



August 20, 2026

To whom it may concern,

I am writing as a children's environmental health expert who has had several contacts by a parent whose children attend public school within Montgomery County, Maryland concerning proposed artificial turf playing fields at the high school.

Artificial turf playing fields are an environmental health concern. These concerns are compounded by the fact that there are few epidemiological studies regarding health risks for student athletes exposed to artificial turf.¹ Despite the gaps in scientific evidence, there is enough information about the components of artificial turf on athletic fields and the health of student athletes to be concerned.

School age children and teenagers are more vulnerable to environmental exposure as their bodies and organs are still developing. They can be exposed to toxicants from artificial turf via inhalation, ingestion, and dermal contact. High school students' lungs are still developing and do not reach their full size and breathing capacity until between 20 to 25 years old, making students at greater risk of air pollution and particulates.² During middle adolescence (14 -17 years old) the gut microbiome within the gastrointestinal system finalizes development to support digestion and immune response.³ Ingestion of toxic materials during this time could interfere with this development. Besides being an exposure source due to cuts and scrapes that can occur during play on artificial turf, dermal exposure can also be a source of ingestion or inhalation if students eat before washing their hands or track toxic materials into school or home after playing on the artificial turf fields.

To understand exposure, it is helpful to describe artificial turf. Artificial turf is constructed of seven layers. The top layer is plastic fibers made to resemble natural grass, layer 2 is an infill that historically has been made of recycled chunked tires (crumb rubber) but now is being made with new alternative infills that have not been well-studied for safety, layer 3 is a barrier to prevent weeds, layer 4 is shock absorbing pad, layer 5 crushed concrete, and the last layer is natural soil.¹ These components, particularly layers 1 and 2, degrade and increase student's environmental health risks. The scientific evidence of these risks is described in greater detail below.

Injury

A systematic review of all published articles that compared hip, knee, leg, ankle, and foot injury with grass to artificial turf found that there are greater injury rates to the foot and ankle on artificial turf; while there was no notable difference in the rate of injury to the hip and knees between the two different types of turfs.⁴ Additionally, with time, the playing surface of artificial turf becomes hard and this increases students' chances of concussion and other injuries.

Heat

With environmental change across the region, we are experiencing longer and hotter temperatures beginning in the spring and extending into the fall. The newer third generation artificial turf has been found to have volatile organic compounds (VOC) and polycyclic aromatic hydrocarbons (PAH) emissions that are increased when exposed to sunlight and heat.⁵ VOCs can cause upper respiratory irritation with long term exposure associated with liver, kidney, and central nervous system damage. PAHs can disrupt the immune system, and is associated with cancers, respiratory problems, and heart disease. Furthermore, testing artificial turf with ambient air temperatures of 80°F or higher found that the turf can rise to 160°F or more, making students at risk of burns or heat-related illness.⁶

Microplastics

As the turf ages and deteriorates, the plastic fibers of the artificial grass in the first layer begins to shed bits of microplastic into the air.⁷ These tiny plastic fibers can be inhaled by the players on the field, coaches, and people standing nearby. Microplastics can penetrate deep into the respiratory track and cross the air sacs (alveoli) into the circulatory system. Microplastics can carry hazardous substances such as polycyclic aromatic hydrocarbons, heavy metals, and endocrine disruptors, increasing the health risks for those who inhale the material.⁷

Chemical exposures

In addition to VOC and PAH exposure, artificial turf also contains PFAS (perfluoroalkyl and polyfluoroalkyl substances) – a class of nearly 15,000 chemicals with a half-life of 2 - 35 years.⁸ Exposure to PFAS through play on artificial turf can result in these chemicals being in a student's body well into adulthood. PFAS exposure is associated with reduced vaccine response, damage to the liver and kidney, delayed mammary gland development, obesity, early puberty onset, low sperm count and motility, and testicular and kidney cancer.⁹

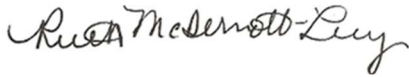
Concentration levels of iron, lead, zinc, and aluminum from the artificial turf that is currently on the market has been found to be higher than the permissible concentrations standards in the soil.³ Exposure to these elements can cause brain, kidney, and liver damage and increase the health risks to students.¹⁰

As artificial turf degrades, chemicals and microplastics from the turf can leach into the surrounding environment and into local waterways. This is especially a concern in areas where residents rely on wells for their water supply.

Conclusion

Our youth trust that the adult decision-makers will provide a safe school environment. We must consider the short and long-term impacts of artificial turf on the health of the students. Given the health risks of artificial turf are greater than a natural grass playing fields, from a health perspective, it is best to take a precautionary approach to reduce health risk to the students and use grass turf.

Sincerely,



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1. Murphy M, Warner GR. Health impacts of artificial turf: Toxicity studies, challenges, and future directions. *Environ Pollut.* 2022;310:119841. doi:10.1016/j.envpol.2022.119841
2. American Academy of Pediatrics. Council on Environmental Health. Background: Addressing Environmental Health in Primary Care. In: Etzel RA, ed. *Pediatric Environmental Health*, 4th Edition; Itasca, IL: American Academy of Pediatrics; 2019.
3. He P, Shen X, Guo S. Intestinal flora and linear growth in children. *Front Pediatr.* 2023;11:1252035. Published 2023 Nov 16. doi:10.3389/fped.2023.1252035
4. Gould HP, Lostetter SJ, Samuelson ER, Guyton GP. Lower Extremity Injury Rates on Artificial Turf Versus Natural Grass Playing Surfaces: A Systematic Review. *Am J Sports Med.* 2023;51(6):1615-1621. doi:10.1177/03635465211069562
5. Mohammed AMF, Saleh IA, Abdel-Latif NM. Hazard assessment study on organic compounds and heavy metals from using artificial turf. *Heliyon.* 2023;9(4):e14928. Published 2023 Mar 29. doi:10.1016/j.heliyon.2023.e14928
6. <https://www.safehealthyplayingfields.org/heat-levels-synthetic-turf>

7. Fu N, Wang A, Kumar P, Cao SJ. Airborne microplastic emissions from synthetic sports surfaces and associated health risks to children. *Environ Geochem Health*. 2026;48(3):150. Published 2026 Feb 9. doi:10.1007/s10653-026-03043-9
8. Anderko L, Pennea E, Cardon MK, McDermott-Levy R, Mutic A. Forever Chemicals (PFAS): An Overview for Maternity and Pediatric Health Care Professionals. *MCN Am J Matern Child Nurs*. 2025;50(3):133-140. doi:10.1097/NMC.0000000000001090
9. Fenton SE, Ducatman A, Boobis A, et al. Per- and Polyfluoroalkyl Substance Toxicity and Human Health Review: Current State of Knowledge and Strategies for Informing Future Research. *Environ Toxicol Chem*. 2021;40(3):606-630. doi:10.1002/etc.4890
10. Jaishankar M, Tseten T, Anbalagan N, Mathew BB, Beeregowda KN. Toxicity, mechanism and health effects of some heavy metals. *Interdiscip Toxicol*. 2014;7(2):60-72. doi:10.2478/intox-2014-0009

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MACCHE is one of 10 pediatric environmental health specialty units in the United States. We serve the District of Columbia, Maryland, Virginia, Delaware, West Virginia, and Pennsylvania. We provide education and consultation about environmental health issues affecting children. We are funded by the Agency for Toxic Substances and Disease Registry (ATSDR), a part of the US Centers for Disease Control & Prevention (CDC), and by the US Environmental Protection Agency (EPA). The recommendations that we make are our own and do not represent the policy of ATSDR or EPA.