

Greetings from the TIDES team! This newsletter provides additional information for families in the TIDES and ECHO PATHWAYS studies. We are so grateful for your continued participation and are excited to share updates and recently published research.

TIDES by the Numbers

So far, we've had over 160 families complete the Age 8 visit across our four TIDES centers, including 21 families from the University of Minnesota. We are so grateful for our community of moms and children and their willingness to participate!



Seattle Children's Research Institute (Seattle, WA)
University of California, San Francisco (San Francisco, CA)
University of Minnesota (Minneapolis, MN)
University of Rochester Medical Center (Rochester, NY)

Study Updates

Thank you so much for your patience and flexibility in working with us over the past year. We understand what an immense stress COVID-19 and its ripples have added to families. From staying in touch and hearing your stories, our appreciation for the time and energy you have invested into the TIDES project has grown even more. We are continually impressed by our TIDES families; we could not do this research without you!

In response to the far-reaching impacts of COVID-19, we have added additional questionnaires to document and understand the stress families are experiencing during the pandemic. Each site has been hard at work adopting COVID safe practices and making accommodations to prioritize the safety of our families and staff.

Recent Publications

With every newsletter, we will provide links and information to access publications from our cohorts. This month we'd like to highlight the following:

[*Phthalate mixtures in pregnancy, autistic traits, and adverse childhood behavioral outcomes*](#)

Day DB, Collett BR, Barrett ES, Bush NR, Swan SH, Nguyen RHN, Szpiro AA, Sathyanarayana S. Environ Int. 2021 Feb;147:106330. doi: 10.1016/j.envint.2020.106330. Epub 2021 Jan 5.

This study examined associations between phthalate exposures in pregnancy and child behavior at age 4. Phthalates are commonly found in consumer products, including plastic toys, food packaging, personal care products, cosmetics, air fresheners, and some medications. Phthalate exposure was measured using urine samples TIDES mothers gave during their pregnancy. Researchers found the following results:

We are grateful to be able to begin our in-person study visits in Minnesota! We've really enjoyed seeing families again – even if it is with masks and other protections!

Here are some measures we are implementing to limit exposures and protect our moms, kids, and staff:

- Study staff are screened daily for signs of illness. No staff with symptoms in the last two weeks will be present at visits.
- Study staff will be wearing masks, gloves, gowns and face protection. Participants will also be wearing masks.
- We ask that you only bring your child who is participating in the study visit. We are trying to limit the number of people within the clinic space, including other family members.

Early pregnancy phthalate exposures were associated with autism-related social impairment in both sexes. Early pregnancy phthalates were associated with worse adaptive skills in girls. Adaptive skills include daily living activities, communication, and social skills. Late pregnancy phthalate exposures were associated with higher externalizing behaviors in boys, such as hyperactivity and aggression.

[Vitamin D Levels During Pregnancy Linked with Child IQ](#)

Melough MM, Murphy LE, Graff JC, Derefinko KJ, LeWinn KZ, Bush NR, Enquobahrie DA, Loftus CT, Kocak M, Sathyanarayana S, Tyllavsky FA. *J Nutr.* 2021 Jan 4;151(1):132-139. doi: 10.1093/jn/nxaa309.

Vitamin D is a critical nutrient with wide-ranging functions in the body across all life stages. During pregnancy, the mother's vitamin D supply is shared with the fetus and helps regulate essential processes including brain development. This study examined how mothers' vitamin D levels during pregnancy are related to children's IQ. Researchers used data from the CANDLE (Conditions Affecting Neurocognitive Development and Learning in Early Childhood) cohort in Tennessee. CANDLE is another cohort that is part of ECHO PATHWAYS. Approximately 46% of the mothers were deficient in vitamin D during their pregnancy, and vitamin D levels were lower among Black women compared to White women. After controlling for several other factors related to IQ, higher vitamin D levels in pregnancy were associated with higher IQ in children at ages 4-6 years. This study confirmed that vitamin D deficiency is common in pregnancy, and that Black women may be at higher risk because of reduced vitamin D production in skin. These findings also revealed that higher vitamin D levels in pregnancy may promote brain development in offspring and lead to greater childhood IQ scores. Additional research is needed to determine the optimal levels of vitamin D in pregnancy, but this study will help to develop nutritional recommendations for pregnant women. Especially among Black women and those at high risk for vitamin D deficiency, nutritional supplementation may be an impactful strategy for reducing health disparities.

[Omega-3 fatty acid supplement use and oxidative stress levels in pregnancy](#)

Sley EG, Rosen EM, van 't Erve TJ, Sathyanarayana S, Barrett ES, Nguyen RHN, Bush NR, Milne GL, Swan SH, Ferguson KK. *PLoS One.* 2020 Oct 23;15(10):e0240244. doi: 10.1371/journal.pone.0240244.

Oxidative stress occurs when there is an imbalance between unstable molecules (known as free radicals) and antioxidants (such as vitamin E and beta-carotene) in the body. Increased oxidative stress during pregnancy has been associated with adverse birth outcomes. In this study, prenatal omega-3 fatty acid consumption was associated with lower concentrations of oxidative stress biomarkers in TIDES mothers' urine. This suggests that omega-3 supplements may decrease maternal oxidative stress during pregnancy.

TIDES in the News

Our TIDES Cohort Principal Investigator, Dr. Sheela Sathyanarayana, consulted on a New York Times parenting article, titled "The types of Plastics Families Should Avoid." To read more about why plastics should be reduced in our environment and how this can be achieved, please click here:

<https://www.nytimes.com/article/plastics-to-avoid.html>

KIDS' SCIENCE CORNER

For Moms: We will provide a science experiment, resource, and more each newsletter to help your child better understand the tie between health and environmental exposure. For this newsletter, we have provided a science experiment to highlight the impact of environmental pollution on health outcomes.

For Our TIDES Kids:

Experiment #1: Food Coloring as Environmental Pollutants

1. Collect a few white flowers. Celery can be used as a substitute.
2. Place the flowers in separate containers – one with water and another with water and food coloring.
3. Observe how each container differs.

How do you think this relates to chemicals and toxins in the air we breathe and our health?

The food coloring symbolizes the pollutants in the air around us. Sometimes we can see them such as the smog caused by cars and trucks but most times, we can't.

Experiment #2:

1. For this experiment, gather some bean seeds. Separate the bean seeds into two separate containers both with water.
2. Once the bean seeds start to germinate (sprout), add vinegar or heavy lemon juice to one container. This simulates an acidic environment.
3. What do you think will happen to the beans in the container with acidic water? Write down your answer. This is your hypothesis.
4. Observe the growth of the bean seeds between the two containers over the next several days.

The acidic water and regular water have different impacts on the way the beans will grow. This experiment demonstrates how the quality of our water and the safety of our environment will impact our own growth.