

candles, and phthalates on their own, have been associated with allergic and respiratory disease. This study provides evidence that this exposure may increase the risk of allergic sensitization. Contrary to these results, several studies have found dog and cat exposure to be associated with decreased risk of atopic dermatitis and wheeze or asthma. The authors explain the cat sensitization findings may be due to the age of the children in this analysis (early sensitization may not be lifelong) or cat exposure levels. ETS exposure and risk of atopy have also been reported previously in the literature. In addition, the authors found that children with a positive SPT result at 2 years of age had more exposures prenatally, at 1 and 2 year time points and a dose-response trend was observed. This suggests that multiple exposures may contribute more to allergy development than a single exposure.

**REVIEWER COMMENTS:** This study evaluated the effect of multiple exposures at different time points on odds of sensitization. While this provides valuable information about various environmental risk factors, there are several limitations. The low sample size, especially at the 6-month time frame, makes this study less robust. The authors acknowledge this in their methods, as they were unable to make corrections for multiple comparisons due to the small sample size. Therefore, it is unclear if confounding impacted the identified relationship. In addition, the information on environment was collected via questionnaire instead of using samples from the home. Finally, sensitization does not always equate to clinical allergy. This study has identified several exposures, candles, cats, and ETS, that warrant further evaluation. A larger study with better environmental exposure and allergic sensitization and outcome measurements is needed.

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### **Exposure to Indoor Endocrine-Disrupting Chemicals and Childhood Asthma and Obesity**

Paciência I, Cavaleiro Rufo J, Silva D, et al. *Allergy*. 2019;74(7):1277-1291

**PURPOSE OF THE STUDY:** The goal of this study was to examine the role of specific indoor air contaminants identified as endocrine-disrupting chemicals (EDCs) in the prevalence of asthma and other respiratory symptoms and obesity.

**STUDY POPULATION:** A cross-sectional analysis was used with 815 participants from 20 schools in Porto, Portugal, corresponding to a total of 71 classroom assessments.

**METHODS:** Respiratory symptoms were assessed, lung function and airway reversibility were evaluated by

spirometry and airway inflammation was determined by exhaled nitric oxide measurement. BMI was also calculated. The concentrations of 13 volatile organic compounds and 2 aldehydes identified as EDCs were measured throughout 1 week. Principal component analysis (PCA) was used to assess the effects of co-exposure. Associations were analyzed using linear and logistic regression models.

**RESULTS:** More children with asthma and obesity were found in classrooms that had increased individual and combined ECD levels. Higher levels of hexane, styrene, cyclohexanone, butylated hydroxytoluene and 2-butoxyethanol were associated with obesity, and higher levels of cyclohexanone were associated with increased BMI. Toluene, o-xylene, m/p-xylene, and ethylbenzene were significantly associated with nasal obstruction. A positive association was found between PC1 and the risk of obese asthma (OR = 1.43, 95% CI 1.01-1.98) and between PC2 and overweight (OR = 1.51, 95% CI 1.28-1.79). PC1 and PC2 were also associated with nasal obstruction.

**CONCLUSIONS:** The findings support the role of EDCs in the development of asthma and obesity. Even low levels of indoor exposure to certain EDCs may have an impact on the risk of asthma, respiratory symptoms, and obesity.

**REVIEWER COMMENTS:** This study supports the need to improve indoor air quality in schools to include decreasing EDC exposures. School are the occupational environment for most children and much has been written about the importance of indoor air quality in reducing respiratory symptoms. This report adds to our knowledge by describing the potential effects of specific pollutants that are EDCs in this regard.

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### **e-Cigarette Use Among Youth in the United States, 2019**

Cullen KA, Gentzke AS, Sawdey MD, et al. *JAMA*. 2019;322(21):2095-2103

**PURPOSE OF THE STUDY:** To estimate the prevalence of e-cigarette use among US adolescents students in 2019 including frequency of use, brands used, and use of flavored products.

**STUDY POPULATION:** US high school and middle school students participating in the 2019 National Youth Tobacco Survey.

**METHODS:** Cross-sectional analyses of a school-based nationally representative sample of 19 018 US students in grades 6 to 12. The National Youth Tobacco Survey was a self-administered questionnaire given from February 15, 2019, to May 24, 2019.

**RESULTS:** The survey included 10 097 high school students (mean [SD] age, 16.1 [3.0] years; 47.5% female) and 8837 middle school students (mean [SD] age, 12.7 [2.8] years; 48.7% female). The response rate was 66.3%. An estimated 27.5% (95% CI, 25.3% to 29.7%) of high school students and 10.5% (95% CI, 9.4% to 11.8%) of middle school students reported current e-cigarette use. Among current e-cigarette users, an estimated 34.2% (95% CI, 31.2% to 37.3%) of high school students and 18.0% (95% CI, 15.2% to 21.2%) of middle school students reported frequent use, and an estimated 63.6% (95% CI, 59.3% to 67.8%) of high school students and 65.4% (95% CI, 60.6% to 69.9%) of middle school students reported exclusive use of e-cigarettes. Among current e-cigarette users, an estimated 59.1% (95% CI, 54.8% to 63.2%) of high school students and 54.1% (95% CI, 49.1% to 59.0%) of middle school students reported JUUL as their usual e-cigarette brand in the past 30 days. Among current e-cigarette users, 13.8% (95% CI, 12.0% to 15.9%) of high school students and 16.8% (95% CI, 13.6% to 20.7%) of middle school students reported not having a usual e-cigarette brand. Among current exclusive e-cigarette users, an estimated 72.2% (95% CI, 69.1% to 75.1%) of high school students and 59.2% (95% CI, 54.8% to 63.4%) of middle school students used flavored e-cigarettes, with fruit, menthol or mint, and candy, desserts, or other sweets being the most commonly reported flavors.

**CONCLUSIONS:** In 2019, the prevalence of self-reported e-cigarette use was high among high school and middle school students, with many current e-cigarette users reporting frequent use and most of the exclusive e-cigarette users reporting use of flavored e-cigarettes.

**REVIEWER COMMENTS:** Trends of declining youth smoking—achieved after decades of public health policy, educational programs, and activism—have begun to reverse with the growing popularity of e-cigarettes. This study estimates that roughly 60% of current e-cigarette users in high school and middle school use e-cigarettes and no other type of tobacco product. This suggests many young e-cigarette users might never have been drawn to traditional smoking or other tobacco use. Known risks of adolescent nicotine-use, as well as the rising popularity of e-cigarettes, and the largely unknown health consequences of long-term e-cigarette use, suggest a need for educational programs specifically designed to inform students about the manipulative history of tobacco sales and present dangers of e-cigarette use. Previous research has shown adolescents with asthma use e-cigarettes at higher rates than adolescents without asthma, have positive beliefs about e-cigarette products, and experience worsened asthmatic symptoms after exposure to e-cigarette flavoring agents and traditional tobacco products. Thus, the rising

prevalence of adolescent e-cigarette use is especially worrisome in asthmatic populations.

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## Electronic Vapor Products, Marijuana Use, Smoking, and Asthma in US Adolescents

Han YY, Rosser F, Forno E, Celedón JC. *J Allergy Clin Immunol.* 2020;145(3):1025–1028.e6

**PURPOSE OF THE STUDY:** Consumption of e-cigarettes can lead to cigarette smoking and use of other combustible products, but little is known about concurrent use of e-cigarettes, marijuana, and cigarettes in adolescents. Use of e-cigarettes has been associated with symptoms and exacerbations of asthma and the authors hypothesized that e-cigarette use would be associated with asthma in adolescents, and that such association would be stronger when e-cigarette use is combined with marijuana and/or cigarette smoking.

**STUDY POPULATION:** Data from the Youth Risk Behavior Surveillance (YRBS) system from 2015 and 2017, including 21 532 study participants with valid data.

**METHODS:** The US Centers for Disease Control and Prevention established the YRBS system to monitor health risk behaviors in US youth. The YRBS is conducted every 2 years and uses a 3-stage cluster sampling design to produce a representative sample of ninth-grade through 12th-grade students. The YRBS contained questions on use of an electronic vapor product (including e-cigarettes, e-cigs, e-pipes, vape pipes, vaping pens, e-hookahs, and hookah pens), cigarette smoking, and marijuana use. Data from the 2015 and 2017 surveys were used for this analysis.

**RESULTS:** The overall prevalence of asthma was 24.3%. Compared with control subjects, subjects with asthma were more likely to report current cigarette smoking, marijuana use, and use of an electronic vapor product. Of the 4073 participants reporting use of an electronic vapor product, 2587 (63.5%) also reported marijuana use and/or cigarette smoking. Use of any of these products was higher in subjects with asthma than in controls across all racial/ethnic groups. Frequent cigarette smoking, frequent marijuana use, and frequent use of an electronic vapor product were each significantly associated with 55% to 65% increased odds of asthma. Compared with participants who reported no current use of an electronic vapor product or marijuana or cigarette smoking, those currently using an electronic vapor product and marijuana had significantly increased (1.45 times greater) odds of asthma, and

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