The Impact of Asthma on the Health Status of Adolescents

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ABSTRACT. *Objective.* **To identify a characteristic pattern of health and illness for adolescents with asthma, we compared the health status of teenagers with asthma to those without asthma using a recently developed generic health status instrument, the Child Health and Illness Profile, Adolescent Edition (CHIP-AE).**

Methods. **This was a cross-sectional survey using a school sample of 3109 teenagers. Participants completed the CHIP-AE during school in northern Baltimore City, rural western Maryland, and rural Arkansas. The health and functioning scores of teens without asthma ("well" group) were compared with those with asthma with and without recent wheezing.**

Results. **Of the 12% who reported that a physician had ever told them they had asthma, 50% had problems with wheezing in the past 28 days. Compared with well teenagers, those with asthma and recent wheezing had lower perceived well-being, more physical and emotional symptoms, greater limitations in activity, more comorbidities, and more negative behaviors that threaten social development. These findings held true in multivariable regression models that controlled for sociodemographics and sites of data collection. Teenagers with asthma without recent wheezing reported a greater number of comorbidities than well teens and showed similar trends in health status as those with recently symptomatic asthma.**

Conclusions. **Multiple aspects of adolescent health status are affected by asthma, particularly if it is recently symptomatic. These results argue for incorporating a generic health status instrument, such as the CHIP-AE, in studies that document the health needs or outcomes of medical care for populations of teenagers with asthma.** *Pediatrics* **1997;99(2). URL: http://www.pediatrics.org/cgi/content/full/99/2/e1; *asthma, quality of life, adolescence.***

ABBREVIATIONS. CHIP-AE, Child Health and Illness Profile, Adolescent Edition; CI, confidence interval.

Health status instruments are increasingly used to describe health states of populations, to measure outcomes in clinical trials, and to conduct research on quality of care. There is a widespread consensus that health systems should be held accountable for both traditional clinical outcomes and individuals' health-related quality of life. Although there are many measures to assess both generic and disease-specific aspects of adults' health,[1] measurement of health status in pediatric populations is still in the nascent stages of development.

Conceptually, health status is a multidimensional state of physical health, mental health, everyday functioning in social and role activities, and general self-perceptions of well-being.[2–5] The current conceptualization of children's health as the ability to participate fully in developmentally appropriate physical, psychological, and social activities calls for comprehensive (ie, generic health status measures) instruments that are capable of tapping all these domains.[6–8] Generic instruments differ from disease-specific instruments in their applicability across disease entities and clinical interventions and their ability to summarize broad conceptualizations of health.[9]

Because asthma is a common[10] and costly[11] chronic disease in childhood and adolescence, the need for methods to describe the health status of and evaluate interventions for these individuals is acute. Research on the outcomes of pediatric asthma treatment has been hampered because of an absence of an existing instrument that can broadly assess all aspects of health for children with asthma. In general, prior efforts have examined disease-specific effects of asthma.[12–18] The instruments used generally focus only on physical and emotional symptoms considered to be attributable to an individual's experiences with asthma. However, both the disease itself and treatment for it may have impacts that extend beyond specific symptoms. Although it would be possible to develop an asthma-specific instrument that uses a broad conceptualization of health, it is unlikely that individuals recognize the manifold health effects that result because of their disease. Instead, they are more likely to report on their general health perceptions, health experiences, and health behaviors, which may or may not be associated with biomedical conditions. Thus, disease-specific instruments may fail to capture the diverse effects that a chronic illness, such as asthma, has on health and may not detect unintended adverse effects of treatment.

Prior studies on the health effects of asthma suggest that it influences multiple dimensions of child health. Children with asthma seem more uncomfortable and report lower perceived well-being, more limitations in physical activity, and more emotional symptoms than children without chronic disease.[19–25] Asthma may be associated with poorer physical fitness, possibly because of self-imposed inactivity rather than physiologic dysfunction caused by disease processes.[26]

It is unclear whether asthma is associated with

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poorer functioning in age-appropriate roles, such as school and work performance. Using nationally representative data, one study found that children with asthma were significantly more likely to have learning disabilities than those without asthma.[27] On the other hand, Gutstadt and colleagues[28] found that children with asthma had average to above-average academic abilities. In young adults, asthma has been associated with a small adverse effect on employment.[29]

In summary, existing evidence suggests that asthma affects multiple dimensions of health. There are no studies, however, that measure the health status of adolescents with asthma using a single instrument with acceptable psychometric properties that is based on a comprehensive conceptualization of health. In this study, we use the Child Health and Illness Profile, Adolescent Edition (CHIP-AE) to describe the health and functioning of a community sample of adolescents with and without asthma. The CHIP-AE is the most comprehensive currently available generic health status tool to measure the health status of adolescents.[29,30] It uses a broadly defined conceptual framework that recognizes that health includes not only perceptions of wellness and illness but also participation in developmentally appropriate tasks and activities. We hypothesized that asthma would affect multiple dimensions of health (primarily perceived well-being and physical, emotional, and social functioning), and the magnitude of these effects would be greatest for individuals whose asthma was symptomatic, as evidenced by recent wheezing.

METHODS

Data Collection

This investigation was part of a larger study conducted to develop and test the CHIP-AE.[8] A school sample of 3109 adolescents who completed a self-administered version of the CHIP-AE in school was used for this study. The adolescents' ages ranged from 11 to 17 years. Details of survey administration are presented elsewhere.[30] Briefly, data for teenagers in this study were obtained in 1992 from two schools in northern Baltimore City (N = 877), two schools in rural Maryland (N = 1,878), and two schools in rural Arkansas (N = 354). Additionally, mothers of 225 teenagers (26%) in the northern Baltimore City sample completed a modified version of the CHIP-AE over the telephone.

Before administration in the schools, parents were sent an explanation of the survey and consent materials. In the northern Baltimore city sample, those who did not want their children to participate were given the opportunity to send a postcard to the project team indicating their desire to decline. At the request of the school administrators in the western Maryland and Arkansas samples, we obtained parental written consent before administration of the questionnaire at these locations. The survey was conducted in a middle school and a high school at each of the three sites.

In the northern Baltimore and Arkansas samples, questionnaires were self-administered and completed in classrooms after a member of the project team explained the study and gave instructions for completing the questionnaire to the students. Teachers assisted the project team for the purposes of monitoring the class. In the western Maryland sample, the survey was conducted entirely by the teachers in the schools.

Measurement of Health Status Using the CHIP-AE

The CHIP-AE is a recently developed health status measure[8,30] that has a conceptual framework that includes 6 domains and 20 subdomains (see Table 1). Within the developmental context of adolescence, the instrument measures perceived well-being, symptoms, states and behaviors that are known to reduce or increase the likelihood of future health, burden of morbidity, and physical, emotional, and social functioning. The satisfaction domain includes perceptions of well-being and self-esteem as well as the respondents' overall perceptions of their own health and attitudes toward it. The discomfort domain includes a variety of symptoms that would generally interfere with comfort or a sense of well-being as well as positive health perceptions. The resilience domain assesses aspects of positive health characterized by the existence of resources and patterns of behavior; it also captures phenomena that are known to be related to the capacity to resist threats to well-being that inevitably arise in the course of the life span. The risks domain is the converse of the resilience domain. The achievement domain reflects the state of development of the individual and consists of work and school accomplishments. Last, the disorders domain includes biomedically defined states of physical and mental ill health.

Scales in the instrument have acceptable levels of internal consistency and test-retest reliability. Construct validity has been documented by showing that the instrument has moderate to high correlation with other measures that assess single domains of health and by demonstrating that it can discriminate "well" ado-

TABLE 1. Child Health and Illness Profile, Adolescent Edition, Domains and Subdomains

- Satisfaction: perceived level of health and well-being
  - Subdomains
    1. Satisfaction with health: overall perceptions of and beliefs about one's health
    2. Self-esteem: self-concept
- Discomfort: specific physical and emotional sensations/feelings that interfere with comfort
  - Subdomains
    1. Physical discomfort: physical feelings and symptoms
    2. Emotional discomfort: emotional feelings and symptoms
    3. Limitations of activity: restrictions in age-appropriate activities and limitations in mobility
- Resilience: states and behaviors known to reduce the likelihood of subsequent illness or injury
  - Subdomains
    1. Physical activity: involvement in a variety of activities related to fitness
    2. Social problem solving: active approaches to solving a hypothetical problem
    3. Home safety and health: aspects of the home and environment that reduce/increase likelihood of harm
    4. Family involvement: the amount and type of activities done as a family
- Risks: states and behaviors that are known to heighten the likelihood of subsequent illness or injury
  - Subdomains
    1. Individual risks: activities that threaten individual development
    2. Threats to achievement: negative behaviors that threaten to disrupt social development
    3. Peer influences: involvement with peers who engage in risk-taking behaviors
- Achievement: meeting expectations for role performance
  - Subdomains
    1. Academic performance: school accomplishments
    2. Work performance: work accomplishments
- Disorders: diagnostic entities, including conditions, injuries, and impairments
  - Subdomains
    1. Acute minor disorders: eg, colds, tonsillitis, sprains
    2. Acute major disorders: eg, pneumonia, broken bones, hepatitis
    3. Recurrent disorders: eg, ear infections, asthma, allergies
    4. Long-term medical disorders: eg, arthritis, diabetes, epilepsy
    5. Long-term surgical disorders: eg, scoliosis, vision problems, hearing problems
    6. Psychosocial disorders: eg, speech problem, eating problem, learning disability

lescents from those with "illness," as characterized by acute and chronic disorders.[8,30,31]

All respondents completed a series of sociodemographic questions. These responses were used to create age, gender, ethnicity, and socioeconomic variables. We used four dichotomous indicators obtained from the sociodemographic section of the CHIP-AE to measure socioeconomic status: family structure (eg, single-mother family); participation in Aid to Families With Dependent Children, food stamps, or school lunch programs; maternal education (high school graduate, yes or no); and whether the teenager's mother was currently employed.

Data Analysis

Analyses were done using the following three groups: (1) no asthma, (2) asthma and no recent wheezing, and (3) asthma with recent wheezing. These groups were formed using two questions in the questionnaire. In the recurrent disorders subdomain section, teenagers were asked, "Has a doctor ever said you had asthma?" They could respond, "No," "Yes—but no problems with it in the past 12 months, or "Yes—problems with it in the past 12 months." The two groups with asthma were combined, because preliminary analyses indicated few substantive differences between those with or without problems with their asthma in the past 12 months. Teenagers with asthma were further classified by their responses to the following question in the physical discomfort subdomain of the discomfort domain: "In the past 4 weeks, on how many days did you have wheezing or trouble breathing (when you weren't exercising)?" Individuals with asthma were divided into two groups: those with no wheezing in the past 28 days and those with any wheezing in the past 28 days. Of the 3109 teenagers who completed the CHIP-AE for this study, 106 (3.4%) could not be categorized into one of the three asthma groups because of missing data for the asthma or wheezing items.

We calculated the subdomain scores for the recurrent disorders and physical discomfort subdomain scales excluding the asthma and wheezing items, respectively. To facilitate interpretation of scale scores, we standardized all scales to a reference group. The sample of 877 adolescents in northern Baltimore city constituted this reference group. For that group, scale scores were arbitrarily set to a mean of 20 and an SD of 5. The reference group is used for comparative purposes only and is not intended to be used as a normative population; none of the populations on which the CHIP-AE has been tested are representative of the average population of adolescents in the United States. A standardized subdomain score of 25 was 1 SD greater than that of the reference population. Domain scores were computed as the averages of the subdomain scores for a given domain.

All analyses examined differences between teenagers without asthma (well group) and the two groups with asthma. Initially, the sociodemographic characteristics of each of the three groups were compared. Univariate analyses were done for all domain and subdomain scales. The 95% confidence intervals (CIs) of the mean scale scores of the two asthma groups were compared with the 95% CI of the mean score of the well group. The comparison was considered statistically significant when the CIs did not overlap.

Because statistical significance does not indicate the magnitude of differences, we calculated effect sizes for domain scales as a measure of the relative impact of asthma on each of the six domains of health. Effect sizes translate changes in health status into standardized units. They were calculated as the difference in means (well group − asthma group$_i$) divided by the SD of the well group.[32] The absolute value of the effect size indicates the relative magnitude of the effect. A positive sign was used to imply improvement in health, and a negative sign indicates worsening in health.

Multivariable linear regression was conducted to control for sociodemographic differences between the groups. Each regression produced an adjusted estimate of the difference in subdomain scores between the asthma groups and the well group. Separate regressions were done for each subdomain scale and controlled for age, gender, socioeconomic status, and site of data collection. P values for regression-adjusted parameter estimates were obtained from t tests of the β coefficients.

RESULTS

The validity of teenagers' reports of the presence of asthma was assessed by comparing the responses of 225 individuals in the study population with those of their mothers. Interrater agreement as measured by the κ statistic was 0.60, indicating a high level of agreement. Using maternal reporting as the criterion, the sensitivity of adolescents' reports on the presence of asthma was 82%, and specificity was 94%. These figures exceeded those for other disorders and were comparable with levels of agreement found for sociodemographic data included in the CHIP-AE.

Of the 3003 adolescents in the study population, 12.0% reported that a physician ever had told them they had asthma, and of these, half (50.0%) said that they had problems with wheezing in the prior 28 days. Asthma was more commonly reported in the urban sample than the two rural samples. In the northern Baltimore City sample, 16.7% reported that they ever had asthma, which compared with 9.9% and 11.3% for the two rural samples in Maryland and Arkansas, respectively. Of those with asthma, about half reported recent wheezing in the northern Baltimore (46.1%) and western Maryland (49.4%) samples, but 65.8% reported recent wheezing in the Arkansas sample.

Table 2 presents personal characteristics of the study population stratified into three groups based on the presence of asthma and wheezing. Teenagers with symptomatic asthma were more likely to be in minority ethnic groups and girls than were well adolescents. However, when the association between ethnicity and the presence of asthma was examined by site of data collection, no significant associations

TABLE 2. Personal Characteristics of Study Population Stratified by Presence of Asthma and Wheezing

Characteristic	Total Population (N = 3003)	No Asthma (N = 2644)	Asthma	
			No Wheezing Past 28 d (N = 180)	Wheezing Past 28 d (N = 179)
Age, y (mean)	14.4	14.4	14.6	14.5
Female, %	50.2	49.9	43.3	66.5*
Minority ethnic group, %	37.0	35.4	44.1	45.8*
Single-mother family, %	23.7	22.6	31.5*	34.2*
Families that participate in at least 1 of 3 welfare programs, %	35.4	34.4	33.1	44.2*
Children whose mothers did not graduate from high school, %	12.1	12.2	9.1	12.7
Children whose mothers are currently not employed, %	25.6	25.9	22.1	24.9

* The 95% confidence intervals of the indicated asthma group and the no-asthma group did not overlap.

were found in any of the three sites. Whereas 37% of the adolescents in the study population were in minority ethnic groups, the proportion of minorities in each of the three geographic sites varied dramatically: 88.4% in northern Baltimore, 89.4% in Arkansas, and just 3.1% in western Maryland.

Presence of asthma was associated with lower socioeconomic status for two of the four indicators. Teenagers in families with single mothers were 1.8 times more likely to have symptomatic asthma than teenagers in two-parent families (95% CI, 1.3 to 2.5). Furthermore, the odds of symptomatic asthma were increased by 50% for those who received at least one of three different types of welfare aid versus those without any welfare aid (odds ratio, 1.5; 95% CI, 1.1 to 2.1).

Adolescents with symptomatic asthma had significantly lower perceived well-being and were more uncomfortable than those without asthma (Table 3). In the satisfaction domain, teenagers' satisfaction with their health and their self-esteem were significantly lower for those with recent wheezing but not for those without wheezing. Similarly, adolescents with symptomatic asthma had greater levels of other physical symptoms, emotional symptoms, and restrictions in their activity than counterparts without asthma. This finding suggests that symptomatic asthma is negatively associated with multiple dimensions of individuals' perceived well-being, experiences with symptoms, and functional status.

Teenagers with asthma and wheezing also reported a greater burden of morbidity (ie, more comorbidities), as measured by each of the six subdomain scores in the disorders domain. Item level analysis revealed that within each of the disorder subdomains, teenagers with symptomatic asthma were more likely to have other conditions of a variety of types (data not shown). Conditions were not limited to infectious problems. For example, compared with those without asthma, the odds of reporting a sprained joint for teenagers with symptomatic asthma were 1.9 times greater, 1.8 times greater for a broken bone, 3.6 times greater for anemia, 8.2 times greater for epilepsy, 2.0 times greater for scoliosis, 2.4 times greater for vision problems, and 5.0 times greater for an eating disorder. (The 95% CIs between the symptomatic asthma groups and those without asthma did not overlap for any of these comparisons.)

For each of the six domains of health that the CHIP-AE addresses, the effect sizes for the two asthma groups relative to the no-asthma group are presented in Table 4. Effect sizes can be used to draw inferences concerning both the presence of statistical associations and the magnitude of the effect. Table 4 shows that except for other disorders, individuals with asthma but no recent wheezing have comparable health and illness patterns as those without asthma. However, teenagers with asthma and recent wheezing scored 1.5 SD units higher on the disorders domain scale, 1 SD higher on the discomfort scale, and 0.5 SD lower on satisfaction. Interestingly, teenagers with asthma and wheezing also had higher scores on the risk domain scale than those without

TABLE 3. Child Health and Illness Profile, Adolescent Edition, Subdomain Standardized Scale Scores for Adolescents by Presence of Asthma and Wheezing*

Subdomain Scale	No Asthma	Asthma	
		No Wheezing Past 28 d	Wheezing Past 28 d
Domain: satisfaction			
Satisfaction with health	19.6	19.4	16.5†
Self-esteem	18.6	18.8	16.7†
Domain: discomfort			
Physical discomfort	20.0	20.4	25.4†
Emotional discomfort	19.8	20.1	24.0†
Limitations in activity	19.1	19.9	22.5†
Domain: disorders			
Acute minor	20.3	21.8†	24.4†
Acute major	19.9	21.4†	23.0†
Recurrent	19.0	21.8†	25.0†
Long-term medical	19.8	21.1	25.6†
Long-term surgical	20.1	21.2	23.8†
Psychosocial	19.8	20.2	22.7†
Domain: resilience			
Family involvement	20.1	20.3	18.4†
Physical activity	22.5	22.0	20.8
Social problem solving	19.4	19.9	20.1
Home safety and health	20.2	20.5	20.2
Domain: risks			
Individual risks	21.2	22.0	22.4
Threats to achievement	19.4	20.4	21.3†
Peer influences	20.4	21.1	21.2
Domain: achievement			
Academic performance	20.5	20.6	20.3
Work performance	21.0	19.4	20.8

* Subdomains were scored in the direction of their effect—eg, higher scores on satisfaction, resilience, and achievement subdomains imply better health, whereas higher scores on discomfort, disorders, and risks subdomains imply poorer health.
† The 95% confidence intervals between the mean standardized scale score for the indicated group and the no-asthma group do not overlap.

TABLE 4. Effect Sizes for Differences in the Domain Scale Scores by Presence of Asthma and Wheezing Compared With the No-Asthma Group*

Domain Scale	Asthma	
	No Wheezing Past 28 d	Wheezing Past 28 d
Satisfaction	0.01	−0.49†
Discomfort	−0.13	−1.05†
Disorders	−0.44†	−1.48†
Resilience	0.05	−0.14
Risks	−0.16	−0.28†
Achievement	−0.06	0.12

* Effect sizes were calculated as: (mean of no-asthma group − mean of asthma group$_i$/SD of no-asthma group). Effect sizes translate changes in health status into standardized units. − indicates a negative effect on health (poorer health status).
† The 95% confidence intervals of the means of the indicated asthma group and the no-asthma group did not overlap.

TABLE 5. Regression-adjusted Differences in Subdomain Standardized Scale Scores for Adolescents With Asthma Versus Those Without Asthma*

Scale	Asthma	
	No Wheezing Past 28 d	Wheezing Past 28 d
Domain: satisfaction		
Satisfaction with health	−0.8	−2.9‡
Self-esteem	−0.6	−2.4‡
Domain: discomfort		
Physical discomfort	0.5	4.4‡
Emotional discomfort	0.6	3.7‡
Limitations in activity	0.5	2.4‡
Domain: disorders		
Acute minor	1.9‡	3.6‡
Acute major	1.3‡	2.4‡
Recurrent	2.7‡	5.4‡
Long-term medical	1.4‡	4.0‡
Long-term surgical	1.5‡	2.7‡
Psychosocial	0.3	2.2‡
Domain: resilience		
Family involvement	−0.2	−1.5‡
Physical activity	−1.1	−0.9
Social problem solving	0.3	−0.3
Home safety and health	0.1	−0.2
Domain: risks		
Individual risks	0.6	1.0
Threats to achievement	0.4	1.6‡
Peer influences	0.3	0.4
Domain: achievement		
Academic performance	0.3	−0.5
Work performance	−1.0	−0.2

* Multivariable models controlled for the influences of age in years, gender (male/female), the four socioeconomic status indicator variables, and two indicator variables for the three data collection sites. The no-asthma group served as the reference category.
‡ $P \leq .01$.

asthma. This result is attributable principally to more negative, externalizing behaviors that threaten to disrupt social development (ie, a higher score on the threats to achievement subdomain scale).

Because some demographic and socioeconomic characteristics of respondents differed across the three groups, we conducted multivariable linear regression to adjust for the effects of these covariates on the subdomain scale scores (Table 5). Results indicate that despite adjustment for age, gender, geographic site of data collection, and socioeconomic status, teenagers with asthma and wheezing had significantly lower perceived well-being (ie, satisfaction), higher discomfort, and a greater burden of morbidity (ie, higher scores on disorders subdomains). These regression analyses also demonstrated that the group with asthma and no recent wheezing had similar trends in the various subdomain scores as the wheezing group, but except for the disorders subdomains, the effects were small. Last, the regression-adjusted differences in subdomain scale scores between the asthma groups and the no-asthma group indicated a trend for teenagers with asthma to report more states and behaviors that are known to heighten the likelihood of subsequent illness (ie, risks subdomain).

DISCUSSION

This study is the first, to our knowledge, to measure the health of teenagers with asthma using a self-administered, generic health status instrument that operationalizes a comprehensive conceptualization of adolescent health. Compared with teenagers without asthma, those with asthma and recent wheezing have more emotional and physical symptoms, poorer functional status, lower perceived well-being, more negative behaviors that threaten to disrupt social development, and a greater number of reported comorbidities. These results demonstrate that, to fully understand how asthma affects their patients, practitioners should monitor not only clinical and physiologic responses but also changes in health-related quality of life, ie, symptoms, functional status, and perceptions of well-being.

Merely having asthma without concomitant exacerbation of the disease, as manifested by wheezing, was not associated with substantive effects on health status. Teenagers with asthma but no recent wheezing differed significantly from well teenagers only in the number of reported comorbidities. The statistical associations attributed to asthma reported in this study were found primarily for individuals with wheezing in the past 28 days. Thus, investigators developing community-based surveys that include adolescents with asthma should consider including a question about recent wheezing to identify individuals who are having the greatest health effects of their disorder.

One potential limitation of the study's findings is the unknown validity of teenagers' reports of asthma in comparison with physicians' diagnoses. Although the validity of teenagers' reports on the disorder is unclear, there is evidence that maternal reports of asthma in their children strongly agree with medical records.[33] The high level of agreement between teenagers' responses concerning the presence of asthma and their mothers' responses serves to minimize concern that there is substantial overreporting or underreporting of asthma.

Because this was a cross-sectional survey, the directionality of the statistical associations is unclear. For example, does recent wheezing lead to poorer perceived well-being, does poorer perceived well-being lead to more wheezing, or both? The consistency of a negative effect of asthma across multiple

dimensions of the health and functioning is evidence that suggests a potentially causal relationship between asthma and poorer health-related quality of life. However, future longitudinal investigations on the natural history of the effects of asthma on the health status of teenagers are needed to clarify this temporal relationship.

Although the results of this study were replicated in three separate geographic sites, their generalizability may be limited to similar community-based populations. Because of highly skewed distributions of ethnicity within each geographic site, the power of our analyses to detect differences in health status attributable to ethnicity was limited. Even so, the findings were replicated in each of the sites, which argues against ethnicity as a principal explanation for the differences in health status.

We did not sample teenagers for moderate or severe asthma. It is possible that the health and functioning profiles of teenagers with more severe asthma may differ from those in this study. However, based on the trends found across the two asthma groups in this study, differences attributable to severity may be more quantitative (poorer health and functioning in the dimensions identified in this study) than qualitative.

The cumulative prevalence estimate of asthma in this study was similar to those obtained in prior reports. We found that, of nearly 3000 adolescents, the cumulative prevalence of asthma was 12%. A random digit–dialing telephone survey of Bronx households found a cumulative prevalence of 14.3%,[34] and a study in a large suburban health maintenance organization indicated that 12.5% of children of 4 through 11 years of age had a subsequent 6-year cumulative prevalence of asthma.[35] However, data from national surveys in the United States estimate its point prevalence to be from 3.6% to 9.5%.[20,36–38] These findings suggest that the cumulative prevalence of asthma may be as much as three times as high as its point prevalence.

Similar to other investigations,[36,37] this study indicated that asthma was more common and tended to be symptomatic, or more severe, among adolescents with low socioeconomic status. Because socioeconomic status may have negative effects on teenagers' health and functioning, we performed multivariate regression that controlled for its effects. Results indicated that asthma has a negative effect on adolescent health status that is independent of socioeconomic status.

In this study, teenagers with symptomatic asthma reported more acute, recurrent, and chronic comorbidities than teenagers without asthma. This finding suggests that morbidity clusters in some individuals who have a disproportionate share of illness. Nonrandom clustering of morbidity has also been reported in longitudinal studies using claims data[38,39] and a British survey.[40] Further work is need to describe the epidemiologic characteristics of morbidity clusters in adolescents and to determine the mechanisms by which morbidity clusters influence the health status of teenagers.

One promising approach to measuring health-related quality of life for adolescents will be to combine a generic instrument with a disease-specific supplement. A generic instrument provides comprehensive information on the overall health and functioning of individuals and in longitudinal study designs allows better understanding of the impact of disorder on health. Generic instruments have the additional advantage of providing comparable data for comparisons across disease entities. On the other hand, a disease-specific module can potentially give information on asthma-specific symptoms that may be more responsive to intended effects of medical interventions. Therefore, we propose that investigations that describe the health status of or examine the effects of medical interventions on teenagers with asthma incorporate a generic health status instrument. Because of the availability of the CHIP-AE and several newly developed asthma-specific instruments,[12–18] this approach for teenagers with asthma is now possible.

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