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Asthma Self-Management is Sub-optimal in Urban Hispanic and African American/Black Early Adolescents with Uncontrolled Persistent Asthma

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Abstract

Introduction—Youth as young as 11 are given responsibility to manage their asthma. Yet, little is known regarding early adolescents' asthma self-management behaviors. This study characterizes urban early adolescents' asthma self-management behaviors and perceived responsibility to manage asthma, exploring demographic differences and examining the relationship between asthma responsibility and disease management.

Methods—317 Hispanic and Black early adolescents (mean age=12.7) with persistent, uncontrolled asthma reported prevention and symptom management steps, and responsibility for asthma care. We used Poisson, cumulative logistic, logistic, and linear mixed-effects regression models to assess relationships between demographic predictors, prevention and management behaviors, and responsibility for asthma care.

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Declaration of Interest

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Results—50% took 7–9 prevention steps; few saw physicians when asymptomatic or took daily medication. When symptomatic, 92% used medication to treat symptoms, 56% sought medical attention. Controlling for asthma responsibility, fewer older youth reported observing how they feel when asthma is likely to start, observing symptom changes, or asking for help. More boys reported taking medication daily or upon trigger exposure. Controlling for age, gender, and race/ethnicity, those reporting more asthma responsibility were less likely to report taking management steps, seeking preventive care, asking for help, or going to a doctor/hospital for their asthma.

Conclusions—Early adolescents' asthma self-management is suboptimal. With increasing age, they are less observant regarding their asthma and less likely to seek help. Although they perceive themselves to have greater responsibility for managing their asthma, early adolescents do less to care for their asthma, suggesting they are being given responsibility for asthma care prematurely.

Keywords

responsibility; inner-city; ethnic minority; chronic illness management

Introduction

Despite important progress in asthma management through enhancements in medications and dissemination of clinical guidelines, pediatric asthma continues to be a significant public health concern. Hispanic and Black children and those of lower socioeconomic status consistently have the highest asthma prevalence (1–3); within low-income populations, Hispanic and Black children have worse outcomes than white children (4, 5), but are less likely to use controller medications (5). Adolescents are also a vulnerable population. Compared to younger children, they have higher asthma prevalence (1), experience more frequent (6, 7) and more severe (8) exacerbations, and have higher asthma-related mortality rates (1), but receive less medical care (7).

Adolescence is a challenging time for asthma management because of the developmental transitions during this time, including increased separation from parents and being entrusted with more responsibility for asthma management (9, 10). Pediatric patients begin to manage their asthma at a young age (11, 12), with 50% of parents of 11-year olds reporting they delegate responsibility for taking daily medication to their children (11). Despite the increased responsibility, little is known about asthma management by adolescents (9). Among early adolescents, most of the focus has been on adherence to treatment regimens and trigger avoidance (13, 14); research has yet to consider other steps early adolescents take to manage asthma.

This study characterizes the prevention and management behaviors of urban Hispanic and African-American/Black early adolescents with uncontrolled persistent asthma. We explore age, gender, and race/ethnicity differences in asthma self-management. We also describe how early adolescents perceive their responsibility to manage asthma, and explore the relationship between asthma responsibility and disease management.

Methods

Participants

We utilized baseline data from a larger randomized controlled trial (RCT) testing the efficacy of a school-based intervention for early adolescents, ages 11 to 14, with uncontrolled asthma and their caregivers (15). This study was approved by the Institutional Review Boards of the New York University School of Medicine, Columbia University of College and Physicians, the New York City Department of Education, and the New York City Department of Health and Mental Hygiene. Families (n=392) were recruited over four years (2005–2008) from 27 New York City public middle schools serving predominately low-income, Hispanic and African-American/Black students. To be eligible for the intervention, caregivers reported on a symptom-focused case detection survey that their child had an asthma diagnosis, had taken prescribed asthma medication in the past 12 months, and had uncontrolled asthma.

We included only Hispanic (n=187) and African-American/Black (n=130) early adolescents in this analysis to permit exploration of racial/ethnic differences. We excluded two participants with intermittent asthma because their asthma management may differ from those with persistent asthma, in part because of the National Health Lung and Blood Institute (N.H.L.B.I.) practice guideline (16, 17) that those with persistent asthma take a daily, controller medication. Table 1 presents demographic and clinical characteristics of the sample (n=317).

Measurements

Early adolescents enrolled in the RCT completed surveys that were proctored by trained research assistants. Demographic items included the age, gender, and race/ethnicity. We measured asthma self-management using the *Asthma Prevention Index* and the *Asthma Management Index*, measures our team has developed and used in prior research. While not validated against other self-management instruments, both indices have good reliability (see below), and when used in clinical trials have detected change in self-management behaviors following participation in an intervention.(18–20)

The *Asthma Prevention Index* (21) consists of nine items regarding steps taken to prevent symptoms from starting, including taking medication before trigger exposure and making regular visits to the doctor for asthma even when not symptomatic. Item responses are on a 3-point scale, where 0=No, 1=Yes, but not on a regular basis, and 2=Yes, on a regular basis ($\alpha = 0.70$). Two scores are computed: (1) a total count of endorsed items allows for an understanding of how many steps are taken and (2) the mean of the items on the 3-point scale determines the regularity with which steps are taken.

The *Asthma Management Index* (21) consists of seven yes/no items regarding steps taken to manage symptoms once they begin, including watching to see if symptoms got better or worse, and asking for help ($\alpha = 0.53$); items are summed to compute the total number of management steps taken.

Participants completed the *Asthma Responsibility Questionnaire* (ARQ) (22), a 10-item validated measure assessing whether the early adolescent or parent takes responsibility for the asthma management. Items are on a 5-point scale (1=Parent takes responsibility all the time, 3=Parent and I share responsibility about equally, and 5=I take responsibility all the time); the mean is computed for an overall asthma responsibility score. We also examined individual items to explore activities for which the children were responsible.

We defined level of asthma control using caregiver responses on the symptom-based case detection survey completed during the enrollment phase of the RCT. Building on N.H.L.B.I. criteria (16) in place in 2005, the study's onset, we assigned the early adolescents one of three levels of uncontrolled asthma: (1) daily daytime symptoms that occurred all the time, or night awakening every night; (2) daily daytime symptoms that did not occur all the time or night awakening 3 – 6 nights a week; and (3) daytime symptoms three to six days a week, or night awakening three or more times per month, plus at least one urgent visit for asthma to a doctor, hospital, or Emergency Department in the past 12 months. These criteria are consistent with subsequent N.H.L.B.I. criteria for uncontrolled asthma (17).

Statistical Analyses

We first characterized self-management using descriptive statistics. To explore the relationships between early adolescent demographic characteristics and self-management, we modeled the total number of prevention steps, the total number of management steps, and the individual prevention and management items, as functions of demographic characteristics (i.e., age, gender, and race/ethnicity). Two models were fit for each outcome: 1) controlling for level asthma control (16, 17); and 2) controlling for level of asthma control and asthma responsibility. The distributions of outcomes were either Poisson (e.g., total number of steps taken), multinomial (e.g., regularity with which a prevention step is taken – never, sometimes, or regularly), or binary (e.g., whether or not a management step is taken). We modeled these outcomes using Poisson, cumulative logistic regression, or logistic regression models, respectively; to account for the possible between-subject correlation resulting from students being from the same cohort, we used Generalized Estimating Equations (GEE) (23). We modeled asthma responsibility, both the total score and individual items, as a function of the adolescent demographic characteristics, controlling for level of asthma control. The responsibility outcome is a continuous variable, and was modeled using linear mixed effects models with random effects for cohort. Lastly, we modeled the total number of prevention steps, the total number of management steps, as well as the individual prevention and management steps as a function of asthma responsibility, controlling for age and level of asthma control. We tested these models using Poisson, cumulative logistic regression, or logistic regression based on the distribution of the outcome.

Results

Prevention Steps

Early adolescents reported taking an average of 6.19 (SD=2.06) out of 9 prevention steps. Half (50%) took 7 – 9 prevention steps, 40% took 4 – 6 prevention steps, and 10% took 3 or

fewer steps. While each step was reported by no less than 55% of participants, there was considerable variability in the regularity with which individual steps were taken. Table 2 details the regularity with which steps were taken. Overall, 83% reported they stayed away from things they are allergic to or that bother their asthma, and 75% cleaned their room in a special way to remove triggers. While 55% took medication when getting a cold, 56% before trigger exposure, and 72% in cold weather, only one-third (31%, 29%, and 35%, respectively) did so regularly. Moreover, among those whose parents reported their child was prescribed a controller medication (69%; 219/317), only 36% of the early adolescents reported taking daily medication regularly, and 31% reported not taking daily medication at all. Additionally, only 24% regularly saw a physician for their asthma when asymptomatic.

Management Steps

On average, early adolescents reported taking 5.60 (SD=1.36) out of 7 steps to manage asthma once symptoms begin. Most (61%) took 6 – 7 steps, 30% took 4 – 5 steps, and 9% took 3 or fewer steps. Table 3 details the percentage of students endorsing each step. With the exception of going to a doctor or hospital, which was reported by 56% of the early adolescents, every step was reported by a large majority of students (74% to 92%). Specific noteworthy findings include that most used medication when symptoms began (92%) and 26% failed to ask for help when symptomatic.

Demographic Predictors of Self-Management

Age—Controlling for level of asthma control, there was no effect of age on the total number of prevention or management steps taken. However, when we considered individual prevention steps, older participants had significantly lower odds of paying attention to how they feel in situations where asthma may start (for one year increase in age, the odds ratio [OR] for paying attention: 0.82; 95% confidence interval [CI]: 0.70 – 0.96; $p = 0.02$). With respect to management, older participants had significantly lower odds of observing symptoms to see if they improve or get worse (OR for one year increase in age: 0.71; 95% CI: 0.54 – 0.95; $p = 0.02$), and asking for help once symptoms begin (OR: 0.72; CI, 0.57 – 0.91; $p = 0.01$). Results remained significant when responsibility was added to the model.

Gender—Controlling for level of asthma control, gender was not a significant predictor of how many steps early adolescents took to prevent or to manage asthma, nor any individual management item. However, when we examined individual prevention steps, boys had significantly higher odds of taking daily medication preventively (OR: 1.52; 95% CI: 1.09 – 2.11; $p = 0.01$) and taking medication before trigger exposure (OR: 1.62; 95% CI: 1.10 – 2.39; $p = 0.02$). After adding responsibility to the model, results remained significant. Additionally, boys now took more prevention steps (Ratio of number of steps taken by boys versus girls: 1.07; 95% CI: 1.00 – 1.13; $p = 0.03$).

Race/Ethnicity—Controlling for level of asthma control, there was no significant effect of race/ethnicity on the total number of prevention or management steps taken, nor on any individual management item. The model for individual prevention steps indicated that African-American/Black early adolescents had significantly lower odds of taking prescribed

medication in cold weather compared to Hispanics (OR: 0.58; 95% CI: 0.45 – 0.74; $p < 0.001$). This result remained significant after responsibility was added to the model.

Asthma Responsibility

The mean responsibility score was 2.48 (SD=0.93, range 1 – 5), indicating that on average, early adolescents perceive their caregivers as having more responsibility for their asthma care than themselves. Table 4 details the distribution of responsibility across individual items. Few early adolescents reported being mostly or fully responsible for noticing when their asthma gets worse (12%), starting treatments when symptoms occur (15%), staying away from triggers (32%), or remembering to take albuterol before trigger exposure (33%). In contrast, 53% reported being responsible for changing what they are doing when symptoms happen.

Demographic Predictors of Asthma Responsibility

Controlling for level of asthma control, no demographic factors significantly predicted the mean responsibility score; however, age and race/ethnicity, but not gender were significant predictors of individual aspects of responsibility. Older participants were significantly more likely to take responsibility for noticing when their asthma is starting or is getting worse (β regression coefficient = 0.14, standard error [SE] = 0.06; $p = 0.03$). Older participants were also more likely to be responsible for avoiding triggers ($\beta = 0.18$, SE = 0.08; $p = 0.02$). Additionally, compared to Hispanic early adolescents, African-American/Black early adolescents were significantly more likely to take responsibility for starting treatment when symptoms occur ($\beta = 0.37$, SE = 0.15; $p = 0.01$).

Asthma Responsibility as a Predictor of Self-Management

Controlling for age and level of asthma control, there was no effect of responsibility on the total number of prevention steps taken. However, those who reported taking more responsibility took significantly fewer steps to manage symptoms once they began (Ratio of steps taken for one point increase in responsibility, a measure between 1 and 5 (RR): 0.97; 95% CI: 0.95 – 0.99; $p = 0.01$); this corresponds to 0.50 to 1.00 step difference in the number of steps taken between early adolescents for whom caregivers take all responsibility (responsibility=1) and for whom the early adolescents is fully responsible (responsibility=5). To determine if a particular aspect of responsibility accounted for this finding, we modeled the total management score as a function of each individual responsibility item controlling for age and level of asthma control using Poisson regression. Early adolescents who reported more responsibility for the following four aspects of asthma care took significantly fewer steps to manage symptoms once they began: 1) starting treatment, like using an inhaler or breathing machine when symptoms happen (RR: 0.9976; 95% CI: 0.9958 – 0.9994); 2) remembering to use albuterol when going to be exposed to a trigger, like before exercise (RR: 0.9984; 95% CI: 0.9975 – 0.9993); 3) remembering to take the asthma drugs (or other treatment) along if going away from home (RR: 0.9979; 95% CI: 0.9964 – 0.9994); and 4) telling teachers they have asthma and explaining the symptoms (RR: 0.9979; 95% CI: 0.9962 – 0.9996). For each item, this corresponds to approximately only a 0.1 step difference in the number of steps taken between early adolescents whose caregivers take full

responsibility (responsibility=1) and early adolescents who are fully responsible (responsibility=5). The effect of each aspect of responsibility is minimal, but in combination account for the impact of responsibility on asthma management.

When testing individual prevention steps, participants who reported taking more responsibility had significantly lower odds of taking medication at signs of a cold (OR: 0.76; 95% CI: 0.62 – 0.94; $p = 0.01$), or seeing a medical provider for regular visits, even when asymptomatic (OR: 0.67; 95% CI: 0.56 – 0.81; $p < 0.001$). Once symptoms begin, early adolescents who reported taking more responsibility had significantly lower odds of resting (OR: 0.74; 95% CI: 0.57 – 0.96; $p = 0.02$), asking for help (OR: 0.70; 95% CI: 0.56 – 0.87; $p = 0.001$), or going to a doctor or hospital (OR: 0.74; 95% CI: 0.64 – 0.86; $p < 0.001$). Results remained significant when controlling for either gender or race/ethnicity.

Discussion

In a sample of urban, Hispanic and African-American/Black early adolescents with uncontrolled, persistent asthma, asthma prevention and management behaviors were suboptimal. A few findings are of particular concern. Although half reported taking steps to prevent symptoms, few indicated that they do so regularly. One step they reported taking on a regular basis is actively avoiding triggers to prevent symptoms; however, this strategy is insufficient as some triggers, like cold weather, cannot be controlled or avoided by patients. Additionally, such a prevention strategy limits adolescents from living a fully active life.

When symptomatic, many early adolescents failed to seek medical attention and some did not ask for any help. This implies inadequate supervision, or inadequate access to proper adult resources. The latter is problematic because parents or other adult family members take early adolescents to see clinicians and procure medication for them. Additionally, the early adolescents (a) lack regular physician follow-up, (b) do not take medication before trigger exposure, including during cold weather or when having a cold, and (c) fail to take their controller medication, a finding that is consistent with an African American early adolescent sample in Detroit (13). Together, this suggests that urban early adolescents use a reactive, “crisis-management” style when caring for their asthma, which may lead to worse disease outcomes and higher health-related costs, compared to an anticipatory, preventive method (24, 25). This interpretation is supported by the finding that participant’s as-needed reliever medication is refilled at higher rates than daily controller medication (26), and the fact that early adolescents are often not adherent to treatment regimens (13). This reactive management style is not unique to early adolescents; it has also been found to be used by parents (27, 28) as well as elementary school teachers (29), suggesting that early adolescents may learn to manage asthma reactively through modeling.

We found older participants reported paying less attention to symptoms both preventively and when symptomatic; compared to younger participants, they had lower odds of being attuned to symptoms in situations where asthma may start, and of observing if symptoms improved or worsened once they began. This finding is consistent with the notion that adolescents generally feel invulnerable to harmful situations or exposures (30, 31). Because of their perceived invulnerability, they do not view their asthma as serious or life threatening

(32) and therefore do less to care for it, putting them at high risk for negative outcomes associated with asthma, including life-threatening exacerbations.

After controlling for asthma responsibility, we found boys took more steps to prevent asthma. Specifically, they had higher odds of using medication preventively than girls. In contrast, Orrell-Valente and colleagues found that among predominately white youth ages 4 to 19, boys took less responsibility for taking daily controller medication (11). However, consistent with our findings, in a primarily African-American, inner-city early adolescent sample, Clark and colleagues found boys were more likely to use medication preventively, and were more comfortable using medication in front of peers (9). There are several plausible explanations for the finding that boys are more likely to use medication preventively. One is that given asthma occurs more frequently in males than females prior to puberty, but then occurs at a greater frequency in females post-puberty (33), the males in our sample may have been diagnosed for a longer time period, and thus more knowledgeable and/or confident in managing their asthma. To test this, we looked to see if there were gender differences in asthma knowledge and/or self-efficacy to manage asthma, and we found no differences according to gender in either asthma knowledge or asthma self-efficacy.

Alternatively, early adolescents may manage asthma in gender-specific ways (9), with girls incorporating their illness and treatment into their identities while boys avoid this (34). In fact, boys with a chronic disease perceive their illness as making them appear weak (34, 35). Therefore, to avoid having symptoms in front of peers, which may cause embarrassment, boys may use their medication preventively. That is, they would rather take medication to prevent symptoms than experience symptoms in front of peers.

Another possible explanation is that the caregivers continue to supervise illness management in their early adolescent sons but not their daughters. For example, mothers have been found to monitor boys more around diabetes (36), and thus are more aware of adherence to treatment regimens (36, 37). Therefore, the increased reporting by boys in this study of taking medication preventively may be due to increased parental supervision and prompting around their asthma.

The majority of the early adolescents in our sample perceived their caregivers as having more responsibility for their asthma care, with very few feeling they were responsible for managing their asthma by themselves. Unlike McQuaid and colleagues who found that among 7 to 15-year olds, older participants reported higher levels of responsibility than younger participants for their asthma management (22), we did not find a significant age difference for the overall responsibility score. However, we did find that older participants were more likely to report relatively greater responsibility for two specific management tasks: noticing if their asthma is starting to get worse, and avoiding triggers. This finding may be explained by the fact that during early adolescence students are in the process of becoming more independent and autonomous (31). Unlike older adolescents, early adolescents have not fully separated from parents; therefore, increases in overall asthma responsibility are not yet reported. But, with increased time away from their parents beginning, the older participants in this sample of early adolescents may have to take more

responsibility for caring for specific aspects of their asthma, particularly being mindful of avoiding asthma triggers and being aware of their asthma symptoms when they occur.

Similar to prior research (38), we found that, paradoxically, as participants get older they report more responsibility for managing specific aspects of their illness, but actually report doing less to prevent and manage it. In diseases such as cystic fibrosis and diabetes, early adolescence is often a period of decreased adherence, which does not improve until mid-adolescence (39, 40). This suggests that early adolescents may be being given the responsibility of caring for their asthma prematurely. They may not be ready to accept the responsibility, or they may not have developed the proper skills or confidence to self-manage their illness (10, 15).

There are limitations to this study. We utilized self-report data, which is potentially subject to under- or over-reporting of behaviors. Also, while it would have been interesting to learn why early adolescents were not executing particular disease management behaviors, our likert-scale response options precluded further understanding of this. Similarly, we were not able to ascertain why they felt responsible for certain behaviors. Our study lacked a comparison group of participants of the same age and race/ethnicity with persistent asthma that is well controlled, thus precluding our ability to ascertain if the management behaviors described here are ubiquitous to early adolescents with uncontrolled asthma. Also, the inclusion of only Hispanic and African American urban early adolescents limits the external validity of our findings; we are unable to answer important questions regarding the potential developmental differences between early, middle, and late adolescents and the potential role of socio-economic status and race/ethnicity in asthma management. Research utilizing both quantitative and qualitative instruments, observations or multi-person reporting of disease management and comparison groups that include diverse samples with both controlled and uncontrolled asthma will advance our understanding of what early adolescents do – or fail to do – to manage their asthma.

Despite these limitations, our findings have important clinical implications. Our finding that many of the early adolescents reported taking preventive steps at least some of the time suggests that they know what they should be doing to prevent symptoms. However, something precludes them from doing so regularly, and thus from controlling their asthma. Behavioral management interventions that instill regular preventive care in adolescents are warranted. Given the important role of peers in the lives of adolescents, interventions that utilize peer educators with controlled asthma should be considered. Tailored interventions, such as Puff City (41) and ASMA (18), should also be considered because asthma management varies between individuals due to different lifestyles and disease characteristics (42), as well as different skills and abilities of early adolescents.

Clinicians should consider targeting both parents and early adolescents to ensure the transfer of asthma responsibility to the adolescents is done seamlessly. Early adolescence is the ideal time to lay the foundation for proper transfer of care due to developmental gains made in adolescence (10, 43). Thus, clinicians have a unique opportunity to ensure early adolescents have the requisite skills needed to successfully manage their asthma. Simultaneously, clinicians should encourage and empower parents to support the development of self-

management skills in their early adolescent in ways that match their child's maturity level and skill set. They should help parents gradually transfer the responsibility of asthma management to their child, ensuring parents continue to monitor them.

As with the skills and abilities of early adolescents, the skills and abilities of parents vary from family unit to family unit, highlighting the need for individualized family education. We suggest clinicians assess asthma management skills and responsibilities of the early adolescent at each medical visit. Checklists, such as the indices used in this study, can easily be completed by both parents and early adolescents during a medical visit or while in the waiting room. Such information can provide a focal point for discussion between the parent, the early adolescent, and the clinician, and highlight areas of strength and weakness in asthma self-management, as well as areas of discord between the parent and early adolescent. Clinicians could utilize this information to discuss how the transfer of care is taking place. It is suggested that clinicians assign the early adolescent one task for which he or she is responsible using the checklist as a guide, and have parents monitor this task until the parent and early adolescent, as well as the clinician, are confident the task is properly executed.

In sum, asthma self-management of early adolescents is suboptimal. While many report taking steps to prevent their asthma, they do not do so with regularity. Further, those who report being more responsible for their asthma management, report doing less to care for their asthma, suggesting they are being given the responsibility to manage their asthma prematurely. Clinicians should simultaneously assist early adolescents in developing the requisite skills needed to self-manage their asthma and assist parents in gradually transferring the responsibility of asthma management to their children in developmentally appropriate ways.

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Table 1

Demographic and baseline clinical characteristics (N = 317).

	% (N)
Child Demographic Characteristics	
Age, mean $\pm$ SD, yr	12.71 $\pm$ 1.11
Male	54 (170)
Ethnicity	
Hispanic	59 (187)
African American/Black, not of Hispanic origin	41 (130)
Caregiver demographic characteristics	
Relation to child	
Biological or adoptive mother	90 (286)
Other	10 (37)
Marital status	
Married or living with someone as married	37 (117)
Separated or divorced	28 (87)
Widowed	4 (13)
Single, never married	31 (99)
Highest level of education	
Less than high school	35 (110)
High school, GED, or vocational school	24 (77)
Partial college	30 (95)
College graduate	11 (35)
Employment status	
Unemployed	52 (165)
Employed, part-time	12 (39)
Employed, full-time	36 (113)
Baseline Clinical Characteristics	
Level of Uncontrolled Asthma	
Mild	35 (111)
Moderate	31 (98)
Severe	34 (108)
Symptoms in past 2 weeks (child-report)	
3 or more days	79 (249)
1 or two days	17 (55)
0 days	4 (13)
Take controller medication (caregiver-report)	69 (219)
Take quick reliever medication (caregiver-report)	92 (290)
At least one urgent visit to doctor, ED Visit, or hospitalization for asthma in past 2 months (parent-report)	52 (166)

Table 2

Student-reported prevention steps, % (N).

Step taken to prevent symptoms:	No	Yes, but not on a regular basis	Yes, on a regular basis
Take daily medication ^I	31 (67)	33 (73)	36 (79)
Take medication when get a cold	45 (142)	24 (77)	31 (97)
Take medication before trigger exposure	44 (137)	27 (85)	29 (92)
Take medication in cold weather	28 (90)	37 (118)	35 (109)
Stay away from triggers	17 (54)	28 (89)	55 (174)
Clean room in a special way to get rid of triggers	25 (79)	26 (82)	49 (156)
Pay attention to how you feel in situations where asthma may start	11 (34)	33 (105)	56 (177)
Ask a doctor or the clinic for help	37 (117)	37 (118)	26 (81)
See a doctor for asthma even when asymptomatic	39 (122)	37 (118)	24 (76)

^I Percentages only for those children whose parents reported that they were prescribed a long-term controller medication

Table 3

Student-reported management steps, % (N).

Step taken once symptoms begin:	No	Yes
Take medication prescribed by doctor	8 (24)	92 (292)
Stay calm	10 (32)	90 (284)
Rested	15 (46)	85 (271)
Got away from trigger	19 (62)	81 (255)
Observed if symptoms got better or worse	18 (57)	82 (259)
Asked someone for help	26 (82)	74 (235)
Went to a doctor or a hospital	44 (139)	56 (178)

Table 4

Student-reported asthma responsibility, % (N).

Asthma Responsibility Questionnaire Item	My parent takes responsibility all of the time	My parent takes responsibility most of the time	My parent and I share the responsibility	I take responsibility most of the time	I take responsibility all of the time
Notice when my asthma is starting or getting worse	54 (168)	7 (23)	27 (86)	7 (22)	5 (15)
Starting treatment like using an inhaler or breathing machine when symptoms happen	48 (148)	12 (37)	25 (76)	9 (27)	6 (20)
Using an inhaler or taking a pill everyday ¹	39 (107)	8 (21)	23 (64)	16 (43)	14 (39)
Seeing when asthma drugs are running out and will need to be refilled	73 (224)	9 (27)	12 (37)	2 (7)	4 (12)
Remember to use my albuterol when I am going to be exposed to a trigger, like before exercise	39 (116)	7 (21)	21 (61)	18 (54)	15 (45)
Staying away from triggers, like cats or smoke	34 (104)	9 (29)	25 (77)	17 (51)	15 (38)
Remembering to take the asthma drugs (or other treatment) along if I am going to be away from home	36 (109)	10 (30)	28 (85)	10 (31)	16 (47)
Telling my teachers I have asthma, explaining about my symptoms	38 (116)	10 (30)	19 (60)	17 (53)	16 (49)
Deciding to change what I am doing when symptoms happen, like slowing down or sitting out of a game	23 (72)	7 (20)	17 (52)	25 (78)	28 (86)
Using a peak flow meter by myself ²	38 (63)	13 (21)	19 (32)	17 (28)	13 (21)

¹ Percentages only for students who indicate that they have a daily medication that they take² Percentages only for students who indicate that they have a peak flow meter