

asthma severity score. Associations were evaluated through multivariate logistic regression analysis.

**RESULTS.** A total of 20% (58) of the asthmatic children reported EL. In this group, 8 factors differed significantly compared with those without reported EL; however, after multivariate analysis, only asthma severity score (OR 1.49; 95% CI 1.32–1.67) and overweight status (OR 2.35; 95% CI 1.14–4.82) were independently associated with perceived EL. In a model excluding asthma severity score, additional associations included prenatal smoking, comorbid allergic rhinitis (AR), and children with comorbid AR and atopic eczema. EIB and BHR were associated with EL, only with exclusion of asthma severity and allergic disease from the analysis. Physical activity, sex, and household income were not risk factors for EL. Overweight status remained significant in all models of multivariate analysis reported in this study.

**CONCLUSIONS.** Perceived EL in asthmatic children was independently associated with overweight status and asthma severity score but was not associated with daily physical activity or socioeconomic factors. Being overweight more than doubles the probability of perceived EL.

**REVIEWER COMMENTS.** This study highlights the link between exercise limitation in asthmatic children and being overweight. Many studies regarding exercise limitation in asthma focus on children under specialty care. Results from population-based cohort studies such as this likely reflect more accurately the experience of pediatricians. While factors such as allergic disease and asthma severity may have some effect on perceived exercise limitation, the association with overweight status appears more robust. Awareness of this association may lead to increased focus on weight control for asthmatic children reporting exercise limitation to their pediatrician.

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### **Sex Differences in the Relationship Between Fitness and Obesity on Risk for Asthma in Adolescents**

Lu KD, Billimek J, Bar-Yoseph R, Radom-Aizik S, Cooper DM, Anton-Culver H. *J Pediatr.* 2016;176:36–42

**PURPOSE OF THE STUDY.** To examine the association of obesity and fitness on risk of asthma in adolescent girls and boys.

**STUDY POPULATION.** Cross-sectional analysis of data of 4828 subjects, 12–19 years old, from the 1999–2004 NHANES. Mean age of males was 15.5 years and mean age of females was 15.3 years.

**METHODS.** Data including cardiorespiratory fitness testing (submaximal treadmill exercise test), body composition measurements, and respiratory questionnaires from NHANES were used. Asthmatics were defined as those who responded “yes” when asked whether a doctor or health professional had told them they had asthma. Participants were classified as normal weight if sex-specific BMI percentile-for-age was fifth to <85th, overweight if 85th to <95<sup>th</sup>, and obese if ≥95th. Comparisons of subjects’ characteristics were done for continuous variables with an independent sample *t* test and for categorical variables with a Pearson  $\chi^2$  test; then, sex-specific associations of BMI and fitness with prevalence and morbidity were analyzed with logistic regression models, stratified by sex.

**RESULTS.** In females, being overweight or obese was associated with increased odds of history of or current asthma (aOR 1.63, 95% CI 1.16–2.3; aOR 1.73, 95% CI 1.13–2.64) in addition to asthma attacks (aOR 2.67, 95% CI 1.56–4.65) and exercise-related wheezing (aOR 1.6, 95% CI 1.07–2.38). This association was not seen in males. In males, there was an association between high fitness and lower odds of asthma-related visits to the emergency department (aOR 0.24, 95% CI 0.07–0.89), wheezing-related medical visits (aOR 0.31, 95% CI 0.13–0.75), wheezing-related missed days (aOR 0.14, 95% CI 0.06–0.33), and exercise-related wheezing (aOR 0.43, 95% CI 0.06–0.33), but this was not observed in females.

**CONCLUSIONS.** This study found that, in adolescent females, there is an association between overweight/obesity and increased asthma prevalence and morbidity, independent of fitness. In adolescent males, there is an association between high fitness and decreased rates of asthma morbidity that is independent of weight categorization. This suggests that the prevalence and morbidity of asthma are affected differently in adolescent females as compared with adolescent males.

**REVIEWER COMMENTS.** It has been suggested before that there are gender differences in the effects of obesity on prevalence and morbidity of asthma, though there are few studies examining an adolescent population or that also consider fitness. As the authors noted, there is insufficient evidence to conclude that the observed differences were true as opposed to simply by chance. However, others have also noted this relationship between obesity and asthma in females, though it is unclear why this may be. More females reported wheezing related to exercise, which begs the question of directionality. Furthermore, if obesity is related to the development of and morbidity associated with asthma in females, there are likely a multitude of players in this complex relationship, including hormones, puberty, adipokines, adipose distribution, and inflammation, whose potential roles have yet to be elucidated. Nevertheless, the mechanisms in which obesity may predispose females to asthma and associated morbidity and, conversely, those related to high fitness that potentially

protect males are currently unknown, and the potential of a biological mechanism based on the results of this study highlights the need for further research.

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### The Influence of Comorbid Asthma on the Severity of Symptoms in Children With Attention-Deficit Hyperactivity Disorder

Borschuk AP, Rodweller C, Salorio CF. *J Asthma*. 2017;1:1-7

**PURPOSE OF THE STUDY.** This study examined the association between asthma and attention-deficit/hyperactivity disorder (ADHD) symptoms in a clinical pediatric sample.

**STUDY POPULATION.** Children with asthma and ADHD symptoms.

**METHODS.** Demographic and neuropsychological data for children with a billing diagnosis of ADHD were extracted from a clinical database. Families completed standard rating scales. Seventy-one patients with a comorbid asthma diagnosis were identified and matched by age to a group of 71 patients with only ADHD.

**RESULTS.** Children with asthma and ADHD were more likely to display clinically elevated levels of hyperactivity, externalizing behaviors, anxiety, and hyperactive and/or impulsive behaviors compared with children with ADHD alone. Boys with asthma and ADHD had more symptoms than boys with only ADHD of somatization and emotional internalizing, while girls with asthma and ADHD had more symptoms of hyperactivity and/or impulsivity, conduct problems, anxiety, and emotional internalizing compared with girls with only ADHD.

**CONCLUSIONS.** Findings suggest that in children with ADHD, comorbid asthma is associated with increased behavioral and internalizing symptoms, with distinct sex differences present. Increased behavioral and internalizing symptoms seen in children with both asthma and ADHD may be due to the burden of their medical condition. No difference was found in cognitive variables, suggesting chronic hypoxia may be less influential in explaining these differences. Future research should determine the specific mechanisms of these differences.

**REVIEWER COMMENTS.** Clinicians are often faced with dilemmas when caregivers focus on the impact of controller and rescue medications on behavior in addition to managing the chronic nature of asthma. In children with ADHD and similar disorders, the authors note that these learning disabilities can impact how children potentially perceive their symptoms, and they can affect the ability of

the children to self-manage. In addition, the specific sex differences can impact how children may respond to both asthma treatment and their ability to manage, which clinicians should take into account when creating asthma treatment plans with caregivers.

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### Effectiveness of Evidence-Based Asthma Interventions

Kennedy S, Bailey R, Jaffee K, et al. *Pediatrics*. 2017; 139(6):e20164221

**PURPOSE OF THE STUDY.** To assess the effectiveness of using evidence-based asthma interventions in community health centers as part of the Community Healthcare for Asthma Management and Prevention of Symptoms (CHAMPS) study.

**STUDY POPULATION.** Children aged 5 to 12 years ( $N = 590$ ) with moderate to severe asthma were enrolled in 3 intervention and 3 control sites within high-risk, low-income communities in Arizona, Michigan, and Puerto Rico.

**METHODS.** Asthma intervention (environmental control) was tailored to each child's allergen sensitivity and exposure and involved 4 visits over the course of a year. Study visits were electronically documented and prospectively monitored. Asthma symptoms and health care utilization were evaluated at baseline, 6 months, and 12 months.

**RESULTS.** The intervention group included 314 children, and there were 276 children in the control group. Nearly all children had allergy testing (96%) and home environmental assessments (89%) performed. A total of 70% of children completed all study activities (testing, assessments, and intervention visits). Symptomatic days in the previous 4 weeks were significantly reduced in the intervention group compared with the control group ( $-3.27$  in the intervention group vs  $-2.28$  days in the control group, or a  $-0.99$  difference;  $P < .001$ ). This is consistent with changes found in the initial rigorous, evidence-based interventions in other large studies.

**CONCLUSIONS.** Evidence-based interventions can be successfully used in community health centers that care for underserved, high-risk populations, leading to a reduction in asthma morbidity.

**REVIEWER COMMENTS.** This study shows that evidence-based asthma guidelines can be successfully employed with positive clinical outcomes despite the challenges of high-risk asthmatic children in community health settings with limited financial resources. The results here mirror the results previously reported as part of the National

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