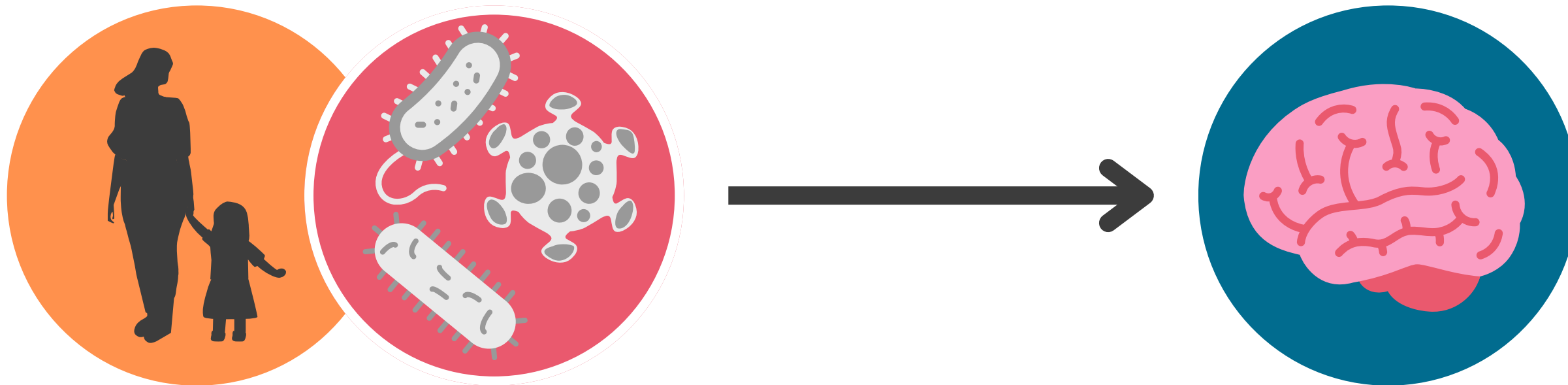
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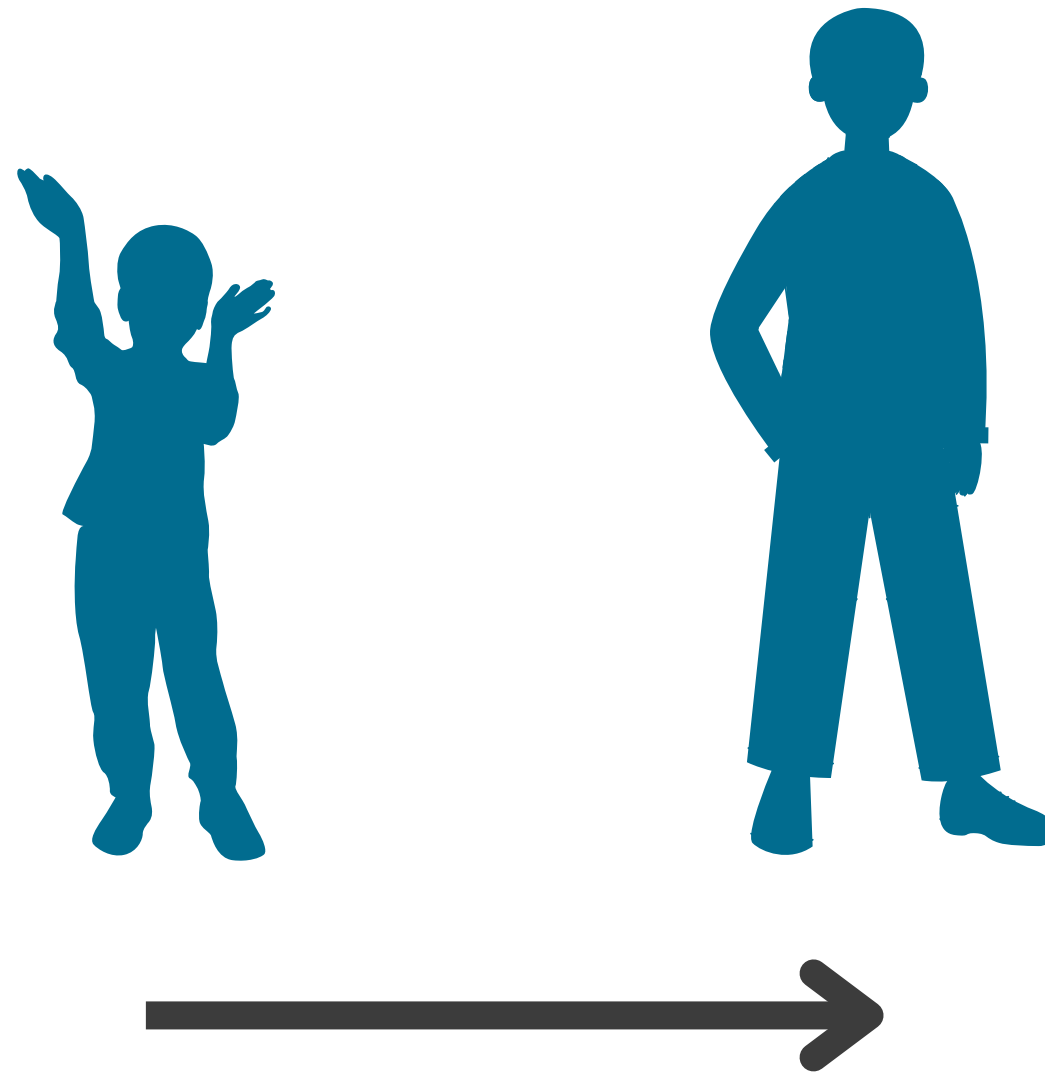
Takeaways:

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- Higher SCFA-producing bacteria ~ lower internalizing sx
- IA-exposed kids w/more of certain *Clostridia*: higher tissue iron
- IA-exposed kids w/healthy diet have more beneficial bacteria



Future Directions:

- Longitudinal data



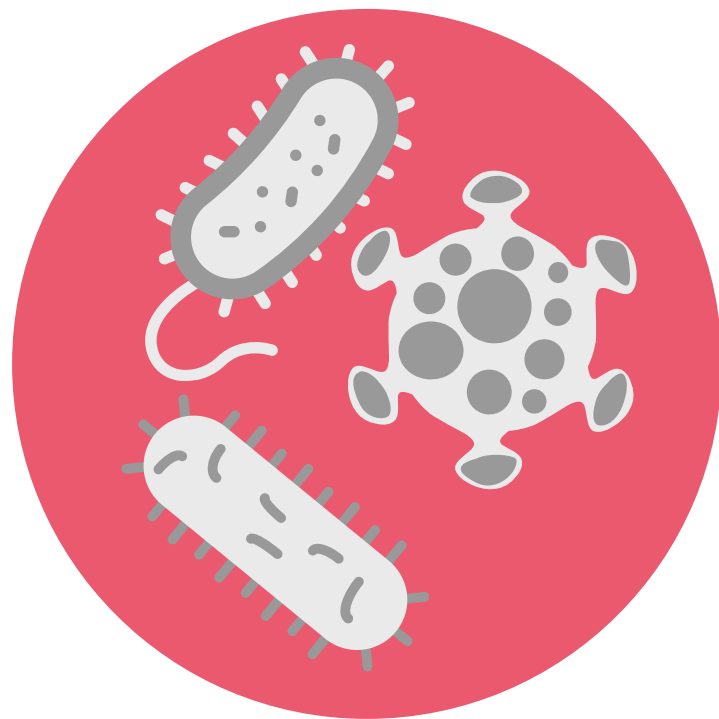
Future Directions:

- Longitudinal data
- Higher-resolution measures



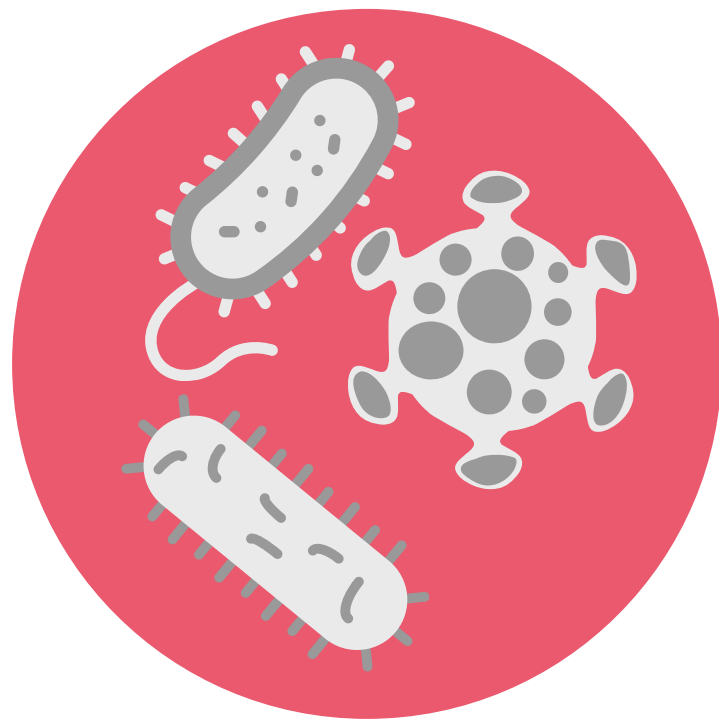
Future Directions:

- Longitudinal data
- Higher-resolution measures
- Multiple data types



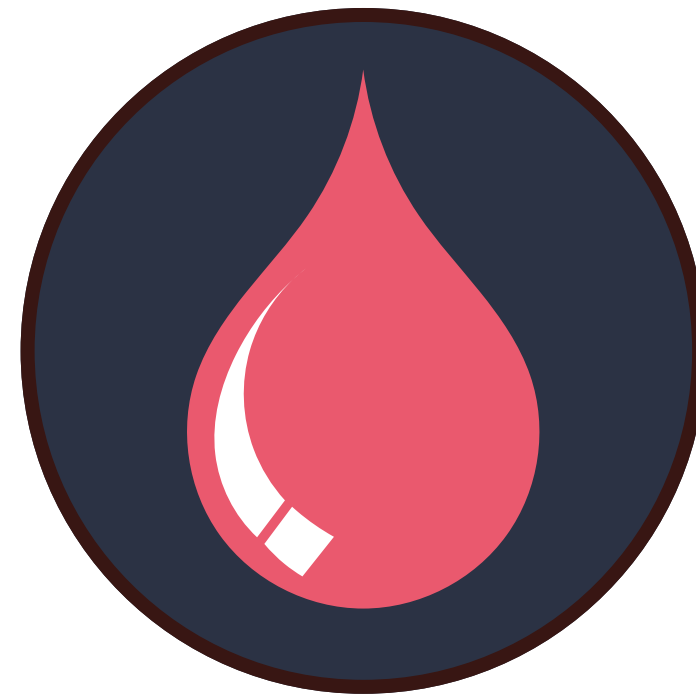
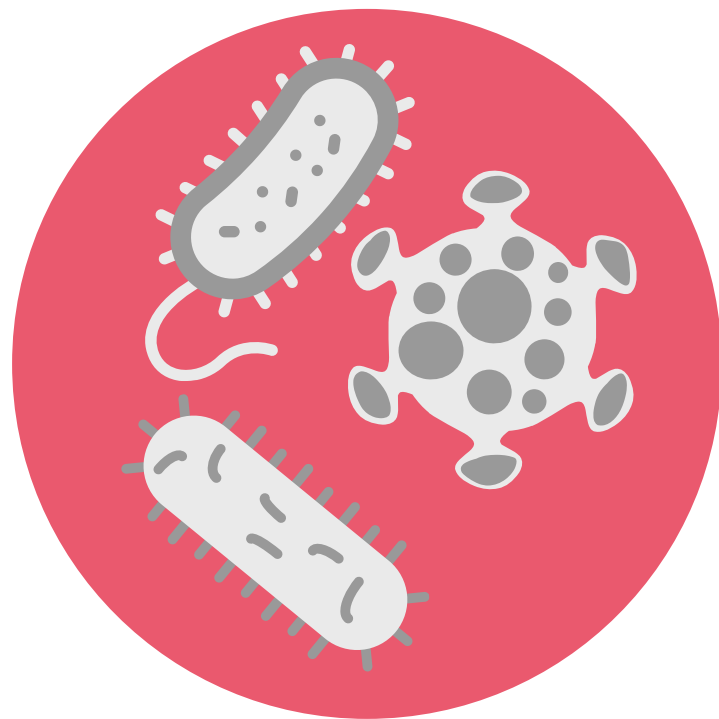
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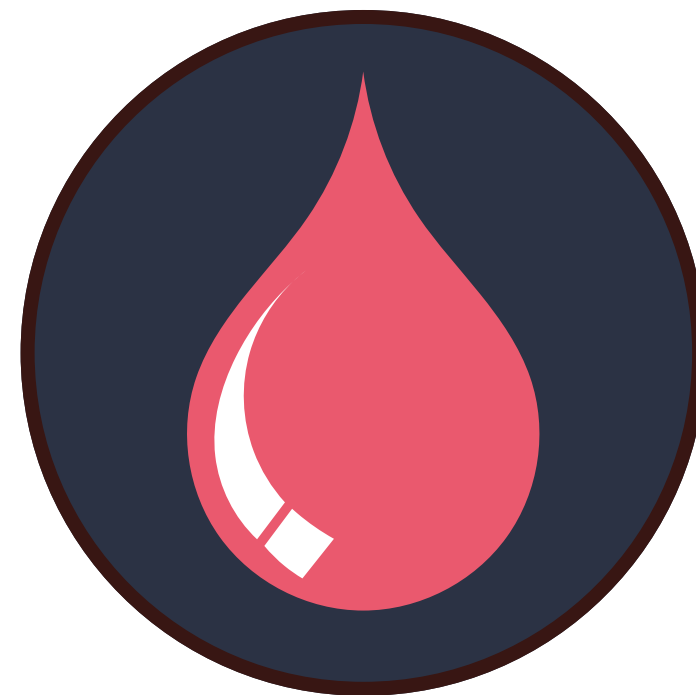
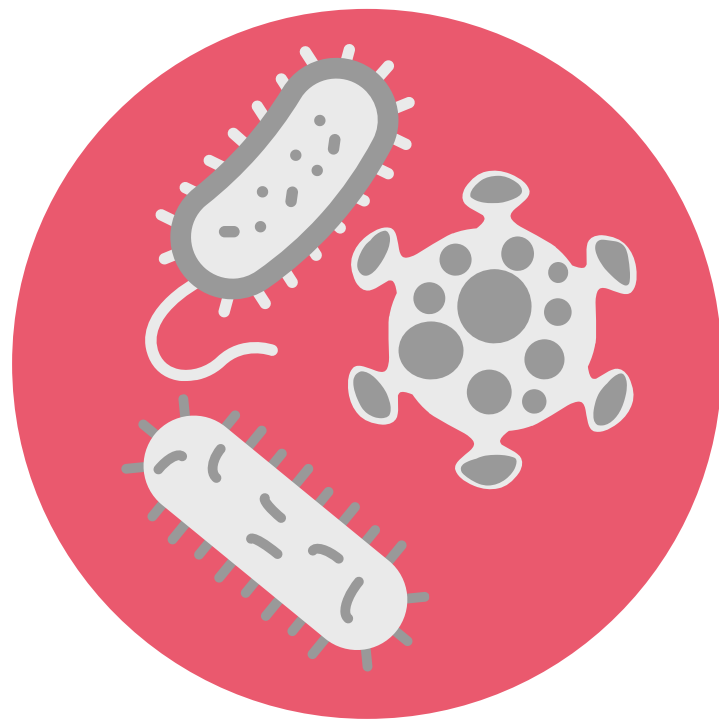
Future Directions:

- Longitudinal data
- Higher-resolution measures
- Multiple data types



Future Directions:

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- Higher-resolution measures
- Multiple data types



Thank you

Mentors

Bridget Callaghan

Collaborators

BABLab

Nim Tottenham

Funding Sources

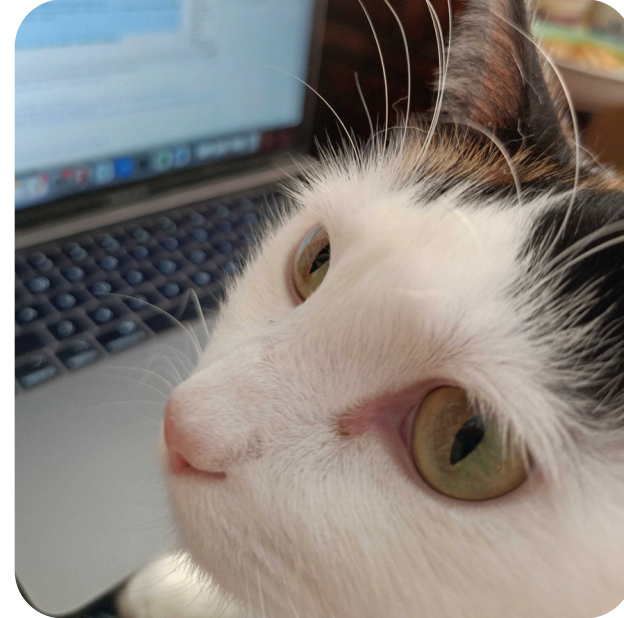
NIMH

Goodman-Luskin

Microbiome Center

UCLA Grad Division

Participants & Families



Link to slides



Get in touch!

ngancz@ucla.edu | @ngancz.bsky.social