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Oct 15 · 15 tweets · [lisa_iannattone/status/1581372711506677761](https://twitter.com/lisa_iannattone/status/1581372711506677761)

The “hygiene hypothesis” is the misnomer that just won’t die. We don’t need to get sick to be well. A better name is the “biodiversity hypothesis” since the rise in allergic/immune diseases is thought to be related to the loss of contact with biodiverse environments (nature!).

We have millions of microbes on our skin and in our guts (our microbiome) that interact with and influence the functioning of our immune systems. Every day. Every second. Our immune systems never quit.

This is an area of active research so there’s still a lot we don’t fully understand (hence why it’s still a hypothesis) but essentially a more diverse microbiome is associated with a lower risk of immune system disorders like allergies and celiac disease.

The reduction in living organisms in urban environments (concrete jungles) is thought to lead to homogeneity in our personal microbes, which increases the risk of immune disorders. Hygiene, antibiotics, processed foods and pollution are also thought to contribute to dysbiosis.

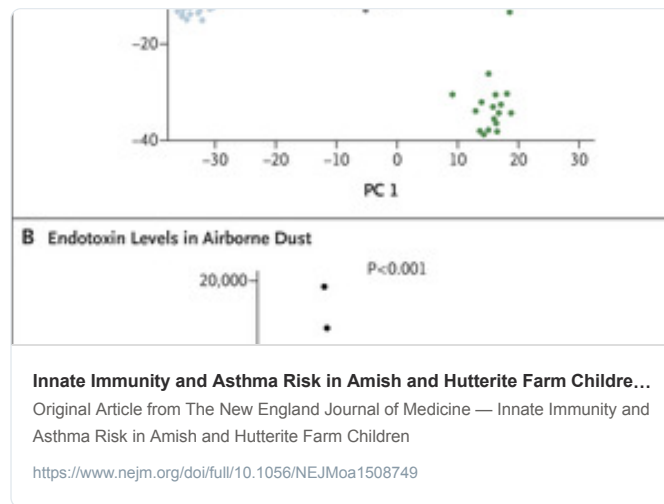
Several studies have shown that both adults and kids living in rural areas have more diverse gut microbes than urban populations in the West.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5635058/>

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geography (Torrazza and Neu, 2011), medication exposure, blood parameters, bowel, diet, health, anthropometrics and lifestyle (Falony et al., 2016). Of particular interest is the observation that healthy adults from rural societies such as Papua New Guinea (Martínez et al., 2015), Amerindia and Malawi (Clemente et al., 2015), and hunter-gatherers from Tanzania and Amazon (Schnorr et al., 2014) have higher gut bacterial species richness compared to urban populations in Italy and US. Similarly, children (between ages 1 to 5) from rural communities have more diverse gut microbiotas compared to children from Western populations (De Filippo et al., 2010). These host-specific differences in gut microbiota may arise from distinct selective pressures within the host gut habitat including genetics and diet but also may be due, at least in part, to their unique environments.

There are also studies like this one where in two comparable communities that differ mainly in the way they farm (traditional vs industrial) the authors observed a protective effect of the traditional farming environment against asthma.



And more recently, there was an absolutely fascinating human intervention trial done to study the effect that bringing the forest back to playtime might have on daycare children's immune systems.

<https://www.science.org/doi/10.1126/sciadv.aba2578>

They studied 10 daycare centers in Finland:

-3 that were already forest based (positive control)

-3 standard daycares (control group)

-4 standard daycares in the intervention group that received forest floor, sod, planters for growing annuals, peat blocks for climbing and digging

The kids, 3-5 year olds, were encouraged to "play in the dirt" (planting, making crafts with natural materials) twice a day. They spent an average of 1.5 hours a day outside. The trial lasted 28 days.

After only 28 days, there was a net increase in the diversity and richness of the kids' skin bacteria, leading to diversity results that were similar to the kids attending nature-oriented daycares.

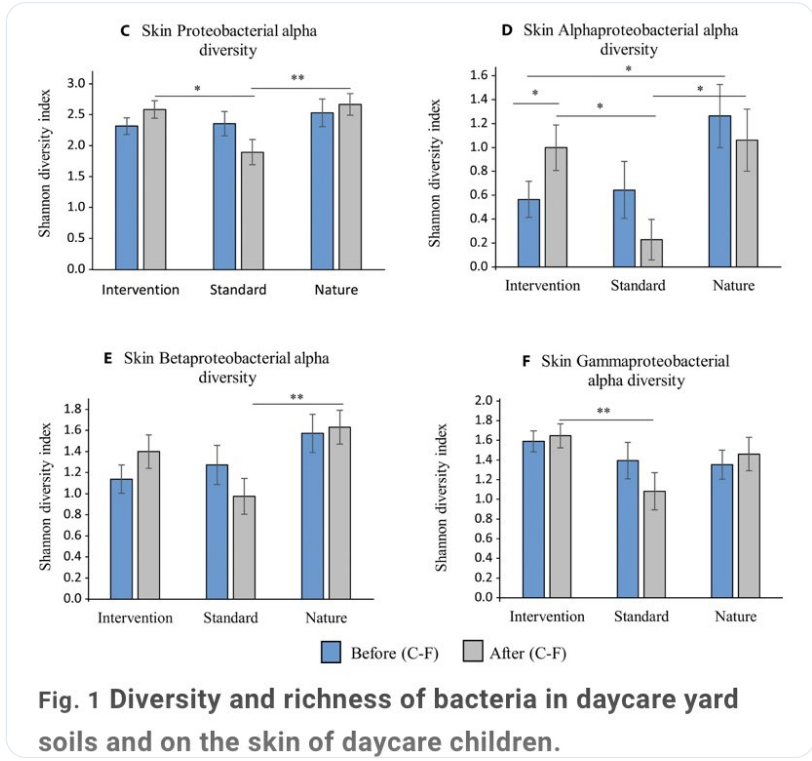
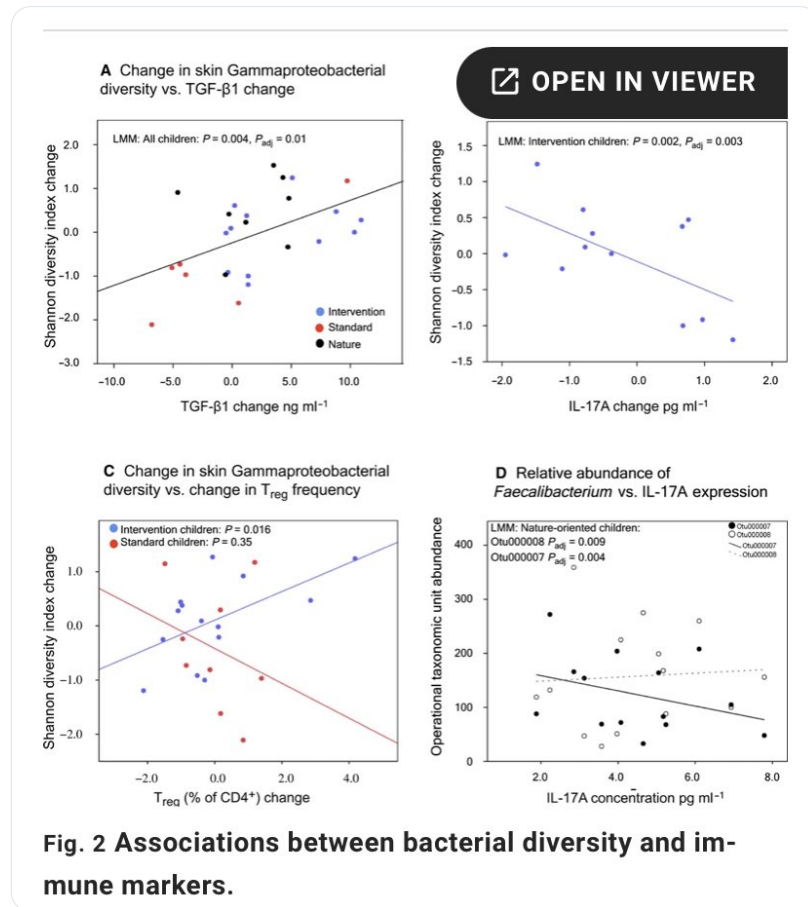


Fig. 1 Diversity and richness of bacteria in daycare yard soils and on the skin of daycare children.

Ok that's nice but did it impact their immune systems? Yes! They had an increase in regulatory T cells and molecules (IL-10, TGF- β 1) and a decrease in IL-17 (an inflammatory molecule). These changes were positively associated with the increased diversity in their skin bacteria!



This study lends further support to the biodiversity hypothesis by demonstrating that regular exposure to a rich, diverse microbial environment (friendly microbes or “old friends”) can modulate the microbiome and stimulate immunoregulatory pathways. After only 28 days!!

So yes there's science supporting the idea that "kids should play in the dirt" and no this is not the same as the incorrect notion that kids catching pathogenic viruses is good for their immune systems — a common misinterpretation of the hygiene (biodiversity) hypothesis.



During the study, forest undergrowth, lawn turf and planter boxes, in which children planted and tended crops, were added to paved, tiled and gravel-coated yard areas at daycare centres.

This is a good interview with one of the authors that explains the findings in accessible language:



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A forest-based yard improved the immune system of daycare children ...
An experimental study coordinated by the Natural Resources Institute Finland (Luke) showed, for the first time in the world, that the immune system of daycare children of three to five years improved...

<https://www.helsinki.fi/en/faculty-biological-and-environmental-sciences/news/forest-ba...>

Finally this is an article that discusses the origins and evolution of the hygiene hypothesis. An important line:

“Measles and many respiratory diseases proved not to be protective against allergic disease, and, in many cases, even increased the risk.”

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5320962/>

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