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Teacher Management of Asthmatic Children:
The Contributions of Knowledge and Self-Efficacy

by

Stephen Appea

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4/27/99 Barry J. Zimmerman

Date Chair of Examining Committee

4/27/99

Date Executive Officer

Shirley Feldmann

David Rindskopf

Bert Flugman

Supervisory Committee

THE CITY UNIVERSITY OF NEW YORK

Abstract

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Stephen K. Appea

Advisor: Professor Barry J. Zimmerman

Although asthma is the most common chronic disease of school-age children, little is known about how teachers cope with the challenge of providing instruction to asthmatic students. This study represents an initial attempt to develop a profile of American inner-city public school teachers in an environment where asthma is endemic.

A few European and Australian studies have investigated teacher knowledge of asthma but have not examined the relationship between asthma knowledge, self-efficacy and classroom asthma management. The present study was the first effort to examine inter-relationships between asthma knowledge, management and self-efficacy within the context of a proposed multi-process model of teacher asthma domains in order to develop a profile of urban teachers of asthmatic students. Self efficacy was found to contribute as much to teacher classroom asthma management as asthma knowledge itself, thus providing support for a conceptual model of teacher asthma management in which self-efficacy is a vital component.

Many teachers were found to have very low levels of asthma knowledge, however, teachers who had asthma themselves or vicarious experience with the disease through a close personal relation displayed significantly greater asthma knowledge, efficacy, and management than their colleagues without such experience.

The small number of trained teachers in the study also showed significantly greater levels of asthma knowledge, efficacy and management than the vast majority of their untrained counterparts. A major implication of the study is that teachers need to be trained in order to more effectively cope with the challenge of asthmatic students.

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Finally, I dedicate this work to the memory of my mother whose life was taken away by asthma. But not before 4 children were touched by her light of love and learning.

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Chapter I

Introduction

Asthma is the most common chronic childhood disease; one that affects 4.8 million children younger than 15 years of age in the United States (National Institutes of Health: National Heart, Lung, and Blood Institute, 1997). Asthma morbidity and mortality are apparently on the rise, especially among inner-city African American and Hispanic populations (McEwen, Johnson, Neatherln, Millard & Lawrence, 1998; Corn, Hamrung, Ellis, Kalb & Sperber, 1995). The adequate management of asthma requires individuals to possess understanding about the disease in order to implement asthma management plans (Warner, Gotz, Landau, Levison, Milner, Pedersen & Silverman, 1989). Much of the research on asthma education has focused on the roles of various health professionals (Henry, Hazell & Halliday, 1993) but very little research has been done on teachers, who are responsible for more than a third of students' waking hours. The purpose of this study is to develop a profile of teacher knowledge about asthma, their asthma - related self-efficacy beliefs and their managing of the asthmatic children in class.

The literature dealing with teachers and asthmatic children is still very much in its early infancy, being comprised of only a handful of studies and conducted mainly outside of the United States. What little research there is suggests that very few teachers have an adequate understanding of asthma. This paucity of knowledge is compounded by the fact that asthma is a rapidly growing chronic disease that is an increasing source of educational disruption, especially in inner-city school districts (NY Times, 1996). The media has reported numerous horror stories dealing with the effects of asthma on children's school experiences. For example, one elementary school in the South Bronx section of NYC had 242 asthmatic students out of a total student body of 760 (32%). Of the 90 staff members, 15 (16.6%) had asthma symptoms such as wheezing and dyspnea. Many neighborhood residents suspect that the concentration of 60 sludge, sewage, and solid-waste facilities within a mile of the school might have something to do with the high rate of asthma. Due to the community's poverty, the resources and political clout necessary to combat such a concentration of waste facilities are very limited, prompting some to make charges of environmental racism (Newfield, 1996).

Inner-city areas where asthma incidence is high, such as the South Bronx and East New York (Brooklyn) are regions where many industrial factories operate. This would seemingly point to an environmental cause for the high incidence of asthma. Airborne chemical and biological products of bacterial and fungal decay are known asthma triggers (Field, 1996). However, other non-industrial factors, such as low socioeconomic status, cockroach and rodent-infested dwellings, the presence of dust or tobacco smoke in the dwelling, non-existent or poor health care alternatives (i.e., using the overcrowded hospital emergency rooms as clinics), and lack of knowledge about disease management must also be considered as potential causes of the alarming asthma morbidity and mortality rates in these neighborhoods.

Since school is a part of a community, it should not be surprising to find manifestations of the aforementioned conditions and their effects in schools. Very little is presently known about how teachers are coping with the daunting task of educating, caring for, and managing the asthmatic children of such an inner-city community. We do know that asthmatic children show:

academic underachievement in school, in spite of average to above average standardized IQ and academic achievement scores, as well as poor school attendance, inappropriate use or nonuse of medication in school, inappropriate conduct (perhaps as a consequence of the side-effects of their asthma medication), as well as physical activity difficulties and limitations (American Academy of Allergy, Asthma & Clinical Immunology, 1995).

Problems Faced by Teachers of Asthmatic Students

The few controlled studies that compare the academic performance between children with and without asthma have focused largely on standardized reading and math test scores as a measure of performance. These studies have generally indicated that asthma has little impact upon academic achievement. For example, Gustadt, Gillette, Mrazek, Fukuhara, LaBrecque and Strunk (1989) reported that standardized tests of academic achievement and IQ showed that asthmatic children were average or above average when compared to national norms. Interestingly, lower test scores were associated with history of continuous oral steroid use, low SES, as well as emotional and behavioral problems, variables frequently encountered by inner-city teachers. While standardized test scores are important, they do not adequately reflect changes in class functioning. Teachers often notice, for instance, that due primarily to poor management of their disease, asthmatic students can be inattentive, tired, and unable to concentrate; these are factors that can conceivably lead to poor classroom performance. There is some evidence to show that when students' asthma is properly managed, their classroom performance can be positively influenced. For example, in a study that assessed the effects of a school health education program for asthmatic, upper primary school children, Evans, Clark, Feldman, Rips, Kaplan, Levison, Wasilewski, Levin, and Mellins (1987) demonstrated that such an intervention can significantly enhance the ability of asthmatic children to function effectively in class. Unfortunately, inner-city elementary school teachers rarely encounter such programs.

A second problem that teachers of asthmatic children must confront is the youngsters' poor school attendance. While studies have shown that elementary school students with asthma miss approximately 5 more school days per year than non-asthmatic students, the variability among asthmatic students in any one school is considerable. For example, in perhaps the most widely cited study of school attendance in the asthma literature, Parcel, Gilman, Nader and Bunce (1979) reported that annual school absences for children with asthma in a Texas school district was on the average 4.5 days more than for nonasthmatics. The range of absences for asthmatics however, was from 0 to 72 days! In a brief review of the asthma attendance literature, Evans (1994) includes the following as factors that explain the variability in school absences due to asthma: disease severity, parental perception of disease severity, undertreatment, and the student's perception of school staff reaction to his or her asthma. Whatever the cause, such variability can be perplexing and difficult to deal with especially for inner-city school teachers whose student attendance rates are usually significantly lower than those of their suburban colleagues.

Another particularly important problem for the teacher of asthmatic children concerns their medication. For instance, teachers are often not aware that different medications have different effects. Given that asthma is a disease involving both airway muscle spasms as well as airway swelling and inflammation, there are two distinctively different groups of medications utilized to treat asthma. Bronchodilator drugs such as Proventil and Ventolin open up lung airways by relaxing the muscles in and around the airways that tighten during an asthma attack. Anti-inflammatory corticosteroids, such as Beclovent (inhaled) and Prednisone (systemic), on the other hand, prevent airways from swelling, and decrease mucus production, but cannot stop an attack once it starts (Bonner, 1996). Clearly then, teachers need to be aware of the two fundamentally different medication classes their asthmatic students may carry with them to school, and which type to use during an attack, as well as which one the student may be taking on a regular basis (although most wise parents schedule the taking of such regularly administered medications so that it does not have to be done at school).

Related to information about differing classes of asthma medication, the teacher also needs to know that these medications may also be the cause of certain involuntary student behaviors in class. Asthmatic students using adrenergic bronchodilators such as Proventil may exhibit nervousness and shakiness. Children taking xanthine bronchodilators such as Theo-Dur may experience nausea, vomiting, headaches, and stomach cramps. One common side-effect of inhaled corticosteroids such as Vanceril or Beclovent is an increased appetite. Students using Cromolyn class drugs such as Intal can experience a dry cough (Bonner, 1996). Teachers who are knowledgeable about the side-effects of the basic asthma medications will then be in a better position to judge whether to ignore a child's cough or shakiness, or whether to consult the child's parents or physician about possible modifications of the medication dosage.

The above discussion centers on the physical effects of asthma medicine. Perhaps more important for teachers is the possible side-effect of such medications on an asthmatic student's academic functioning. In a recent review of the literature, Bender (1995) summarized the present state of research on asthma drug effects on learning. Among his conclusions were that inhaled corticosteroids, Cromolyn sodium, and beta agonists in moderate dosages "do not seriously interrupt children's school performance." Theophylline, which had been widely thought to interfere with student's class learning and conduct, has now been demonstrated in many controlled studies to have "a relatively small influence on mood and behavior and may even, similar to caffeine, improve memory." Oral steroids, however, may disrupt neurocognitive functions, such as memory, as well as increase anxiety and depression (Bender, 1995).

It is clear then, that while medication side-effects can impede academic and behavioral functioning, in most instances, at the proper dosages, these effects should be minimal and should not put the asthmatic student at risk for educational failure. As previously noted, however, uncontrolled, chronic asthma, in and of itself, may cause children to become easily fatigued, to have limited attention span, as well as poor concentration, thus adversely affecting classroom performance and behavior (American Academy of Allergy & Clinical Immunology, 1995).

Since many inner-city public schools do not have a full-time nurse available, teachers with asthmatic students have the added responsibility to be able to recognize and quickly respond to potentially life-threatening symptoms. For example, if an asthmatic student tells the teacher that he or she cannot breathe, how should the teacher respond? Some of the decisions involved include the following: Should medication be administered? If so, what kind of medication? Should the nurse (if available) be called? Should an ambulance be called? Should the parents be immediately notified?

Yet another frequently encountered, problematic situation for the teacher arises out of participation in gym class. When asthmatic students say they don't want to go to gym, should the teacher force these students to participate and risk an attack, or should (s)he excuse the students and thereby fail to encourage participation in physical exercise? Conversely, if an asthmatic child who is wheezing slightly demands to participate in gym, should such a student be permitted to exercise? Should medication (if available) be administered? If so, should it be done before, during or after exercising? These are some of the common decisions that teachers of asthmatic students have to make. Research with trained nurses (Williams & McCarthy, 1995; Henry, Hazell & Halliday, 1994) shows that even they sometimes have trouble with these kinds of complex decisions with asthmatic patients. How much more so among untrained teachers? One might expect that those teachers who possess knowledge about asthma in general as well as knowledge about managing asthmatic students should be able to more effectively cope with asthmatic children in the class than those teachers who do not.

Sources of Teacher Knowledge About Asthma

The issue of the source of teachers' asthma knowledge has been broached in a few foreign studies, but no similar investigation has been conducted in the United States to my knowledge. These foreign studies showed that teachers are ill-equipped to adequately cope with asthmatic children due to a lack of formal training such as teacher education courses and district staff development. If a similar lack of training exists among U.S. teachers, then they must rely on their own personal experiences with asthma when helping their students with the disease. In this case, one would expect that teachers with asthma themselves or with close family members having asthma to cope more effectively with asthmatic students in their classes than those teachers without any asthma experience. If teachers do lack training, it would seem obvious that sound educational policy would dictate formal asthma training for teachers and other involved school personnel.

While there is scant information about teachers' knowledge of asthma, there is a complete void of information about teachers' perceptions of efficacy about asthma and classroom management of asthmatic students. This is the first effort to explore the latter issues. It is significant that the context for this exploration is the inner-city because the incidence of asthma has grown dramatically in these communities.

Perceptions of Efficacy About Asthma and Classroom Management of Asthmatic Students

The above discussion indicates the necessity of asthma-related knowledge for teachers with asthmatic pupils. Knowledge of asthma alone, however, is not usually enough because a person may possess the knowledge but fail to act on it. The link between knowledge, self-beliefs, and outcomes has been examined extensively in educational and health psychology. Perhaps the most widely known and predictive contemporary model of these processes is social learning theory (Bandura, 1986).

One key, self-referent variable in social learning theory that mediates the relationship between knowledge and acting upon knowledge is known as self-efficacy. According to Bandura (1986), perceptions of efficacy are perhaps the most influential aspects of self-knowledge in human motivation and action because they take into account limitations in one's personal skills and knowledge. Certainly such perceptions would be important in understanding how a teacher copes with the unpredictable and stressful domain of a classroom with asthmatic students.

Self-efficacy refers to a judgement by an individual about his or her capabilities to accomplish a specific task in a particular context (Thoresen & Kirmil-Gray, 1983). For example, in this case, self-efficacy might refer to a judgement by an individual teacher about his or her capability to prevent or control a student's asthma symptoms in class. According to social learning theorists (e.g., Zimmerman, 1989), perceptions of efficacy are important because they are good predictors of a person's motivation, affective reactions, and eventual task success. For example, the motivation of teachers to effectively supervise asthmatic children will depend on their confidence that they can properly explain the appropriate procedures to follow, such as using a bronchodilator dispensing Ventolin before a gym class.

Self-efficacy has been shown in academic studies to be positively related to task choice (Bandura & Schunk, 1981), task persistence (Schunk, 1981), and skill acquisition (Schunk, 1984). In health-related studies, the significance of self-efficacy has been demonstrated in health behavior change (Strecher, DeVellis, Becker & Rosenstock, 1986), asthma education (Thoresen & Kirmil Gray, 1983), asthma management (Creer, 1988), as well as in the management of other chronic conditions, such as cystic fibrosis (Bartholomew, Parcel, Swank & Czyzewski, 1993) and heart disease (Clark, Janz, Dodge & Sharpe, 1992; Clark, Rosenstock, Hassan, Evans, Wasilewski, Feldman & Mellins, 1988).

Thus, in a social learning conceptualization, a teacher cannot effectively manage asthmatic students in their class unless he or she has adequate knowledge and sufficient self-efficacy to catalyze that knowledge into appropriate asthma management activities. Teachers who lack self-efficacy may avoid assisting their asthmatic students. In order to understand the development and employment of a learning strategy such as asthma management then, one needs to examine self-efficacy as a factor in the ongoing decision-making (Clark & Zimmerman, 1990).

A Model of Teacher Processes in the Educational Domains of Asthma

In order to conceptualize how teachers of asthmatic children cope with the various aspects of the children's disease in an educational setting, the following model is proposed in Table 1. The model is composed of 8 educational domains of asthma: triggers, exercise, medicine-taking/reactions, symptoms, prevention, learning/teaching, parental-student communication, and school policy/resources. For the purposes of this model, these domains are intended to be viewed as non-hierarchical, independent categories. According to the model, each domain can be viewed in terms of three distinctive teacher processes: asthma knowledge, self-efficacy about asthma and the managing of asthmatic students, and actual asthma management.

Although these cognitive, affective, and behavioral teacher processes are conceptualized as independent, they may clearly influence each other. Successful teacher asthma management, for instance, while dependent upon teacher asthma knowledge and self-efficacy about asthma, can also be viewed as an influence on asthma knowledge as well as a critical source from which asthma efficacy perceptions are derived.

One contention drawn from the model then is that a teacher's classroom management of asthmatic children depends on his or her knowledge and self-efficacy for the domain in question. Suppose parent/student communication is the chosen domain. In order to modify the teacher's communication pattern with the parents of an asthmatic child, as well as with the child, the level of the teacher's knowledge about the child's asthma needs to be ascertained. In addition to studying asthma knowledge, self-efficacy about asthma and the managing of the asthmatic youngster, together with the self-efficacy about communicating with parents would also be examined. Staff development which includes learning strategies such as social modeling, support, and feedback might then be provided. In order for more effective management to occur then, both knowledge and efficacy perceptions of the teacher must be considered and engaged.

This model may be used as a guide for educators, administrators and researchers in conceptualizing the interaction between the inter-related processes of knowledge, self-efficacy, and management in regard to educational asthma domains.

Table I

Multi-Process Model of Teacher Asthma Education Domains

Educational Domains of Asthma	Teacher Processes: Knowledge	Self-Efficacy	Management
Triggers			
Exercise			
Medicine-taking / Reactions	Items representing teacher processes within		
Symptoms	the educational domains of asthma.		
Prevention			
Learning / Teaching			
Parental / Support Communication			
School Policy / Resources			

Summary

In summary, little is known about the roles of teachers in their attempts to provide instruction to asthmatic school children. The focus of previous studies has largely been limited to teacher knowledge of asthma but very few investigations have delved into actual asthma management by teachers. In addition, there has been no previous effort to study the role of teachers' perceptions of efficacy about asthma and its management, despite the existence of a substantial body of research suggesting the importance of self-efficacy in predicting the management of the disease (e.g., Creer & Wigal, 1993; Clark & Zimmerman, 1990; Bandura, in press). One purpose of the present study was to develop a reliable scale to measure self-efficacy as well as to demonstrate that teachers' sense of efficacy is in fact important in their provision of care as well as instruction of their asthmatic students.

In the next chapter, literature pertaining to asthma knowledge, management, and self-efficacy will be reviewed.

Chapter 2

Literature Review

In this chapter, research pertaining to teacher knowledge of asthma as well as teacher management of children with asthma will be reviewed. As there has been no research to date conducted on teacher self-efficacy about asthma and its management, a few selected studies demonstrating the importance of self-efficacy in research dealing with asthmatic children and their mothers as well as in asthmatic adults will be reviewed. The multi-process model of asthma education domains previously described will provide an analytic focus for this review.

Studies of Teacher Knowledge and Management of Children with Asthma

In what appears to be the first investigation of the role of teachers in the management of asthma in schools, Hill, Britton, and Tattersfield (1987) distributed a brief questionnaire to the headteachers of 291 Nottingham (U.K.) state schools, 245 of which were primary schools. The survey inquired about the number of students with asthma and how the schools were made aware of these students. The questionnaire also asked about policy regarding administration and supervision of asthma medication as well as whether any staff development about asthma had taken place. Moreover, teachers were asked about any concerns they had when teaching asthmatic children.

Questionnaire responses indicated that the majority of schools identified children with asthma by way of verbal reports from parents, usually during parent-teacher conferences. Less than a quarter of the schools surveyed parents with a health questionnaire. In these primary schools, the responsibility for supervising asthmatic children was placed largely on the class teachers. In 65% of the schools, students were required to give their medicine to either the office or the teacher. Medication administration was to occur under staff supervision or during particular periods during the school day. In only 10% of schools were children explicitly granted permission to keep and administer their inhalers themselves. Staff development about asthma took place in only 8% of the primary schools, and 40% of schools reported that teachers were concerned about their lack of preparation to cope with an asthma attack. Many teachers were unaware of whether certain children in their classes actually had asthma. Some teachers worried about the time needed to make sure that students received their medication. School absence and reduced participation in physical education were also mentioned as problems.

The Hill et al. (1987) study raised a number of issues central to asthma management in schools. Given the rising incidence of asthma as well as its under diagnosis (Evans, 1994), schools that rely solely on verbal and / or non-asthma-specific, health survey reports are likely to continue to leave a number of asthmatic children undiagnosed. In-school screening (e.g., the Frast test, Tsanakas et al., 1988) would appear to offer the most efficient way to identify unrecognized asthmatic children. The issue of whether students should be allowed to keep and self-administer their asthma medications was also raised. On the one hand, teachers and administrators have justifiable safety concerns, especially with younger primary school children. On the other hand, during emergencies, the immediate administration of the appropriate medicine (i.e., a bronchodilator) can mean the difference between life or death. Finally, the issue of whether teachers should receive instruction in the management of childhood asthma seems to be pretty much of a current non-issue in light of the rising prevalence of the disease. Clearly there is a need for the appropriate staff development. Unfortunately, in the American, inner-city public school context, such health education needs are often superseded by budgetary constraints.

In conducting the first study of asthma management in schools, Hill and colleagues (1987) raised a number of pertinent issues and gathered some important preliminary data. However, from a multi process view of teacher asthma education, their study is subject to a number of limitations. Perhaps the most important limitation is the scope of their investigation. In order to appraise how asthma is being managed in the schools, one must examine the state of knowledge about asthma among the teachers. Very little information about teachers' asthma knowledge can be derived from the investigators' questionnaire. Another critical omission in terms of a process understanding of asthma management in school is some measure of the teacher's motivation to manage a child's asthma. Even if a teacher is knowledgeable about asthma, researchers would need to have some indication of whether or how a teacher would act on that knowledge. Finally, no information about the reliability or validity of the investigators' questionnaire is provided.

Bevis and Taylor (1990) surveyed 98 teachers in 8 inner London (U.K.) schools with the objective of assessing knowledge of asthma among primary teachers. The investigators' questionnaire contained 38 items about the nature of asthma and 17 items about teachers' views, opinions, and experiences with asthmatic children. The intent of the authors was to identify particular areas of limited asthma understanding as well as to identify how teachers felt about managing asthmatic children in school and about the schools' policies for administering asthma medicine.

Results indicated that only 4% of the teachers had ever received any kind of asthma training and only 5% felt that they knew enough about asthma and asthmatic children. While only a small number of the teachers had personal or family contact with asthma, more than 69% had taught asthmatic children. Almost one fifth of the teachers thought that asthmatic children were different from other children and gave reasons, such as inability to indulge in strenuous activity, lack of confidence, and nervousness. In terms of general knowledge about asthma, most teachers knew that asthma is influenced by emotional factors, that children can die from asthma, and that asthma tends to run in families. However, less than a third knew that asthma can cause retardation of growth or that asthmatic children commonly have allergies as well. Very few had any idea about the incidence of asthma in their area or country. Although most teachers knew that children with asthma did not differ from other children in intelligence and competence in sports, less than a third knew basic facts about asthma medications or environmental conditions that can trigger and prevent asthma attacks. For example, only 32% were aware that giving medication before exercise could prevent breathing problems, and only 33 % knew that wheezing after exercise is highly suggestive of asthma. In terms of school policy, teachers were frequently unaware of their own school's policy on giving medication and barely one half of the teachers would even allow children to keep their inhalers with them.

The Bevis and Taylor study demonstrates that teachers' knowledge and understanding of asthma in a major European city was quite limited. As mentioned by these investigators, asthma is the most common chronic medical condition that teachers must face. Teachers not only make decisions about whether asthmatic children should be allowed to play games or go outside in cold weather but also about which drugs should be given at what times and whether or not extra treatment is needed. If understanding of asthma is not satisfactory, then management of the disease cannot be adequate.

Although the Bevis and Taylor study addresses the cognitive aspect of a teacher's preparedness to deal with asthmatic students, it fails to assess the motivational requirement. Teachers who know about the different asthma medications, for instance, may still fail to properly assist their asthmatic students if they lack the confidence to effectively supervise the taking of those medications. The authors themselves broached the issue of confidence to act when they noted that some teachers' lacked confidence to take appropriate action on occasions such as on school trips when there is no one else to assist if an asthmatic child has an attack. Clearly then, from a multi process standpoint of teacher asthma education, knowledge alone, is usually not enough to provide effective management of children with asthma.

There also appears to be a serious methodological problem with the Bevis and Taylor study with regard to one intriguing hypothesis. The authors compared the responses of teachers who had been exposed to asthma (either personal, relative, or child in the class) to those of teachers without such experience and found no significant difference, with the exception of on one statement ("Asthmatic children should be encouraged to participate fully in games"). Logically, an individual with a significant amount of asthma experience (i.e., either has asthma personally or has directly cared for an asthmatic) would be expected to know more about asthma than an individual without such experience. Although very little information about exactly how this hypothesis was tested was included in the published article, it would seem that by including teachers in the "experienced" group whose sole experience with asthma was in teaching asthmatic children, one decreases the chances of obtaining a significant result. Since those teachers' experiences are qualitatively and quantitatively distinct from those who have asthma themselves or those who have directly cared for an asthmatic child or elderly parent, for example, they should have been placed in a separate testing group.

Bevis and Taylor provided the teacher asthma literature with a major conceptual upgrade from its preliminary beginnings with the Hill study. However, it is precisely during such advances when concerns of reliability and validity become increasingly important. No such information about the investigators' questionnaire is given. There is no evidence, for example, that other researchers would obtain similar results using the same survey. Moreover, certain questionnaire items can be interpreted in a number of ways. For example, the item "Asthma can cause retardation of growth, "is problematic since asthma does not usually retard growth, but it can when an individual has been taking oral steroid medication for a lengthy period of time or if the condition is very severe and poorly controlled. If pulmonologists and other "asthma experts" often find it difficult to agree on items such as these, how can we expect teachers to know the correct response?

In the same year as the Bevis and Taylor study was published, another study assessing asthmatic knowledge in school teachers in Israel was reported (Brook, 1990). Sixty-nine teachers (31 classroom teachers and 38 subject matter teachers) in two large high schools were questioned about their general knowledge of asthma, awareness of asthmatic students in class, and the source of their asthma knowledge. No significant differences were found in the general knowledge about asthma between classroom and the various subject matter teachers, however, as expected, classroom teachers out-performed their subject colleagues when it came to knowledge and information about asthmatic students in their classes. The average score obtained by teachers was only 54%, supporting the author's contention that there is a need to increase teachers' awareness about asthma. Contrary to the results reported in the Bevis and Taylor study, teachers with asthma in their immediate family knew significantly more than teachers without such personal asthma experience. With regard to the sources of asthma information, 65% of teachers mentioned health magazines, journals, and books. Approximately 48% of the teachers acquired asthma knowledge from school, clinic or hospital physicians and nurses. Almost 20% of teachers who had studied biology and science at university claimed to recall asthma-related information that they had learned. About 13% reported friends as a source of asthma information. Interestingly, only 6% mentioned electronic media as an asthma information source.

One important contribution to the teacher asthma literature by the Brook study is the source of teacher knowledge about asthma. It would, however, be reasonable to expect some differences in an inner-city, American context. In an urban technological society where increasing amounts of information are obtained through the electronic rather than print media, one might expect that significantly more American teachers would report the electronic media as a source of asthma-related information than their Israeli counterparts in the Brook study. This issue of the source of teacher asthma information has important implications for health educators and policy makers when disseminating asthma-related information.

From a multi-domain, multi process view of teacher asthma education, the Brook study is deficient in two major ways: First, although teachers' knowledge about various facets of asthma is assessed, items in the questionnaire seem arbitrarily and randomly selected. There appears to be no guiding theory as to what educational dimensions of asthma need to be represented in the instrument. Secondly, as in the Bevis and Taylor study, no measure of teacher motivation is included, and thus, any conclusions drawn regarding actual teacher asthma management would be severely limited.

A third major limitation in the Brook study is the questionnaire itself. No information is reported about how the survey was developed, nor about its reliability or validity. Many questionnaire items seem overly simplistic, for example, "There is difficulty in inspiring air during an asthma attack" or "Asthma can result from fears and anxiety of the mother during pregnancy" or "Later in life, the asthmatic chooses and practices only 'white collar' professions." Other items seem particular to a "developing world" context, such as, "Paracetamol helps the child during his asthmatic crises " or "When joining the army the asthmatic adolescent can in no case be in a battle unit." The wording of other items practically 'gives away' the answer, such as "Acupuncture and homeopathy will *definitely* cure the asthmatic child" or "If one of the parents suffer from asthma, his child will *obligatorily* be asthmatic." It should be noted that in spite of such wording, teachers still only scored an average of 54% correct! Nevertheless, from an American perspective at least, the utility of the questionnaire is problematic.

One American study has been conducted concerning the asthma knowledge of educational personnel. With the cooperation of the American Lung Association of Oregon (ALAO), Eisenberg, Moe, and Stillger (1993) surveyed 90 participants (54 nurses, 15 teachers, 11 office staff, 3 administrators, and 7 others) in an educational workshop on asthma for school personnel before the program and four weeks thereafter. The program, "Asthma Management in the Schools," developed by ALAO consisted of a three-part workshop on; basic asthma information, medication usage and side effects, as well as school issues (e.g., policy, exercise, and emergences). Participation was voluntary with the exception of a few districts which required school nurses to attend. The questionnaire consisted of 24 general statements about asthma and 7 additional school policy-related questions.

Pretest mean scores indicated an average of approximately 64% correct. Nurses had an average of 73%, while non-medical personnel had an average of 56%. Posttest responses demonstrated a marked increase in correct answers for the non-medical school staff to approximately 85% correct, while nurses' scores increased to about 84%. Both nurses and non-medical school personnel then, significantly increased their asthma knowledge following the educational program. Pretest surveys also indicated that 67% of the respondents thought that office staff are the school personnel who manage and administer medications most often! Seventy-seven percent felt that responsible students should be allowed to self-administer asthma medication without supervision. Only 10% felt that self-medication should not be permitted. 80% of participants reported dealing with care of an asthmatic student 1-3 times per week, though 80% also did not consider their asthma management responsibilities to be a serious problem. Seventeen percent of respondents felt that students' asthma was a moderate to extreme management problem.

The Eisenberg et al. (1993) study contributes to the teacher asthma literature in several ways: First, although the investigators' focus was not on teachers per se, the case was made that due to a shortage of medical personnel in the schools teachers and other educational personnel must bear the responsibility for management and assessment of children with asthma as well as for the administration of asthma medications; According to the authors, most public elementary schools in Oregon do not have a full-time nurse, and in some schools, the nurse is only available one day a week. Second, school personnel, when provided with the opportunity, can significantly increase their asthma knowledge from fairly brief staff development workshop sessions.

The Eisenberg et al. study also suffers from several deficiencies from a teacher asthma management perspective. First, as mentioned above, the focus was on educational personnel in general, however, since teachers make up the bulk of such personnel, they should have been better represented among the subjects. Of the 90 participants, only 15 (17%) were teachers, and no information about what kind of teachers they were was mentioned in the article. Furthermore, it is not clear how many of the posttest subjects were teachers. In fact, only about 40% of the subjects returned the posttest to the authors four weeks after the study. Thus, conclusions about the effectiveness of the asthma workshop are limited since posttest responders may have been more knowledgeable than nonresponders. Third, from a multi-domain, multi-process model perspective, Eisenberg and colleagues have still only focused on the cognitive component of asthma management, namely knowledge. No indication of how educational personnel would act on the knowledge they possess is offered. Fourth, although most of the survey items seem reasonable and well-worded, no information about the questionnaire's reliability is provided. Somewhat debatable items such as "Asthma usually leads to permanent damage of the lungs," for instance, make reliability considerations especially important. Although the correct answers to their survey are not given, one may assume that the authors' desired response is negative given that the hallmark of asthma has always been airway obstruction that is reversible. There is evidence, however, that a common asthmatic condition such as constant wheezing and coughing lead to lung tissue fibrosis of a more permanent nature (Henson, 1996). Evidence as to the controversial nature of such an item may be found in the responses to the item. Pretest responses indicated 50% correct, 14% incorrect, and 36% "don't know." After the program, only 59% responded to the item correctly; 31% responded incorrectly, with the other 10% still not knowing.

Only one study in the teacher asthma knowledge literature provides any indication of questionnaire reliability. Using a waiting-list control design, Atchison and Cuskelly (1994) surveyed 121 teachers in 7 Queensland, Australia primary schools. Teachers in 3 schools composed the experimental group which was pretested, given a staff development information session, and posttested 12-16 weeks later. Teachers in the remaining 4 schools formed the control condition which was pretested, tested again at the same time as the experimental posttest, then given the staff development information session, followed by a posttest 12-16 weeks later. The information session consisted of a lecture on asthma followed by an exhibition of different types of asthma medication and devices (e.g., a peak flow meter). Information provided during the lecture originated from 2 leaflets and 8 brochures published by a Queensland health foundation, the primary source of asthma information in Queensland. These brochures were made available to the teachers upon completion of the workshop. The investigator's questionnaire consisted of a teacher background section followed by 24 multiple choice questions reflecting 4 educational dimensions of asthma: knowledge about medications, knowledge about how to prevent attacks, when to call or not call an ambulance, and general facts about asthma including items concerning its causes, relationship to stress, mortality and morbidity. Two respiratory specialists examined the questionnaire and made recommendations for modification, following which there was no disagreement between them on any of the survey items. Two primary teachers also answered the questionnaire which was adjusted according to their recommendations.

Multivariate analysis of variance indicated that the intervention program did not significantly increase the teachers' asthma awareness. Attrition for both the experimental (35%) and control groups (30%) during the second testing period was extremely high, and attrition was so high for the control group at their final testing period that results could not be analyzed! Pretest analysis indicated that teachers with asthma had more asthma knowledge than those without asthma, but merely knowing someone with asthma made no difference. Further analysis indicated, similar to findings by Bevis and Taylor, that the main difference between the knowledge of asthmatic teachers and their non-asthmatic colleagues was in their information about asthma medication. The asthmatic teachers knew no more about preventative measures or how to respond to an emergency than teachers without asthma. Analysis of the subscales revealed a low level of knowledge about asthma in general and an especially low level of preventative knowledge. Interestingly enough, and contrary to the findings of Bevis and Taylor, the teachers' highest scores overall were obtained on the medication subscale!

It is clear from the Atchison and Cuskelly study that the "usual methods of lecture, demonstration, and discussion" failed to enhance teachers' asthma awareness, at least as measured by a multiple choice test. If knowledge per se was not significantly increased, how much less so appropriate asthma management? Another similar indication of the failure of the workshop to communicate asthma knowledge to teachers is that almost 80% of the experimental subjects felt they needed further information about asthma management after the workshop which therefore, may be said to have raised more questions than it answered. Moreover, as the authors themselves point out, more effective "adult learning techniques" need to be employed in order to help teachers retain information presented to them. Motivational sources such as perceived self-efficacy are clearly in need of being addressed in teacher asthma management training. This perhaps is the most significant contribution of the study to the teacher asthma knowledge literature. The issue of techniques used by health educators to convey asthma information to teachers must be given serious consideration by future investigators wishing to conduct training studies.

As mentioned, Atchison and Cuskelly's study was the first to provide any description of survey reliability. By having two respiratory specialists examine and agree on the final version, the authors established some degree of interrater reliability. However, we are still left to wonder whether the questionnaire is internally consistent. No test-retest or other such reliability information is described. Moreover, the authors deviated from the form of testing used in the teacher asthma knowledge literature which had previously consisted mainly of statements to be judged as "true," "false," or "don't know." By using a multiple choice format, the nature of testing is altered, thus making direct comparisons with other studies difficult, if not impossible. Any possible advantages of using a multiple choice format (e.g., ease of answering) are brought into question given the initial 30% school rejection rate of even permitting the questionnaire to be administered to their teachers. Another disadvantage of using this more "test-like" questionnaire is reflected in the extraordinarily high attrition described by the investigators. Clearly, teachers and / or administrators felt threatened by a "test" that would expose their lack of asthma preparation.

A third contribution of the Atchison and Cuskelly study is its further differentiating of asthma knowledge into a few separate subcomponents, i.e., medicine, prevention, ambulance, and facts. Clearly, however, from a multidimensional, multi process viewpoint, there are other educational dimensions of asthma that need to be highlighted (e.g., asthma triggers, exercise, symptoms, learning/teaching, parental/student communication, and school/policy resources). Furthermore, it is not enough to examine these dimensions along a single teacher process, i.e., knowledge. If appropriate asthma management is the desired end goal, then teacher efficacy processes must also be addressed.

Self-Efficacy and Asthma Management

As mentioned at the beginning of this chapter, there has been no research to date describing the process of teacher self-efficacy about the management of asthmatic children. However, there is a growing body of asthma research demonstrating the importance of self-efficacy with asthmatic children and their parents, as well as with asthmatic adults. After a brief review of self-efficacy theory and its significance, selected examples of such research will be reviewed in order to provide the closest possible link with the teacher asthma management literature.

Two decades ago, Bandura (1977) hypothesized that "expectations of personal efficacy determine whether coping behavior will be initiated, how much effort will be expended, and how long it will be sustained in the face of obstacles and aversive experiences." As discussed earlier self-efficacy refers to a judgement by a person about his or her capabilities to accomplish a specific task in a given situation. According to Bandura's social cognitive model (1977), self-efficacy, as derived from past performance accomplishments, vicarious experience, verbal persuasion, and physiological states, provides a common mechanism by which individuals are motivated to behave.

Perceived self-efficacy has been shown to affect health behavior in a number of ways. For example, asthmatic patients who strongly believe in their ability to affect their health will expend more effort in attempting to comply with a medical regimen (O'Leary, 1985) than those who weakly hold this belief. As noted earlier in chapter I, self-efficacy beliefs have been demonstrated to significantly influence various health behaviors including asthma education (Thoresen & Kirmil-Gray, 1983) and asthma management (Creer, 1988).

Child Studies

With the prevalence of asthma rising, more research is being conducted on childhood asthma. When faced with the onset of sudden breathlessness, many children, as do many adults, experience feelings of hopelessness and decreased self-efficacy and control (Creer et al., 1992). A number of fairly comprehensive, school-based self-management programs have been developed and implemented to, among other things, promote the asthmatic child's perceptions of self-efficacy (Parcel & Nader, 1977; Parcel, Nader, & Tiernan, 1980; Evans, Clark, Feldman, Rips, Kaplan, Levison, Wasilewski, Levin, & Mellins, 1987).

The University of Texas group (Parcel et al., 1977; 1980) developed the first comprehensive self-management program for elementary school children delivered by a multidisciplinary team of teachers, nurses, resource personnel, and school psychologists. The primary instructional focus was a book called Teaching Myself About Asthma, which promoted the acquisition of skills such as, observation of asthma triggers and symptoms, discrimination of symptom change, communication about symptoms, preventive or management decision-making, and self-reliance. Evaluation of the health education program showed a significant increase in the experimental group's knowledge and health locus of control (which indicated an increased perception of control, though not self-efficacy per se).

The Columbia group (Clark et al., 1986; Evans et al., 1987) developed a comprehensive health education system based on the Open Airways program in an attempt to increase children's asthma management skills, self-efficacy skills, and other skills in 12 predominantly African American and Hispanic schools. Evaluation of the program demonstrated that these children's health education can significantly reduce asthma symptomology and improve self-management skills, as well as confidence in the ability to control one's asthma.

Although self-management skills impinge on perceptions of efficacy, the relationship appears to be reciprocal. Schlosser and Havermans (1992) for instance, found that asthmatic children's higher self-efficacy was associated with adequate coping with their disease, suggesting an important role for self-efficacy in the development and maintenance of coping mechanisms and thereby also influencing self-management behavior as well as medical outcome.

In the first direct study of the effect of efficacy perceptions on self-management behavior in asthmatic children, Clark and colleagues (1988) interviewed and administered questionnaires to 214 mostly African American and Hispanic children who received services for asthma in a New York City hospital clinic. Results revealed that the perceptions of children who thought that they were self-efficacious, i.e., able to prevent or attenuate the effects of asthma, were significantly related to their subsequent self-management behavior.

A recent study of children's perceptions of their behavior as it relates to their asthma management has confirmed and extended the findings by Clark and her co-workers. Kieckhefer and Spitzer (1995) found that 75 asthmatic children (ages 6-14) were able to provide theoretically appropriate, though somewhat limited explanations for their asthma exacerbations in terms of their own behavior. Among their findings was the observation that higher levels of such theoretically appropriate asthma knowledge (i.e., knowledge derived from actually experiencing linkages between one's behavior and asthma management, rather than merely being told about them) was positively related to reported judgements of personal efficacy about the child's ability to perform asthma management behaviors.

<u>A Parent-Child Study Involving Self-Regulation</u>

One of the most recent social cognitive lines of childhood asthma management research has focused on both an asthmatic child's parent, usually the mother, and on the role of self-regulation behaviors. One widely accepted view of the concept of self-regulation proposed by social cognitive theorists emanates from an analysis of health functioning in terms of three dimensions: cognitive and physiological personal processes, one's behavior, as well as the social and physical environment. According to this triadic model, physiological asthma symptoms can be influenced by a person through the use of behavioral and environmental regulatory processes (Zimmerman, Bonner, Evans & Martinez-Pons, 1995). For instance, an asthmatic teacher could employ a cognitive strategy to classify and behaviorally avert situations that trigger allergic, reactions such as inhaling dust from the chalk board. From this self-regulation viewpoint, three subprocesses are used in asthma management strategies: self-observation, self-judgement, and self-reaction (Clark & Zimmerman, 1990). In order to reduce allergic reactions which could trigger an asthma attack, for example, our asthmatic teacher would have to *observe* and recognize the situations and factors related to her sneezing, coughing, etc. (i.e., the chalkboard dust). Second, she must *judge* or decide whether or not the chalk dust is a trigger. Following an evaluation of the situation, she *reacts*. That is, after such an assessment of the situation, she must use strategies to avoid or remove the trigger (e.g., by using "dustless chalk," using a chalk holder, letting non-asthmatic students erase and wash the board, etc.). The teacher's successful avoidance of inhaling chalk dust due to the employment of her management strategy might lead her to continue such behavior in the future as well as increase her feeling of personal efficacy, i.e., the belief that she can act effectively to reduce or avoid her asthma triggers in the classroom. According to self-regulation theorists (e.g., Clark et al., 1994), "through self-regulation training one is expected to learn how to acquire relevant information, to identify effective responses, and to develop the appropriate self-reaction, that is, the personal confidence to carry out needed actions." Self-regulating asthmatic individuals then, whether by personal experience or by direct training, would be expected to avoid hospital or clinic emergencies by virtue of their high level of disease management.

In order to demonstrate that self-regulating parents did indeed more effectively manage their children's asthma , Clark and colleagues (1994) interviewed 450 mothers whose young children were hospitalized at a major, inner-city Manhattan hospital serving predominantly Hispanic and African American clients. The mothers were asked about what they did when their children had a cold or respiratory infection. Regression analysis indicated that mothers who were more self-regulating managed their children's wheeze better and took more preventative actions to avoid their children's asthma triggers in the first place. Moreover, with respect to self-efficacy, prevention behavior was significantly associated with the mother's confidence to prevent her child from getting future colds as well as her confidence in preventing symptoms when the child had a cold in the future.

An Adult Study

Surprisingly few studies document the relationship between asthma management and self-efficacy in adults. This is due in part, to the nature of self-efficacy itself, which requires measurement of one's confidence in a particular context, and therefore, necessitates separate scales to measure each specific context. No general self-efficacy measure exists that would, for example, measure a variety of illnesses. The first formal instrument used to measure self-efficacy in adult asthmatics was the Asthma Self-efficacy Scale developed by Tobin, Wigal, Winder, Holroyd, and Creer (1987). The current version of their instrument is now a subscale of The Knowledge, Attitude, and Self-Efficacy Asthma Questionnaire or KASE-AQ (Wigal, Stout, Brandon, Winder, McConnaughy, Creer, and Kotses, 1993). After establishing the reliability and validity of KASE-AQ and each of its separate subscales in previous research, Wigal et al. (1993) enlisted 30 asthmatic subjects for their asthma self-management intervention entitled "Wheezer's Anonymous: An Adult Asthma Self-Management Program." Utilizing a waiting-list control design, the investigators pretested the subjects and assigned them into experimental or control conditions. Experimental subjects completed the intervention (a two-part training video comprised of topics on lung physiology, medications, triggers, etc.) and were posttested immediately upon completion. Waiting-list control subjects who also were tested again on the same day as the experimental posttest to determine if their responses had varied from their baseline KASE-AQ, then completed the two-part intervention. Both groups were tested a third time three months later to assess changes since program completion.

Results on the self-efficacy subscale indicated a significant (13%) increase in experimental subjects' personal efficacy to manage their asthma in contrast to a nonsignificant decrease in the control subjects during the same period. Between group differences were also statistically significant. Following completion of the intervention, wait-list control subjects also demonstrated an (11%) significant increase in self-efficacy. Three months later, both groups still displayed significant increases from baseline in personal efficacy to manage their asthma. The investigators concluded that self-efficacy is a critical variable to consider when designing and implementing an asthma management program. The authors further conclude that self-efficacy is a key variable to include when considering why a given asthmatic individual may not be complying with a medical regimen or management program. Such an individual, for example, may possess adequate asthma knowledge but may lack the confidence in his or her ability to follow specific physician-recommended steps in an asthma management plan.

Summary

In summary, the emerging literature on teacher asthma knowledge and management of children with asthma has provided an initial view of what teachers know about asthma. This research has shown that teachers have a largely inadequate understanding of basic facts about asthma as well as a severely limited understanding of preventative measures related to asthma triggers, common asthma medications, physical exercise, and emergency situations. These findings however, have been derived mainly from instruments of unknown reliability. Moreover, almost all of such findings have been based on research conducted with European and Australian populations. There is a clear need for a reliable measure of teacher asthma knowledge in the U.S.

The teacher asthma knowledge literature has also been plagued with a number of methodological inconsistencies which may have produced contrasting research findings. For example, the issue of whether teachers who have personal experience with asthma know more about asthma than those without such experience has received mixed results. Such incompatible findings, however, may be clarified with the use of more focused research questions and procedures.

Management of asthmatic children, however, requires more than teacher knowledge. In order to obtain a more informative profile of how teachers are coping with asthmatic students in their classrooms, researchers must possess an understanding not only of what teachers know but also information on how teachers would use the knowledge that they have. Such considerations of teacher efficacy about asthma and about the management of asthmatic children have not received any research attention to date.

Purposes of the Study

There were four main purposes of this study. The first purpose was to contribute further information about the current state of teacher knowledge and asthma management in an American inner-city context. Information regarding teacher self-efficacy about asthma and the managing of asthmatic children will also be offered for the first time. The second purpose of this study was to develop a reliable instrument to measure teacher asthma knowledge as well as teacher self-efficacy about asthma and capability to manage asthmatic children. The third purpose was to clarify differing findings of previous researchers regarding teacher knowledge of asthma. The final purpose was to provide an analysis of the interrelationships of three distinctive but related psychological teacher processes within the framework of a multi-process model of asthma education domains.

Specifically, it was expected that teachers' self-efficacy about asthma combined with their asthma knowledge can significantly predict their classroom asthma management skill. Secondly, it was predicted that teachers with asthma themselves, together with those who have asthmatic children of their own, would display greater asthma knowledge, self-efficacy, and classroom asthma management skill than non-asthmatic teachers or teachers without their own asthmatic children. Similarly, those teachers with asthmatic parents, spouses, or primary family members with asthma were also expected to display greater asthma knowledge, self-efficacy, and classroom asthma management skill than teachers without asthmatic family members. Finally, teachers with asthma training were expected to display greater asthma knowledge, self-efficacy, and management skill than teachers without any such training.

One future benefit of the study is to provide a basis for developing training methods that are related to the educational dimensions/teacher processes model proposed above. Training methods that take into consideration existing levels of teacher self-efficacy as well as specific dimensions of asthma knowledge and skill are more likely to improve teacher management of asthmatic students in school than more diffuse training methods. It is believed that this theory-driven approach, possessing cognitive, motivational, and behavioral dimensions will have special benefits for teachers, nurses, administration, and other staff members whose concern is the education of children with asthma.

Hypotheses

The hypotheses examined in this study were:

1. A teacher with asthma will display greater knowledge, self-efficacy and management about the disease than a teacher without asthma.

2. A teacher who has a child with asthma will display greater knowledge, self-efficacy and management of asthma than a teacher without an asthmatic child.

3. A teacher with an asthmatic parent will display greater knowledge, self-efficacy and management of asthma than a teacher without an asthmatic parent.

4. A teacher with an asthmatic spouse will display greater knowledge, self-efficacy and management of asthma than a teacher without an asthmatic spouse.

5. A teacher with an asthmatic primary family member will display greater knowledge of asthma, self-efficacy and management than a teacher without an asthmatic primary family member.

6. Knowledge of asthma and self-efficacy about asthma will be significant predictors of teacher asthma management.

7. Teachers who receive asthma training will outscore teachers without staff development on asthma knowledge, efficacy and management measures.

Chapter 3

Method

One of the purposes of this study was to develop a reliable multidimensional, multi-process scale to measure teachers' knowledge as well as their self-efficacy about asthma and their managing (i.e., teacher action in relation to student asthma control or regulation) of asthmatic children. Knowledge, efficacy, and asthma management have been inter-correlated in previous studies of asthmatic children. (Wigal et al., 1990a: Wigal et al., 1990b) and have been used as dependent measures in most asthma management programs (Wigal et al., 1993). It is for the above reasons that these variables were selected as dependent measures in this study of teachers' asthma- related functioning.

As the general purpose of this study was to provide a profile of urban teachers' asthma knowledge, self-efficacy, and management of asthmatic students, a descriptive, design approach was undertaken. The regular elementary school classroom teacher population of a New York City school district's K-5/6 schools was selected as an example of a group of urban teachers in a high asthma-incidence, inner-city, American school district. It should be noted, of course, that this group of teachers may not be representative of teachers at large.

Phase I: Questionnaire Development

Because no present measure of a teacher's asthma knowledge has sufficient published reliability, the initial phase of this study consisted of developing a reliable questionnaire to measure a teacher's asthma knowledge. In addition, a scale to measure a teacher's self-efficacy about asthma and the management of asthmatic children was developed. Existing teacher knowledge questionnaires in the literature were reviewed and items reflecting the various dimensions of asthma (asthma medications and their reactions; triggers; exercise; symptoms; prevention; learning/teaching; parental/student communication; and school policy/resources) were selected for consideration and modification. All but one of the previous asthma knowledge questionnaires in the literature have used items answered as "true," "false," or "don't know." Since other formats, such as the multiple-choice "test" format used by Atchison and Cuskelly (1994), have led to questionnaire rejection (i.e., refusal to participate) by schools as well as high experimental attrition rates, it was decided true/false/don't know statements would be the most suitable. A preliminary set of 39 items was generated and presented to a pulmonologist, an asthma project director at a major urban hospital, and a graduate research associate experienced in administering asthma questionnaires. These experts completed the survey and agreed on the correct responses to all but 7 items. These 7 items were subsequently rejected for their ambiguity. The remaining 33 items were presented to 3 primary school teachers who evaluated the scale for clarity and ease of interpretation and from their comments, several minor adjustments were made. The resulting 33 items form the Teachers' Asthma Knowledge Questionnaire (KQ) (Appendix A). The items on the asthma management (MQ) and self-efficacy (EQ) scales were constructed by considering common situations that elementary school teachers of asthmatic children might encounter. Items of an efficacy scale were paired with items of a management scale in order to achieve the closest possible contextual linkage. Items on the management scale offer response choices of: "Never," "Not Usually," "Sometimes," "Usually," and "All the Time." Items on the efficacy scale offer response choices of: "Definitely Could Not," "Probably Could Not," "Maybe," "Probably Could," "Usually," and "All the time." Questionnaire items on both scales were constructed so as to achieve a balance of positive and negative correct responses. Finally, items were devised as part of an introductory teacher background section to gather relevant information, such as the sources of a teacher's asthma knowledge, school policy with respect to asthmatic students, and personal asthma information.

Phase II: Establishing Reliability

With inter-rater reliability already established, the purpose of the second phase was to determine the test-retest reliability and internal consistency of the teachers'asthma questionnaires. Ten primary school regular classroom teachers from the staff of an inner-city public school were randomly selected to complete the Asthma Questionnaires once and then again two weeks later. Pearson product-moment correlations between first and second administrations of the Asthma Questionnaires for the three scales were as follows: general knowledge, $r = 0.81$, $p<0.001$; management, $r = 0.78$, $p<0.001$; self-efficacy, $r = 0.86$, $p<0.001$. Coefficient alpha was 0.92 for the knowledge scale, 0.85 for the management scale, and 0.87 for the efficacy scale. Overall, coefficient alpha was 0.89 for the first administration and 0.91 for the second administration of the instruments, demonstrating that the Asthma Questionnaires are internally consistent.

Phase III: Administration

Subjects. All of the 450 pre-kindergarten through 5th grade regular classroom teachers from all 14 pre-k-5/6 or pre-k-8, inner-city, public elementary school district were approached to complete the 3 questionnaires. Students in the low SES district were predominantly African American.Teachers in these schools varied in age (early 20's to early 60's), experience (recent college graduates to approaching retirees), and ethnicity (Caucasian, African American, Hispanic). Teachers in the schools were predominantly female.

Sampling. All of the 450 regular classroom teachers from each of the 14 pre-k-5/6 or pre-k-8 schools were approached either through their attendance at district office workshops or school staff meetings to complete the teacher asthma questionnaires. Teachers who were not present at the district office or staff sessions were given the questionnaires by their principals. Approximately 80 of the 164 teachers who returned their questionnaires did so by mail.

Analysis. In order to determine the sources of teacher knowledge of asthma and to develop a profile of the inner-city, primary teacher in regard to asthma, descriptive analyses were performed using the obtained knowledge, self-efficacy, and management data. One important prediction in this study was that teachers with asthma themselves would display greater knowledge, self-efficacy, and management about asthma than nonasthmatic teachers (Hypothesis 1). Similarly, it was predicted that a teacher with primary personal experience with caring for an asthmatic individual, such as a child, elderly parent, spouse, partner or close friend) would also display greater asthma knowledge, self-efficacy, and management than a teacher without such experience (Hypotheses 2-5). These first five predictions were tested using analysis of variance procedures. Another important prediction in this study was that asthma knowledge and self-efficacy would additively predict asthma management (Hypothesis 6). This prediction was tested by using regression analysis. Finally, the expectation that teachers who had received some kind of asthma training would outscore teachers without such training (Hypothesis 7) was tested with analysis of variance procedures.

Chapter IV

Results

General Descriptive Information

Approximately 450 teachers from each of the 9 pre-k - 5/6 elementary schools and 5 pre-k-8 schools in the district were approached to participate in this study. One hundred and sixty-three teachers agreed and returned the Knowledge Questionnaire (KQ), the Efficacy Questionnaire (EQ), and the Management Questionnaire (MQ) (Appendices I-IV), 4 of which were eliminated from the analysis due to missing data. Out of the remaining 159 subjects, 124 (78%) were female and 35 (22%) were male. Thirty-two percent of the sample had 0-5 years teaching experience. Another twenty-four percent had between 6 and 10 years experience. Finally, the other 44% had approximately 11-30 years experience. In terms of teaching experience at their present school, 44% of the teachers had been at their present school for 5 years or less. Another 26% had taught for 6-10 years at their present school. Finally, 30% had between 11 and 29 years experience at their present school (Table 2). Upper-primary school teachers of grades 3 through 5, comprised 17%, 23.9% and 18.9% of the sample respectively, whereas the lower primary grades of pre-kindergarten through second grade comprised 6.3%, 8.2%, 10% and 15.7% of the sample respectively (Table 3).

Table 2.

Years of Teaching Experience

Years Teaching			Years at Present Public School		
Years	Freq	Percent	Years	Freq	Percent
1-5	51	32	1-5	70	44
6-10	38	24	6-10	42	26
11-30	70	44	11-29	47	30
Total	159	100		159	100

Table 3

Present Grade Level

Grade	Freq	Percent
Pre-K	10	6.3
K	13	8.2
1	16	10.1
2	25	15.7
3	27	17.0
4	38	23.9
5	30	18.9
Total	159	100

Reliability of Instruments

Reliability analyses were conducted for each of the three scales separately and together. Cronbach's alpha was .89 for the KQ, .90 for the EQ, and .88 for the MQ. Over the 3 questionnaires considered together, Cronbach's alpha was .77, thus demonstrating that the 3 scales are reliable.

Asthma-Related Information

Approximately twenty-five percent of the subjects considered themselves asthmatic and reported receiving a physician's diagnosis of asthma sometime in their lives (Table 4). Approximately 41% of the asthmatic teachers had the disease for less than six years. Twenty-eight percent reported having asthma for 6-19 years while an additional 31% of them had it for 20 or more years (Table 5). Approximately 10% of the teachers had a child with asthma, 11% had a parent with asthma, 6% had a spouse with asthma, and 21% had a primary family member with asthma (Table 6). At the time of the survey, 93% of the teachers had at least one asthmatic student in their class and an additional 3% of the teachers reported having had an asthmatic student in their classes at one point in their careers (Table 7). Forty-eight percent of the teachers had 4 or more students with asthma in their classes (Table 8). Thirty-five percent of the teachers, however, were undecided or unsure about the number of asthmatics presently in their class (Table 9).

Table 4

Asthma Frequency

Asthma	Frequency	Percent
Yes	39	24.5
No	120	75.5
Total	159	100.0

Table 5

Years with Asthma

Years	Frequency	Percent
1-5	16	41
6-19	11	28
20 +	12	31
Total	39	100*

*100% of the 39 asthmatics in the study

Table 6

Familial Experience with Asthma

		Frequency	Percent
Own Child Asthmatic	Yes	16	10.1
	No	143	89.9
Parent Asthmatic	Yes	18	11.3
	No	141	88.7
Spouse Asthmatic	Yes	9	5.7
	No	150	94.3
PFM* Asthmatic	Yes	33	20.8
	No	141	88.7

* Primary Family Member

Table 7

Asthmatic Students in Class

		Frequency	Percent
Ever Had Asthmatic Asthmatic In Class	Yes	153	96.2
	No	6	3.8
Total		159	100.0
Presently Have Asthmatic in Class	Yes	147	92.5
	No	12	7.5
Total		159	100.0

Table 8

How Many Asthmatic Students in Class

#Asthmatic	Frequency	Percent
1.00	10	6.3
2.00	26	16.4
3.00	35	22.0
4.00	42	26.4
5.00	16	10.1
6.00	18	11.3
Total	159	100%

Table 9

Certainty About the Number of Asthmatics in Present Class

Certainty	Frequency	Percent
V Unsure	5	3.1
Unsure	35	22.0
UND	16	10.1
Sure	69	43.4
V Sure	34	21.4
Total	159	100.0

School Policy Information

Only 18% of the teachers reported that their school had a school policy on asthma. Forty-four percent of the teachers described their school as not having such a policy and 38% of the teachers were not sure of whether such a policy existed. Of those reporting their school as having a policy on asthma, only 13% reported understanding it (Table 10). About 64% of teachers reported their school as having a full-time nurse 5 days/week (Table 11). Approximately 18% believed there were restrictions on the participation of asthmatic students in their school (Table 12). Only 42% of the teachers reported that when a child first enters school, they would be routinely informed about that youngster's asthma). Forty-two percent also reported that they would be routinely informed sometime later during the student's primary school years (Table 13). Ninety-seven percent of the teachers reported never having received staff development courses on asthma (Table 14). Teachers reported obtaining information about asthma mostly from the general print and electronic media, from personal or vicarious experience, as well as from physicians and friends (Table 15).

Table 10

School Asthma Policy

	Certainty	Frequency	Percent
School Has Asthma Policy	Yes	29	18.2
	No	70	44.0
	Unsure	60	37.8
	Total	159	100.0
Understand Asthma Policy	Yes	20	12.6
	No	67	42.1
	Unsure	72	45.3
	Total	159	100.0

Table 11

School Nurse Days

Days	Frequency	Percent
0	6	3.8
1	7	4.4
2	13	8.2
3	27	17.0
4	1	.6
5	101	63.5
< 1	4	2.5
Total	159	100.0

Table 12

School Restrictions on Asthmatics

RESTRICTS	Frequency	Percent
Yes	28	17.6
No	102	64.2
Unsure	29	18.2
Total	159	100.0

Table 13

When Teachers Are Informed About A Student's Asthma

	Certainty	Frequency	Percent
Informed When	Yes	66	41.5
Child Starts	No	91	57.2
School	Don't Know	2	1.3
	Total	159	100.0
Routinely	Yes	67	42.1
Informed	No	79	49.7
Later	Don't Know	13	8.2
	Total	159	100.0

Table 14

Asthma Staff Development

	Frequency	Percent
Yes	5	3.1
No	154	96.9
Total	159	100.0

Table 15

Sources of Teachers' Asthma Knowledge

Sources	Frequency*	Percent*
General Media	48	30
Reading	45	28
Physicians	30	19
Experience	32	20
Friends	23	14
Colleagues	7	4
Parents	1	0 .06
Family	14	8.8
Word of Mouth	10	6.3
None	19	11.9

*Subjects were able to choose more than 1 source, therefore, columns will not add to N=159 or 100% respectively

Knowledge of Asthma

Teachers' knowledge about asthma was tested with the KQ which contained 33 items requiring a true/false/don't-know response. Reliability analyses with the KQ revealed a Cronbach alpha of .89. Appendix V summarizes the teachers' responses. Each subject's responses on the KQ were tabulated and correct responses were summed to yield a total knowledge (Ktot) score, with a maximum of 33. Ktot scores ranged from 5-33 with a mean of 17 and standard deviation of 6.22.

Self-Efficacy About Asthma

Teachers' efficacy about asthma and their management of it was assessed with the EQ. This measure consisted of 12 items which were matched to corresponding management items in a Likert scale format. The items indicated how sure teachers were that they could perform a given activity. Their responses took the form of "Definitely could not," Probably could not," "Maybe," "Probably could," and "Definitely could." Self-efficacy items were tabulated and scored in such a manner as to indicate higher efficacy about asthma with higher scores and lower efficacy about asthma with lower scores (i.e., "Definitely could not" was scored as a "1," "Probably could not" was scored as a 2, etc.). Although the total scores could potentially range from 12 to 60 (48 points) the obtained range of efficacy scores was 41 with a mean of 37 and a standard deviation of 9.14. Cronbach's alpha reliability coefficient was .90. The subjects' efficacy responses are summarized in Appendix VI.

Management of Asthmatic Students

Classroom management of asthmatic students was assessed with the MQ. Subjects responded to 12 typical scenarios encountered by primary teachers of asthmatic students in terms of the frequency with which they performed a given task. Items were tabulated so that a higher score (e.g., the highest was a "5") indicated more involved asthma management and a lower score (e.g., the lowest was a "1") indicated lesser management. The total score could range from 12 to 60 (48 points) but actual management scores ranged from 12 to 39 with a mean of 21 and standard deviation of 7.48. Cronbach's alpha reliability was .88. Subjects' responses to these management items are summarized in Appendix VII.

Asthma Experience

In order to determine the effects of asthma background experience on teachers' knowledge, management and efficacy, analysis of variance procedures were employed. As expected, significantly greater total asthma knowledge was reported by teachers with asthma ($m = 23.00$) compared to those without it ($m = 15.35$), $F(1, 157) = 61.17$, $p < .001$; by teachers with asthmatic children of their own ($m = 23.68$) compared to those who did not have asthmatic children ($m = 16.51$), $F(1, 157) = 21.59$, $p < .001$; by teachers with an asthmatic parent ($m = 22.66$) compared to those without an asthmatic parent ($m = 16.53$), $F(1, 157) = 17.01$, $p < .001$; by teachers with an asthmatic spouse ($m = 25.33$), compared to those without an asthmatic spouse ($m = 16.74$), $F(1, 157) = 17.86$, $p < .001$; and finally, by teachers with asthmatic primary family members ($m = 19.57$) compared to those without asthmatic primary family members ($m = 16.61$), $F(1, 157) = 6.08$, $p < .01$. ANOVA procedures were also used to compare asthmatic teachers and their non-asthmatic colleagues on each of the knowledge items, and significant differences were found for 22 of the 33 items and are displayed in Appendix VIII.

With regard to perceptions of self-efficacy, teachers with asthma ($m = 43.15$) reported higher levels than those without asthma ($m = 35.45$), $F(1, 157) = 23.88$, $p < .001$. Teachers with asthmatic children of their own ($m = 44.81$) were also significantly more efficacious about asthma than their colleagues without asthmatic children ($m = 36.51$), $F(1, 157) = 12.75$, $p < .001$. Teachers with an asthmatic parent ($m = 47.44$) were also more likely to have higher self-efficacy than their colleagues without such a parent ($m = 36.05$), $F(1, 157) = 29.19$, $p < .001$. Similarly, teachers with asthmatic primary family members ($m = 44.06$) were more efficacious about asthma than teachers without asthmatic primary family members ($m = 35.58$), $F(1, 157) = 26.03$, $p < .001$). Finally, teachers with an asthmatic spouse ($m = 44.22$) were significantly more efficacious about asthma than their colleagues without an asthmatic spouse ($m = 36.93$), $F(1, 157) = 5.55$, $p < .02$. Asthma background experience also was related to asthma management skill. Teachers with asthma ($m = 26.17$) had higher management scores than their non-asthmatic colleagues ($m = 19.70$), $F(1, 157) = 25.45$, $p < .001$). Teachers with an asthmatic child of their own ($m = 29.12$) also outscored those colleagues without such a child ($m = 20.41$), $F(1, 157) = 22.09$, $p < .001$. Teachers with an asthmatic parent ($m = 26.61$) had significantly higher management scores than their colleagues without an asthmatic parent ($m = 20.60$), $F(1, 157) = 10.90$, $p < .001$. Similarly, teachers with primary asthmatic family members ($m = 23.72$) obtained significantly higher management scores than their colleagues without such family members ($m = 20.65$), $F(1, 157) = 4.51$, $p < .001$. Teachers with ($m = 25.00$) and without ($m = 21.06$) an asthmatic spouse, however, did not significantly differ on classroom asthma management scores.

Classroom Experience

The effect of teachers' classroom experience on knowledge, efficacy and management of asthma was assessed with ANOVA and multiple comparison procedures. No significant differences in asthma knowledge, efficacy or management were found between teachers who had

0-5 years of teaching experience; teachers with 6-10 years experience; and teachers with 11-29 years of experience. However, when the number of years of teaching experience at their present school was considered, significant differences were obtained, in asthma management, $F(2, 156) = 7.14$, $p < .001$) and knowledge, $F(2, 156) = 3.76$, $p < .025$) measures between the same three groups of teachers. Tukey post hoc tests revealed that the most experienced and stable teachers (11-29 years at their present school) scored significantly higher than the least experienced, least stable teachers (0-5 years at their present school) in both asthma management and knowledge (all $p < .05$). No differences were found involving the intermediate experience group with 6-10 years of teaching experience.

Specialized Training Experience

Only a few teachers had previously received staff development training in asthma (3% or 5 teachers) ANOVA indicated that these trained teachers reported greater asthma knowledge, ($m = 28.20$) than untrained teachers ($m = 16.87$), $F(1, 157) = 17.69$, $p < .001$. Trained teachers also displayed greater asthma management, ($m = 29.40$) as compared to their untrained colleagues ($m = 21.02$), $F(1, 157) = 6.260$, $p < .013$. Trained teachers ($m = 44.70$) displayed greater self-efficacy than untrained teachers ($m = 37.10$), $F(1, 157) = 3.487$, $p < .03$, one tailed. The most notable effect of specialized training were the results on the knowledge scale, where 4 of the 5 teachers with asthma staff development scored 31 or more correct out of 33 questions.

Construct Relationships

Multiple regression procedures were used to assess whether general knowledge and self-efficacy were significant additive predictors of classroom asthma management. Asthma knowledge and self-efficacy accounted for 37% of the variance predicting asthma management

(R = .61), $F(2, 156) = 47.21$, $p < .001$. The standardized regression weights for knowledge and self-efficacy were virtually identical (.36 each) and both variables were statistically significant predictors of asthma management (smaller $t = 5.08$, $p < .001$). The three variables were highly inter-correlated as displayed in the table below.

Table 16

Correlations for Asthma Knowledge, Self-efficacy and Asthma Management

	Management	Knowledge	Efficacy
Management	1.000	.523	.520
Knowledge	.523	1.000	.444
Efficacy	.520	.444	1.000

Chapter 5

Discussion

Introduction

The purpose of this study was to develop a profile of American, inner-city, elementary school teachers regarding their classroom management of asthmatic students. Previous research (mostly European) has identified teacher knowledge of asthma as a crucial factor, however, the use of varying instruments of unknown reliability together with unfocused methodological procedures has been problematic. Moreover, despite evidence suggesting the importance of self-efficacy in predicting asthma management, no efforts have been made to study the role of teachers' perceptions of their efficacy about handling students' asthma. As such, this study sought to provide descriptive data about teachers' asthma knowledge, efficacy perceptions and management of asthmatic students using reliable instruments and more focused research questions in an American, inner-city context where asthma has been endemic. When analyzed within a framework of asthma education domains, teachers' asthma knowledge, efficacy perceptions and management of students with asthma form a critical process component in the understanding of how teachers have been coping with the present asthma crisis in the classroom and how they can be trained to manage their asthmatic students more effectively.

Support for the Hypotheses

Regarding hypothesis 1 that teachers with asthma would display more knowledge, self-efficacy and management of asthmatic students than their non-asthmatic colleagues, support is indicated by the fact that the overall mean scores of asthmatic teachers were significantly higher than those of their non-asthmatic counterparts in all of these three domains. In terms of asthma knowledge, asthmatic teachers outscored their non-asthmatic colleagues on 22 of the 33 items on the Knowledge Questionnaire. The reason for this finding is self-evident: personal experience with asthma increased one's knowledge about it. Personal experience, i.e., successful experience with asthma, moreover, also increased confidence in one's ability to manage the disease in class. Finally, this study showed, that asthmatic teachers, who are used to dealing with the disease on a personal level, can use their knowledge to manage asthmatic students in their classrooms.

Regarding hypothesis 2 that teachers with asthmatic children of their own would display greater knowledge, self-efficacy and management of asthma than their colleagues without asthmatic children, support is indicated in the fact that the mean scores for teachers with asthmatic children were significantly higher than those of their counterparts without asthmatic children in all three domains. It is hardly surprising that teachers with asthmatic children at home knew more about asthma than their counterparts without such children at home, since they had to deal with asthma on a daily basis as a parent. Furthermore, having successful experience in managing one or more asthmatic children at home would be expected to increase one's confidence in one's ability as well as actual ability to handle the symptoms among one's classroom students with asthma.

Regarding hypothesis 3 that teachers with an asthmatic parent will display greater knowledge, self-efficacy and management of asthma than their colleagues without an asthmatic parent, support is indicated in the fact that the mean scores of teachers with an asthmatic parent were significantly higher than those of teachers without an asthmatic parent on all three domains. Teachers with such a parent evidently learned about the symptoms and treatments of the disease vicariously. That experience also seemingly fostered an increased confidence in ability to manage classroom asthma as well as actual application of asthma management skills.

Regarding hypothesis 4 that teachers with an asthmatic spouse will display greater knowledge, self-efficacy and management of asthma than teachers without such a spouse, partial support is indicated in the fact that the mean scores of teachers with an asthmatic spouse were significantly higher than those of their colleagues without an asthmatic spouse on the knowledge and efficacy domains. Mean scores for the management domain approached but did not achieve significance. Having an asthmatic spouse evidently resulted in teachers' learning about the disease as well as a greater confidence in their ability to respond to disease symptoms with asthmatic students. . However, since the difference between the two groups of teachers in terms of actual, reported management was not significant, it would seem then, that teachers' increased learning about the disease together with increased confidence in their ability to manage asthma through vicarious experience with their asthmatic spouse does not automatically indicate more effective classroom asthma management.

Regarding hypothesis 5 that teachers with asthmatic primary family members will display greater knowledge, self-efficacy and management of asthma than those without such family members, support is indicated for all measures. Clearly then, vicarious asthma experience through a close personal relation results in a teacher's attaining knowledge about asthma as well as greater confidence in their ability to manage the disease in class. Such experience is also related to slightly better management skills when dealing with asthma in the classroom. However, the marginally significant difference in management between teachers with and without asthmatic primary family members, together with the finding of no significant differences in management between teachers with and without an asthmatic spouse, may be reflective of the weaker intensity of the vicarious experience; Dealing with asthma in the case of one's dependent child or elderly parent would likely require more direct, "hands on" experience than with an asthmatic spouse or sibling who may be capable of managing the disease themselves.

Hypothesis 6, that knowledge and self-efficacy about asthma are significant additive predictors of teachers' classroom asthma management, was supported by the regression analysis. Regression weights for knowledge and self-efficacy were similar in size and both were statistically significant predictors of asthma management. Clearly then, teachers' knowledge about asthma and their perceived efficacy about dealing with asthma constitute important predictors of their effectiveness in managing their students' classroom asthma.

Regarding hypothesis 7 that teachers who received staff development training would outscore those teachers without such training on asthma knowledge, efficacy, and management measures, support is indicated in the fact that the means of teachers with asthma training were significantly higher than those of their untrained colleagues on the knowledge, management and efficacy domains. Although few teachers in the sample received training, those who did knew significantly more about asthma than their un-trained colleagues. Asthma staff development training also translated into increased confidence in dealing with the disease as those in the training group outperformed their untrained colleagues. Teachers with some form of training also showed significantly more classroom asthma management skills on the Management Questionnaire than their untrained colleagues.

Support for the Model

Support for the multi-process model of teacher asthma education domains is indicated by the study in a number of ways. First, scales representing the teacher processes of classroom asthma knowledge, self-efficacy and management were found to be internally consistent. Second, although the scales dealt with distinctive psychological processes, they displayed expected interrelationships as predicted by the model. For example, the present study's data support the model's contention in regard to a student's asthma triggers that a teacher needs to know what those triggers are and be confident in communicating the appropriate procedures to follow. Finally, the fact that knowledge and self-efficacy were highly inter-correlated and that both were statistically significant predictors, supports the model's conceptual view that knowledge and self-efficacy are vital components for teacher classroom asthma management.

A Profile of the American Inner-city Primary Public School Teacher of Asthmatic Students

Descriptive data from this study indicate that teachers' knowledge, self-efficacy and management of asthmatic students is largely unsatisfactory. Since students often spend as much and in some cases, even more time with their teachers than with their parents or other primary guardians, teachers must be fully prepared to assist students with widespread chronic diseases. Teachers need to become a reliable member on the students' asthma management team whenever appropriate. One key area of teacher asthma knowledge deficiency uncovered by the Knowledge Questionnaire concerned asthma triggers. More than one third of the sample was either unsure of or mistaken about whether removing asthmatic children from asthma triggers would help prevent symptoms! Clearly, for example, if chalk dust is a trigger for a student's asthma, the uninformed teacher would unintentionally do harm by having the student write on the chalkboard. Knowledgeable teachers can easily assist students in managing their disease by helping them avoid known asthma triggers. Another glaring deficit in teachers' asthma knowledge is with respect to basic asthma medications. One does not expect a teacher to possess the asthma knowledge of a physician, however, a teacher with even the most rudimentary understanding of asthma medications might be able to assist in a student's asthma management. For example, reminding a student with exercise-induced asthma, to take their medication *before* participating in physical exercise is not beyond the scope of a teacher's duties. Yet 67% of the teachers in this study were either unsure of or mistaken about such a basic procedure involving the medication of asthmatic students. The general lack of familiarity with asthma medications among primary school teachers observed in the previously cited European studies, was confirmed in the present research. Approximately 80% of the present sample was also confused about the basic classes of asthma medication and their general effects. Effective classroom asthma management is impeded by such a lack of basic understanding about the treatment of this disease.

In terms of actual management activities engaged in by teachers of asthmatic students, in this study, it is apparent that insufficient asthma management is taking place. In fact, in the course of surveying these teachers, it became evident that the main management activity of teachers is to send a known asthmatic child displaying symptoms to the nurse or main office! More than a third of the teachers in this sample either "never" or "did not usually" obtain information about a student's asthma from their school records. More than half of the sample of teachers either "never" or "did not usually" help asthmatic students avoid their asthma triggers. Nor had the same percentage of teachers contacted an asthmatic child's parent regarding the child's symptoms, medication or learning. More than 80% of the teachers either "never" or "did not usually" supervise asthmatic children who take their medicine in school.

Even teachers with some asthma knowledge may not engage in enough asthma management due to low perceptions of efficacy regarding their abilities to manage their students' disease. A teacher's motivation to effectively supervise asthmatic children will depend on confidence that he or she can properly explain and guide the student in the appropriate procedures to follow (e.g., recognizing asthma symptoms during a class trip and taking the necessary actions or using a bronchodilator dispensing Ventolin before a gym class). Confidence in one's ability to perform such tasks is due in large part to training and practice, whether it is gained from personal experience (e.g., if the teacher has asthma) or professional staff-development sessions. These results regarding perceptions of asthma management self-efficacy underscore the need for more effective asthma management teacher training.

The profile of inner-city teachers of asthmatic students summarized above generally fits with the results of the European and Australian studies also showing extremely limited teacher understanding of asthma and its management. One important difference in results obtained in this American study and those obtained in Great Britain (Bevis & Taylor 1990) pertains to the effect of personal exposure to asthma on teachers. Bevis and Taylor reported that only a small proportion of teachers had personal or family contact with asthma. In this study, however, more than a quarter of the subjects were exposed to asthma on a personal or familial level. Bevis and Taylor reported few significant differences between teachers with and without such personal exposure to asthma. In this study however, there are clear and sizeable differences between the two teacher groups with respect to asthma knowledge, self-efficacy and management. Perhaps the amount and duration of personal exposure to asthma in the two populations can account for this difference in finding. It should also be noted that while reporting their results on this issue, the British researchers did not appear to distinguish between types of exposure to asthma in their analysis. Rather, teachers with asthma exposure (personal, familial, or by their asthmatic students) were compared as one group to teachers without exposure to asthma. Their results seem counter-intuitive; It does seem logical to expect, for instance, that teachers who have asthma themselves should have a better awareness of asthma symptoms and medications than teachers who merely know someone with asthma or teachers who do not have asthma. When types of exposure were distinguished and more detailed instruments were used in the present study, support for the personal experience hypothesis was found.

Analysis of the effect of the amount of teachers' classroom experience revealed no differences in knowledge, efficacy and management of classroom asthma. This finding is similar to that obtained by British (Bevis & Taylor 1990) and Australian researchers (Atchison, Psych & Cuskelly, 1994). Interestingly, however, when the number of years of teaching experience *at one's present school* was considered, the most experienced and stable teachers (11-29 years at the same school) outscored the least experienced and stable teachers (0-5 years at their present school) on both asthma knowledge and management indices. This outcome may be attributable to the high incidence of asthma in inner city schools.

Bevis and Taylor (1990) also reported that approximately 4% of the British teachers had at one point received some kind of asthma training. Such training, however, did not result in those teachers showing significantly better asthma knowledge than that of their untrained colleagues. Similar results were found in an Australia study (Atchison, Psych & Cuskelly, 1994) with 34% of teachers receiving asthma training, but failing to show more knowledge than their untrained counterparts. The results of the present study stand in contrast to those findings; the 3% of teachers reporting previous asthma staff development far outscored their untrained colleagues on asthma knowledge and management indices. Perhaps these New York teachers received more than the usual methods of lecture, demonstration, and discussion that the Australian teachers received. According to the Australian researchers, "teachers may learn more about asthma and retain the information longer if adult learning techniques are used" (p 274). On the other hand, the United States school personnel training study in Portland, Oregon (Eisenberg et al 1993) showed that knowledge of asthma displayed by non-medical personnel (40% of whom were teachers) significantly increased following training consisting of 'the usual' educational methods. Another explanation for the differences in asthma knowledge between the present and Australian teachers may lie in the proportion of trained teachers who were themselves asthmatic. In the present study, 80% of the trained teachers were themselves asthmatic, which no doubt contributed to their excellent understanding of asthma. The proportion of trained Australian teachers who were themselves asthmatic was not reported. Nor was it reported in the Portland or British studies. The extent to which a teacher's own asthmatic status influences his or her understanding of asthma, however, does not change the simple fact that adequate asthma knowledge is a necessary prerequisite for teachers to respond appropriately and effectively to the needs of asthmatic children. Clearly, this study coheres with the aforementioned studies in revealing that not enough urban American school teachers are receiving *any* type of asthma training. Given today's asthma epidemic, this fact has serious consequences for the management as well as treatment and diagnosis of asthma in the inner city student population.

Implications for Educational Practice

One important implication of this study is that teachers must be especially prepared to cope with asthma in the classroom given the prevalence of asthma among inner-city students. According to the New York Times, the most recent figures reported by the Center for Disease

Control at the beginning of May 1996, indicate that African Americans from birth through 4 years of age and for youths 15 to 24, were six times more likely to die of asthma in 1993 than Caucasians of the same age groups. Mortality rates for African American children ages 5-14, were four times greater than for Caucasian children (New York Times, May 2, 1996). Hispanic populations are also disproportionately represented in trends of rising asthma morbidity and mortality. For example, Christiansen et al (1996) found that 14.4% of Mexican American children (9-12 years of age) in the inner-city of San Diego had asthma. This rate is far higher than the national average of approximately 5% (Halfon & Newacheck, 1993). There is considerable evidence, however, that poverty as opposed to ethnicity, is the more likely major factor that contributes to the disparity between asthma mortality rates (Malveaux, Houlihan, & Diamond, 1993). Teachers in inner-city areas where large numbers of low SES African American and Hispanic families live can play an important role in (a) assisting asthmatic students in school to follow their treatment plans and thereby control their asthma (e.g., taking medicine before gym if indicated, avoiding asthma triggers, etc.), (b) in communicating with parents and physicians to assist with implementing and / or complying with asthma management plans, (c) and in helping students to understand and cope with their disease in general. However, teachers can only be of assistance to asthmatic children if they are knowledgeable about asthma as well as possess the requisite self-efficacy and management skill.

A second implication is that given the ubiquitous under-diagnosis of asthma (American Academy of Allergy, Asthma & Immunology, 1995; Evans, 1994), teachers who are knowledgeable about the disease can assist in the identifying of suspected asthmatic children for medical testing. Such teachers could organize in-school screening and treatment with the help of the school nurse, health aides, administrators, and community physicians. Moreover, given that asthma falls under the classification of "other health impaired" clause of the Education for All Handicapped Children Act of 1975 (PL94-142), knowledgeable teachers could help their school districts comply with federal law requirements and provide assistance for asthmatic children who are excessively absent or falling behind academically (American Academy of Allergy, Asthma & Immunology, 1995).

A third implication is that if teachers are to become more knowledgeable about asthma management, then school districts must allocate greater resources toward staff development about asthma. Too often, health programs are eliminated due to budgetary considerations. Government, community, and corporate support must be enlisted to assist impoverished inner-city school districts.

A fourth implication is that if school districts do find the resources to provide teachers with asthma training, effective adult educational methods must be utilized to foster retention and use of material learned. Moreover, instead of consisting of single video-driven, sporadic information sessions, such training should be ongoing, interactive, and "hands-on" (e.g., with use of tools such as the peak flow meter). Such an approach would capture better the types of personal asthma experiences reported in the present research.

School districts should not have to take all responsibility for teacher asthma training. University teacher education programs as well as city and state education departments should develop methods to help teachers cope with the challenge of asthmatic students in the classroom. For example, a health component dealing with common diseases impacting schools might be added as a requirement for graduation or state certification.

A sixth implication is that teachers are more likely to benefit from programs that focus on developing levels of personal efficacy about asthma management as well as asthma knowledge, across specific educational domains, than from programs using undifferentiated approaches. To that end, it is hoped that the multidimensional, multi-process model outlined in this study will provide a guide toward the genesis of meaningful staff development opportunities for teachers of asthmatic children.

Limitations of the Study

There are a few limitations of the study that restrict any conclusions drawn from the obtained results. First, the sample is confined to teachers because they have not received much research attention with respect to their management of asthmatic students. Therefore, no conclusions can be made about asthma management of other school personnel (e.g., secretaries, nurses, administrators, parents) important in the day-to-day management of an asthmatic student in school. The sample is also limited to teachers working in an inner-city school district where the prevalence of asthma is particularly high and the resources for training and health support are low. Therefore, findings cannot necessarily be generalized to non-similar school districts.

Second, this study relies upon self-report data which depends upon the veracity of the subjects' responses. It is possible, although unlikely, given the nature of the questionnaires and their distribution / administration, that teachers may have made responses, for example, which they believe to satisfy the experimenter rather than indicating what they actually feel. However, there is extensive questionnaire research in the literature on children's asthma and these scales have been highly predictive of behavioral and health outcomes (Bonner, Zimmerman, Evans, Irogoyen, Mellins, and Resnick, 1999).

A third limitation concerns the limited number of subjects (5) who had completed some kind of asthma training. Such results, although statistically reliable, may not be representative of larger populations of teachers. Even more importantly, 80% of this small group of teachers had asthma themselves, and thus, any observations relating to staff development may have been confounded by a teacher's own asthmatic status.

A fourth limitation is that even though a response rate of 36% is certainly an adequate sampling basis for describing teachers within this inner-city school district, it is difficult to ascertain the characteristics of teachers who did not participate. What is evident, however, is that the number of teachers with asthma might be over-represented. Thus, the findings of this study may in fact portray an optimal picture of teacher awareness of asthma!

Directions for Future Research

There is a need to extend this research to additional inner-city school districts in order to monitor its scope of representation. With a larger group size, the problem of a teacher's asthmatic status confounding data interpretation concerning the efficacy of asthma teacher training can be resolved by separating those with such staff development experiences into two analysis sub-groups.

Further research is needed pertaining to the relative effectiveness of various methods of asthma instruction. Having teachers simply watch a video about asthma may help a district comply with state or city policy mandates, but is clearly an inadequate method of asthma teacher training. Interactive forms of training involving "hands on" problems and direct physical participation are needed. The use of professionals who can assist teachers during class to handle asthmatic students has been shown to produce statistically sizable effects (Bonner, Zimmerman et. al., 1999).

More research is needed on teacher processes involved in asthma management. The proposed model in this study may need to incorporate additional components (such as learning and teaching "styles") which may affect the interaction of a teacher's asthma knowledge and self-efficacy to influence classroom asthma management. The introduction of self-efficacy into the effective asthma management equation is clearly an initial step in need of further elaboration and refinement by future research (Zimmerman, Bonner, Evans and Mellins, 1999).

There is also a need for experimental training studies in order to demonstrate that effective methods of asthma staff development can in fact play an important role in improving the asthma knowledge, efficacy and ultimately, management of teachers with asthmatic students.

Finally, this study's findings indicating that not only personal exposure to asthma, but also vicarious experience with a close asthmatic relation may lead to increased asthma knowledge and management is at odds with the current literature and needs to be replicated. If confirmed, another avenue of future research would be to identify which circumstances foster the retention and proper use of asthma management information and skills. Such data would be useful in implementing teacher asthma management education programs.

Appendix I

Teacher Asthma Questionnaire
Demographic Questions

1. What school do you presently teach in? __________
2. How long have you been teaching? __________
3. How long have you been teaching at your present school? __________
4. What grade level(s) do you presently teach? __________
5. Are you male or female? __________
6. Have you ever been diagnosed by a doctor as having asthma? Yes or No (please circle)
7. Do you presently have asthma? Yes or No. If yes, for how long? __________
8. Do you (or did you ever) have a child, parent, spouse, partner, sibling or close friend with asthma? Yes or No. If yes, please indicate which person(s): __________
9. Are you now (or were you ever) actively involved in the care of an individual with asthma? Yes or No. If yes, please indicate which person(s): __________
10. Have you ever had an asthmatic student in any of your classes? Yes or No
11. Have you ever been actively involved in the care of an asthmatic student in any of your classes? Yes or No.
12. Do you presently have an asthmatic child in your class? Yes or No
13. Are you presently actively involved in the care of an asthmatic student in your class? Yes or No.
14. How many asthmatic children do you presently have in your class? (Circle answer below)
    0, 1, 2, 3, 4, 5, 6 or more
15. How sure are you of this number (in question 14)?
    Very unsure Not sure Undecided Sure Very sure
16. How many days per week does your school have a **nurse** (RN or LPN) available for the students? (Circle your answer below).
    0, Less than 1 day, 1, 2, 3, 4, 5
17. Does your school have a policy on asthmatic students? Yes No Don't know
18. If yes, do you have a good understanding of that policy? Yes or No
19. Do asthmatic students have any restrictions on their participation in gym or sports activities in your school? Yes No Don't know
20. Would you be routinely informed if a child has asthma when (s)he first joins the school? Yes or No
21. If yes, how would you be informed if a child had asthma when (s)he first joins the school?
    a) verbal report from parent b) questionnaire returned by the parent
    c) school records d) school health service
    e) other (please specify) __________
22. Would you be routinely informed if a child develops asthma later on? Yes or No
23. If yes, how would you be informed if a child develops asthma later on?
    a) parents b) school health service
    c) students d) doctors/hospital staff
    d) other (please specify) __________

24. Have you had any staff development training relative to asthmatic students? Yes or No
a) If yes, please describe ____
25 Where have you obtained information and knowledge regarding asthma?

Appendix II

Knowledge of Asthma Questionnaire
Directions: Read each statement. Then respond as follows in the blank before each item: T)True; F)False; D)Don't Know

__1. Asthma usually runs in families.

__2. The prevalence and severity of asthma is increasing in the United States.

__3. Inner-city African American and Hispanic populations have a particularly high rate of asthma.

__4. While mortality rates for most other chronic diseases are declining, during the past 15 years there has been an increase in asthma mortality among children..

__5. Asthma is the most common chronic childhood disease in the United States.

__6. Asthma is both a spasm of the muscle in airway walls and an inflammation and swelling inside of the airway.

__7. Sudden temperature changes can exacerbate an asthma attack in asthmatic children

__8. Asthma in children is frequently caused by allergies.

__9. School absence is a good indicator of the severity of asthma.

__10. Children with asthma may not experience symptoms for months.

__11. Asthma episodes usually occur suddenly without warning.

__12. The best approach to exercise-induced-asthma is to treat symptoms when they occur.

__13. Infections like colds and sore throats can start or worsen asthma symptoms.

__14. Wheezing or coughing after exercise suggests asthma.

__15. Due to tissue scarring, the lungs of asthmatic children are less sensitive to chemical fumes and perfumes than children without asthma.

__16. Removing asthmatic children from asthma triggers can help to prevent symptoms.

__17. Fatigue, poor concentration, and hyperactivity in asthmatic children are good indications of uncontrolled or poorly controlled asthma.

__18. Full participation in all activities should be encouraged for children with asthma.

__19. Having an asthma attack at school can make a child more apprehensive about asthma and school. .

__20. Asthmatic children usually have overprotective mothers.

__21. Antibiotics are helpful in treating asthma.

__22. In general, self-administration of asthma medications by (K-6) students is dangerous.

__23. Inhaled corticosteroids such as Vanceril and Beclovent provide immediate relief of asthma symptoms during an asthma attack.

__24. Most asthma attacks can be prevented with the use of appropriate medication.

__25. Bronchodilator drugs such as Ventolin should be given to an asthmatic child who is Wheezing.

__26. Drugs such as Ventolin can increase heart rate and cause trembling of the hands.

__27. Drugs such as Intal, Vanceril or Beclovent should be immediately given to a child who is wheezing in class.

__28. Ventolin, Proventil, and other bronchodilators are most effective at preventing exercise-induced asthma if used immediately before exercise.

__29. A chest x-ray is most frequently used to assess an asthmatic child's lung capacity.

__30. Children with asthma are generally less competent at physical sports than other children.

__31. Excitement and emotional tension can cause an asthmatic reaction.

__32. Teachers should ensure that the necessary drugs for asthmatic students are taken before participation in physical activities.

__33. Parents should be immediately notified if an asthmatic child continues to experience breathing deterioration after repeated medication is taken.

Appendices III-IV

Management & Efficacy

Directions: Read each numbered item below and determine how the following statements or situations apply to you in your capacity as a classroom teacher. Then circle the letter of your answer in the line following each item using the given answer choices:

1. How often have you gotten information about a student's asthma from their school records?
   A) Never B) Not usually C) Sometimes D) Usually E) All the time

1a. How sure are you that you can find the information you need from their records?
   A)Definitely could not B)Probably could not C)Maybe D)Probably could E)Definitely could

2. How of ten have you supervised asthmatic children who take their medicine in school?
   A) Never B) Not usually C) Sometimes D) Usually E) All the time

2a. How sure are you that you can supervise them appropriately?
   A)Definitely could not B)Probably could not C)Maybe D)Probably could E)Definitely could

3. How often do you have to decide when asthmatic children should participate in physical fitness activities?
   A) Never B) Not usually C) Sometimes D) Usually E) All the time

3a. How sure are you that you can do it effectively?
   A)Definitely could not B)Probably could not C)Maybe D)Probably could E)Definitely could

4. How often have you tried to help asthmatic children avoid their asthma triggers?
   A) Never B) Not usually C) Sometimes D) Usually E) All the time

4a. How sure are you that you could do it effectively?
   A)Definitely could not B)Probably could not C)Maybe D)Probably could E)Definitely could

5. How often have you helped asthmatic children to control their emotions in order to prevent an attack?
   A) Never B) Not usually C) Sometimes D) Usually E) All the time

5a. How sure are you that you can calm them down?
   A)Definitely could not B)Probably could not C)Maybe D)Probably could E)Definitely could

6. How often have you dealt with children's asthma attacks in class?
   A) Never B) Not usually C) Sometimes D) Usually E) All the time

6a. How sure are you that you can do it effectively?
   A)Definitely could not B)Probably could not C)Maybe D)Probably could E)Definitely could

7. How often have you had to cope with asthmatic children's wheezing or coughing in class?
   A) Never B) Not usually C) Sometimes D) Usually E) All the time

7a. How sure are you that you can help them breathe easier?
   A)Definitely could not B)Probably could not C)Maybe D)Probably could E)Definitely could

8. How often have you supervised asthmatic children during recreational activities such as trips?
   A) Never B) Not usually C) Sometimes D) Usually E) All the time

8a. How sure are you that you can manage an asthma attack during a trip or activity?
   A)Definitely could not B)Probably could not C)Maybe D)Probably could E)Definitely could

9. How often have children's asthma symptoms interfered with their learning in your classroom?
   A) Never B) Not usually C) Sometimes D) Usually E) All the time

9a. How sure are you that you can find a way to help them learn?
   A)Definitely could not B)Probably could not C)Maybe D)Probably could E)Definitely could

10. How often have you contacted an asthmatic child's parent regarding the child's asthma symptoms, medication, or learning?
   A) Never B) Not usually C) Sometimes D) Usually E) All the time

10a. How sure are you that you can work out a plan with them to help the child learn better?
   A)Definitely could not B)Probably could not C)Maybe D)Probably could E)Definitely could

11. How often have you had to explain a child's asthma to other students in the class?
   A) Never B) Not usually C) Sometimes D) Usually E) All the time

11a. How sure are you that you can explain it well?
   A)Definitely could not B)Probably could not C)Maybe D)Probably could E)Definitely could

12. **Have you ever noticed an undiagnosed child displaying asthma symptoms in class?**
A) Never B) Not usually C) Sometimes D) Usually E) All the time

12a. **How sure are you that you could recognize these symptoms?**
A)Definitely could not B)Probably could not C)Maybe D)Probably could E)Definitely could

Appendix V

Teachers' Knowledge of Asthma

Knowledge of Asthma Questionnaire Items		*CR	%C	%I	%DK
1.	Asthma usually runs in families.	T	49.1	23.3	27.7
2.	The prevalence of asthma is increasing in the United States.	T	85	3.1	11.3
3.	Inner-city African American and Hispanic populations have a particularly high rate of asthma.	T	81.8	3.1	15.7
4.	While mortality rates for most other chronic diseases are declining, during the past 15 years there has been an increase in asthma mortality among children.	T	61.6	3.8	34.6
5.	Asthma is the most common chronic childhood disease in the United States.	T	59.1	6.9	34
6.	Asthma is both a spasm of the muscle in airway walls and an inflammation and swelling inside of the airway.	T	87.4	0.6	11.9
7.	Sudden temperature changes can exacerbate an asthma attack in asthmatic children.	T	87.4	0.6	11.9
8.	Asthma in children is frequently caused by allergies.	T	61.6	10.7	27.7
9.	School absence is a good indicator of the severity of asthma.	T	53.5	32.7	13.8
10.	Children with asthma may not experience symptoms for months.	T	67.9	6.3	25.8
11.	Asthma episodes usually occur suddenly without warning.	F	57.2	13.8	28.9
12.	The best approach to exercise-induced-asthma is to treat symptoms when they occur.	F	22.6	33.3	44
13.	The best approach to exercise-induced-asthma is to treat symptoms when they occur.	T	81.1	5.7	13.2
14.	Wheezing or coughing after exercise suggests asthma.	T	64.2	8.2	27.7
15.	Due to tissue scarring, the lungs of asthmatic children are less sensitive to chemical fumes and perfumes than children without asthma.	F	20.1	47.8	32.1
16.	Removing asthmatic children from asthma triggers can help to prevent symptoms.	T	62.9	18.2	18.9
17.	Fatigue, poor concentration, and hyperactivity in asthmatic children are good indication of uncontrolled or poorly controlled asthma.	T	35.2	18.9	45.9
18.	Full participation in all activities should be encouraged for children with asthma.	T	35.2	36.5	28.3
19.	Having an asthma attack at school can make a child more apprehensive about asthma and school.	T	73.0	13.8	13.2
20.	Asthmatic children usually have overprotective mothers.	F	38.4	39.0	22.6
21.	Antibiotics are helpful in treating asthma.	F	15.1	34.6	50.3

Table 24 Continued

Knowledge of Asthma Questionnaire Items		*CR	%C	%I	%DK
22.	In general, self-administration of asthma medications by (k-6) students is dangerous.	F	42.1	28.3	29.6
23.	Inhaled corticosteroids such as Vanceril and Beclovent provide immediate relief of asthma symptoms during an attack.	F	38.4	12.6	49.1
24.	Most asthma attacks can be prevented with the use of appropriate medication.	T	57.2	18.2	24.5
25.	Bronchodilator drugs such as Ventolin should be given to an asthmatic child who is wheezing.	T	28.3	2.5	69.2
26.	Drugs such as Ventolin can increase heart rate and cause trembling of the hands.	T	28.9	5.0	66.0
27.	Drugs such as Intal, Vanceril or Beclovent should be immediately given to a child who is wheezing in class.	F	8.8	22.0	69.2
28.	Ventolin, Proventil, and other bronchodilators are most effective at preventing exercise-induced asthma if used immediately before exercise.	T	18.9	10.7	70.4
29.	A chest x-ray is most frequently used to assess an asthmatic child's lung capacity.	F	22	37.7	40.3
30.	Children with asthma are generally less competent at physical sports than other children.	F	13.8	66.0	20.1
31.	Excitement and emotional tension can cause an asthmatic reaction.	T	82.4	3.8	13.8
32.	Teachers should ensure that the necessary drugs for asthmatic students are taken before participation in physical activities.	T	29.6	25.2	45.3
33.	Parents should be immediately notified if an asthmatic child continues to experience breathing deterioration after repeated medication is taken.	T	97.5	1.9	0.6

* Correct Response; %Correct; %Incorrect; %Don't Know

Appendix VI

Efficacy About Asthma & Its Management (in percent)

Efficacy Items	M*	%dcn	%pcn	% m	%pc	%dc
1. How sure are you that you can find the information you need from their records?	2.90	3.1	18.9	62.9	15.1	0
2. How sure are you that you can supervise them appropriately?	2.87	18.9	18.2	28.3	26.4	8.2
3. How sure are you that you can do it effectively?	3.04	10.7	25.8	23.9	27.7	11.9
4. H ow sure are you that you could do it effectively?	3.03	10.7	20.8	29.6	33.3	5.7
5. How sure are you that you can calm them down?	3.21	6.9	15.7	37.1	30.2	10.1
6. How sure are you that you can do it effectively?	2.98	13.8	17.6	37.7	18.9	11.9
7. How sure are you that you can help them breathe easier?	2.75	13.2	36.5	18.2	26.4	5.7
8. How sure are you that you can manage an asthma attack during a trip or activity?	2.69	16.4	29.6	28.3	20.1	5.7
9. How sure are you that you can find a way to help them learn?	3.54	5.0	3.1	43.4	29.6	18.9
10. How sure are you that you can work out a plan with them to help the child learn better?	3.43	4.4	12.6	36.5	28.3	18.2
11. How sure are you that you can explain it well?	3.60	4.4	8.2	28.9	39.6	18
12. How sure are you that you could recognize these symptoms?	3.31	3.8	18.2	37.1	25.2	15.7

*Mean Item Rating; % definitely could not; % probably could not; % maybe; % probably could; % definitely could

Appendix VII

Management of Asthmatic Students (in percent)

Management Items	M*	Never	NotU **	Some	Usual	All
1. How often have you gotten information about a student's asthma from their school records?	2.69	21.4	17.0	40.3	13.8	7.5
2. How of ten have you supervised asthmatic children who take their medicine in school?	1.62	61.0	20.1	15.7	2.5	.6
3. How often do you have to decide when asthmatic children should participate in physical fitness activities?	1.79	52.2	24.5	16.4	5.7	1.3
4. How often have you tried to help asthmatic children avoid their asthma triggers?	2.16	44.7	13.2	23.3	18.9	0
5. How often have you helped asthmatic children to control their emotions in order to prevent an attack?	2.08	45.9	20.8	21.4	3.1	8.8
6. How often have you dealt with children's asthma attacks in class?	1.93	37.7	34.6	24.5	3.1	0
7. How often have you had to cope with asthmatic children's wheezing or coughing in class?	2.25	22.6	35.2	37.7	3.8	.6
8. How often have you supervised asthmatic children during recreational activities such as trips?	2.06	50.3	18.9	.17.0	2.5	11.3
9. How often have children's asthma symptoms interfered with their learning in your classroom?	2.31	23.9	35.8	29.6	6.9	3.8
10. How often have you contacted an asthmatic child's parent regarding the child's asthma symptoms, medication, or learning?	2.21	44.7	13.2	27.0	6.9	8.2
11. How often have you had to explain a child's asthma to other students in the class?	1.98	38.4	32.1	22.6	6.9	0
12. Have you ever noticed an undiagnosed child displaying asthma symptoms in class?	1.83	42.8	35.2	18.2	3.8	0

*Mean Item Rating **1) Never 2) Not usually 3) Sometimes 4) Usually 5) All the time

Appendix VIII

Asthma Vs. No Asthma on KQ Items

Item Number	Asthma	No Asthma	F	Significance
KQ1	1.38	1.92	12.295	.001
KQ2	1.05	1.32	5.391	.022
KQ3	1.18	1.40	2.658	.105
KQ4	1.15	1.91	21.643	.000
KQ5	1.59	1.80	1.495	.223
KQ6	1.00	1.33	7.588	.007
KQ7	1.05	1.31	4.663	.032
KQ8	1.18	1.82	16.795	.000
KQ9	1.46	1.65	2.027	.157
KQ10	1.33	1.66	4.149	.043
KQ11	1.64	1.74	.378	.540
KQ12	2.00	2.28	3.850	.052
KQ13	1.08	1.40	6.556	.011
KQ14	1.54	1.67	.611	.436
KQ15	2.00	2.16	1.448	.231
KQ16	1.38	1.617	2.550	.112
KQ17	1.40	2.35	46.183	.000
KQ18	1.38	2.11	28.535	.000
KQ19	1.44	1.39	.113	.737

Item Number	Asthma	No Asthma	F	Significance
KQ20	1.59	1.93	5.786	.017
KQ21	1.97	2.48	15.062	.000
KQ22	1.51	1.99	10.117	.002
KQ23	1.69	2.24	10.870	.001
KQ24	1.28	1.80	11.796	.001
KQ25	1.51	2.70	74.911	.000
KQ26	1.49	2.66	71.430	.000
KQ27	2.38	2.68	6.131	.014
KQ28	1.64	2.80	103.154	.000
KQ29	1.85	2.29	10.438	.002
KQ30	2.13	2.04	.651	.421
KQ31	1.03	1.41	9.150	.003
KQ32	1.67	2.32	19.023	.000
KQ33	1.00	1.04	1.181	.279

*N (Asthma) = 39; N (No Asthma) = 120.

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IMAGE EVALUATION TEST TARGET (QA-3)

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