



# Understanding autism-gut microbiome relationships

Part of the systems genomics of autism project

## Can diet influence autism traits?

No, we do not suggest that diet affects autism. Our results suggest the opposite: that autistic people tend to have restricted dietary preferences, and that this influences the gut microbiome. This is consistent with anecdotal and scientific evidence that autistic people tend to have more restricted diets, which is a known clinical issue. So, our results fit the gut microbiome to the broader clinical picture which includes dietary restriction.

## Should probiotics be used as an intervention for autism?

Our study investigated the relationship between autism and the gut microbiome, rather than formally testing the effect of probiotics on autistic traits, so we cannot comment directly. Overall, probiotics are used by, or given to, autistic people for a few reasons:

1. General gut health and wellbeing
2. For specific co-diagnoses affecting the gut
3. Hoping to directly target autistic traits by changing the microbiome.

Our results suggest that Reason 3 may not be supported by evidence. However, rigorous clinical trials will be needed to provide a definitive answer. It is important to consider that probiotics may also have side effects and may be costly. If you have any concerns, you should ask your doctor.

## Should faecal microbiome transplantation (FMT) be avoided as an intervention for autism?

Our study did not assess the effect of FMT, so we cannot comment directly. However, the negligible association of the microbiome with autistic traits in our study brings into question the rationale for recommending autistic people have FMT. Beyond a couple of conditions which have a known effect on the microbiome (e.g., severe *Clostridium difficile* infection), there is limited evidence to support the effectiveness of FMT.

## Why is this study different from others that have found autism-gut microbiome associations? How can we be confident in the results?

Overall, our study design has several advantages compared to previous studies, which gives us confidence in the findings:

1. Previous autism microbiome studies have been small (typically <100 participants), whereas ours included 247 people. By undertaking a larger study, we had greater ability to detect true associations, and yet we found very few.
2. Our study carefully accounted for factors that could influence the results, such as diet, stool consistency, age, sex, and medication use.
3. We had access to detailed clinical, behavioural and lifestyle information that was provided by participants in the Australian Autism Biobank and Queensland Twin Adolescent Brain project. This enabled





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us to evaluate and better understand mechanisms relating autism to the gut microbiome.

However, we acknowledge that this is only one study, and additional studies with similarly rigorous design and analysis are required to further test these claims.

## Does your study suggest that autism affects the microbiome?

Yes, our results suggest a relationship between autistic traits (such as restricted and repetitive interests and sensory sensitivity) and a more restricted diet. This in turn is associated with a less diverse microbiome and changes in stool consistency. Our study is not the only one to find that there are no direct autism-microbiome associations (see as an example of a larger study that is larger than most others, Son et al. 2015 PLoS ONE).

## How can the results of this study be reconciled with findings from animal studies that suggest a causal role of the microbiome on autism-related behaviours?

We believe that animal studies should be interpreted with caution because rodents are imperfect models of human physiology and behaviour, particularly for a condition as complex and heterogeneous as autism. Our study has the benefit of using samples and data from people.

## Does your study suggest that gastrointestinal issues among autistic people are related to restricted diet?

Our study didn't look at gastrointestinal conditions so we cannot comment about whether they are caused by restricted diet. Instead, we examined a one-off measure of stool consistency. Although this is related to gastrointestinal conditions such as constipation and diarrhoea, it does not capture chronic conditions that many autistic people experience.

Our study revealed a relationship between autistic traits (such as restricted and repetitive interests, and sensory sensitivity) and a more restricted diet, which in turn was associated with a less diverse microbiome and altered stool consistency. Although this shows that gastrointestinal issues among autistic people might be related to restricted diet, more research will be needed to establish this, since it is possible that factors other than diet and the microbiome are involved. Future research could investigate many potential factors, for example, sensory sensation and pain, toileting habits or how the bowel moves.

## Who did the research?



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