

ALTERNATIVE MEDICINE

Complementary and Alternative Medicine Behaviors and Beliefs in Urban Adolescents with Asthma

SIAN COTTON, PH.D.,^{1,2,3,*} CHRISTINA M. LUBERTO, B.A.,^{1,4} MICHAEL S. YI, M.D., M.SC.,^{2,3,5}
AND JOEL TSEVAT, M.D., M.P.H.^{5,6}

¹Department of Family and Community Medicine, University of Cincinnati College of Medicine, Cincinnati, OH, USA.

²Department of Pediatrics, University of Cincinnati College of Medicine, Cincinnati, OH, USA.

³Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA.

⁴Department of Psychology, University of Cincinnati College of Arts and Sciences, Cincinnati, OH, USA.

⁵Division of General Internal Medicine, Department of Internal Medicine, University of Cincinnati College of Medicine, Cincinnati, OH, USA.

⁶Health Services Research and Development, Veterans Affairs Medical Center, Cincinnati, OH, USA.

Background/purpose. Up to 80% of adolescents with asthma have used complementary and alternative medicine (CAM) for symptom management. However, little is known about patient characteristics associated with CAM factors other than use. Previous studies recommend provider–patient discussion of CAM use, although few adolescents with asthma disclose their CAM use to their providers. To inform clinical interactions, this study examined prevalence and predictors of CAM use, consideration of use, disclosure of use, and perceived efficacy of use, in urban adolescents with asthma. **Methods.** Adolescents with asthma ($N = 151$) recruited from a children's hospital completed questionnaires addressing demographic and clinical variables and 10 CAM modalities. Response frequencies to four questions assessing CAM use, consideration of use, disclosure, and perceived efficacy were calculated for each modality. Multivariable logistic regression analyses examined characteristics associated with responses to each question for the two most commonly used CAM modalities. **Results.** Participants' mean age was 15.8 ($SD = 1.8$), 60% were female and 85% were African-American. Seventy-one percent reported using CAM for symptom management in the past month. Relaxation (64%) and prayer (61%) were the most frequently reported modalities and were perceived to be the most efficacious. Adolescents most commonly reported considering using relaxation (85%) and prayer (80%) for future symptom management. Participants were most likely to disclose their use of yoga (59%) and diet (57%), and least likely to disclose prayer (33%) and guided imagery (36%) to providers. In multivariable analyses, older adolescents ($OR = 1.27, p < .05$) and African-Americans ($OR = 2.76, p < .05$) were more likely to use relaxation. Adolescents with more frequent asthma symptoms ($OR = 0.98, p < .05$) were more likely to use prayer. African-Americans were more likely to report using prayer ($OR = 3.47, p < .05$) and consider using prayer ($OR = 7.98, p < .01$) in the future for symptom management. **Conclusions.** Many urban adolescents used and would consider using CAM, specifically relaxation and prayer, for asthma symptom management. African-Americans, older adolescents, and those with more frequent symptoms were more likely to use and/or consider using CAM. Providers caring for urban adolescents with asthma should discuss CAM with patients, particularly those identified as likely to use CAM. Future studies should examine relationships between CAM use and health outcomes.

Keywords adolescents, asthma, complementary and alternative medicine, patient–provider, prayer, relaxation

INTRODUCTION

Asthma is a common lung disease characterized by chronic airway inflammation, episodes of airway constriction, and increased mucus production in response to a variety of stimuli that can result in symptoms of wheezing, coughing, and shortness of breath (1).

Affecting approximately 9% (6.7 million) of children under the age of 17 (2), asthma is the third leading cause of hospitalization for children and adolescents under the age of 15 (3). Asthma disproportionately affects children from urban, low-income backgrounds and causes higher rates of morbidity and mortality among minority children (4). Compared with their healthy peers, adolescents with asthma are at greater risk for impaired health-related

quality of life (HRQoL) (5), anxiety-related problems (6), and academic difficulties (7).

Conventional treatments for asthma include fast-acting rescue inhalers (e.g., albuterol) as well as preventive anti-inflammatory medications (e.g., fluticasone). Dissatisfaction with conventional medications and concerns about side effects may prompt individuals with asthma to seek out complementary and alternative medicine (CAM) (8, 9). Among some ethnic minorities, CAM techniques may be used as a result of religious/cultural beliefs regarding the safety and efficacy of conventional medication. For example, in a qualitative study of African-Americans with hypertension, participants expressed concerns that medications were harmful and ineffective, and that physicians and pharmaceutical companies could not be trusted (10). CAM has been defined as a “group of diverse medical and health care systems, practices, and products that are not presently considered to be part of conventional medicine” (11).

*Corresponding author: Sian Cotton, PhD, University of Cincinnati College of Medicine, P.O. Box 670840, Cincinnati, OH 45267-0840, USA; Fax: 513-558-2744; E-mail: sian.cotton@uc.edu

The National Center for Complementary and Alternative Medicine (NCCAM) groups CAM practices into four domains: (1) natural products (dietary supplements), (2) mind–body medicine (e.g., progressive relaxation or guided imagery), (3) manipulative and body-based practices (e.g., massage therapy), and (4) other CAM practices (e.g., healing touch, whole medical systems) (11). Of note, there is increasing debate whether prayer, a common behavior for many people (12–14), should be included in the formal definition of CAM (15). In fact, NCCAM recently reorganized its definitions of CAM (11) and no longer specifically mentions prayer as an example of mind–body medicine. Given this recent transition in definitions, we chose to incorporate prayer use as one of the CAM modalities to be assessed in this study, although we examined behaviors and beliefs about prayer as an individual modality (rather than as a composite with other mind–body modalities) to assess its unique characteristics in urban adolescents.

The use of CAM among individuals with chronic illnesses has dramatically increased in the United States in recent years (16). Among adults with asthma, prevalence rates of CAM use range from 6 to 79% in adults (17–20) and 13–89% in children and adolescents with asthma (21–24). Adolescents with asthma have been reported to use CAM for a variety of reasons including improved symptom management, concerns about and/or dissatisfaction with conventional therapies, and a belief in “more natural,” alternative methods (8, 25). In the only previous study of CAM use in adolescents with asthma that used adolescent, rather than parent, self-report, 80% of 160 mostly Hispanic urban adolescents reported using CAM for asthma symptom management in the past year (26). Although not assessed by specific CAM modality, 73% reported that CAM use in general was effective in improving their asthma symptoms and 66% indicated that they would use CAM modalities again in the future (26). Another study of the prevalence and patterns of CAM use as reported by parents of children with asthma (25) found that 49% of children used CAM for asthma symptom management during their lifetime and that poor asthma control was associated with the use of CAM modalities.

CAM use has been shown to differ by certain sociodemographic and clinical characteristics. For example, although the prevalence of CAM use is fairly consistent across ethnic groups (27), the use of specific CAM modalities has been shown to differ depending on ethnicity. For example, African-Americans and Hispanics report higher rates of mind–body CAM use (e.g., guided imagery, prayer) as compared to Whites (12), whereas Whites report a greater use of chiropractic services (27). In general, adolescent females report higher rates of CAM use than males (27, 28). Regarding asthma, higher rates of CAM use have been reported by those with poorer asthma control. For example, among 174 children with asthma, CAM use was associated with more asthma symptoms and more frequent doctor visits (8).

Although previous studies provide important information regarding CAM use among adolescents with asthma,

several important gaps remain in the literature. With the exception of CAM use and some information on consideration of CAM use, the specific demographic and clinical factors associated with important CAM-related behaviors (e.g., disclosure of CAM use to providers) and beliefs (e.g., perceived efficacy of CAM use) have yet to be examined. As CAM modalities are being more rigorously tested for their potential to affect outcomes (29, 30), understanding factors associated with CAM behaviors and beliefs is critical when designing future interventions. Moreover, with the exception of the study by Reznik and colleagues (26), data regarding CAM use in asthma have been based primarily on reports by parents/caregivers (16, 25), rather than adolescent self-report; thus, previous research may not accurately represent the adolescent patient’s perspective. Examining adolescent self-report is particularly important as rapid development and growth in autonomy allows for a shift from parental management of illness to increased adolescent responsibility for asthma management (31).

Therefore, the purpose of this study was to (1) determine the frequency of CAM use, consideration of CAM use, disclosure of CAM use, and perceived efficacy of CAM use of 10 CAM modalities in urban adolescents with asthma; and (2) in the two most often used CAM modalities, to determine demographic and clinical characteristics associated with CAM use, consideration of use, disclosure, and perceived efficacy, through adolescent self-report. Based on previous studies, we hypothesized that African-Americans (16), girls (28), and those with poorer asthma control (8, 17) would both use CAM more and be more interested in using CAM in the future for symptom management.

METHODS

Participants

Our study sample consisted of 151 adolescents with asthma enrolled in a larger longitudinal study examining religious coping and health-related quality of life in adolescents with asthma (32, 33). Adolescents were recruited from the Teen Health Center at Cincinnati Children’s Hospital Medical Center (CCHMC) between January 2008 and November 2009. Eligible adolescents had a diagnosis of asthma, were 11–19 years old, and spoke English. Participants completed questionnaires following their clinic visits or at prearranged times and were compensated \$25 for their time and travel. This study was approved by the CCHMC Institutional Review Board, and appropriate informed consent/assent was obtained.

MEASURES

Independent and Descriptive Variables

Demographic/Clinical. Demographic data including age, sex, race/ethnicity, education level, religious preference, and parental education level (of the most

highly educated primary caregiver) and insurance status (proxy for socioeconomic status) were obtained through adolescent report and chart review. According to criterion set forth by the National Heart, Lung and Blood Institute, which is used as the standard of care, adolescent disease severity was rated by patient physicians and was obtained through chart review (34). These guidelines for assessing asthma severity are commonly used in asthma research (35–37).

Asthma Symptoms. The asthma symptoms subscale of the PedsQL™ Asthma Module was used to assess asthma symptoms in the past month. Participants rated how much of a problem each item (e.g., “I feel wheezy”) has been for him or her in the past month on a 5-point Likert scale ranging from 1–“never” to 5–“almost always.” Items were reverse-coded according to the scale 100– “never” to 0– “almost always,” and the total score was derived by dividing the response sum by the number of answered items. Possible scores range from 0 to 100 with higher scores indicating better quality of life (i.e., fewer asthma symptoms). Internal consistency, as assessed with Cronbach’s α , in this sample was acceptable ($\alpha = 0.88$).

Dependent Variables

Regular CAM Use for Symptom Management. We used previously developed items addressing adolescents’ use of five mind–body CAM modalities (prayer, guided imagery, relaxation, meditation, yoga) (38), plus five additional modalities often used in adolescents with asthma (biofeedback, massage, herbs/vitamins, dietary changes [e.g., eating less dairy products], therapeutic ointments/rubs [e.g., Vicks VapoRub]) (39–41) to create one questionnaire that measured all dependent variables. Each CAM modality was defined in writing for the participant. The question measuring CAM use read: “How often do you use [X modality] for symptom management?” Responses were rated on a 5-point Likert scale ranging from 1–“I never used this in the last month” to 5–“I used this about one time per day or more in the past month.”

Consideration of CAM Use for Symptom Management. Using this questionnaire, we assessed the consideration of use of each CAM modality by asking, “Would you consider using [X modality] for symptom management [yes or no],” with lower values representing the willingness to consider using that CAM modality (1 = yes, 2 = no). Of note, the two CAM questions about use/consideration of use were not mutually exclusive; therefore, a participant reporting that he/she would be willing to consider using a CAM modality in the future could also report that he/she is a “regular user of CAM.”

Disclosure of CAM Use to Provider. The questionnaire was also used to assess whether participants informed their medical practitioners of their CAM use by asking, “Did you tell your doctor/provider that you are using this method [yes or no]?” Lower values indicated the disclosure of CAM use to physicians (1 = yes, 2 = no). Scores for disclosure were only calculated for those participants

who reported using a specific modality more than once in the past month.

Perceived Efficacy of CAM Use. The same questionnaire assessed whether the adolescent felt that the CAM technique was efficacious in managing their asthma symptoms by asking, “Do you think using this method improved your asthma symptoms [yes or no]?” Lower values indicated the perceived efficacy of CAM (1 = yes, 2 = no). Scores were only calculated for those participants who reported using a specific modality more than once in the past month.

Statistical Analyses

We examined frequency distributions of study variables and checked for skewness and kurtosis of continuous variables to assess normality assumptions. Given the non-normal distribution of regular relaxation ($W = 0.89$, $p < .001$) and regular prayer ($W = 0.84$, $p < .001$) use, these variables were dichotomized as high usage (once a week or more in the past month) versus low usage (never or only once in the past month) for all subsequent analyses. Response frequencies for all four CAM questions were examined for each of the 10 CAM modalities. We also examined what percentage of non-CAM users would be willing to consider using CAM modalities in the future. Eight multivariable logistic regression models were calculated to examine demographic (i.e., age, gender, ethnicity) and clinical (i.e., asthma symptoms) characteristics associated with CAM use, consideration of use, disclosure of use, and perceived efficacy of use for the two most commonly used CAM modalities. The top two, rather than just the top one modality, were chosen as their rates of use were so similar to each other and appreciably higher when compared with the other eight modalities. A backward elimination strategy was used until only predictors significant at $p < .05$ remained in the final models. Only significant regression models and significant final predictors are presented in the regression table. Analyses for disclosure and perceived efficacy were only examined for the subset of patients who reported using each particular modality (e.g., the efficacy of relaxation was only assessed for those participants who reported being a “regular user” of relaxation). Level of self-reported asthma symptoms, rather than asthma severity, was used as an indicator of asthma control in the regression models given that asthma control better reflects the actual manifestations of the disease (42) as compared to severity. All analyses were performed using SPSS, version 18.0.0 (43).

RESULTS

Participants

The mean (SD) age of the participants was 15.8 (1.8) years; 91 (60%) were female; and 129 (85%) were African-American (Table 1). Approximately, half (48%) of the sample had intermittent asthma and the mean (SD) score on the asthma symptoms subscale was 61 (20). Seventy-four adolescents (49%) used general prayer

TABLE 1.—Demographic and clinical characteristics.

Variables		Range
Mean (SD) age, years	15.8 (1.8)	12–19
Sex		
Male, <i>N</i> (%)	60 (40)	
Female, <i>N</i> (%)	91 (60)	
Race/Ethnicity		
White (not Hispanic), <i>N</i> (%)	13 (9)	
Black/African-American (not Hispanic), <i>N</i> (%)	129 (85)	
Asian or Pacific Islander, <i>N</i> (%)	1 (1)	
Native American or Alaskan Native, <i>N</i> (%)	1 (1)	
Biracial, <i>N</i> (%)	4 (3)	
Other, <i>N</i> (%)	3 (2.0)	
Health insurance ^a		
Private, <i>N</i> (%)	20 (13)	
Public, <i>N</i> (%)	101 (66)	
None, <i>N</i> (%)	26 (17)	
Highest level of participant education ^b		
Grade 6–8, <i>N</i> (%)	27 (18)	
Grade 9–12, <i>N</i> (%)	102 (68)	
In GED program, <i>N</i> (%)	6 (4)	
In college, <i>N</i> (%)	2 (1)	
Not currently in school	12 (8)	
Home schooled	1 (1)	
Highest level of parental education ^c		
Did not finish high school, <i>N</i> (%)	21 (14)	
Graduated high school or passed GED exam, <i>N</i> (%)	44 (29)	
Received some college education, <i>N</i> (%)	42 (28)	
Graduated from college, <i>N</i> (%)	31 (21)	
Graduate with an advanced degree, <i>N</i> (%)	3 (2)	
Not sure, <i>N</i> (%)	9 (6)	
Medications		
Inhaled corticosteroids, <i>N</i> (%)	81 (51)	
Oral corticosteroids, <i>N</i> (%)	4 (3)	
Inhaled beta-agonists, <i>N</i> (%)	139 (98)	
Other, <i>N</i> (%)	10 (7)	
Asthma severity ^d		
Intermittent, <i>N</i> (%)	72 (48)	
Mild persistent, <i>N</i> (%)	38 (25)	
Moderate persistent, <i>N</i> (%)	36 (24)	
Severe persistent, <i>N</i> (%)	5 (3)	
Pediatric quality of life, <i>M</i> (SD)		
Asthma symptoms score	61 (20)	14–100

Note: GED, General Equivalency Diploma.

^a*N* = 147.

^b*N* = 150.

^cHighest level of parental (mother or father) or caregiver education was used.

^dAccording to National Heart Lung and Blood Institute criteria.

daily (not asthma specific) and 122 adolescents (80%) identified as being spiritual and religious (for additional religious/spiritual sample information refer to Cotton et al. (38)). Furthermore, 47 adolescents (30%) reported the daily use of prayer specifically for asthma symptom management. Overall, 105 adolescents (71%) reported using some form of CAM for symptom management in the last 30 days. This overall figure changes to 89 (59%) when prayer use is not included.

In bivariate analyses, gender was not significantly associated with the use, consideration of use, perceived efficacy, and/or disclosure of relaxation and/or prayer. African-American ethnicity was related to a greater use of relaxation ($\chi^2 = 4.74$, $p < .05$), a greater use of prayer ($\chi^2 = 6.61$, $p < .01$), a greater consideration of prayer for future symptom management ($\chi^2 = 19.63$,

$p < .01$), and more perceived efficacy of prayer ($\chi^2 = 7.00$, $p < .01$) when compared with non-African-Americans. Associations between age, asthma symptoms, and outcome variables are presented in Table 2.

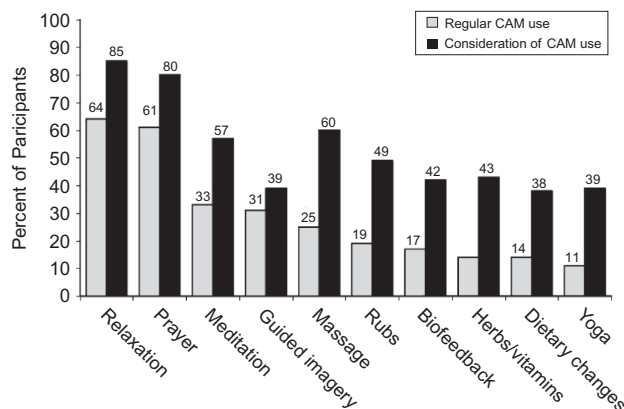
Regular CAM Use

Adolescents with asthma reported using relaxation ($n = 96$ [64%]) and/or prayer ($n = 92$ [61%]) most commonly for symptom management in the past month (Figure 1). Use of relaxation was associated with older age ($\beta = 0.26$, OR = 1.30, $p < .01$) and African-American ethnicity ($\beta = 1.14$, OR = 3.12, $p < .05$; model *C*-statistic = 0.65; Table 3). Use of prayer was associated with being African-American ($\beta = 1.42$, OR = 4.14, $p \leq .01$) and reporting more frequent asthma symptoms ($\beta = -0.02$, OR = 0.98, $p < .01$; model *C*-statistic = 0.68). Gender

TABLE 2.—Correlations between predictor variables and CAM outcomes.

Variables	Age	Asthma symptoms
CAM use		
Prayer	0.02	−0.20*
Relaxation	0.21*	−0.05
Consideration of CAM use		
Prayer	−0.04	−0.06
Relaxation	0.14	0.09
Perceived efficacy of CAM use		
Prayer	−0.05	−0.18*
Relaxation	0.14	−0.03
Disclosure of CAM use		
Prayer	−0.06	−0.06
Relaxation	0.05	−0.10

P-value:

* $p < .05$.FIGURE 1.—Frequency and consideration of CAM use by modality, $N = 151$. Note: CAM, complementary and alternative medicine.

was not significantly associated with the use of relaxation and/or prayer.

Consideration of CAM Use

Relaxation ($n = 129$ [85%]) and prayer ($n = 121$ [80%]) were the most common CAM modalities that adolescents would consider using in the future for symptom management (Figure 1). Amongst nonregular users of CAM,

relaxation ($n = 37$ [67%]) and prayer ($n = 33$ [57%]) were the two CAM modalities that they would most consider using in the future for symptom management. African-Americans were more likely than non-African-Americans to consider using prayer in the future ($\beta = 2.08$, OR = 7.98, $p < .01$; model C -statistic = 0.66; Table 3). No other demographic or clinical variables were significantly associated with the consideration of use of prayer, and none of the measured variables were significantly associated with the consideration of relaxation for symptom management.

Disclosure of CAM Use

Disclosure of CAM use was assessed among the subset of participants who reported using a given modality. Adolescents were most likely to tell their provider about their use of yoga ($n = 10$ [59%]) and dietary changes ($n = 12$ [57%]), and least likely to disclose their use of prayer ($n = 30$ [33%]) and guided imagery ($n = 17$ [36%]; Table 2). No clinical or demographic predictors were significantly associated with either the disclosure of relaxation or the disclosure of use of prayer for symptom management.

Perceived Efficacy of CAM

Among those who used the modality, relaxation ($n = 83$ [87%]) and prayer ($n = 78$ [85%]) were perceived to be the most helpful CAM modalities, whereas imagery ($n = 29$ [64%]) and massage ($n = 29$ [76%]) were perceived to be the least helpful (see Table 2). Perceiving that relaxation was effective for managing symptoms was associated with older age ($\beta = 0.35$, OR = 1.42, $p < .05$; model C -statistic = 0.59; Table 3). In logistic regression analyses, no demographic or clinical characteristics were significantly associated with the perceived efficacy of prayer.

DISCUSSION

The purpose of this study was to examine the prevalence and predictors of CAM use, consideration of use, disclosure to providers, and perceived efficacy among urban,

TABLE 3.—Multivariable logistic regression results.

Variable	β	OR	95% CI	Model C -statistic
Regular use				
Relaxation				0.65
Older age	0.26	1.30**	1.07–1.59	
African-American race	1.14	3.12*	1.18–8.25	
Prayer				0.68
African-American race	1.42	4.14**	1.50–11.48	
More asthma symptoms	−0.02	0.98**	0.96–100	
Consideration of use of prayer				0.66
African-American race	2.08	7.98**	2.88–22.09	
Perceived efficacy of relaxation				0.67
Older age	0.18	1.19*	0.99–2.02	

Note: Only significant models and significant predictors are presented.

P-values:

* $p \leq .05$, ** $p \leq .01$.

primarily African-American, adolescents with asthma. Similar to previous studies (16, 22, 26, 44), most of these adolescents (71%) reported using some form of CAM for symptom management in the past 30 days. Relaxation and prayer were the most often cited modalities being used, partly in line with previous research (16). In the only other adolescent self-report study of CAM use, 74% reported most often using rubs (26), as compared with only 19% of adolescents reporting the use of rubs in this study. Still other studies reported that vitamins and minerals (8) and quail eggs (in Turkish children) (25) were the most commonly reported CAM modalities in children with asthma. The observed differences in popularity of different CAM modalities are most likely a factor of the different cultural and ethnic groups being assessed. For example, given the relative salience of religion in the African-American community (45), it is not surprising that the use of prayer was relatively high in our sample of mostly African-American adolescents—a finding echoed in other studies of adult CAM use (46).

Our study was one of the few (41, 47) to report which specific CAM modalities adolescents with asthma would consider using in the future for symptom management—the top three in this study being relaxation, prayer, and massage. Our study was also the first to examine the characteristics of those who would consider using a specific CAM modality for asthma symptom management in the future, revealing that African-Americans are more likely than non-African-Americans to consider the use of prayer for symptom management. Knowing who would consider using CAM for symptom management is important as researchers decide who to target for the increasing number of randomized controlled trials testing the efficacy of CAM modalities for impacting outcomes in adolescents with a chronic illness (29, 30). Of note, although relaxation and prayer were perceived to be the most efficacious CAM modalities for treating asthma symptoms, adolescents were least likely to tell their provider about their use of prayer. Previous studies have shown that patients often do not report their use of prayer or religion to help cope with chronic illness symptoms (47). These findings should inform clinical encounters with urban adolescents with asthma, as they report not only using, but also not talking about their use of, many CAM modalities. In addition, most of these adolescents would consider using some CAM modalities for symptom management in the future. Given that many of these modalities are free or low cost, are accessible to most patients, and are portable (38), they should be further evaluated regarding safety and efficacy in urban adolescents with asthma.

Similar to previous studies that found that children with poor asthma control were more likely to use CAM than those with less controlled asthma (8, 17, 25, 26), we found that adolescents with more frequent asthma symptoms were more likely to report the use of prayer for symptom management. Given the cross-sectional nature of this study, we are unable to determine the directionality of this relationship. That is, it is unclear whether these adolescents have poorly controlled asthma because,

for example, they are using prayer in lieu of their medications or whether adolescents with poorly controlled asthma turn to prayer because of their increased symptoms. Future studies in which more sophisticated analyses (e.g., cross-lagged designs), qualitative methods, and/or more thorough detailed exploration of CAM use (e.g., are adolescents using prayer as a complement or an alternative to conventional medicine) are utilized are needed. Regarding ethnic/racial differences, African-Americans were more frequent CAM users. Specifically, in line with past research (44), African-Americans used mind–body CAM modalities more than their non-African-American counterparts and were more willing to both use and consider using prayer in the future for symptom management. This finding may be due in part to cultural norms, as the use of such mind–body modalities, particularly prayer, is considered more widely acceptable in ethnic minority populations (44, 45). Contrary to previous findings (27, 28), female gender was not significantly associated with the use or considered use of relaxation and/or prayer. One possible explanation for this discrepancy is that gender differences in CAM use are particular to specific modalities other than relaxation and prayer. Future work is needed to identify potential gender differences in the use of other CAM modalities (e.g., yoga, massage) to better target recruitment for intervention trials.

Similar to Reznik and colleagues' study of adolescents with asthma, in which only 54% disclosed their use of CAM (26), rates of disclosure among our adolescents ranged from 33 to 59%, depending on the CAM modality. The use of prayer and herbs for symptom management was less likely to be disclosed than the use of other CAM modalities, corroborating results from a study of adolescents by Wilson and Klein (47). Such nondisclosure of CAM use may compromise the patient–provider relationship and may undermine the provider's ability to provide comprehensive informed treatment to the patient. In addition to concerns about potential adverse interactions between CAM and conventional treatments (48), providers who are aware of their patients' CAM use have additional insight into the patient's personal values, lifestyle, and beliefs (49), which may ultimately affect patient behavior and/or adherence to prescribed therapies. Rates of disclosure of relaxation and prayer were not associated with demographic or clinical variables in our study, meaning that no particular group was any more likely to disclose their use of CAM than another, thus suggesting that providers should routinely ask all urban adolescent patients with asthma about their CAM use.

The issue of inclusion or prayer in our study bears consideration. Although the debate continues on whether prayer should be considered CAM, this does not in itself mean that CAM studies should no longer include prayer or spiritual healing. In fact, given that the majority of studies on coping with illness and symptom management do not routinely address the use of prayer, it is concerning that prayer might be considered neither "CAM" nor conventional medicine. Given the large body of literature that supports the importance of issues of religious

coping and prayer to many patients with chronic illnesses (50) this potential exclusion or omission could be problematic. As such, we suggest that future studies clarify upfront whether their definition of CAM includes the use of prayer and that studies assessing psychosocial functioning and coping with illness routinely assess the use of prayer.

Regarding perceived efficacy of CAM modalities, 64–78% of adolescents who used CAM reported it to be effective for improving symptoms, depending on the CAM modality (26). Perceived efficacy was greatest for relaxation and prayer—a finding not previously reported in adolescents with asthma. This overall rate is similar to findings by Reznik and coauthors, who reported that 73% of adolescents with asthma thought that their CAM treatment was effective in treating their asthma—although that study did not assess perceived efficacy by specific CAM modality. Perceptions of treatment efficacy are important among adolescents with asthma, as their attitudes toward their disease and its treatment have been shown to influence their efforts at managing asthma. For example, negativity toward asthma medications has been identified as a barrier in adolescents' adherence to asthma treatment (51). Positive perceptions of CAM use are important to consider, particularly given that some adolescents report using CAM instead of their prescribed asthma medications (26).

Our study has several limitations worth noting. First, the number of participants approached for recruitment who declined to participate was not tracked over the course of the study and cannot be reported. Second, as the data were collected from one primary care center, findings may differ in other geographically and ethnically different groups of adolescents. Third, as with any self-report data, CAM behaviors may have been over- or underestimated or may reflect the socially desirable response. And lastly, although we did define in writing each CAM modality for participants, it is possible that adolescents conceptualized each modality differently (e.g., what they considered to be relaxing), which may have influenced their responses. These limitations notwithstanding, important conclusions can still be drawn.

Although evidence supporting the efficacy of CAM techniques for asthma management is currently limited (24, 52), many of these urban adolescents with asthma reported using CAM modalities for symptom management, many believed them to be efficacious, and most did not disclose their CAM use to their provider. Relaxation and prayer were the most common CAM modalities that adolescents both used and would consider using, specifically among older adolescents and African-Americans. Although we did not test the efficacy of these modalities for symptom improvement, it is possible that the use of these modalities can provide adolescents with coping tools that are accessible, of low-cost, and potentially empowering around their illness. Therefore, providers should not only be aware of issues surrounding CAM use, they should actively inquire about the use of various CAM modalities and whether such CAM techniques are

perceived to be effective. In addition, perceived efficacy of CAM should be explored in relation to the patient's overall asthma management efforts and in particular, the interface with conventional medical approaches. Future studies should rigorously assess the potential effectiveness of CAM modalities in reducing asthma symptoms and improving other health outcomes in adolescents.

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DECLARATION OF INTEREST

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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