

PEDIATRICS

The Relationship of Season of Birth to Asthma and Allergy in Urban African American Children from 10 to 13 Years of Age

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Objectives. To assess the relationship between season of birth and presence of asthma and allergy in preteen, low-income, African American children. **Methods.** The study consisted of a self-administered survey followed by telephone interviews of parents of children attending 19 middle schools in Detroit, Michigan. Out of 4194 children, 1292 were identified with asthma and 962 parents of these children provided informed consent and took part in telephone interviews. **Results.** No statistically significant relationships were observed between season of birth and diagnosis of asthma ($p > .05$) or with diagnosis adjusting for income, age, gender, parent's education, or parent being a smoker ($p > .05$). No statistically significant association was evident between season of birth and presence of allergy ($p > .05$) or with allergy adjusting for the above variables ($p > .05$). **Conclusions.** Identifying children vulnerable to problems with asthma and allergy, especially in populations exhibiting high prevalence of the conditions and significant disparities in outcomes, requires use of all possible means. Season of birth does not appear to be a useful indicator in identification of such children. The findings from this study do not support the proposition that season of birth, associated with early exposure to viruses as evident in the winter and to seasonal allergens, contributes to more asthma and/or allergy.

Keywords African American children, allergic rhinitis, asthma, atopy, low-income, season of birth

INTRODUCTION

Over the past decade and a half, studies have explored the relationship of the month or season of birth to the presence of asthma. Generally, the hypothesis of these studies has been that early exposure to respiratory viral infection more prevalent in the winter months and/or to aeroallergens more evident seasonally may sensitize children and increase risk for developing wheezing, asthma, or allergic rhinitis. Among the most cited studies (see Table 1), the majority suggest that there is an association between season and outcomes, although three teams of investigators have found no support for the association.

Collectively, the available research has suggested relationships between date of birth and wheezing, asthma, or allergic rhinitis that includes every season of the year. In other words, no one time period of birth has emerged in work to date as more likely to increase risk for these conditions. The varied results of previous work leave unsubstantiated the premise that a particular birth season raises the chances of poor respiratory outcomes in the general population of children and adults. However, to date, no study has focused on the association between date of birth and asthma and allergic disorders in urban African American populations where prevalence of the

conditions are consistently higher than in the general population and where the presence of atopy has also been shown to be greater (14, 15).

The purpose of the study presented here was twofold: first, to determine associations between season of birth and presence of wheeze or asthma in children from 10 to 13 years of age residing in low-income, predominantly African American, communities where asthma prevalence is high; and second, among the children with asthma symptoms, to evaluate the association between season of birth and the presence of allergy and their asthma symptom severity (16). Determining associations, if any in this group, is clinically important since, as noted, among African American children, prevalence of asthma, allergic rhinitis, and atopy is high, and clinicians need markers of risk in this population. We anticipated that in the target group, by the early teenage years, season of birth would be positively associated with the (a) presence of asthma and allergy and (b) the severity of asthma based on the National Asthma Education and Prevention Program (NAEPP) guidelines (17).

METHODS

Data Collection

All study procedures were approved by the Institutional Review Board of University of Michigan. To reach a large sample of preteen children, middle schools in low-income, predominantly African American, neighborhoods in

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TABLE 1.—Studies of association between month of birth and wheeze, asthma, or allergy.

Season/month associated with asthma	Author	Outcome	Patients	Number in study
December–February	Wu (1)	Asthma	5 years old	95,310
March–June	Gazala (2)	Asthma	7 years old	135
April–November	Dik (3)	Asthma	6 years old	170,960
May–August	Karachaliou (4)	Asthma/allergy	Adults	1755
July–October	Korsgaard (5)	Asthma/allergy	Adults	576
August–January	Aberg (6)	Asthma/allergy	Children and 18 years old	133,437
August–October	Croner (7)	Asthma	14 years old	1654
September–March	Harley (8)	Wheeze	2 years old	514
September–November	Linneberg (9)	Wheeze	18 months old	34,793
High pollen season	Carosso (10)	Allergy	Adults	304
No association	Wjst (11)	Allergy	Adults	200,682
No association	Schäfer (12)	Atopy	5–6 years old	1066
No association	Anderson (13)	Asthma/wheeze	0–24 years old	6887

Detroit, Michigan, were identified as the source of recruitment. With permission of the Detroit Public School System, letters were sent to the principals of 31 middle schools requesting participation in the study. Nineteen schools agreed to take part. As an indication of low-income status of these schools, it was determined that over 70% of students qualified for the federal reduced/free lunch program according to School System reports (18). A two-step process was used for enrollment. First, a survey questionnaire (asthma identification form) to be completed by parents/guardians of children from 10 to 13 years of age was sent home with students requesting the parents' description of asthma-related symptoms as outlined in the NAEPP guidelines for diagnosis and treatment of asthma (17). A total of 6827 asthma identification forms were distributed over a two-year period and 4194 were returned (return rate of 71.4%, adjusted for 10% Detroit Public Schools daily absentee rate). Second, among families returning a usable questionnaire ($N = 4038$), 32% of children ($N = 1292$) met criteria for asthma and their parents provided a signed and informed consent form. Probable asthma was determined based on NAEPP guidelines. Inclusion criteria were that the child had a diagnosis of asthma and/or a prescription for asthma medications in the last year, and/or presence of asthma symptoms during the daytime or at night in the past year (19).

Telephone interviews were then conducted by trained interviewers with parents of children identified with asthma to confirm symptom history and to gather more details regarding the child and family. Attempts were made to reach parents at least 20 times within a three-month window. The parent interview averaged 45 minutes in length and included questions related to demographics, the child's asthma and allergy history, symptoms, medications, and healthcare use. Of the 1292 parents of children returning the initial questionnaire, a smaller number, $N = 962$, completed the telephone interviews and comprised the sample for this study sample.

Measures

Asthma symptoms included daytime and nighttime symptom frequency (in the past 12 months), as well as symptom

severity. Symptom severity had four categories: intermittent, mild, moderate, and severe persistent. These are based on the number of daytime and nocturnal symptoms, according to the NAEPP guidelines (17). Presence of allergy was documented through the survey item "Has a physician ever told you that your child has allergy including [allergies listed]."

Data Analysis

The first part of analysis was to examine whether season of birth was associated with the occurrence of asthma symptoms. The second part of analysis focused on identifying associations between season of birth and diagnosis of asthma and allergy, asthma symptom frequency, and severity in children with asthma. Pearson's chi-squared tests were performed to assess these relationships. Logistic regressions were used to ascertain associations, adjusting for potential confounding effects of age, gender, parent smoking status, income, and education. To explore whether there was any trend of the likelihood of having asthma with child's date of birth, a logistic additive model (PROC GAM) was fitted using B-spline smoother with 3 degrees of freedom. In the model, having asthma symptoms was treated as dependent variable and birth date in a calendar year as independent variable.

To investigate the association between asthma symptoms and birth season, comparisons were made of children with asthma born in the four separate seasons. Since numerous children reported relatively high asthma symptom counts which could affect analysis results if using regular Poisson or zero-inflated Poisson distribution assumptions, class symptoms corresponding to symptoms annually, monthly, weekly, and daily were employed. For example, having 0–12 symptoms corresponds to less than or equal to one symptom monthly, having 13–52 symptoms corresponds to less than or equal to one symptom weekly, and so on (17).

To explore whether there is any seasonality pattern, the likelihood of having more frequent (i.e., >12, >52, and >365) daytime and nighttime asthma symptoms was fitted using a logistic additive model (PROC GAM). The crude association between asthma symptoms and birth season was

then examined using multinomial logistic regression with penalized quasi-likelihood approximation method (PROC GLIMMIX), incorporating random intercepts for 19 schools to account for clustering that may have existed within schools. Results indicated that the 19 study schools did not express high heterogeneity ($p = .57$). Multivariate analyses for symptom frequency and symptom severity were conducted using cumulative logit (proportional odds) models with birth season, age, gender, parent smoking, parent education, and parent income as covariates for each as these factors have been associated with the presence of asthma symptoms (20). Analysis first used autumn as the reference season and was repeated using other seasons as the reference to acquire all pairwise comparisons among four seasons. Chi-square score test was used for assessing the proportional odds assumption. Statistical analyses used the SAS® System, SAS Institute, Inc. version 9.2, and accepted $p = .05$ as statistically significant (21).

Among the 1292 children, 330 children did not have completed telephone interview due to parents' refusal of interview or children moved to nonstudy schools. We compared child's age, gender, race, and asthma severity as well as parent's education level and income between the 962 completers and the 330 noncompleters. All variables (except race) were not found to be significantly different between the completers and noncompleters. A larger proportion of the completers were African American than noncompleters (96% vs. 87%). Since there was no significant difference in all other observed variables and the analysis goal was to make inference to African American children, 330 noncompleters were excluded from analysis.

As such, the interview information collected from the 962 completers was used for data analysis. A few completers, however, failed to respond to all the survey items. For each variable of interest, those cases with missing data were omitted in data analyses.

RESULTS

Characteristics of Study Children with Asthma

Table 2 displays the distribution of characteristics (including factors that might relate to asthma symptoms and severity) of the study children with asthma ($N = 962$) by season of birth. We did not find significant differences in distributions of patient characteristics among children born in the four seasons, except concerning household income, which we interpret as random occurrence. The mean age of the children was 11.6 ± 0.6 years (range = [10.4, 13.6]). More boys than girls were born in fall (13% vs. 9%), whereas the proportions of boys and girls born in other three seasons are about the same. Children were predominantly living in families with annual household income not more than 40 thousand dollars (87%), with parents who had high school level education (80%) and the majority of them did not smoke (67%). Over two-thirds (66%) of the children had confirmed asthma diagnosis and 44% had allergies.

Presence of Asthma Symptoms

Among the 4038 returned surveys, 70 surveys were excluded for analysis due to missing date of birth information. As such, a total of 3968 children (1292 children with

TABLE 2.—Characteristics of the study children by birth season ($N = 962$).

	Fall ($N = 212$)	Spring ($N = 241$)	Summer ($N = 237$)	Winter ($N = 272$)	Total ($N = 962$)
Gender ($p = .12$)					
Male	127 (13%)	123 (13%)	119 (12%)	137 (14%)	506 (53%)
Female	85 (9%)	118 (12%)	118 (12%)	135 (14%)	456 (47%)
Race ($p = .39$)					
African American	201 (21%)	227 (24%)	230 (24%)	262 (27%)	920 (96%)
Non-African American ^a	11 (1%)	14 (1%)	7 (1%)	10 (1%)	42 (4%)
Household income ($p = .05$)					
<15 K	93 (10%)	95 (10%)	111 (12%)	132 (14%)	431 (47%)
15–40 K	80 (9%)	106 (11%)	91 (10%)	88 (10%)	365 (40%)
>40 K	27 (3%)	32 (3%)	23 (2%)	45 (5%)	127 (14%)
Parent education ($p = .26$)					
<High school	44 (5%)	55 (6%)	37 (4%)	52 (5%)	188 (20%)
High school	83 (9%)	72 (8%)	93 (10%)	106 (11%)	354 (37%)
>High school	80 (8%)	112 (12%)	102 (10%)	113 (12%)	407 (43%)
Parent smoker ($p = .23$)					
Yes	81 (8%)	72 (7%)	67 (7%)	90 (9%)	310 (33%)
No	124 (13%)	162 (17%)	163 (17%)	180 (19%)	629 (67%)
Confirmed asthma diagnosis ($p = .23$)					
Yes	148 (15%)	154 (16%)	148 (15%)	188 (20%)	638 (66%)
No	64 (7%)	87 (9%)	89 (9%)	84 (9%)	324 (34%)
Having allergies ($p = .71$)					
Yes	87 (9%)	111 (12%)	107 (11%)	117 (12%)	422 (44%)
No	124 (13%)	130 (14%)	128 (13%)	155 (16%)	537 (56%)

Notes: Comparisons of the distributions of these characteristics among the four birth seasons were performed using Pearson's chi-squared tests.

Some cell frequency counts do not add up to the total $N = 962$ because of nonresponse items.

^aNon-African American included Asian/Pacific Islander, Caucasian, Hispanic/Latino, and other/more than one race.

TABLE 3.—No significant association was found between season of birth and the presence of asthma symptoms ($p = .13$).

Birth season	Asthma	No asthma	Total
Fall	297 (8%)	677 (17%)	974 (25%)
Winter	350 (9%)	642 (16%)	992 (25%)
Spring	331 (8%)	680 (17%)	1011 (25%)
Summer	314 (8%)	677 (17%)	991 (25%)
Total	1292 (33%)	2676 (67%)	3968 (100%)

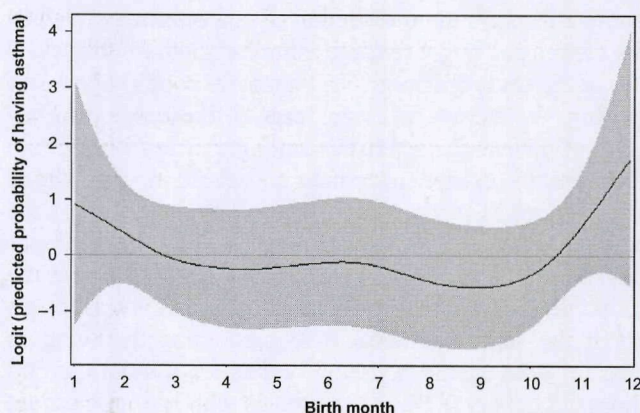


FIGURE 1.—Probability of having asthma and the corresponding 95% confidence band with smoothing spline of birth date in a calendar year (birth month is shown) using generalized (logistic) additive model.

symptoms of asthma) were used for analysis to examine the relationship between season of birth and the presence of asthma symptoms. Births were distributed approximately equally among four seasons, and 33% of children had asthma symptoms (Table 3). The result of logistic regression did not indicate a significant association between birth season and the probability of presence of asthma symptoms ($p = .13$). Figure 1 shows the prediction and the corresponding 95% confidence band from the logistic additive model for date of birth in a calendar year. The prediction curve indicated a greater likelihood of having asthma for children born in winter. The 95% confidence limits, however, cover the zero axis throughout the whole year, confirming the insignificance of season of birth ($p = .29$). To examine whether gender also affects the presence of asthma, multivariate logistic regression was used including season of birth and gender as covariates. The results indicated that birth season still was not significantly associated with the presence of asthma ($p = .13$). Females were found to have significantly lower odds of having asthma symptoms compared to males (odds ratio (OR) estimate = 0.75, 95% confidence interval (CI) = [0.65, 0.85]).

Diagnosis of Asthma and Presence of Allergies

Initial analyses indicated that birth season was not associated with increased odds of having asthma diagnosis ($p = .23$) or having allergies ($p = .71$) (17). Table 4 shows that after adjusting for potentially influential variables (age, gender, income, parent education, and parent smoker), fall season was still not significantly associated with odds of having a diagnosis of asthma compared to

TABLE 4.—Results of logistic regression of the association between receiving a diagnosis of asthma (dichotomized variable) and birth season and demographic factors using fall birth season as the reference category, adjusting for age, gender, parent smoking status, income, and education ($N = 962$).

Effect	OR	95% CI	p-value
Birth season: spring versus fall	0.75	(0.48, 1.16)	.19
Birth season: summer versus fall	0.67	(0.44, 1.04)	.07
Birth season: winter versus fall	0.83	(0.53, 1.31)	.43
Income: <15 K versus >40 K	1.20	(0.75, 1.94)	.45
Income: 15–40 K versus >40 K	1.12	(0.71, 1.77)	.63
Education: <HS versus >HS	0.72	(0.46, 1.12)	.15
Education: HS versus >HS	0.83	(0.59, 1.16)	.27
Parent smoker	0.63	(0.21, 1.95)	.43
Age (years)	1.40	(1.06, 1.83)	.02
Gender: Females versus males	0.69	(0.51, 0.92)	.01

Notes: OR, odds ratio; CI, confidence interval; HS, high school.

TABLE 5.—Results of logistic regression of the association between allergy (dichotomized variable) and birth season and demographic factors using fall birth season as the reference category, adjusting for age, gender, parent smoking status, income, and education ($N = 959$).

Effect	OR	95% CI	p-value
Birth season: spring versus fall	1.14	(0.76, 1.72)	.53
Birth season: summer versus fall	1.08	(0.72, 1.63)	.70
Birth season: winter versus fall	0.99	(0.65, 1.48)	.94
Income: < 15 K versus > 40 K	1.12	(0.72, 1.76)	.62
Income: 15–40 K versus > 40 K	0.94	(0.61, 1.45)	.78
Education: < HS versus > HS	0.64	(0.42, 0.98)	.04
Education: HS versus > HS	0.80	(0.58, 1.10)	.16
Parent smoker	1.13	(0.39, 3.30)	.83
Age (years)	1.10	(0.86, 1.39)	.45
Gender: Females versus Males	0.82	(0.62, 1.08)	.15

Notes: OR, odds ratio; CI, confidence interval; HS, high school.

being born in the other three seasons. Older age was significantly associated with a diagnosis of asthma ($p = .02$). The OR of being diagnosed with asthma for children born in any season was estimated to be 1.40 for every year of increasing age (95% CI = [1.06, 1.83]). The OR of being diagnosed with asthma in any birth season for females was estimated to be 0.69 times that for males (95% CI = [0.51, 0.92]). Similarly, adjusting for age, gender, income, parent education, and parent smoking, Table 5 shows that birth season was not significantly associated with having allergy. Children with a confirmed asthma diagnosis were more likely to have allergies, in general, than children with no confirmed diagnosis (52.8% vs. 26.6%, $p = .0001$).

Asthma Symptom Frequency and Severity

Figures 2 and 3 show the predictions for the probabilities of having more than 52 (i.e., more than once a week) daytime and nighttime symptoms from the logistic additive model on date of birth (in a calendar year), both of which have complicated but nonsignificant patterns ($p = .82$ and 0.44, respectively). Seasonality trends of predictions for more than 12 (once a month) and more than 365 (every-day) daytime and nighttime symptoms are similar to Figures 2 and 3 and are still not significant (plots not shown).

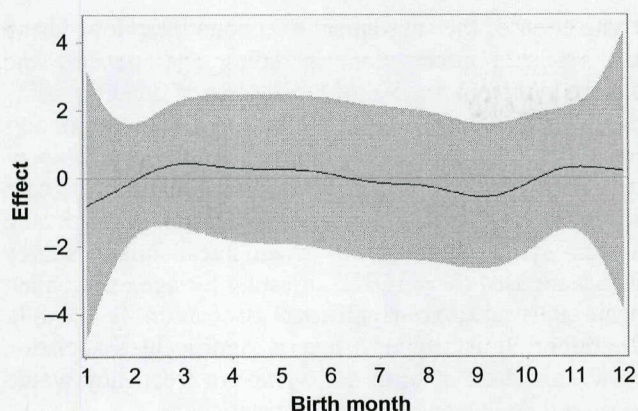


FIGURE 2.—Logit-transformed probability of having more than 52 (more than once a week on average) daytime asthma symptoms and the corresponding 95% confidence band with smoothing spline of birth date in a calendar year (birth month is shown) using generalized (logistic) additive model.

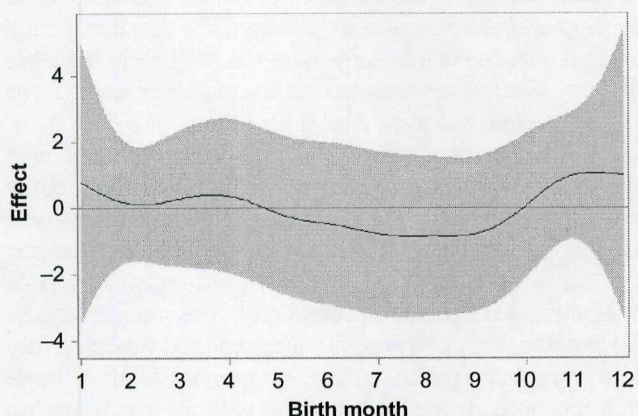


FIGURE 3.—Logit-transformed probability of having more than 52 (more than once a week on average) nighttime asthma symptoms and the corresponding 95% confidence band with smoothing spline of birth date in a calendar year (birth month is shown) using generalized (logistic) additive model.

Considering the four categories of symptom frequency altogether, Pearson's chi-squared test results (Table 6) indicate no significant association between season of birth and daytime symptom frequency ($p = .85$), nighttime symptom frequency ($p = .76$), or asthma severity ($p = .99$). Table 7 illustrates the results of the proportional odds model of asthma symptom frequency. Neither frequency of daytime or nighttime symptoms was

TABLE 7.—Results of proportional odds models for the adjusted association between asthma symptom frequency (in the past 12 months) during daytime and nighttime as well as asthma severity (all of which are ordinal outcome variables) and season of birth ($N = 961$).

Effect	OR	95% CI	<i>p</i>
Daytime symptoms ^a			
Spring versus fall	0.92	(0.65, 1.29)	.62
Summer versus fall	1.10	(0.78, 1.54)	.60
Winter versus fall	0.98	(0.70, 1.36)	.90
Female versus male	0.80	(0.63, 1.00)	.05
Parent smoker versus nonsmoker	1.53	(1.19, 1.95)	<.001
Nighttime symptoms ^a			
Spring versus fall	1.02	(0.72, 1.44)	.92
Summer versus fall	1.18	(0.83, 1.68)	.35
Winter versus fall	1.06	(0.75, 1.48)	.75
Female versus male	0.80	(0.63, 1.02)	.07
Parent smoker versus nonsmoker	1.27	(0.99, 1.64)	.06
Symptom severity ^b			
Spring versus fall	1.03	(0.63, 1.68)	.90
Summer versus fall	0.96	(0.59, 1.58)	.51
Winter versus fall	1.20	(0.75, 1.92)	.22
Age 10 versus 13 years	0.57	(0.25, 1.30)	.80
Age 11 versus 13 years	0.42	(0.21, 0.80)	<.01
Age 12 versus 13 years	0.56	(0.27, 1.13)	.61
Income <15 K versus >40 K	1.96	(1.31, 2.95)	<.001
Income 15–40 K versus >40 K	1.45	(0.97, 2.19)	.80
Parent smoker versus nonsmoker	1.01	(0.7, 1.33)	.95

Notes: OR, odds ratio; CI, confidence interval; HS, high school.

^aProbabilities modeled are cumulated over the lower symptom frequencies; 0–12 symptoms in the past 12 months is the reference category.

^bProbabilities modeled are cumulated over the lower levels of severity. Intermittent severity is the reference category.

TABLE 6.—Distribution of asthma symptom frequency (in the past 12 months) and asthma severity of children born in four seasons ($N = 961$).

	Birth season				
Symptoms ^a and severity	Fall (<i>N</i> = 211)	Spring (<i>N</i> = 241)	Summer (<i>N</i> = 237)	Winter (<i>N</i> = 272)	Total (<i>N</i> = 962)
Daytime symptoms (<i>p</i> = .85)					
0–12 symptoms	64 (7%)	89 (9%)	72 (7%)	85 (9%)	310 (32%)
13–52 symptoms	55 (6%)	52 (5%)	62 (6%)	74 (8%)	243 (25%)
53–365 symptoms	58 (6%)	59 (6%)	62 (6%)	71 (7%)	250 (26%)
>365 symptoms	34 (4%)	41 (4%)	41 (4%)	42 (4%)	158 (16%)
Nighttime symptoms (<i>p</i> = .76)					
0–12 symptoms	100 (47%)	122 (51%)	107 (45%)	126 (46%)	455 (47%)
13–52 symptoms	50 (24%)	48 (20%)	61 (26%)	67 (25%)	226 (24%)
53–365 symptoms	43 (20%)	47 (20%)	39 (16%)	51 (19%)	180 (19%)
>365 symptoms	18 (8%)	24 (10%)	30 (13%)	28 (10%)	100 (10%)
Severity classification (<i>p</i> = .99)					
Intermittent	115 (12%)	137 (14%)	131 (14%)	151 (16%)	534 (56%)
Mild persistent	42 (4%)	46 (5%)	49 (5%)	53 (6%)	190 (20%)
Moderate persistent	28 (3%)	32 (3%)	26 (3%)	34 (4%)	120 (13%)
Severe persistent	24 (3%)	23 (2%)	25 (3%)	31 (3%)	103 (11%)

^aSymptoms at daytime asked include cough, cough with exercise, wheeze with cold, wheeze without cold, wheeze with exercise, short breath, heavy chest, and mucus; symptoms at nighttime asked include cough, wheeze with cold, wheeze without cold, short breath, heavy chest, and mucus.

significantly associated with birth season. Asthma severity was also not related to season of birth, adjusting for age, gender, parent being a smoker, and/or parent income.

Parent smoking status was significantly associated with daytime symptoms ($p < .001$) and marginally associated with nighttime symptoms ($p = .06$). The estimated odds of having a higher level of daytime symptom frequency for children with parent(s) who smoked were 1.53 times the odds for children without a smoker parent (95% CI = [1.19, 1.95]). Also, female children were more likely to have less frequent daytime and nighttime symptoms (OR = 0.80, 95% CI = [0.63, 1.02]). On the other hand, child age and parent income were associated with symptom severity. Younger children were likely to have less severe asthma compared to children at age of 13 years, but the only significant difference was found at age of 11 years (OR = 0.42, 95% CI = [0.21, 0.80]), adjusting for the covariates. Again, adjusting for the covariates, the odds for children of parents with income less than \$15,000 per annum to have higher levels of asthma severity were estimated to be 1.96 times compared to children with parents' income greater than \$40,000 per annum (95% CI = [1.31, 2.95]).

DISCUSSION

Ten studies to date have noted associations between season of birth and subsequent asthma and/or allergy although no season predominated across these studies reducing confidence that any one season is causally associated with the condition. Three previous investigations found no association. Data from this study represented a large number of children from a population shown to have higher prevalence of asthma and atopy and at high priority for clinical intervention. Assisting low-income African American children and reducing significant asthma disparities evident in this group require use of all available means to identify those at risk. However, findings from this study of a large number of children indicate that season of birth is not a valuable indicator of risk. As such these findings do not support the idea that there are subsequent effects (presence of asthma and allergy) from early exposure to seasonal factors.

The divergent findings from the available studies, including this one, raise interesting questions. Do differences result from variation in methods employed across studies? Do differences reflect diverse populations or locales? Do they fail to account for a core set of variables that need to be controlled in such an exploration? Do small sample sizes affect results? As noted, the research presented here targeted a large number of children with greater prevalence of the conditions of interest and as a result amplified the opportunity to reliably associate season of birth with asthma and allergy. Further, it controlled for factors that are associated with development and/or exacerbation of both. Employing these elements in the investigation greatly increases the confidence in the results.

However, there are potential limitations to this study. One-fourth of the eligible population identified through the initial questionnaire survey did not respond to requests for

completion of the subsequent telephone interview. Using the available information, including age, gender, and asthma symptom frequency, on children of nonresponding parents ($N = 330$), we compared them with responders ($N = 962$). There was no indication that children of responders differed from nonresponders (all variables $p > .20$). In addition, the association between season of birth and asthma symptom frequency when questionnaire survey data were used ($N = 1292$), adjusting for age and gender, again illustrated no significant association ($p = .89$). Therefore, it is unlikely that a significant association between season of birth and symptom frequency would exist with inclusion of these nonresponders.

Another potential limitation concerns the timing of data collection. It may be that asthma and/or allergic rhinitis may have been more evident if data were collected when the child was at a younger age, that is, closer to birth season. Boys, in particular, can experience reduction in asthma symptoms by adolescence. Girls, on the other hand, are more likely to develop asthma symptoms by puberty (22). As such, timing of data collection in this study likely did not greatly influence findings. Finally, our study did not assess allergy alone. To be eligible, a child had to fit criteria for asthma. We then ascertained whether or not the child had been diagnosed with allergy by the physician. It may be that season of birth is associated with allergy only, that is, excluding children with asthma, but we could not test this assumption in our data set.

Pets, as a precipitating factor in development of asthma or allergy, were not a consideration in the study analyses. On average, about 16% of families reported that currently pets were a trigger to asthma symptoms. Slightly more children born in the fall reported asthma symptoms on such exposure. No information was available regarding pet exposure at time of birth which was the developmental time period of concern in this study. Finally, it was not possible to assess environmental factors in the neighborhoods where study children reside and we do not know whether and how these factors might be important in a study such as ours.

The findings from this research regarding the relationship between season of birth and presence of asthma and allergy in a preteen, low-income, African American population found no significant association. Identifying children at risk similar to the study population by virtue of their date of birth is unlikely to provide useful clinical information.

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DECLARATION OF INTEREST

The authors report no conflict of interest.

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