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Randomized Clinical Trial of a School-based Academic and Counseling Program for Older School-age Students

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Abstract

Background—Up to 17% of children in the United States have been diagnosed with asthma; ages 9–14 years experience higher morbidity and mortality compared to other age groups. An academic and counseling program for older elementary students with asthma was developed in collaboration with school personnel, healthcare professionals, and community members: Staying Healthy-Asthma Responsible & Prepared (SHARP). The Lifespan Development perspective and Acceptance of Asthma Model were used to guide development and implementation.

Objectives—To establish the preliminary efficacy of SHARP to improve cognitive, behavioral, psychosocial, and quality of life outcomes.

Methods—A 2-group, longitudinal, prospective, cluster randomized clinical trial design was used. The sample of 4th–6th grade students ($n = 66$) with asthma aged 9–12 years ($M = 10.5$, $SD = .9$) was 52% male, was racially diverse (30% Black, 36% White, and 18% Biracial), and had a wide range of incomes. Three schools ($n = 38$ students) were randomized to receive SHARP, and 2 schools ($n = 28$ students) were assigned to usual care. Self-report instruments were used.

Results—Compared to the usual care group, statistically significant improvements in the SHARP group were found in student knowledge of asthma, reasoning about asthma, use of risk reduction behaviors, and participation in life activities, ($p < .01$, effect sizes $> .7$). Improvements in use of episode management behaviors and acceptance of asthma outcomes were clinically significant with medium effect sizes of .3–.5.

Discussion—The SHARP Student and Community Components demonstrated preliminary efficacy for improving asthma knowledge, reasoning about asthma, use of episode management and risk reduction behaviors, acceptance of asthma in taking control and vigilance, and participation in life activities.

Keywords

asthma; school-age children; health self-management

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Nine million (12%) children in the United States less than age 18 years have been diagnosed with asthma at some point in their lives, and approximately 4.5 million (6%) children have had an asthma episode in the last 12 months (Akinbami, 2006, 2007; American Lung Association, 2004; Dey, Schiller, & Rai, 2004; Mannino et al., 2002; Michigan Department of Community Health, 2004). Children with asthma are admitted to hospitals in life-threatening situations (Akinbami, 2007; Mannino et al., 2002), restricted from participating in normal life activities (Hallstrand, Curtis, Aitken, & Sullivan, 2003; Janson & Reed, 2000; Riccioni et al., 2003; Strunk, Sternberg, Bacharier, & Szefer, 2002), and absent from school more than their peers (American Academy of Allergy, Allergy, and Immunology, 2004). Children ages 9-14 years experience increased morbidity and mortality compared to all other age groups (Akinbami, 2007; Mannino et al., 2002). While some healthcare professionals commonly assume that older school-age children are unable or unwilling to accept responsibility for managing their asthma, most healthcare providers realize that asthma is multifactorial and that there are patient, family, healthcare system, and biological factors that affect how well asthma is controlled. The National Asthma Education and Prevention Guidelines specify that part of a successful management program includes educating children with asthma and their caregivers about the condition. The updated Guidelines released August 2007 (National Institutes of Health, 2007) recommend expanding education beyond health offices and clinics to schools and community settings. However, schools are reluctant to adopt programs that are not academically focused in the era of No Child Left Behind (U.S. Department of Education, 2002).

School-based programs are needed to address the multiple factors affecting outcomes for older school-age children with asthma, hereafter referred to as students, in ways that are developmentally appropriate for this age group and that integrate into schools in such a way that they are likely to be embraced by schools pressured to demonstrate academic outcomes. Staying Healthy–Asthma Responsible & Prepared (SHARP) was designed to address this gap. The SHARP program was developed in collaboration with school personnel and members of a community asthma coalition to foster acceptance of asthma by addressing cognitive, behavioral, and psychosocial aspects of asthma management that impact quality of life outcomes.

There are two components to SHARP: a Student Component and a Community Component. For the Student Component, students with asthma met for 50-minute sessions once a week for 10 weeks during school hours. Caregivers, family members, friends, neighbors, schoolteachers, and club or sports leaders were invited by students to participate in one of three programs of the Community Component that occurred during the early weekday hours or on the weekend.

Theoretical Framework

A lifespan development perspective (Baltes, Reese, & Lipsitt, 1980; Hultsch & Deutsch, 1981; Lerner, 1986; Piaget, 1952; Reigel, 1976; Sugarman, 1986; Werner & Kaplan, 1956) guided this study and served as the framework for development of the Acceptance of Asthma Model (Kintner, 1996, 1997, 2004, 2007). Cognitive, behavioral, and psychosocial needs of students with asthma are addressed to foster acceptance of asthma by increasing long-term responsibility for maintaining and promoting health, and for preventing complications.

Lifespan development is an orientation providing conceptual and methodological framing for the study of human behavioral development and change processes. Influenced by a wide range of factors both inside and outside the person (Lerner, 1986), development is viewed as a lifelong process, embedded within a historical and cultural context that can take multiple directions (Baltes et al., 1980). Change is believed to proceed toward increasing complexity, differentiation, and specialization while increasing in hierarchical integration and organization

(Werner & Kaplan, 1956). Interactions among individual, environment, and hereditary factors influence the process (Reigel, 1976). Conflicts among the factors provide energy for change and are subject to interventions aimed at enhancing, promoting, and facilitating healthy development (Sugarman, 1986). Anticipatory guidance is viewed as the key to effective intervention. Interventions are selected from an array of possibilities, including education programs, counseling sessions, and use of supportive networks (Sugarman, 1986).

Fifth-grade students, ages 9-12 years, are entering puberty and transitioning from elementary to middle or junior high schools in 6th-7th grades. Developmental goals for the age group include progression toward acceptance of one's body, achievement of formal operational thought, formation of a sense of identity, independence, attainment of a workable belief system, and establishment of mutually giving relationships (Erikson, 1963; Jolley & Mitchell, 1996; Montemayor, Adams, & Gullotta, 1990; Piaget, 1952). As individual responsibilities become more apparent (Jolley & Mitchell, 1996; Montemayor et al., 1990) asthma management is affected. Following students as they transition from elementary to middle school is a central feature of this program of research.

The Acceptance of Asthma Model was developed within the lifespan development perspective through a series of qualitative and quantitative studies. The model depicts the multidimensional process of how students develop to accept asthma as a chronic condition (Kintner, 1996, 1997, 2004, 2007). Acceptance is a process that is iterative for each developmental phase. The process begins with initial awareness of symptoms and interaction with healthcare professionals, and leads to symptom acknowledgment through a diagnosis and prescription for treatment. Students seek information about the diagnosis from a variety of sources, including caregivers, to gain asthma knowledge. As students develop decision-making and reasoning abilities, they begin to explore options and choices, as well as cause and effect relationships. Reasoning about asthma leads to drawing conclusions about the condition that resolves their inner turmoil of negative emotions, along with the formation of beliefs about asthma for coming to terms with their condition. Two components of acceptance are the focus of this study: Taking Control and Vigilance. Acceptance of asthma, use of effective asthma risk reduction, and episode management behaviors affect participation in life activities. Individual, condition, and environmental factors influence students as they move through the process. Constructs, concepts, definitions, their components, and instruments used to operationalize them are contained in Table 1.

The purpose of this study was to evaluate the preliminary efficacy of SHARP. Compared to the usual care control group, students who received SHARP were projected to demonstrate increased knowledge of asthma (cognitive), logical reasoning abilities for managing acute episodes of symptom exacerbation (cognitive), use of effective episode management and risk reduction asthma health behaviors (behavior), acceptance of asthma as a chronic condition (psychosocial), and participation in life activities (quality of life). Theory-driven and evidence-guided SHARP was designed from a lifespan development perspective as a developmentally appropriate academic and counseling program for students on growth trajectories for shifting away from parental to more personal responsibility for managing asthma when moving from elementary to middle or junior high school.

Methods

A two-group, longitudinal, prospective, cluster randomized clinical trial was used to evaluate preliminary efficacy of the SHARP program. Approval for protection of human subjects was obtained through the University Institutional Review Board. The study was in compliance with the Helsinki Declaration and Health Insurance Portability and Accountability Act (HIPAA) requirements.

Eligibility Inclusion Criteria

Student eligibility criteria included (a) a diagnosis of asthma, (b) availability to participate in scheduled classes or make-up sessions, and (c) verbal and written assent to participate. Student exclusion criteria included student's expressed unwillingness to participate or lack of consent from parent or legal guardian. Family caregiver eligibility criteria included (a) being a designated caregiver of a student with asthma, (b) ability to understand English, and (c) expressed availability to attend and participate in the community component. Exclusion criteria included expressed unwillingness to participate or lack of consent.

Accrual

Notification letters and recruitment brochures prepared by the research team were mailed from the school district to family caregivers of all 4th and 5th grade students enrolled in a south-central Michigan school district alerting all families in the spring of the SHARP program to become available in the fall. Recruitment letters with colorful brochures, response forms, and postage-prepaid envelopes were mailed to caregivers of all students in 4th-6th grades in September inviting participation. Families interested in learning about the study were directed to contact the project director. The racially and economically diverse county ranked third in the state for highest incidence of asthma, with estimates of 10-16% of the students diagnosed.

Two weeks after the recruitment letters were mailed in the fall, school nurses serving as trained recruiters (their time was reimbursed through grant funds) began making follow-up telephone calls to invite participation to caregivers of students known to the school to be diagnosed with asthma. In compliance with protection of human subjects' and HIPAA regulations, the research team did not have access to students' health or school records. However, as required by the State Inhaler Law (Michigan Legislature, 2004), school nurses did have information about students approved to carry emergency medication. Only information of families that were eligible, expressed interest, and agreed to be contacted were provided to the research team.

With family contact information, the project director established relationships and scheduled appointments for enrollment and data collection at a time and location convenient for the student and parent dyads and evaluator pairs. Informed written consent was obtained from a parent or legal guardian and assent was obtained from the student by pairs of trained evaluators prior to data collection. The period of recruitment, including preintervention data collection, was from September through December 2006 and follow-up was from April through June 2007.

Randomization

Because there is much interaction among students within a given school, subjects were randomized by school (rather than each student or each classroom) to avoid contamination within a particular school. Recruiters and evaluators were blinded to randomization status during preintervention (Time 1) data collection. Randomization was computer-generated following Time 1 data collection. Three elementary schools were allocated randomly to the treatment group, and two elementary schools were assigned to the control group. Students assigned to the treatment group received the 10-week Student Component and their caregivers received the Community Component. Students assigned to the control group received usual health care.

Interveners and participants were not blinded to randomization after schools were designated to treatment and control groups. Evaluators were instructed not to assume or ask randomization status of participants. Participants were requested not to disclose randomization status to evaluators. Attendance at schools of choice offered additional blinding of evaluators in that evaluators could not assume randomization based on the participants' home street addresses.

Power

Because of the exploratory nature of the study and since no estimates of the effect size were available prior to the preliminary testing of this innovative intervention program, the sample size was not based on predetermined effect sizes. The sample size was determined based on feasibility considerations; that is, the number of schools within a school district where the SHARP program could be implemented within the study time frame.

Procedures

Student school component—The SHARP program was integrated into the schools as a teaching module. (At the elementary level, content is taught using integrated modules.) Students met for 50-minute sessions delivered once a week for 10 weeks from January through March. Students worked through the 100-page SHARP workbook, which was designed to be colorful, entertaining, educational, and developmentally appropriate, as well as diverse in regards to gender, race, and culture. The program was incorporated into the existing curriculum as an elective course by including spelling words, math problems, reading and writing assignments, discussions, demonstrations, and hands-on learning activities from biology, psychology, and sociology. Students were offered a personal choice to accept responsibility for management of their asthma early in the program, and were then provided guidance to reach their goals.

Caregiver community component—To support SHARP students, caregivers and others participated in a 3-hour information-sharing program. Students offered personalized invitations to close friends, neighbors, schoolteachers, and club and sport leaders in their social networks. The area coalition members chose the hospital auditorium as the designated event site. Staffed by asthma coalition members, display tables with asthma-related handouts, pamphlets, and products were arranged similar to an asthma health fair. As families arrived, attendance was recorded and participants were encouraged to visit the displays.

The intervener and a coalition representative presented content interspersed with discussions and question and answer sessions directed toward increasing asthma knowledge, logical reasoning abilities for managing acute episodes, use of effective asthma health behaviors, and acceptance of asthma, and presented an overview of coalition activities. Presentation time was limited to 90 minutes. Handouts of the content were provided.

Measures

The self-report measures used are summarized in Table 1 with operational definitions and item examples. Age-appropriateness, reliability, validity, and readability were considered in the selection of instruments. Instruments, item numbers, sample size, standardized alpha reliability for internal consistency, and potential and actual score ranges with means and standard deviation scores for this sample at baseline are presented in Table 2.

Knowledge of Asthma Survey—Students and caregivers completed the 18-item matching and multiple-choice Knowledge of Asthma Survey (Kintner, 1996). Items contain information reflective of 6 objectives related to the naming the respiratory system, describing pathology, distinguishing symptoms, discussing stimuli, contrasting medications, and assessing use of management techniques. Item 1 (matching) requests anatomical parts to be named. A composite score was computed for the matching section by dividing the correct number of identified body parts by 3. Items 2-18 are multiple-choice. The composite matching score and multiple-choice score were summed. Concurrent validity was supported when scores yielded significant and strong correlations among (a) caregiver and student scores, (b) students' scores and reasoning abilities, and (c) students' scores and participation in education programs.

Reasoning about Asthma Scenarios—Completed by students, the Reasoning About Asthma Scenarios is a 4-scenario, process-learning instrument used to measure how students use knowledge and experience to make decisions, solve problems, and draw conclusions related to management of asthma (Kintner, 2007). The instrument contains 7 items for each scenario addressing symptom recognition, severity classification, stimuli identification, helper selection, medication consideration, management technique usage, and summary of experiential learning. Mean scores were computed for each item and scenario on a 3-point scale (0 = less logical reasoning, 1 = more, 2 = most) before computing a grand mean for overall reasoning ability. With appropriate factor loadings, the items accounted for 62% of the variance explained.

Asthma Health Behaviors Survey—Completed by caregivers as an objective measure of use of asthma health behaviors, the Asthma Health Behaviors Survey is a 30-item, 5-point Likert-type instrument (Kintner, 2007). Two subscales were used: use of episode management (6 items) and risk reduction (6 items) behaviors. With appropriate factor loadings, the items accounted for 52% and 69% of the variance explained, respectively. Mean scores were computed.

Acceptance of Asthma Questionnaire—Completed by students, the two-part, 5-point Likert-type Acceptance of Asthma Questionnaire is used to measure aspects of an individual's level of acceptance of asthma (Kintner, 2007). Two scales were used: taking control (6 items) and vigilance (6 items). With clean factor loadings, the items accounted for 51% and 48% of the variance explained, respectively. Mean scores were computed for both.

Participation in Life Activities—Completed by students, the Participation in Life Activities questionnaire contains 15 yes/no questions summarized into three items designed to measure planning for, interference with, and prevention from participation in chosen life activities (Kintner, 2008; Kintner & Sikorskii, 2008). Subjects are asked to list 5 of their favorite activities, then to answer 3 questions about each. Three measurement items, summarizing 5 favorite activities, are used to determine whether or not (a) subjects need to think about their asthma when planning for activities, (b) asthma interferes with participating in the activity, and (c) asthma prevents them from participating in the activity. Items reflect the level of restriction believed to motivate behavioral changes in management. Scoring is summative across 3 items; higher scores are reflective of increased participation. With appropriate factor loadings, the items accounted for 66% of the variance explained.

General Health History Survey including the Nam-Powers Socioeconomic Index Scores—Completed by caregivers, the 36-item General Health History Survey was developed for collecting demographic data (sex, age, grade in school, race and ethnicity, family structure, and socioeconomic status) and asthma-related information (age at onset of symptoms, age at diagnosis, and prescribed medications; Kintner, 1996). The 3-item Nam-Powers Socioeconomic Index Scores (SEIS; Nam & Powers, 1983) are used to average parents' occupation and education and family income scores. The SEIS has demonstrated high degrees of stability with correlation coefficients of .97 over 10 years and .91 over 20 years (Miller, 1991).

Severity of Illness Rating Scheme—Completed by caregivers, the 4-item Severity of Illness Rating Scheme is used to measure asthma severity (Kieckhefer, 1987) and taps both pathophysiological aspects and responses to the condition. Concurrent validity was supported when scores yielded significant correlations with parents' perceptions of their children's health status, school attendance records, and numbers of acute visits and hospitalizations.

Data Collection

The FileMaker Pro[®] database system (Filemaker, Inc., Santa Clara, CA) was used to enter and manage the data. Audiolinked, self-report surveys were loaded on password-protected laptop computers for data entry. The system included quality control methods to restrict field ranges and values, provide internal consistency checks, prevent entry of erroneous data, and track missing data. Following informed written consent and assent, preprogram (Time 1) data were collected by pairs of trained evaluators in the home from students with asthma and their family caregivers using data entry systems loaded on laptop computers. Time 2 data were collected immediately postintervention. Data were encrypted and transferred electronically to a password- and firewall-protected secure computer at the primary site by the project director as soon as possible after each data collection session. Raw data were downloaded into SAS (SAS Institute Inc., Cary, NC) for processing and analysis.

The majority of caregivers (75%) completed surveys in less than 65 min (range 25-120 min), and students (75%) completed surveys in less than 90 min (range 40-150 min with a break). Virtually no missing data were present in completed surveys. Students and caregivers were offered monetary awards of \$15 each at each data collection point for their time. Students and caregivers who participated in both collection points were awarded a total of \$30 each, or \$60 per dyad.

Data Analysis

SAS 9.1 (SAS Institute Inc., Cary, NC) was used for systematic analysis of the data to establish preliminary efficacy of SHARP. Descriptive statistics were computed for all variables to ensure data quality and to evaluate the assumptions of statistical tests. Psychometric properties of all instruments for each cohort were evaluated beginning immediately following preprogram (Time 1) data collection. Specifically, internal consistency reliability was assessed using Cronbach's alpha or Kuder-Richardson 20. Frequencies, means, and standard deviations were computed for demographic and asthma-specific variables.

Intent to treat approach was adopted for analysis: all participants were analyzed as randomized regardless of their adherence to the intervention protocol. Following randomization, differences between treatment and control groups' demographic characteristics at baseline were examined. Characteristics of those who dropped out of the study between time 1 and time 2 were compared to those who completed the study. Since there were no dropouts in the control group, and only 4 dropouts in the experimental group, attrition analysis by study group was not performed. Analysis of the effect of the intervention was performed using a statistical model that included the outcome at baseline as a covariate and the study group variable. School attended was included as a random effect to account for student clustering. The outcome at baseline was included as a covariate to control for the differences between groups at baseline and to increase power compared to unadjusted analysis, since outcomes at baseline and postintervention were correlated. Adjusted means and their standard errors were calculated by study group and differences between them were tested. Since the study was exploratory, estimates of the effect sizes (ES), using adjusted means and baseline standard deviation of the outcomes, were calculated in addition to formal tests of significance.

Threats to validity

Model assumptions, including assessment of reliability and validity of all instruments, were tested also to assure validity for this sample. No adverse events were identified for participants randomized to the intervention or control groups.

Results

The convenience sample consisted of students ($n = 66$) ages 9 to 12 years ($M = 10.5$, $SD = .92$) and their family caregivers. Flows of student and caregiver participants through each stage of the study are reported in Figures 1 and 2, respectively. Of the 66 students enrolled, 38 students were allocated to the treatment intervention and 28 to the usual care control groups. Regardless of adherence to the intervention protocol, all students and caregivers allocated to the treatment group received copies of the Student Component Workbook and Community Component Handout. Baseline demographic and asthma-specific characteristics of each group are presented in Table 3.

Demographic characteristics of the students and caregivers assigned to the intervention group that did not participate in the treatment did not differ significantly from those who participated. Baseline characteristics of those who dropped out of the intervention group did not differ from those who completed postintervention assessment. However, due to the small number of schools ($n = 5$) that were randomized to the intervention and control groups, treatment and usual care groups were not equivalent at baseline on socioeconomic status and baseline assessment of outcome measures (Tables 3 & 4). This baseline group imbalance was addressed by adjusting for baseline values of outcomes in the analyses. Over and above baseline values of the outcomes, sociodemographic characteristics had no significant effect on the outcomes postintervention and were not included in the final statistical models. Estimates of adjusted means and effect sizes for treatment and control groups' postintervention outcomes are provided in Table 4.

Where effect sizes were large ($ES > .7$; Cohen, 1988) for asthma knowledge, reasoning about asthma, risk reduction behaviors, and participation in life activities, results were statistically significant. The outcomes of episode management behaviors, taking control, and vigilance were better in the treatment group compared to control with the effect sizes ranging from 0.32 to 0.47. Since the goals of this exploratory study were to establish feasibility and obtain preliminary evidence of efficacy, the study was not powered to detect these effect sizes as statistically significant. An ES above .3 or improvements above 30% are considered clinically significant (Guyatt, Osoba, Wu, Wyrwich, & Norman, 2002; McQuay, Barden, & Moore, 2003).

Discussion

Evaluation of SHARP Student and Community Components confirmed preliminary efficacy with large effect sizes for statistically significant asthma knowledge, reasoning about asthma, use of risk reduction behaviors, and participation in life activities; and medium effect sizes for clinically significant use of episode management behaviors and acceptance of asthma in taking control and vigilance. A larger sample size is needed to reach statistical significance where observed effect sizes were medium. Clinical significance in scores with improvements above 30% warrants further testing with larger sample sizes.

The theory-guided and evidence-based SHARP program offers education to improve student and caregiver asthma knowledge, reasoning about management of acute episodes, and use of effective health behaviors, and provides health counseling to improve acceptance of asthma in taking control and vigilance to improve overall quality of life reflected in unrestricted participation in life activities. More research is needed to assess the impact of SHARP on lessening condition severity, use of healthcare services, and school or work absenteeism due to asthma symptoms.

All outcomes were derived from self-report of individuals participating in the intervention. Self-report measures have been found to contain inherent limitations including distortion in

recall, lack of objectivity, and social desirability. However, self-report measures capture personal dynamics, convey perceptions of experiences, have value, and are of interest to health researchers. Additionally, by definition, symptoms and quality of life ratings come from the person's perspective, thus making self-report the only appropriate way to measure these outcomes. In completion of instruments, participants were assured responses were not right or wrong.

Caution should be taken in generalizing findings to larger populations due to a limited sample drawn from one moderate size Midwest community. Larger sample sizes drawn from more diverse communities are needed to evaluate the efficacy and effect of the program fully. To reach Hispanic or Latino populations, SHARP and measures used to evaluate the program should be translated into colloquial Spanish.

Community members and school personnel working collaboratively to meet the developmental needs of older school age students with asthma now have an education and counseling program for students preparing to transition from elementary to middle or junior high school. Innovative features of the Student Component support rapid adoption by school systems, and key features of the Community Component support adoption by coalitions that are searching for best methods to increase public awareness and knowledge in order to address prevalence and decrease morbidity and mortality.

In summary, the National Asthma Education and Prevention Guidelines (National Institutes of Health, 2007) recommend expanding education and counseling programs beyond health offices and clinics to schools and community settings. The SHARP program was designed to address cognitive, behavioral, and psychosocial aspects of asthma management affecting quality of life outcomes for older school-age students with asthma in developmentally appropriate ways. In addition, it was designed to be integrated into schools in a way more likely to be embraced despite the pressure on the schools to demonstrate academic outcomes. The SHARP Student and Community Components demonstrated preliminary efficacy for improving asthma knowledge, reasoning about asthma, use of episode management and risk reduction behaviors, acceptance of asthma in taking control and vigilance, and participation in life activities.

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Figure 1.
The CONSORT E-Flowchart for Student Participants.

Figure 2.
The CONSORT E-Flowchart for Caregiver Participants.

Table 1
The Constructs, Concepts, Definitions, Their Components, Instruments, and Item Examples

Constructs and Concepts	Conceptual Definitions	Components	Instruments	Item Examples
<u>Cognitive</u> Student Asthma Knowledge	Information pertinent to the chronic condition gained either through study or experience (Kintner, 1996, 1997, 2004, 2007)	<ul style="list-style-type: none"> Name parts of respiratory system Describe pathology Distinguish symptoms Discuss stimuli Contrast Medications Assess use of management techniques 	Knowledge of Asthma Survey (Kintner, 1996)	1 During asthma episodes the linings of the bronchial tubes swell with fluid and muscles around the tubes squeeze shut.
				2 Asthma symptoms include wheezing, coughing, and breathlessness.
				3 Stimuli include exercise, allergies, and weather changes.
				4 Self-care steps to use in the early stages of an episode to prevent symptoms from getting worse include using reliever medication, sipping warm beverages, and using breathing exercises.
<u>Cognitive</u> Student Reasoning about Asthma	Process of reflective, introspective thinking through which situations are examined and options are considered (Kintner, 1996, 1997, 2004, 2007)	<ul style="list-style-type: none"> Symptom recognition Severity classification Stimuli identification Helper Selection Medication Consideration Management Technique Usage Experiential Learning 	Reasoning About Asthma Scenarios (Kintner, 1996, 1997, 2004, 2007)	1 Simple and Unfamiliar: Smoke from a grill at barbeque stimulates a dry coughing spell.
				2 Simple and Familiar: Running in PE class stimulates mild wheezing and breathlessness.
				3 Complex and Familiar: Playing in cold weather stimulates a productive cough and moderate wheezing.
				4 Complex and Unfamiliar: An acute respiratory infection stimulates a life-threatening episode.
<u>Psychosocial</u> Acceptance of Asthma	Desiring to take possession of one's chronic condition versus resignation or expressed reluctance to take possession (Kintner, 1996, 1997, 2004, 2007)	Vigilance: Degree of being watchful and attentive to warning signs	Acceptance of Asthma Questionnaire (Kintner, 1996, 1997, 2004, 2007)	1 I watch for early warning signs of asthma.

Constructs and Concepts	Conceptual Definitions	Components	Instruments	Item Examples
				2 I am able to control asthma symptoms.
<u>Behavior</u> Asthma Health Behaviors	Risk reducing, episode managing, and health promoting activities influential in effectively controlling one's chronic condition (Kintner, 2007)	<p>Taking Control: Degree of assuming power to regulate one's condition</p> <p>Risk Reduction Behaviors: Activities used to prevent symptoms associated with asthma episodes</p> <p>Episode Management Behaviors: Activities used to effectively control symptoms associated with asthma episodes</p>	Asthma Health Behaviors Survey (Kintner, 2007)	<p>1 My child stays away from things (stimuli) he or she knows may result in asthma symptoms.</p> <p>2 My child uses his or her reliever medication as ordered by the health care provider.</p>
<u>Quality of Life</u> Participation in Life Activities	Unrestricted involvement in chosen pursuits, such as sports, clubs, interests, and hobbies (Kintner, 1996, 1997, 2004, 2007)	<p>Planning for Participation</p> <p>Interference with Participation</p> <p>Restriction from participation</p>	Participation in Life Activities Scale (Kintner, 2008; Kintner & Sikorskii, 2008)	<p>1 Do you need to think about your asthma when planning to do this activity?</p> <p>2 Does asthma interfere with participating in this activity?</p>
<u>Condition Severity</u> Severity of Asthma	Degree of severity captured by both pathophysiological aspects and responses to the condition	<p>Wheezing Frequency</p> <p>Medication Use</p> <p>Oral Steroid Use</p> <p>Exercise Tolerance</p>	Severity of Illness Rating Scheme (Kieckhefer, 1987)	<p>1 My child wheezes (frequency selection).</p> <p>2 My child requires medication (frequency selection).</p>

Table 2
Summaries of the Instruments Including Number of Items, Standardized Alphas, Potential Score Ranges, and Actual Score Ranges with Means and Standard Deviations for This Sample (n = 65)^a at Baseline

Instruments and Subscales	Completed by	No. of Items	Alpha (<i>n</i>)	Potential Score Range	Actual Score Range	<i>M</i> (<i>SD</i>)
Knowledge of Asthma	Student	18	.70 (.65)	0-20	2.90-12.8	7.63 (2.27)
Reasoning about Asthma	Student	4	.74 (.61)	0-2	0.61-1.71	1.19 (0.22)
Asthma Health Behaviors--Episode Management	Caregiver	6	.77 (.66)	0-4	0.00-3.67	1.29 (0.70)
Risk Reduction	Caregiver	6	.74 (.66)	0-4	0.00-4.00	1.69 (.91)
Acceptance of Asthma--Taking Control	Student	6	.61 (.65)	1-5	1.00-5.00	3.57 (.65)
Vigilance	Student	6	.69 (.65)	1-5	1.82-4.91	3.54 (.61)
Participation in Life Activities	Student	3	.74 (.63)	0-3	0-3	1.83(.77)

^a Student with cognitive processing challenges omitted

Table 3
Demographic and Clinical Characteristics of Control and Treatment Groups at Baseline

Demographic Characteristic	Usual Care Control Group (<i>n</i> = 27) ^a		SHARP Intervention Group (<i>n</i> = 38)	
	<i>n</i>	%	<i>n</i>	%
Gender				
Male	11	40.7	22	57.9
Female	16	59.3	16	42.1
Grade				
4 th grade	5	18.5	11	28.9
5 th grade	12	44.4	11	28.9
6 th grade	10	37.0	16	42.1
Race or Ethnic Grouping				
Black or African American	13	48.1	8	21.1
White or Caucasian	10	37.0	15	39.5
American	0	0	2	5.3
Hispanic, Latino, or Mexican	3	11.1	7	18.4
American	1	3.7	6	15.8
Biracial (Black and White)				
Other ^b				
	Range	<i>M</i> (<i>SD</i>)	Range	<i>M</i> (<i>SD</i>)
Age (in years)	9-12	10.6 (0.89)	9-12	10.5 (0.95)
Nam-Powers Socioeconomic Scores *	19-95	64.0 (26.1)	16-93	48.5 (16.4)
Severity of Illness Rating Scheme	4-10	5.93 (1.54)	4-10	5.84 (1.88)

Notes. SHARP = Staying Healthy-Asthma Responsible & Prepared

^a Student with cognitive processing challenges omitted

^b Native American (*n* = 1), Pacific Islander (*n* = 1), listed Other (*n* = 2), not reported (*n* = 2)

* *t*-test = 2.73, *p* = .009 for NP-SES (equal variances were not assumed)

Table 4
Unadjusted and Adjusted Means, and Standard Deviations and Standard Errors of Outcome Variables by Group

Outcome Variables	Usual Care Control (n = 27)		SHARP Intervention (n = 34)		Adjusted Means (SE)		p	Effect Size
	Pre Mean (SD)	Post Mean (SD)	Pre Mean (SD)	Post Mean (SD)	Control Mean (SE)	SHARP Mean (SE)		
Student Asthma Knowledge	7.94 (2.19)	8.05 (2.60)	7.39 (2.34)	10.0 (3.03)	7.96 (0.47)	10.18 (.43)	< .01	0.91
Reasoning About Asthma	1.28 (0.20)	1.29 (0.23)	1.14 (0.19)	1.38 (0.21)	1.24 (0.03)	1.42 (0.03)	< .01	1.19
Behaviors: Risk Reduction	1.65 (0.75)	1.71 (0.64)	1.49 (0.87)	2.08 (0.76)	1.66 (0.09)	2.13 (0.08)	< .01	0.98
Behaviors: Episode Management	0.87 (0.79)	1.01 (0.81)	1.04 (0.76)	1.41 (0.96)	1.09 (0.15)	1.34 (0.13)	.20	0.33
Acceptance: Taking Control	3.76 (0.66)	3.71 (0.63)	3.43 (0.61)	3.85 (0.62)	3.61 (0.17)	3.88 (0.15)	.26	0.47
Acceptance: Vigilance	3.63 (0.57)	3.69 (0.61)	3.45 (0.63)	3.76 (0.50)	3.61 (0.15)	3.77 (0.13)	.42	0.32
Participation in Activities	1.90 (0.77)	1.72 (0.71)	1.78 (0.77)	2.12 (0.65)	1.70 (0.11)	2.13 (0.10)	< .01	0.72

Notes. SHARP = Staying Healthy-Asthma Responsible & Prepared