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Adolescent Asthma and School Disparities: An Ecological Perspective of Students and Stakeholders

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DEDICATION

This dissertation is dedicated to all adolescent students affected by asthma and those who lost their lives because of asthma.
ACKNOWLEDGMENT

I would like to extend my gratitude to all of the individuals who helped me approach this day; I could not have done it without them.

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ABSTRACT

Adolescents spend around a third of their day at school. With the growing prevalence of adolescent asthma, one in every ten adolescents has to cope with asthma throughout her daily routine, including in school. Limited information has gained about the school experience of adolescent students with asthma.

Guided by the social-ecological model (SEM), this study sought to explore the links between asthma and academic attainment and school functioning and experiences in middle and high school as perceived by students with asthma and key stakeholders. It further explored the role of asthma severity on students' experience and solicited suggestions for improvement of the school life and academic success of these students.

The study sample included 20 adolescents and ten key stakeholders and applied a convergent mixed-methods design. Students shared insights on their school experiences and academic performance. Additionally, they completed the Pediatric Asthma Quality of Life Questionnaire and reported their asthma severity level. Stakeholders such as healthcare providers, school nurses, educators, and parents responded to the themes that students shared and furthered the discussion with additional concepts based on their views and diverse experiences. Qualitative data were analyzed using thematic analysis to identify themes in correspondence to the SEM tiers. Asthma severity and QOL means were linked to the coding and themes expressed by each student in the intention to explore how they reflect on students’ school experiences.

Five overarching themes appear to reflect on students’ school lives and academic experiences: 1. Asthma knowledge and awareness; 2. Communication between the school, the
students and their families, and healthcare providers; 3. Accommodation of health and academic
needs; 4. Asthma control and prevention of flare-ups; and 5. Social support from friends and
schoolmates, educators, and school nurses, and other personnel. These elements intertwine to
shape the school experiences of students with asthma. Students shared experiences were only
partially related to their reported asthma severity and QOL score.

The knowledge gain in this study suggests addressing the school disparities of adolescent
students with asthma through a comprehensive approach such as the Whole School, Whole
Child, Whole Community. Finally, it presents recommendations to future practice, research, and
policy specifically centered on the improvement of health education opportunities, enhancement
of communication across key players relevant to the students’ health and education, and access
to care and allergen-free environment.
CHAPTER 1 - INTRODUCTION

Background

Asthma is a chronic condition that mainly affects adolescents. Recent reports from the Centers for Disease Control and Prevention (CDC) indicate a gradual increase in rates of lifetime asthma among adolescents from 17.1% in 2005 to 22.8% in 2015. Currently, one in ten adolescents nation-wide experience active asthma; similar trends are seen in the state of Florida (Florida Asthma Program, 2013; Centers for Disease Control and Prevention, 2015). As a chronic, lifelong condition, asthma can be life-threatening if not properly controlled. When exacerbated, attacks of asthma constrict airways, leading to restrained breathing, wheezing, coughing and chest pain (Parulekar, Alobaidy, & Hanania, 2013). Living with asthma poses daily demands for a routine treatment regimen including maintenance medication and trigger avoidance. In addition to the physiological manifestations, patients with asthma encounter challenges on multiple levels in their social and ecological environments. Some asthma implications pertain to physical, intrapersonal challenges that directly affect their daily routine and overall quality of life (Dean, Calimlim, Kindermann, Khandker, & Tinkelman, 2009). For instance, children with asthma are occasionally unable to participate in sports activities or enjoy uninterrupted sleep (Diette et al., 2000a; Florida Asthma Program, 2013). Adolescents with asthma also struggle with social and psychological issues such as stigmatization, depression, and poor self-esteem (Clark et al., 2010). In-depth interviews with adolescents with asthma revealed concerns about social acceptance among peers their age; adolescents further articulated perceiving themselves as different from their counterparts, they also reported often feeling left
out and isolated (Panzera et al., 2013). Caregivers in that study described their children’s’ condition as an “emotional rollercoaster.”

**Statement of the Problem**

Asthma can also impact adolescents’ educational experiences and academic performance. For adolescents in general, the transition to middle and high school is associated with a decline in academic achievement and motivation (Eccles & Roeser, 2009). In addition to experiencing considerable developmental, emotional, psychological, and social changes, adolescents with asthma face challenges presented by their health condition (de Benedictis & Bush, 2007). The current body of knowledge presents evidence that supports a potential link between asthma and academic success through chronic absenteeism, and/or lower test scores, grades and graduation rates (Schneider, 2017).

Asthma in school-aged children results in an estimated 14.5 million lost school days (Wang, Zhong, & Wheeler, 2005) with a range of 2.5-14.8 lost days a year per child (Milton, 2004). Parental loss of productivity associated with asthma-related school absence of children amounts to $285 per child per year (Atherly, 2010; Wang, Zhong, & Wheeler, 2005). Indirect costs from lost school days are roughly $957 million over a decade of lost caretaker productivity (Weiss, Sullivan, & Lyttle, 2000).

Although asthma among adolescents is broadly studied, little is known about the possible linkage between asthma, school experience and student performance. Several potential, interrelated factors are suggested to affect a child’s opportunity to succeed academically (Basch, 2011a). Some factors are related to the quality of care, self-management skills and the ability to control asthma, the number of asthma exacerbation, hospitalization and consequently extended
school absenteeism (Grant, 2010). Others are related to the emotional and mental implications of asthma and psychosocial stressors such as exposure to violence/bullying and maternal depression (Hertz, Everett Jones, Barrios, David-Ferdon, & Holt, 2015). Several studies link sleep quality and its influence on the ability to concentrate in class (Basch, 2011a), or alternately the quality of educational resources available and healthcare services on campus (Grant & Brito, 2010).

A comprehensive systematic review of research exploring the relationship between adolescent asthma and academic achievement indicated that school absenteeism is more prevalent among students with asthma compared with asthma-free students, and among those with uncontrolled asthma compared with controlled asthma (Schneider, 2017). Findings were less consistent with regards to scoring differences (course grade, GPA, test, standardized exams) between asthma and asthma-free students and across asthma severity levels. Numerous studies demonstrated a negative relationship between test or grade score and absenteeism regardless of asthma status; when controlling for absenteeism, the differences in the scores between asthma and asthma-free individuals were insignificant (Crump et al., 2013; Krenitsky-Korn, 2011; Moonie, Cross, Guillermo, & Gupta, 2010; Moonie, Sterling, Figgs, & Castro, 2008; Silverstein et al., 2001). Several researchers estimated the potential mediating effect of school absenteeism on tests, course completion, or GPA scores. Concerning high school completion, Champaloux and Young (2015) demonstrated lower graduation rates among students with asthma compared to healthy individuals. Contrarily, Maslow and colleagues (2011) could not demonstrate favorable academic or life outcomes among healthy subjects compared to subjects with asthma.

As the link between asthma and academic/school outcomes appears plausible, studies to date have not focused directly on an exploration of this relationship, identified the specific barriers adolescents with asthma encounter in the context of educational performance, or tested
strategies to facilitate their academic outcomes. This study intended to address these gaps in research that could, ultimately, be expanded and translated into practices in the school system and address educational disparities among this group.

**National and Political Context**

In the recent decade, national attention has been given to the link between health and education. A holistic approach is highlighted in addressing educational outcomes that incorporates not only students’ performance, but also their physical and mental health, the school environment, the role of significant individuals in their lives (e.g., peers, educators, parents), the community at large, and policies relevant to facilitating their academic success (ASCD, 2017; Basch, 2011b; Healthy Schools Campaign, 2015).

For instance, in 2015, President Obama signed the “Every Student Succeeds Act” (ESSA) into law. The ESSA incorporates provisions that intend to facilitate the success of students and schools. One of the sections calls for advances in educational equity to protect America's disadvantaged and students in need. It acknowledges the importance of physical and mental health in educational equity. This policy sets the stage for the exploration of the link between health and academic outcomes and development of strategic plans and infrastructure to address educational inequalities among students with compromised health (Healthy Schools Campaign, 2015). In the public health arena, national goals were set addressing asthma and school attendance. The Health and Human Services (HHS) established objectives through the Healthy People 2020 document for the current decade aiming to” *Reduce the proportion of children aged 5 to 17 years with asthma who miss school days*” from the 2008 baseline of 58.7% to 48.8% by the end of this decade (US Department of Health and Human Services, 2010).
Another noticeable effort in acknowledging students’ achievements in a holistic way and offering a collaborative approach to learning and health was established by the Association for Supervision and Curriculum (ASCD), in collaboration with the CDC, and developed through the Whole School, Whole Community, Whole Child model (WSCC). This framework emphasized the complex connection between health and educational outcomes and outlines the multiple components that influence these outcomes while integrating the community’s role and school variables while placing the student in the center (ASCD, 2017).

These legislation efforts and the political acknowledgment of the link between students’ health and their academic attainment and the central role the school system plays in addressing this link offers a window of opportunities for researchers to explore ways in which different health conditions might influence students’ educational experiences and academic outcomes.

**Research Purpose and Aims**

This study explored the links between asthma and academic attainment and school functioning and experiences in middle and high school as perceived by students with asthma and key stakeholders. Guided by an extensive literature review, the study aims are to:

1. Explore adolescents’ and stakeholders’ perceptions of the influence asthma has on academic achievements and school experiences;
2. Explore the role of asthma severity/control in these relationships;
3. Identify the role of individual and contextual factors in student/school disparities among adolescents with asthma; and,
4. Identify barriers contributing to these disparities and strategies to overcome those barriers.
While quantitative evidence on the potential relationship between asthma and school attainment is relatively available in the literature, qualitative research on the topic is rather sparse (Schneider, 2017). Furthermore, practice-guided research using mixed methodologies has not been discussed in the literature. Experimental studies that were implemented in the school setting to improve asthma outcomes paid little attention to academic success and students' school experiences as part of the outcomes. Therefore, the presented mixed-methods study was designed to address the following research questions:

**Research Questions**

Research question 1

- What are the perceptions of adolescents with asthma regarding the influence of their medical condition on their academic achievement and school experiences?
  - Sub-question 1a. What are the roles of individual interpersonal, organizational, community and policy factors in educational disparities among adolescents with asthma?
  - Sub-question 1b. How can the individual, interpersonal, organizational, community and policy influencers affecting academic/school disparities among adolescents with asthma be overcome?

Research question 2

- What are the perceptions of key stakeholders’ regarding the influence of adolescent asthma on academic achievement and school experiences?
Sub-question 2a. What are the roles of individual interpersonal, organizational, community and policy factors in educational disparities among adolescents with asthma?

Sub-question 2b. How can the individual, interpersonal, organizational, community and policy influencers affecting academic/school disparities among adolescents with asthma be overcome?

Research question 3

- How do students with varying levels of QOL (poor, intermediate, and high) describe their academic achievement and school experiences?

Theoretical Framework

Although asthma is a physiological medical disorder, one should consider the multifaceted nature of the condition where factors contributing to the manifestation of the disease and its resulted implications reflect elements on multiple levels (Hertz et al., 2015; Hsu, Qin, Beavers, & Mirabelli, 2016; Svavarsdottir et al., 2013). Therefore, a multi-systemic approach seems suitable for the exploration of the implications that asthma has on students, their learning experiences, and ways to address the educational disparities it can generate for students. Acknowledging the holistic notion of the “whole school whole child whole community” model in the presented study, I employed the Bioecological Theory of Development (Bronfenbrenner, 1979) and its public health equivalent the Social-Ecological Model (SEM) (McLeroy, Bibeau, Steckler, & Glanz, 1988) to explore/depict these linkages/connections while incorporating mixed-methods.
Bronfenbrenner’s Bio-ecological Theory was initiated in the 1970s with the recognition that human development does not occur in isolation but rather as part of an ecological system that influences the developmental process (Roberts & Steele, 2010). In the first variation, Bronfenbrenner emphasized the importance of the multilevel environment in the course of child development (Stivaros, 2007). Recognizing that the model lacked comprehensiveness, Bronfenbrenner later modified the model to include the elements of Person, Process, Context, and Time, that is known as the PPCT model. This version of Bronfenbrenner’s theory incorporates 1. individual factors that contribute to the developmental process such as personality, IQ, and physical characteristics, 2. ecological systems – explained in the next paragraph- serve as the context in which development takes place/occurs and 3. the process reflected by the reciprocal interplay that occurs between persons and their ecological contexts. Finally, Bronfenbrenner integrated the element of time to capture maturation or changes occurring on the individual level or in the ecological context.

The bioecological outline places the individual (with her distinct personality and traits) at the center (Person) of the scheme surrounded by a sequence of nested systems (Context) that interact in a reciprocal manner (Process). Bronfenbrenner differentiated the ecological environment to the following subsystems (Figure 1):

- **The Microsystem** - represents the immediate environment the individual is exposed to and interacts with in her daily life. That includes the relationship of the child/adolescent within the family unit including parents and siblings, connection with peers, interaction in the school environment – student-educator, student-classmates, student-nurse relationships, and communication with healthcare providers. These relationships emerge in a bi-directional manner between the individual and agents in the microsystem.
The nature of the interaction can be influenced by the personal characteristics of the individual. The microsystem also includes the proximate physical environment such as the school environment in which the individual interacts, learns and plays throughout the day (Stivaros, 2007).

- **The Mesosystem** – represents the interrelationships among agents from the microsystems of the individual that do not necessarily involve the individual herself, yet influence her development (Bronfenbrenner, 1986). For instance, the interaction between parents and educators or school administration, or the communication between primary care physicians and school clinics.

- **The Exosystem** – introduces a larger and more distal social setting with which the individual has no direct interaction but can influence her development. This system might include extended family members, parents’ workplace and work culture, and policies that could influence the adolescents’ life indirectly (e.g., school policies), and the availability of local family resources. The exosystem can either reinforce or hinder the individual’s asthma status and ultimately her learning/school experiences and outcomes (Stivaros, 2007). For instance, employer-based healthcare coverage can assure a better, more accessible medical treatment that could improve one’s asthma control and ultimately her functioning in school.

- **The Macrosystem** – encompass a broader societal context in the form of cultural customs, political climate, religious affiliation, social-economic status, and more. These overarching elements of the macrosystem reflect on the inner tiers of the ecological outline (microsystem, mesosystem, exosystem). The affordable care act would be an
example of higher-level policies that extrapolate on families’ ability to obtain healthcare coverage and assure a continuum of care for their children.

- **The Chronosystem** – incorporates the dimension of time and the ways in which time affects developmental patterns that include the actual aging and maturing of the individual and her transition throughout the different developmental stages (Stivaros, 2007). It could also includes the effect of time on the ecological systems and ways one responds to challenges, and stressors in life that evolve over time. For instance, challenges in early and middle adolescence may not be relevant in late adolescence. Another example would be the change in parents’ involvement in their child’s school from elementary to high school.

![Figure 1. Bronfenbrenner’s Bioecological Theory](image-url)
Among the applied health education and health promotion theories in public health, the SEM is commonly used to explore and explain complex public health issues involving factors across various levels of the ecological system and to guide researchers and practitioners in conducting studies and planning interventions (Glanz & Riemer, 2014; McLeroy et al., 1988). Derived from Urie Bronfenbrenner’s bioecological system theory, the model focuses on the multiple tiers that influence one’s behavior or conditions. Similar to the bioecological theory, those tiers situate the individual in relation to the distal and proximal environment: intrapersonal, interpersonal, community, organizational, and policy levels that act in synergy in influencing certain health conditions (see figure 2). According to the model, factors such as medicine adherence (intrapersonal) (Michael, Merlo, Basch, Wentzel, & Wechsler, 2015), relationship with parents, peers and educators (interpersonal) (Michael et al., 2015), access to medication at school (organizational) (Rhee, McQuillan, Chen, & Atis, 2017), local health services (community), and air quality of the immediate environment at home and outdoors (policy) (Rhee et al., 2017), interweave to form a more complex determinant that influences one’s asthma status (Herman, 2011). Thus, no sole factor is accountable for disease outcomes.

As mentioned earlier, findings from current studies suggest that school absenteeism and compromised academic outcomes are associated with asthma. However, the role of intrapersonal, interpersonal, school-level factors and the broader school experiences associated with absenteeism and educational success remains unclear. Led by these two ecological approaches, I intend to unfold some of those linkages and learn/understand how variables of the different ecological systems interact to/influence the school and academic disparities of students with asthma. Effective intervention design should tap into the identified factors across the ecological systems to effectively address asthma school disparities.
In line with the broader context of the SEM and Bronfenbrenner’s theory, I plan to employ constructs taken from Social Cognitive Theory. The foundation of the Social Cognitive Theory (SCT) (Bandura, 1989) is the triangle of reciprocal determinism that highlights the bi-directional interaction between one’s personal factors, her behavior, and the environment (Figure 3). The behavior pertains to an action or a task one takes on herself. Personal factors refer to biological and/or cognitive events; they can incorporate the emotional and biological state such as depression, anxiety, and illness. These could affect one’s confidence in her ability to achieve goals. Finally, the environment includes the physical and social setting and such as social norms, access [to health, educational or social services], and the extent to which the environment is conducive to the self-efficacy or the success of the individual. Typically, a change in one of the elements would stimulate a change in the other elements and vice versa. For instance, excess
absenteeism could stimulate the school to develop a plan to accommodate the needs of students who are missing school frequently. Such a plan could ultimately influence their academic success.

The following are constructs of the social cognitive theory that are commonly used in the education and public health disciplines and appear relevant to the presented study (Bartholomew Eldredge, 2006; Cottrell, Girvan, McKenzie, & Seabert, 2002; Glanz, Rimer, & Viswanath, 2002).

**Self-efficacy** – one’s confidence in her ability to successfully take action, master a task, or achieve a goal. Self-efficacy is essential for student’s motivation and found to have a powerful influence on students’ performance. It can be influenced by one’s past experiences or social encouragement. Potential relevance to the current study – *Students’ perceptions of their ability to succeed in school regardless of their asthma.*

**Outcome expectations** – reflects beliefs about the potential results. Individuals behave a certain way or avoid behaving in a certain way based on the outcomes they believe will occur. The linkages between action and result often established through past experience or modeling. Potential relevance to the current study - *Students perceptions of the importance of medication adherence to school attendance or success.*

**Reinforcement** – the response to one’s behavior/action that could inhibit or encourage its recurrence. Potential relevance to the current study - *The way in which educators, parents, peer etc. respond to asthma in the school context.*

**Self-control or self-regulation** – one’s beliefs about the power she has on life events. Potential relevance to the current study – *Sense of control over one’s own behavior or capability to achievement goals or improve school experiences through monitoring and adjusting.*
Outcome expectancies – refers to the personal value the individual ascribes to certain outcomes.

Potential relevance to the current study – the importance Students’ assign to their school experience and academic success throughout middle or high school.

Figure 3. The Reciprocal Determinism of the Social Cognitive Theory

Design Outline

This study employed a convergent mixed-method design (Creswell & Plano-Clark, 2018) to capture students’ and stakeholders’ perceptions on academic and educational disparities related to adolescent asthma and asthma manifestation (symptoms, activity limitations, emotions). Figure 4 provides details on the study design, phases, and the implementation timeline. First, in-depth interviews were conducted with adolescents to capture their experiences in the educational context including academic disparities and the overall school experience. Pediatric Asthma Quality of Life Questionnaire (PAQLQ) were completed at the same meeting to gather data on asthma symptoms, asthma control and its physical and emotional toll. Since the PAQLQ includes a subscale that indicates the level of asthma symptoms experienced by the respondents, it also serves as a proxy measure for ‘asthma control.’ After data are analyzed separately, data sets were consolidated to assess the extent to which the effect of asthma on QOL and its subdomains are linked to adverse school experiences and academic achievements students
express. Finally, findings were shared with key stakeholders to confirm barriers to the academic achievements and school experiences of adolescents with asthma and to explore potential policies and practices to overcome barriers.

**Figure 4. Study Design and Activities**

**Study Rationale**

The aforementioned systematic literature review (Schneider, 2017) identified several gaps in the research focus and the methodologies that were employed to conduct them. The design of the presented study was developed in response and to attend to these gaps.

First, a limited number of studies addressed the link between adolescent asthma and academic achievement as the focus of inquiry; others incorporated some academic indicators as part of a larger study that explored a variety of topics in the area of adolescent asthma (e.g., asthma control and self-management skills (Brasler & Lewis, 2006; Bruzzese et al., 2011a; Clark, Shah, Dodge, Thomas, Andridge, & Little, 2010; Engelke, Guttu, Warren, & Swanson,
asthma education and knowledge (Brasler & Lewis, 2006); the effectiveness of school nurse services in asthma care (Engelke, Guttu, Warren, & Swanson, 2008; Rodriguez et al., 2013); and other life outcomes such as employment (Hsu et al., 2016; Maslow, Haydon, Ford, et al., 2011). As the link between asthma and academic outcomes becomes apparent, studies should focus directly on an exploration of this relationship. Such a research focus could, ultimately, be translated into practice in the school system and address educational disparities among students with asthma. This study focuses on the linkages between asthma and academic disparities among adolescents and incorporates various elements correspondent to the multiple levels in which asthma can influence the life experiences of students in the school context. Measures of quality of life among participants provide data on the extent to which asthma is affecting their daily routine in terms of physiological, physical, and emotional implications. These variables were then linked to students’ insights on their school experiences. Interviews with participants sought to encompass personal, interpersonal and organizational factors that play a role in the school experience of these students and to explore ways in which these factors are associated. For instance, how school policies might enhance asthma self-management that could then improve school attendance and lessen the volume of academic content taught in the class student would miss if she were absent. Study findings shed light on the educational challenges students with asthma experience and provide suggestions on strategies schools might implement to address these students’ particular needs and allow them educational opportunities similar to their peers.

Second, while some studies focused on adolescents or middle and high school students (Brasler & Lewis, 2006; Bruzzese et al., 2011b; Champaloux & Young, 2015; Clark et al., 2010; Joseph et al., 2013; Krenitsky-Korn, 2011; Magzamen et al., 2008), the majority encompassed a
wider range of ages including younger children with asthma, elementary school students, caregivers of students with asthma, and adults with asthma. Insufficient emphasis is given to the exploration of age-specific asthma implications. These studies lack the focus on specific age groups acknowledging the difference in developmental phases - mentally, cognitively, intellectually, and socially. In this study, I focused on the population of adolescents with asthma enrolled in middle and high schools.

Third, studies to date on the topic of asthma and academic outcomes utilized quantitative methods solely. While these methods are valued for their scientific rigor and ability to confirm correlational and/or causal relationships, the lack of qualitative inquiry limits the research community’s understanding of the experiences these adolescents face and the factors contributing to their challenges within the academic environment. Insights into their experiences and thoughts on strategies to bridge these educational gaps, along with input from key stakeholders (e.g., educators, school nurses, and caregivers), would depict broader knowledge of the issues at stake, and inform the development of tailored interventions. Moreover, mixed methodologies could enhance the validity of the findings by exploring a variety of questions from multiple perspectives. Capturing the life experiences of adolescents with asthma could either complement or explain statistical findings (Creswell & Plano-Clark, 2018). In the presented study, I used a mixed-methods design; with an emphasis on the qualitative (QUAL) arm. The quantitative component (Quan) serves as a supporting tool to classify students based on QOL scores that reflects the physiological, physical, and emotional influence of asthma on their life. These data further allows me to compare the perspectives shared by students whose life is less affected by asthma and those that are more affected by it (Creswell, 2014; Creswell & Plano-Clark, 2018; Morse, 2016)
Delimitations

This study is designed to be conducted with and learn about adolescents ages 12-17 years old residing in the Tampa Bay area and who are students in middle or high school and experiencing persistent asthma.

Key Stakeholders in the subject matter include members of the Florida Asthma Coalition that involve healthcare providers, asthma educators, researchers in the medical and public health field, school nurses, and others.

The ecological frameworks served as the theoretical basis for this study and informed the development of the interview guide and the data analysis process.

Study Contribution

The body of literature demonstrates a cyclical pattern in which compromised health influences educational attainment that then plays a fundamental role in one's course of life, professional and occupational outcomes resulting back to compromised health (Basch, 2011b; Bassi, Steca, & Delle Fave, 2011; Haas & Fosse, 2008). Both health and educational disparities are well-documented among certain groups such as minority populations, families of low socioeconomic status (SES), and youth (Basch, 2011b; Haas & Fosse, 2008). Thus, enhanced health and academic outcomes among adolescents could play an important role in breaking the cyclical pattern and improving life trajectories (Basch, 2011b; Haas & Fosse, 2008).

The study provides a valuable perspective from adolescents with asthma and key stakeholders and represents a breadth of views on the factors perceived as linking asthma with school experiences and academic attainment. Findings gleaned from this study could contribute
to research, practice, and policy. First, it informs key stakeholder and professionals in the field, such as school nurses, educators, healthcare providers, and school psychologist of the gaps that inhibit students with asthma from maximizing their academic potential and school experiences. From a research perspective, these findings could further be explored in larger scale studies to confirm their credibility and relevance to the larger population of students as well as inform the development of instrument to gather data relevant to the topic of asthma and school life. They could further guide school practices (school-based interventions, improved communications) and policies (e.g., enactment of clean air policies, school nurse) that have the potential to assist adolescents with asthma overcome educational and health disparities and provide them equal opportunity for a successful and healthy life.

**Definitions**

**Asthma** - a chronic pulmonary disease that is typically characterized by inflammation of the airway and includes symptoms such as shortness of breath, cough, chest tightness, and wheezing (Global Initiative for Global Initiative for Asthma, 2017).

**Lifetime asthma** - is assessed based on positive response on the following item asked in the National Health Interview Survey (NHIS) questions: For adults, “Have you ever been told by a doctor or other health professional that you had asthma?” and for individuals younger than 18 years old, “Has a doctor or other professional ever told you that [sample child] had asthma?” (Akinbami et al., 2012)

**Current asthma** - is assessed based on a positive response to the follow-up item to lifetime asthma asked in the National Health Interview Survey (NHIS) questions: for adults “Do you still
Asthma severity - the intensity of asthma disease process. Severity is measured as a function of lung capacity, asthma daytime and nocturnal symptoms, exacerbation and activity limitation (National Heart Lung and Blood Institute, 2007).

Asthma control - the degree to which the manifestation of asthma symptoms and its interference with daily function, are lessened as a result of the course of treatment (National Heart Lung and Blood Institute, 2007).

Academic achievement - The extent to which students have met their educational goals. Academic achievement is typically measured by examinations benchmarks performance and accomplishment of learning objectives (Donnelly et al., 2016). It often comprises of academic performance (class grades, standardized tests, and graduation rates), educational behavior (absenteeism and behavioral problems at school), and students’ cognitive skills and attitudes (concentration, memory, and mood) (Whole School Whole Community Whole Child, 2014). For the purpose of this study, I also explored student’s perceptions of what encompass academic achievement and school success.

Asthma Self-management - independent self-monitoring of asthma with a focus on tracking of symptoms, lung functions and adherence to the medication regimen (Global Initiative for Global Initiative for Asthma, 2017)

Disparities – preventable differences experienced by socially disadvantaged groups that a disease/condition poses on their health, educational, and other life outcomes.
School Experiences – the overall range of activities, interaction, and engagement student encounter with educators, peers, and the surrounding in relation to the studies curricula/educational program and extra-curricular context within the school environment.

In this chapter I provided the background information related to the matter of adolescent asthma, school experience, and academic achievement, and the rationale of the study based on the reviewed literature. Further, I highlighted gaps in research that informed the design and the theoretical framework of the presented study. Additionally, I presented the statement of the problem and the research questions and provided definitions of terms that were used throughout the proposal. Finally, I discussed the significance of the study and ways in which findings would contribute to the body of knowledge and further the fields of education. The narrative review I present in the next chapter encompasses the physiology and epidemiology of asthma, asthma disparities in general and among adolescents in particular, and the current body literature on the topic of asthma in the context of academic achievement and school functioning.
CHAPTER 2 - LITERATURE REVIEW

Overview

This chapter presents background on asthma and the body of knowledge on adolescent asthma in the context of the school. In this section, I present an overview of asthma, its physiology and etiology, conventional treatment and disease care as well as strategies for asthma management. Additionally, I discuss patterns in the prevalence of adolescent asthma in the United States and highlight asthma disparities among this group. Next, I describe the factors unique to adolescents that take a role in asthma management. Lastly, I present current research that explored the link between asthma and students’ performance in school and list identified gaps that informed the development of this research proposal.

Asthma

Physiology and Etiology

Asthma is a pulmonary disease that is typically characterized by chronic inflammation of the airways and bronchial hyperresponsiveness. This inflammation causes a contraction of the bronchial tubes and excessive accumulation of mucus manifested by symptoms such as shortness of breath or difficulty breathing, coughing, chest tightness, and wheezing (Global Initiative for Asthma, 2017; National Institute of Health, 2014). While the airways are chronically inflamed, the appearance and intensity of symptoms vary over time and with the exposure to triggers. Such triggers can include tobacco smoke, air pollution, exercise, humidity, and various indoor and outdoor allergens (e.g., pollen, mold, dust mites, animal dander, fumes of beauty products).
As seen in Figure 5, the walls of the inflamed bronchial tube appear thicker, the smooth muscle surrounding the airways tighten during an asthma attack causing air to trap in the alveoli and limited expiratory airflow (Global Initiative for Asthma, Global Initiative for Asthma, 2017).

**Figure 5.** Comparison between Healthy and Asthmatic Airways

Of the several phenotypes (clinical characteristics) of asthma, the most common is allergic asthma. This phenotype is typically initiated at a young age and is triggered by exposure to food, drug, or environmental allergens. Eighty percent of asthma phenotype among individuals with asthma under the age of 18 is allergy related (Falcentano, 2018). Other forms of asthma phenotype are more common among adults and are not associated with exposure to allergens. Lastly, researchers have identified asthma phenotypes that are related to obesity and emotional triggers (Global Initiative for Asthma, 2017; Harver & Kotses, 2010).
Asthma is also distinguished by its severity -- mild intermittent, mild persistent, moderate persistent, and severe persistent (see Table 1). Forced Expiratory Volume in one second (FEV1) represents the volume of air that can be blown out forcefully in one second after a full inhalation and is typically used to measure airway obstruction through a spirometry test (Harver & Kotses, 2010). Levels of FEV1 are used to determine asthma severity; lower values indicate increased obstruction of the bronchial tubes. *Mild intermittent asthma* is considered when daytime symptoms occur less than once a week and night symptoms occur twice monthly or less, and FEV1 level is higher than 80% of predicted values. In this severity level, asthma exacerbations are brief and sporadic. However, *mild persistent asthma* exhibits more frequent nocturnal symptoms, exacerbations that could affect one’s activity and sleep, and FEV1 levels of 80% or higher. Typically, it is considered as controllable asthma that responds well to a reliever medication and requires low doses of a maintenance/controller treatment if any. Patients with *moderate persistent asthma* experience daytime symptoms daily and nocturnal symptoms more than once a week. It could be well-controlled by uptake of daily doses of controller treatment. FEV1 levels in these cases are 60 to 80% of the predicted values. *Severe persistent asthma* is characterized by frequent exacerbations and nocturnal symptoms, daily daytime symptoms, and limitation of physical activity. FEV1 values are equal or lower than 60% of the predicted value. Patients with severe persistent asthma require high doses of controller treatment to stabilize their condition. In some instances, severe asthma remains uncontrolled despite the medical treatment. One should distinguish between severe asthma and uncontrolled asthma with severe manifestation as a result of improper treatment or lack of adherence to the prescribed treatment (Harver & Kotses, 2010).
Table 1. asthma severity classification (National Heart Lung and Blood Institute, 2007).

<table>
<thead>
<tr>
<th>Asthma severity</th>
<th>FEV1 (lung function)</th>
<th>Day symptoms</th>
<th>Night symptoms</th>
<th>Asthma exacerbation</th>
<th>Activity limitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild intermittent</td>
<td>80% &gt; predicted values</td>
<td>&lt; 1/ week</td>
<td>≤2/month</td>
<td>brief &amp; sporadic</td>
<td>No</td>
</tr>
<tr>
<td>Mild persistent</td>
<td>80% ≥ predicted values</td>
<td>&gt;1/ week</td>
<td>3-4/month</td>
<td>Several times/week</td>
<td>Minor</td>
</tr>
<tr>
<td>Moderate persistent</td>
<td>&gt;60%</td>
<td>Daily</td>
<td>&gt;1/week</td>
<td>daily</td>
<td>Some</td>
</tr>
<tr>
<td>&lt;80% predicted</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe persistent</td>
<td>&lt;60% predicted</td>
<td>Throughout the day</td>
<td>7/week</td>
<td>Several times/day</td>
<td>Extreme</td>
</tr>
</tbody>
</table>

Prevalence, Trends, and Disparities

Asthma is widely spread across the United States and affects nearly 23 million Americans of which 7 million are younger than 18 years old. Across the latter group, asthma is the most prevalent chronic disease among adolescents (Akinbami et al., 2012). In 2015, the CDC reported that over 22% of American youth ages 12-18 had been told by their physician they had asthma; these rates indicate a steady increase throughout the last decade (Centers for Disease Control and Prevention, 2015; Forrest & Dudley, 2012). It further estimated a 10% rate of current asthma (asthma that was active in the past 12 months) among adolescents (US Department of Health and Human Services, 2016). According to the 2016 National Survey of
Children’s Health, Florida’s prevalence of both lifetime and current asthma surpasses national statistics - current asthma: Florida - 8.4%, nationwide - 9.7%, lifetime asthma: Florida – 7.2%, nationwide – 3.9% (The National Survey of Children's Health, 2016). Specifically for middle and high school students, over 10% of Florida students reported current asthma with acute episodes in the past year (Florida Asthma Coalition, 2017a).

From a national standpoint, asthma poses an economic burden on the healthcare system that reached $3,300 per capita annually between the years 2002 and 2007. In the year 2007, a total of $50 billion was spent on direct medical expenditure (Forrest & Dudley, 2012). A 2009 report from the CDC stated 479,000 hospitalizations, 1.9 million emergency department visits, and 8.9 million doctor visits all related to asthma and could have been decreased with better asthma control (Centers for Disease Control and Prevention, 2012). Florida alone spent $3,000 per emergency department visit with a total of 150,000 annual visits between the years 2011-2016. Furthermore, expenditure of over $24,000 per asthma hospitalization with a total of 20,000 hospitalizations was noted between these years (Florida Asthma Coalition, 2017a). Additional indirect costs are attributable to students’ lost days of school and parents’ decreased work productivity related to their children’s asthma (Diette et al., 2000a).

**Disparities**

Asthma disproportionately affects certain segments of the population (Centers for Disease Control and Prevention, 2012; US Department of Health and Human Services, 2016). A current Morbidity and Mortality Weekly Report (MMWR) estimated 8.3% prevalence of current asthma among children and youth under 18. The distribution of asthma across this age groups varies with highest rates among youth over the age of 12 (12-17- 10.5%, 5-11- 9.6%, 0-4-3.8%) (Zahran, Bailey, Damon, Garbe, & Breysse, 2018). Furthermore, higher prevalence of
asthma is seen among youth from families of lower socioeconomic class and income level - poor children 13.5% vs. 8.3% not poor (US Department of Health and Human Services, 2016). Additional variations are seen across different racial and ethnic groups indicating highest rates of asthma among non-Hispanic African American children (15.7%) followed by Hispanic children (8.0%) and finally white children (6.7%) (Zahran et al., 2018). Asthma distribution across genders appears disproportionate as well, indicating higher asthma rates among boys (9.9%) compared to girls (6.9%). Comparable trends are demonstrated for asthma-related deaths. Higher mortality rates among individuals older than 18 years old (13.7/million), Black non-Hispanic (23.9/million), males younger than 18 years old (3.4/million vs. 2.5/million for female), and females older than 18 years old (16.8/million vs. 10.4/million for male) (US Department of Health and Human Services, 2016). Similarly, emergency department visits and hospitalizations are utilized in a disproportionate fashion across these population segments (Falcentano, 2018).

Other factors associated with asthma disparities are geographic location and access to care. For instance, poor quality of air in urban regions poses excessive exposure to environmental triggers that could affect asthma manifestation/exacerbations. Inner city youth demonstrate a higher prevalence of asthma that can reach 38% in specific areas (Basch, 2011a). Access to care, whether the physical availability of healthcare facilities and specialists or in relation to the financial capacity of families to obtain healthcare coverage, can influence asthma control and its implications (Basch, 2011a). For instance, most patients with asthma are treated by their primary care provider and never see a pulmonology specialist (Falcentano, 2018). Limited access to quality/proper care leads to higher uptake of relief medication and increased utilization of emergency departments and hospitalizations (Falcentano, 2018).
Treatment and Disease Care

The treatment and care of a chronic condition like asthma is a part of one’s daily routine. While a continuous treatment is a pillar in the control of asthma and in maintaining normal life routine, it is often burdensome and demanding or alternately inaccessible to some patients. The purpose of recommended care is to keep long-term asthma control and avoid episodes of exacerbation, achieve considerable control of symptoms such as reducing the limitation of airflow and other asthma side effects, and maintain usual level of activity (Global Initiative for Asthma, 2017). To achieve these goals the core of optimal asthma care includes the following four elements – 1. A routine assessment and monitoring of lung function, asthma patterns, and severity by both healthcare providers and the patient, 2. Asthma education and collaborative treatment plan, 3. Avoidance of triggers (e.g., environmental allergens) and comorbid conditions (e.g., sinusitis) that could activate asthma, and 4. Medical/pharmacologic therapy (National Heart Lung and Blood Institute, 2007).

Routine Assessment and Monitoring

Routine assessment and monitoring of asthma through regular clinic visits are linked to the concepts of asthma severity and asthma control and patients’ compliance with the planned disease care as well as asthma responsiveness to the therapy. Clinic visits typically include assessment of pulmonary function using spirometry as the technique to measure FEV1 and completion of the Asthma Control Test (ACT). The ACT is a short, 5-item questionnaire regarding asthma symptoms, the use of reliever medication, activity limitation, and the patient’s perceived level of asthma control in the previous four weeks. In addition, the healthcare provider might ask about nocturnal awakening, quality of life, missed days in school or work, and ability to maintain regular daily activities (National Heart Lung and Blood Institute, 2007). Since most
asthma cases, mainly among children and adolescents, are allergy mediated, blood levels of immunoglobulin E (IgE), should regularly be monitored (Falcentano, 2018).

**Asthma Education and Collaborative Treatment plan**

Collaboration between the patient and the healthcare team is key to effective asthma care. Evidence has shown that a collaborative approach that allows the patient to engage in the decision making and the development of a care plan not only yield improved asthma outcomes and empower the patient but increase her satisfaction as well (Global Initiative for Asthma, 2017). It is recommended that physicians, nurses and other healthcare providers practice clear and open communication with the patient to encourage productive and reciprocal information exchange. Special attention is given to health literacy and cultural competency to assure the patient understand the treatment plan and can follow the provider’s recommendations (Global Initiative for Asthma, 2017). It is recommended that asthma education focus on an asthma action plan that guides the patient in how to treat asthma in several different scenarios. Finally, practicing of inhaler techniques during clinic visits is recommended to assure appropriate use of medications.

**Avoidance of Triggers**

Avoidance of exposure to triggers includes the environmental and indoor inhalant allergens. This can include any exposure to smoke or tobacco smoke, substances with a strong odor, air pollution, and pollen. House cleanliness is also encouraged to avoid exposure to dust mites, animal fur, and cockroaches. Active treatment and management of comorbidities such as rhinitis and sinusitis that could trigger asthma are also endorsed. For instance, patients are encouraged to consider the influenza vaccine to avoid flu episodes and upper respiratory
symptoms that could intensify asthma complications and severity (Global Initiative for Asthma, 2017).

**Pharmacologic Therapy**

Asthma pharmacologic therapy includes controller and reliever medication. Controller medication is taken routinely to maintain asthma control and reduce symptoms. It is typically intended to treat airway inflammation. Inhaled corticosteroids are commonly used as a controller treatment. In some cases, inhaled long-acting beta\(_2\)-agonists are prescribed in addition to the corticosteroids to assist in opening the airways. Rescue medication is prescribed to patients to treat episodes of asthma exacerbation. Rescue medication such as inhaled short-acting beta\(_2\)-agonists relaxes the tight muscle around the bronchioles allowing a quick relief during an asthma flare-up (Global Initiative for Asthma, 2017).

**Self-management**

Asthma education strives to equip patients with the necessary skills to self-manage their disease and ultimately, control their asthma. Self-management encompasses patients’ abilities to monitor their condition, identify and interpret asthma signs, treat according to the planned regimen, and seek help when necessary (Krenitsky, 2006). Providing patients with a written asthma action plan that indicates the daily course of treatment and recommended steps in instances that asthma exacerbates is intended to facilitate self-management (National Heart Lung and Blood Institute, 2007). Major focus is given to the adherence to controller medication and to frequent monitoring and logging of lung function by using peak flow meters (Global Initiative for Asthma, 2017).
**Asthma in the Context of Adolescence**

Adolescence is defined by the World Health Organization and the American Academy of Pediatrics as the age period between 10 and 19 years old. This developmental stage is characterized by multiple rapid changes. Beyond the growth spurt and puberty, adolescents’ intellectual capacity shifts from concrete to abstract thinking, their sense of self-identity shapes, the desire for autonomy emerges, and behavioral transition often occurs (American Psychological Association, 2002; Christie & Viner, 2005). From a medical standpoint, adolescent patients could exhibit modification in disease patterns, unusual appearance of symptoms, and unique disease management challenges. The various physiological, psychological and social changes adolescents undergo, position them as a unique population in the asthma care and management landscape. The Centers for Disease Control and Prevention recently published statistics that (Centers for Disease Control and Prevention, 2015) indicate increasing rates throughout the past decade of lifetime asthma prevalence among adolescent (current rate - 9.6%). Rates of current asthma, which is defined as asthma that manifested in the last 12 months are also at their peak and are more common among certain minority groups such as multi-racial, Hispanic, Blacks and those in poverty. (Sadof & Kaslovsky, 2011).

Literature has emphasized the role of proximate and distal factors in the life of individuals with asthma and the management of their condition (Global Initiative for asthma, 2017; Sadof & Kaslovsky, 2011). Several considerations more specific to this age group pertain to various factors across the ecological spectrum.

According to Krenitsky (2006), adolescents with asthma or other respiratory disorders demonstrate reduced mood, memory difficulties, potential steroid-related visual impairment, bronchial dilator-related fatigue, and sometimes confusion that stems from episodes of lack of
oxygen. Psychological comorbidities such as depression and anxiety could also affect adolescents with asthma in a bi-directional manner, and could, ultimately, influence asthma control. Severe cases of asthma are further associated with post-traumatic stress disorder. Furthermore, researchers have indicated that adolescents with asthma are more likely to suffer from bullying at school and from cyberbullying compared to healthy peers adding to the overall anxiety and stress (Gibson-Young, Martinasek, Clutter, & Forrest, 2014). A study by Trout, Lambert, Nelson, Epstein, and Thompson (2015) suggested a potential association between asthma and learning disabilities. They further recommended that adolescents with asthma get screened for attention deficit and hyperactivity disorders and other learning disabilities.

Adolescents’ increased susceptibility to disease complication is inferable to factors such as denial, poor medication adherence, and avoidance of triggers (Global Initiative for Asthma, 2017; Sadof & Kaslovsky, 2011). One explanation suggests that asthma treatment routine is perceived as interfering with adolescents’ emerging independence resulting in poor adherence to the treatment plan. Adoption of and engagement in risky behaviors prevalent in adolescence such as tobacco smoking can accentuate asthma complications as well (Global Initiative for Asthma, 2017; Panzera et al., 2013; Sadof & Kaslovsky, 2011). Other noted factors include the ability to think abstractly, evaluate situations and solve problems, issues related to self-image and identity, the perception of invincibility, all of which could influence adolescents’ capability and readiness to adhere to their disease treatment plan (Harver & Kotses, 2010). Sadof and Kaslovsky (2011) suggested a linkage between body image issues and low compliance with steroid intake on the ground of its known side effects on weight and body composition.

From an interpersonal standpoint, the increased influence of peers accompanied by a growing separation from the parents and other family members can influence asthma
management and its outcomes. Adolescents spend less time with their caregivers and assume more independence however occasionally do not demonstrate the responsibility needed in maintaining their disease care regularly, affecting asthma control (Global Initiative for Asthma, 2017). Moreover, like most adolescents, students with asthma strive for social acceptance. Trying to fit-in their social circles, they are often embarrassed about their condition and worried about being stigmatized as different or vulnerable. To avoid the embarrassment, they are likely to skip medication intake while with peers (Panzera et al., 2013). In some instances, specifically exercise-induced asthma, might interfere with extracurricular sports activities that are common among adolescents (Krenitsky-Korn, 2011) and affect their sense of social connectedness.

From an asthma care standpoint, research to date indicates that the discussion during pediatric clinic visits is dominated mainly by healthcare providers and caregivers, leaving young patients outside of the conversation (Sleath et al., 2018; Tates & Meeuwesen, 2001). To assure the quality of care among adolescent with asthma, appropriate coordinated disease management care should be developed across systems with the involvement/lead of the adolescent patients, their caregivers, the school nurse, psychologist and educators, and the healthcare providers. Effective communication and inclusion of the adolescents in the development of their treatment plans is essential for treatment adherence and ultimately to improved asthma outcomes (Harver & Kotses, 2010). Additionally, it is essential to impart preventative asthma care and management strategies among adolescents to assure successful disease management as they graduate to adulthood (Falcentano, 2018). A written asthma action plan is a helpful tool that assist adolescents with asthma and their family track asthma patterns and daily treatment, guide on recommended action steps in events of exacerbation, and inform the school nurse of the treatment plan. Currently, only 51% of children with asthma reported receiving a written asthma
action plan from their healthcare provider (Centers for Disease Control and Prevention, 2018).
Effective asthma care should be responsive to the challenges adolescents encounter and in line
with their developmental stage and considering the unique challenges and concerns.

On broader community and sociodemographic levels, limited resources and access to care
such as availability of healthcare facilities can contribute to asthma disparities. Lack of clinics
and hospitals or steady accessibility to these facilities – location and public transportation, are
associated with underserved populations (e.g., racial and ethnic minorities) and shown to
influence individual ability to control asthma and improve asthma outcomes. Several
interventions that offered asthma care and follow up at the school, whether through on-campus
care or via mobile care unit that visits campus regularly, showed positive asthma outcomes
among underserved populations (Engelke, Swanson, & Guttu, 2014; Morphew, Altamirano,
Bassin, & Galant, 2017). Researchers argue that differences in the quality of care exist among
those communities even when access is available (Harver & Kotses, 2010; Sadof & Kaslovsky,
2011). When addressing adolescents’ asthma, it is essential to consider environmental factors
including indoor/outdoor quality of air, housing quality, social acceptance and social support, as
well as policies and regulations that advocate for the needs of those with asthma (Harver &
Kotses, 2010).

Adolescent Asthma and Students’ School Experiences

Chronic Conditions in the School Context

DuPaul, Power, and Shapiro (2009) suggest three pathways in which pediatric illnesses
interfere with students’ school functioning: academic functioning, social functioning, and
behavioral functioning. Pediatric illnesses can affect school performance in direct and indirect
paths. Disease symptoms or reduced cognitive capacity resulted by certain medications are examples of direct paths while fatigue and school absenteeism are considered indirect. From a social perspective, pediatric illnesses could limit students’ independence from caregivers and their ability to participate in social activities (e.g., sports) resulting in lesser opportunities to socially interact with peers. Finally, pediatric illnesses could entail behavioral influences such as anxiety and depression. These three pathways that link pediatric illnesses and school functioning appear more prominent among students with chronic conditions.

Researchers across the world have shown a critical connection between health and academic outcomes. In a recent literature review by Lum et al., findings demonstrated that chronic conditions influence students’ engagement, participation, and attendance in school and can jeopardize their academic attainment. (Lum et al., 2017). Student engagement in school by itself (independently) was shown to play a key role in academic performance, attendance and psychosocial health, which ultimately improved educational outcomes. Numerous studies examined the link between chronic conditions and student experiences in the school environment. Findings showed that students with chronic conditions experience lower measures of quality teacher-student relationships, relationship with peers, school engagement, and academic motivation all of which affect the academic attainment of the students. At the same time, such literature focusing on students with asthma is lacking (Lum et al., 2017). Beyond school attendance, the review demonstrated an association of chronic health condition and provision of special education services, grade repetition, and lower graduation rates, all of which can result in lessened/sub-optimal school outcomes and life trajectory. Regarding interpersonal experiences, [improved] relationship with peers and educators and social support were shown to be viable in addressing the social needs of these students. Furthermore, effective communication
between school personnel (nurse, school psychologist, educators) and medical providers (hospitals or primary care physicians or a specialist) was found essential for supporting the student with a chronic condition in accommodating educational needs. Such accommodation might include an individual educational plan (IEP), plans for a successful return to school post disease-related absenteeism, or homebound education for more extended absenteeism from school.

Lum and colleagues’ review suggests that researchers and the school system should emphasize ways to assure that students with chronic illnesses are given the essential medical, educational and social support to guarantee school success equivalent to that of healthy peers. Since the school’s ultimate role is to ensure “continuous development and lifelong thriving by promoting the students social, emotional, cognitive, mental and physical potential” (OECD 2015), more attention should be given to students’ entire school experiences rather than just academics. Lum et al. recommended that research not only explore the relationship between chronic conditions and academic outcomes but also school experiences to, ultimately, inform school practices and policies.

In correspondence with the whole School Whole Community Whole Child initiative (WSCC), Michael et al. (2015) conducted a literature review to summarize findings from studies to date exploring the connections between health and academics. In their assessment of the literature, the authors focused on the various elements of the WSCC model including school services and programs, supportive school environment, and the contribution of the family and the community. As part of the definition of academic outcomes, the researchers included academic performance such as grades and test scores, educational behavior such as attendance and behavior in class, and cognitive capability such as attention and memory as well as attitude such
as mood (Michael et al., 2015). Literature included in this review indicated that health education at the schools equipped students with the information and skills required to make health decisions and adopt healthy behaviors. Studies also showed that in schools that were promoting health education, students' academic scores and attendance increased. With respect to school support services (e.g., counseling, psychological and social services) several studies exhibited improvement in attendance, test score and behavior when these services were available to students. Some studies further indicated that the health status of school personnel affected students learning. Regarding the school environment, students’ school experiences were more positive in schools that foster an accepting school climate. Furthermore, school safety, both environmental and social, were shown to affect academic outcomes. The physical environment such as indoor quality of air played a role in students' health and ultimately their academic outcomes. Lastly, schools that promoted relationships within the local community, and the broader school staff and invited families to engage in school activities, established a positive school climate that reinforced academic achievement, attendance, positive behavior in the classroom, and enhanced school engagement of their students. In sum, the review supported a comprehensive approach as suggested by the WSCC model, to improve school experiences of students, specifically those with special health needs, in order to foster their educational success.

In the context of asthma, Basch (2011a) proposed three potential mechanisms by which asthma might influence school success:

- **Cognition** – interrupted sleeping patterns is one potential path in which asthma could influence one's cognition. Due to lower respiratory capacity, many youths with asthma suffer from interrupted sleep and fewer total hours of sleep. Wheezing, coughing, and breathlessness contribute to nocturnal awakening, which enhances as asthma severity worsen.
Inadequate sleep can result in impaired cognitive functioning and exhaustion throughout the school day, impacting academic outcomes.

- **Connectedness** – several factors could contribute to students’ connectedness at school. First, the stigma related to asthma as perceived by students with asthma could result in lower participation in school and extracurricular activities and overall lessen their connectedness. Second, students with activity induced asthma are limited in their ability to participate in sport-related activities and therefore are less engaged in various school events and social interactions. Third, studies have shown that students with severe asthma are more likely to experience depression and anxiety which can indirectly influence school experience, learning, and academic success.

- **Absenteeism** - students with asthma tend to miss more days of school. The literature demonstrates a strong association between absenteeism and academic achievement. School absenteeism also is associated with the level of asthma severity and is caused by asthma symptoms, hospitalization or doctors’ visits, sleep deprivations

To address these three mechanisms, Basch recommended that schools facilitate a comprehensive approach to improve asthma control by incorporating:

- a full-time school nurse and asthma training for school staff
- implementation of a policy that allows students to carry their asthma medication and to self-administer it when needed
- updated asthma action plan on file
- asthma education to students with asthma and their caregivers
- minimization of environmental asthma triggers
- training of school staff on asthma and asthma management
Asthma in the School Context – Research to Date

A literature review that I conducted to explore current research on the topic of adolescent asthma in the school context indicated that most studies focused on academic parameters and their association to the existence of asthma or the various levels of asthma severity and control. While the majority of studies incorporated academic performance as part of the outcome variables only a few addressed the association between asthma and students’ academic outcomes as their main focus (Champaloux & Young, 2015; Crump et al., 2013; Dean et al., 2009; Diette et al., 2000b; Kohen, 2010; Krenitsky-Korn, 2011; Moonie et al., 2010; Moonie, Sterling, Figgs, & Castro, 2008; Moonie, Sterling, Figgs, & Castro, 2006; Silverstein et al., 2001). Additional topic of inquiry included students’ asthma control and self-management skills (Brasler & Lewis, 2006; Bruzzese et al., 2011a; Clark et al., 2010; Engelke, Guttu, Warren, & Swanson, 2008; Joseph et al., 2013; Magzamen et al., 2008; Schmier et al., 2007); school-based asthma education and students asthma knowledge (Brasler & Lewis, 2006); the effectiveness of school nurse services in asthma care (Engelke, Guttu, Warren, & Swanson, 2008; Rodriguez et al., 2013); and various life outcomes of students with asthma (e.g., employment, utilization of public assistance) (Hsu et al., 2016; Maslow, Haydon, Ford, et al., 2011).

Association of Asthma and Academic Performance

Findings from non-experimental studies indicated that school absenteeism was more prevalent among students with asthma compared with asthma-free students and among those with uncontrolled asthma compared with controlled asthma. Furthermore, one study indicated that students with asthma not only miss more full days of school but are also more likely to...
arrive late to school, leave before the end of the school day, and spend more time at the clinic (Schmier et al., 2007).

Correlation of other academic achievements and asthma were inconsistent. In some instances, the correlation of academic grade and other scores were mediated by school absenteeism. For instance, Crump et al. (2013) conducted a cross-sectional study, using secondary data from schools in the district of San Jose, CA for three academic school years (2007-2010). The sample included 22,730 elementary, middle, and high school students. Demographic, academic, and health variables were collected, and academic achievement was evaluated using the CA Standardized Test (CST) scores. The purpose of the study was to explore the association of chronic health conditions among children and adolescents with low school performance. Odds ratio analysis showed that students with chronic health conditions were more likely to be male, in higher grades, white or black, speak English as their first language, and enrolled in special education. All chronic conditions were significantly associated with higher school absenteeism. Expectedly, asthma was the most prevalent chronic health condition (6.1%); students with asthma were 1.29 times more likely to be absent (95% CI, 1.23-1.35; \( p < 0.001 \)). Absenteeism was negatively associated with English and math achievement scores. Among students with asthma, the association with English and math performance was weak (OR=1.395% CI, 1.18-1.43; \( p < .001 \)); this association was not demonstrated after adjusting for demographic variables and absenteeism. Although the findings showed a potential association of asthma with school achievement through school absenteeism as the explaining factor, the use of standardized test scores as an indicator for school achievement was noted as controversial. Additionally, the cross-sectional design of the study limited the observation of trends across time.
Bringing a longitudinal perspective, Champaloux and Young (2015) explored academic attainment among students with different chronic conditions using the National Longitudinal Survey of Youth (NLSY) – cohort 1997. In this survey, cohort members and their caregivers completed the questionnaire for baseline data in 1997 that was repeated annually through 2009. The surveys gathered information regarding students’ health status, academics, and schooling. Supplementary data included high school transcripts and cognitive examinations that were also completed annually throughout the stated timeframe. The researchers examined the completion of high school degree or GED by the age of 21 as the outcome variable. Among the sample of 8,984 students, when compared with students who never experienced a chronic condition, students with asthma (OR=1.63 95% CI, 1.31-2.02) and students with cancer, diabetes, or epilepsy (OR=1.96 95% CI, 1.13-3.37) were more likely to not complete high school or earn a GED. The association remained significant for students with asthma after controlling for depressive symptoms. Given the cohort design, this study was able to associate educational outcomes through adolescence rather than relying on the academic score that represents the academic performance of one point in time. Although the data indicated a strong association between asthma and the completion of high school (high school diploma or GED), like Crump et al., the findings did not support a mediating model of school absence on educational attainment among students with asthma. Contrary, a longitudinal study conducted by Maslow, Haydon, Ford, and Halpern (2011) did not find an association between asthma and life outcomes at young adulthood. In this study, the researchers analyzed the Waves I & III (2001) of the National Longitudinal Study of Adolescent Health to examine the association of young adult life outcomes (high school graduation, employment history, current living situation, receipt of
public assistance) and pediatric chronic illness. No differences were observed between asthma and the healthy group, specifically for high school graduation Risk Ratio=0.98 (0.96–1.01).

Focusing more specifically on asthma and its severity, Hsu, Qin, Beavers, and Mirabelli (2016) examined the relationship between school absenteeism among students with asthma taking into account asthma severity and its level of control. Additionally, they explored possible modifiable risk-factors that could explain asthma disparities. Once identified, factors could be addressed in interventions to promote asthma control and academic performance of students with asthma. Data were collected via phone from 8,881 caregivers in 35 states as part of the Behavioral Risk Factor Surveillance System Child Asthma Call-Back Survey that used random digit calling for sampling 2006-2010. Although not explicitly stated, the study captured information reflecting elements from the various levels of the Social Ecological Model. For instance, the survey instrument assessed missed days of school, asthma control and severity, access to care in relation to cost (e.g., ability to purchase medication and see primary care physician and a pulmonologist), and school and home environment concerning asthma triggers (e.g., mold, pet, etc.). $\chi^2$ tests and multivariate analysis indicated that students who missed school due to asthma were more likely to have persistent uncontrolled asthma. These students also reported more asthma exacerbations and hospitalization due to asthma, limited access to primary care and specialist, and lower use of controller medication. The study identified several demographic variables that could explain school absenteeism among students with asthma – 1. The type of health insurance; students with asthma were more likely to be insured by Medicare or Medicaid (20.9% vs. 16.3%). 2. Annual household income; individuals were also more likely to have an annual household income of less than $25,000 (29.3% vs. 19.6%). 3. Race and ethnicity; African American or Hispanic students were more likely to miss school due to asthma.
compared to their counterparts. Despite the large sample size this study represented, findings were not age specific and included broader age groups rather than adolescents solely. Further, findings could be biased as the data were self-reported by caregivers over the phone.

Similarly, Moonie et al. (2008) investigated school absenteeism but also incorporated the association with performance on standardized tests. The researchers examined whether students with asthma were more likely to score lower on standardized tests compared to their asthma-free counterparts. Finally, they assessed the correlation between asthma severity and performance on standardized tests. This cross-sectional study, therefore, used data from standardized tests: Missouri Assessment Program (MAP) of African American predominantly schools. Scores were collected for a total of (3812 students with no asthma and 397 students with asthma) in 3, 4, 7, 8, 10, 11 grades. Asthma and asthma severity were reported by the school nurse. Asthma severity was determined based on a survey that assessed the severity of symptoms; the survey was completed by students with asthma (fifth grade and above) or by their caregivers (below fifth grade).

Univariate analysis indicated that SES, grade level, school attended, gender, the presence of asthma and asthma severity predicted of academic achievement. In a $\chi^2$ analysis, a negative relationship was found between school absenteeism and test score level after adjusting for covariates regardless of asthma presence. Contradictory to the hypothesized link between asthma and academic outcomes, when compared to students with no asthma, no significant differences were found for test score level ($p = .12$). However, students with asthma missed more days of school compared to asthma free students. Within the group of students with asthma, those that were classified as having persistent asthma had higher mean for days of absence and scored lower on the MAP than those that were classified mild intermittent.
In another analysis of [St. Louis] school records, Moonie et al. (2006) found that students with asthma miss more days of school in elementary (7.9 vs. 6.9 days, \( p = .006 \)) and middle (11.2 vs. 8.6 days, \( p = .006 \)) school compared to their asthma free peers. For students with asthma, higher absenteeism rates were documented among cases of persistent asthma (\( p < .05 \)).

Moonie and colleagues (2010) further explored the link between asthma-related school absenteeism, GPA score and repeated grades in the Las Vegas area. Conducting \( \chi^2 \) analysis and logistic regression, they found higher odds of missing 10 or more day of school among students with asthma (OR=1.5, CI 1.43-1.6) and students with comorbidity of asthma and other health condition (OR=1.6, CI 1.01-1.26). A negative association was demonstrated for GPA and total days of absence (\( r = -.39 \), \( p < .01 \)). Lastly, students with asthma had lower average GPA compared to healthy students and to students with multiple health conditions, although this differences in average GPA were not statistically significant.

Kohen (2010) also examined the association between asthma/asthma severity (low, moderate, severe) and school functioning. A significant association was found between asthma severity and activity limitation; low math score and moderate (OR=1.84, \( p < .05 \)) or severe (OR=1.59, \( p < .05 \)) asthma compared with healthy children; low reading score with moderate (OR=1.83, \( p < .05 \)) asthma. Additionally, students with asthma were found to utilize educational services five times more than healthy students (OR=5.38, CI 4.21-6.88).

Dean and colleagues incorporated the level of asthma control in their research. The study intended to assess the impact of uncontrolled asthma on school absenteeism and quality of life of the individuals with asthma. Findings showed that asthma-related school absenteeism was higher among uncontrolled asthma students (6.4 days) compared with controlled asthma students (2.6 days) - \( p < .001 \) (Dean et al., 2009).
Schmier et al., 2007 expanded on this concept and compared the health outcome and productivity of adolescents with controlled and uncontrolled asthma. Findings showed that in addition to missing more days of school, adolescents with poorly controlled asthma reported higher rates of tardiness (28% vs. 1.8%, \( p < .001 \)) and leaving school early (21.1% vs. 1.8%, \( p = .03 \)). These students also scored lower on total QOL score (4.5(1.3) vs 6.1(0.8)); \( p = .001 \).

These findings highlight the link between health and student performance specifically with respect to asthma severity and control level of the condition. Given these observations, the importance of effective asthma management and control in enhancing students’ attendance and performance in school are accentuated. Hence, effort should be given to assure access to [quality] care and asthma education, and development of self-management skills to mitigate the disadvantages experienced by students with asthma.

Adding the students’ attitudes, Krenitsky-Korn (2011) applied multi-methods to explore differences between students with and without asthma (n=57) in their attitudes toward school health services, absenteeism, and nurse support. The data showed that students without asthma demonstrate a higher level of attendance in school and participation in extracurricular activity. In addition to a higher rate of absenteeism \( (p < .05) \), students with asthma demonstrated greater utilization of school health services. These students valued the school nurse assistance more than their counterparts with no asthma. Regardless of the medical conditions, absenteeism was correlated negatively with English and math grades and positively with permissive attitudes towards absenteeism. Further, students with permissive attitudes towards absenteeism demonstrated lower math grades and less participation in extracurricular activities. This demonstrated a direct and indirect link between absenteeism and score in those subjects.
Some of the reviewed research evaluated the school-based experimental studies to assess the effectiveness of the interventions on asthma knowledge, management skills, and outcomes. Of those, Bruzzese (2011), Clark (2010), Joseph (2013), and Magzamen et al. (2008) have tested how asthma education interventions influence asthma outcomes (Clark et al., Bruzzese et al., 2011b; 2010; Joseph et al., 2013). Results showed a significant improvement in the outcome variables among the treatment groups when compared to control groups. One study showed increased GPA level, enhanced self-regulation of asthma, and improved QOL among students participating in the asthma program (Clark et al. 2010). Other studies showed decreased absenteeism from school and days with activity limitation (Bruzzese et al., 2011a; Joseph et al., 2013), and two Engelke et al. (2008) and Rodrigues et al. (2013) assessed the influence of school nurse work in care coordination and facilitation of better disease outcomes among students with chronic conditions. In the study by Engelke et al. (2008) participants exhibited improvement in their end-of-course grade and in GPA score—specifically those students that struggled academically in the courses at the pre intervention phase. The noted improvements indicated sustainability one and two years post-intervention. Other outcomes indicated a decrease in the number of days with activity limitation and/or asthma episodes, and an increase in QOL. These studies support the importance of the school nurse role in facilitating disease care and management and advocating for students with chronic conditions. Further, they highlighted the effectiveness of school-based asthma education in facilitating self-management skills, improving students’ outcome and ultimately reducing asthma disparities. Findings can inform areas in which the school system can intervene to decrease the noted asthma disparities.
Students and Stakeholders’ Insights

Whereas quantitative evidence on the potential correlation between asthma and academic realization is relatively available in the literature, qualitative research incorporating insights of students and key stakeholder on the topic is rather sparse. Of the few studies the review yielded that integrated these insights, Krenitsky-Korn (2011) for instance, has incorporated several open-ended questions in this study gathered insights from students with asthma regarding their perception of help from school nurses in managing asthma. Positive perception towards availability of healthcare interventions and services to manage medication. Students with asthma perceived availability of school nurse to assist in emergencies as important. As identified by the students, school nurses can play a specific role in communication between parents, physicians, and educators. The study findings supported the researchers' initial hypothesis that coping with asthma influence social isolation, absenteeism, time spent in the school office or clinic, and engagement in extracurricular activities.

Another study by Svavarsdottir and associates was conducted in the school setting and explored insights of school nurses as stakeholders in addressing asthma in schools (Svavarsdottir et al., 2013). Focus group sessions were conducted as part of an international study with school nurses from Iceland and Minnesota (n=32) who work in coordinating and managing asthma with adolescents. Guided by the Social Ecological Model, participants discussed their views on the barriers to asthma management for adolescent students concerning students, families, communities, and school systems of care. Identified barriers were mostly similar for both study sites. On the individual level, nurses expressed that poorly controlled asthma is common and is perceived as the norm by students and their families. With regard to the families, the nurses expressed challenges in communicating with caregivers. Caregivers neglect to communicate
important information regarding the students' asthma to the nurse. Additionally, caregivers did not always follow up with health care providers when requested by the school nurse (especially in instances that a re-evaluation of asthma is needed or when asthma status worsen). Cultural and language gaps were also mentioned as barriers to communication between school nurse and the families. Related to the school level, participants stressed that time constraints, high volume of students and competing demands leave limited opportunities for asthma prevention and management efforts. In addition, nurses expressed that school staff is not proactive about asthma management and communication of asthma-related essential information with the nurse. Finally, on the health care level, access to health care and access to appropriate medical guidance were mentioned as major barriers. Limited medical coverage resulting in limited medicine uptake for some students, in other instances, lack communication with healthcare providers limited the facilitation of asthma management. As demonstrated by several researchers (Hsu et al., 2016; Kohen, 2010; Moonie, Sterling, Figgs, & Castro, 2008; Schmier et al., 2007), asthma severity and the level of asthma control are associated with school absenteeism and ultimately, scores on standardized tests.

Both Svavarsdottir (2013) and Krenitsky-Korn (2011) highlights the importance of the role school nurses play in assisting students with asthma to manage their condition and navigate through schools’ academic and extracurricular activities. However, they lacked practical recommendations for mitigating barriers school nurses face in facilitating these goals of and advocating for students with asthma.

**Implementations of Comprehensive Approaches – A Call for Research and Action**

Ascertained by the review of current research, studies to date have addressed, to some extent, the link between the health condition and academic achievement (graduation, score,
grades, and attendance). However, insufficient inquiry was made to understand the school experiences of students with chronic conditions, specifically with asthma. In correspondence to the WSCC model, additional elements/variables need to be considered to fully understand the challenges students with asthma face as they navigate their academic environment. For instance, Chen et al. introduced the concept of presenteeism — an individual’s ability to actively engage in daily activities (Chen et al., 2008). Other elements, such as participation in extracurricular activities and physical education, were noted in the literature as indirect indicators of educational achievement and should be taken into account as well (Hein, Smerdon, & Sambolt, 2013). Additionally, factors such as fatigue, compromised cognitive ability, and social distress — all of which may be present [excessively] among adolescents with asthma — could contribute to a student’s failure to realize her potential.

A recent study by Rhee et al. was the first to explore the perceptions of middle school students with asthma in relation to their interpersonal relationships and the school environment (Rhee et al., 2017). While positive relationships with peers could improve interconnectedness, asthma management and the psychosocial well-being of these students, findings indicated poor relationships with peers as well as with teachers. As for the school environment, these students perceived the school environment to be poor specifically with respect to air quality, humidity, sanitation, temperature and other asthma triggers. They also thought that the schools' policies and rules were not conducive to their needs for asthma management, for instance access to medication and the nurses' training level. Further research is needed to explore more comprehensively the school experiences of students with asthma in context of school functioning and performance.
While identifying the full array of influencers/barriers that has a role in the school experiences of students with asthma is essential for the understanding of asthma school disparities, additional focus should be given to exploration of practical solutions that could overcome these barriers.

Summary

The literature to date supports the association of school absenteeism with asthma. Overall, the proposition that the presence of asthma compromises the school functioning and academic success of adolescent students was partially supported. Several studies found absenteeism to be a mediating factor between the two, while others found a direct correlation between asthma and limited academic achievement. Asthma severity appears to have a role in asthma control, which ultimately affects school absenteeism and students’ performance. Thus, more attention should be given to the factors influencing asthma-management and asthma control inside and outside the school setting. To address the limitations and gaps of the extant literature, research in the study of adolescent asthma and educational disparities must consider:

- Incorporation of qualitative or mixed-methods that reflect the voices of students with asthma as they are the population of focus and the ones experiencing the challenges first-hand.
- Segmentation to certain age groups to distinguish between the different developmental phases and the varying school/academic expectations.
- Prioritization of theory led studies.
- Emphasis on applied research approaches that would inform more strategically effective elements for future interventions.
- Application of a comprehensive approach to explore the link between health and educational outcomes.
- Understanding of the broader school experiences including students’ engagement, interpersonal relationships, and other environmental factors.

This study addresses these research recommendations by 1. Focusing specifically on students with asthma in middle and high school as the population of focus and their experiences in relation to asthma in the school context; 2. Incorporating the ecological approach (Bronfenbrenner & SEM) as a guiding theoretical framework to capture the factors from multiple levels that are taking roles in adolescent asthma school disparities, and 3. providing insights from the population of interest to the current body of knowledge to inform future interventions with useful elements to address academic disparities among this population. In Chapter 3, I will present the research design and other methodological considerations that were implemented in the study.
CHAPTER 3 – METHODS

The following study design and methods were developed in response to the literature review presented in Chapter 2 with the intent to address the current gaps in the study of adolescent asthma and educational disparities. In this chapter, I explain the selected research design and elaborate on the methods I used in the inquiry of asthma-related school and educational disparities. I start with a description of the study participants and the setting, followed by the procedures that guided the sample recruitment and selection and the data collection steps. I then discuss the analysis plan for both the qualitative and quantitative data. Finally, I address design limitations, ethical issues, and protection of human subjects as well as steps taken to address research biases.

Study Overview and Research Questions

The presented study explored the perceptions of whether and how asthma inhibits academic attainment and contributes to school disparities as viewed by high school and middle school students with asthma and key stakeholders. Bronfenbrenner’s bioecological theory and the Social Ecological Model (SEM) informed the data collected to understand students’ and stakeholders’ insights related to the various levels of these frameworks and to achieve four main aims:

1. To explore adolescents’ and key stakeholder’s perceptions of the influence asthma has on their school experiences and academic achievements;

2. To explore the role of asthma control and severity in this relationship, and
3. To identify the role of individual and contextual factors in academic disparities among adolescents with asthma. These factors could include but are not limited to the individual behavior, attitudes and beliefs, relationships with key people in their lives (family, teachers, peers), school policies, and the school environment.

4. To identify barriers contributing to these disparities and strategies to overcome those barriers.

**Research Questions**

This study was designed to answer the following research questions:

Research question 1

- What are the perceptions of adolescents with asthma regarding the influence of their medical condition on their academic achievement and school experiences?
  - Sub-question 1a. What are the roles of individual interpersonal, organizational, community and policy factors in educational disparities among adolescents with asthma?
  - Sub-question 1b. How can the individual, interpersonal, organizational, community and policy influencers affecting academic/school disparities among adolescents with asthma be overcome?

Research question 2

- What are the perceptions of key stakeholders regarding the influence of adolescent asthma on academic achievement and school experiences?
Sub-question 2a. What are the roles of individual interpersonal, organizational, community and policy factors in educational disparities among adolescents with asthma?

Sub-question 2b. How can the individual, interpersonal, organizational, community and policy influencers affecting academic/school disparities among adolescents with asthma be overcome?

Research question 3

- How do students with varying levels of QOL (poor, intermediate, and high) describe their academic achievement and school experiences?

Research Design

Being a practical person who seeks to find a solution for a given problem, it is quite evident that the philosophical stance that guided me in conducting this research aligns with the pragmatist approach. The utility focus of pragmatism informs applied research in the search for a practical solution (Lodico, Spaulding, & Voegtle, 2010; Morgan, 2007; Plowright, 2016). The knowledge gained from this study could inform practice, policy or cross-system adaptations in the health-educational field, which in return, can then confirm or disprove the obtained knowledge (Yvonne Feilzer, 2010).

A convergent mixed-method research design (Creswell & Plano-Clark, 2018) was implemented to realize the study’s aims with an emphasis on the qualitative component (QUAL). Data were collected and analyzed concurrently with results converging in the analysis and interpretation phases to answer [specifically] research question #3 – “How do students with varying levels of QOL (poor, intermediate, and high) describe their academic achievement and
school experiences?” (Creswell, 2014; Creswell & Plano-Clark, 2018; Onwuegbuzie & Johnson, 2006; Onwuegbuzie & Teddlie, 2003). The study was conducted in two phases (see table 2): phase 1 incorporated a simultaneous collection of both qualitative and quantitative data from adolescents with asthma. The qualitative data addressed students’ perceptions of asthma-related to academic disparities and school experiences. Barriers and suggested solutions were solicited for each of the ecological tiers. The quantitative component of this phase was used to determine the level of asthma control and its burden on adolescents’ daily activities and emotional functioning among the participants. The convergence of the qualitative and quantitative data was used to explore whether the level to which asthma burdens the QOL [the daily activities] of adolescents with asthma is in line with their perceptions of asthma school disparities. Phase 2 was qualitative in nature and was based on findings generated from participating adolescents in phase 1. This phase (2), engaged key stakeholders from the community by soliciting their perception and suggested solutions in response to those themes identified by participating adolescents. This data triangulation served to strengthen the validity of the study findings across systems and the feasibility of intervention options.

Table 2. Study Outline

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<th>Phase 1</th>
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<td>Interviews with adolescents</td>
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*RQ=Research Question*
Participants and Recruitment

Adolescents with Asthma

Using a purposive sampling method, I recruited 20 adolescents (12-17 years old) with a clinical diagnosis of asthma. Recruited participants met the following inclusion criteria: (1) having attained the age of at least 12 years but less than 18 years at the time of enrollment; (2) having an asthma diagnosis verified by clinic physicians for at least one year prior to the study [this inclusion criteria was incorporated to assure ongoing routine of coping with asthma and to eliminate the inclusion of challenges related to adjustment to a newly introduced condition], and are treated with daily and/or emergency asthma medication; (3) be enrolled in a public, charter, or private middle or high school in Florida; and (4) speak English. Adolescents with other chronic diseases in addition to asthma were excluded from the study. Although demographic data on gender, race, ethnicity, and socioeconomic status (SES) were collected (see Appendix E), these variables did not restrict participation in the study.

The initial recruitment strategy was done through the University of South Florida’s pediatric pulmonology health clinics. Participants were identified and recruited by USF Health Clinic personnel (pulmonologists and nurses). Recruiting personnel presented the study to eligible patients and provided a written explanation of the study including contact information they would use if they decided to participate (see Appendix A1). Despite the efforts to conduct sufficient number of interviews in a timely manner, participant recruitment was limited. To enhance recruitment, additional recruitment strategies were incorporated [and approved by IRB]. These included: posting on social media (Facebook and Instagram), posting through USF listserv, and distribution of recruitment fliers through local pediatric clinics outside of the USF system.
Informed consent was obtained from parents of participating adolescents; assent was obtained from the adolescents themselves prior to participation (see Appendix B1 and B2).

**Key Stakeholders**

Using a purposive sampling method, I recruited ten coalition members to participate in a discussion/interview session. Key stakeholders were recruited through the Florida Asthma Coalition. The coalition was established to facilitate the state's asthma plan to assess collective assets in the community with the intent to improve the quality of life of those Floridians experiencing asthma. The coalition includes members from various sectors such as providers, educators, caregivers, and researchers and is divided into several work groups. Its mission is: “To reduce the overall burden of asthma, with a focus on minimizing the disproportionate impact of asthma in racial/ethnic and low-income populations, by promoting asthma awareness and disease prevention at the community level and expanding and improving the quality of asthma education, management, and services through system and policy changes”. One group that is particularly relevant to the work proposed in this study is the Schools and Child Care Workgroup. This group works to promote asthma education in the school setting and facilitate partnerships in the community that benefit students with asthma, specifically by advocating Asthma-Friendly Schools (Florida Asthma Coalition, 2017b). In the past few years, I have been a member of the coalition and this specific workgroup, attended many of the meetings, and developed relationships with some of the leaders. A recruitment email was sent out through the coalition listserv explaining the purpose of the study and providing a synopsis of the activities to date (Appendix A2). Similar to the recruitment of student participants, additional stakeholders were recruited through the USF listserv (Appendix A3). During the recruitment
phase, I assured representation of different stakeholders – healthcare providers, school personnel, caregivers, and asthma advocates in the area – to capture a wide array of perceptions. To participate in the study, these individuals needed to have connections to or work with adolescent students with asthma.

**Procedure**

In-depth interviews took place during the 2018-2019 academic school year. Interview sessions were guided by a semi-structured interview guide (see Appendix C); the interview guide was pre-tested for clarity and comprehensiveness with three adolescents who have asthma and was adapted according to their recommendations. Questions in the interview seek to understand the facilitators and barriers in school success in relation to asthma in general, and in relation to asthma management as perceived by the students (e.g., *How does asthma affect your daily routine? What is it like to be a student with asthma in class? How does it affect your engagement/performance in school? Think back to the last time you experienced an asthma attack in school, how did it affect your learning that day?*). Further knowledge, driven by the SEM framework, was gained regarding potential intervention strategies for each level of the model: individual, interpersonal, organizational, community, and policy (e.g., *How can teachers/peers assist in enhancing your academic success/school experience? Which school policies would facilitate the educational needs of students with asthma?*). Prior to the interview, participants completed the Pediatric Asthma Quality of Life Questionnaire (PAQLQ) and provided demographic information (see Appendix D).

The interviews lasted approximately 45-60 minutes and were conducted by the study investigator. The location was selected to accommodate participants’ preferences. These
locations include the USF pediatric clinic, local libraries or community centers, participants
homes and other locations that were convenient for participants to access. The location was
selected to provide participants with a neutral and private environment allowing them to share
their thoughts freely. Participants received a $20 gift card to Target as an incentive for their
participation in the interview. Interview sessions were recorded and transcribed to assure
capturing of all the insights shared by the interviewees. Data collection continued until data
saturation was achieved, namely little new data or no new ideas were presented (Castro,
Kellison, Boyd, & Kopak, 2010). This sample size was in line with the literature as well as my
previous experience in collection of qualitative data suggesting completion of approximately 16-
20 interviews to reach data saturation (Guest, Bunce, & Johnson, 2006).

In the next phase, findings gleaned from this stage were shared with ten key stakeholders
(school system such as nurses, educators, healthcare providers, and caregivers). A discussion
session was designed to communicate findings, solicit feedback on students’ concerns and ideas,
and discuss additional contributing factors in mapping the elements that influence students’
school experience. Then, stakeholders shared potential solutions and the feasibility of applying
these in the school system to overcome identified barriers and to maximize the school
experiences of students with asthma. The discussion sessions were offered to take place in a
location acceptable to the participating members and lasted approximately one hour. All but one
of the interviews were done via phone or Go To Meeting platform. Informed consent to
participate was obtained prior to the session. The sessions were audio recorded and transcribed
to assure capturing of all the insights shared by the participants. Participants were offered an
incentive for their efforts/time ($30 Target gift card)
**Instrument**

The Pediatric Asthma Quality of Life Questionnaire (PAQLQ) was administered at the start of each interview to address research question #3 – “How do students with varying levels of QOL (poor, intermediate, and high) describe their academic achievement and school experiences?”

The instrument was developed by Dr. Juniper and her research team (Juniper et al., 1996b) in the mid-90s in order to measure functional physical, emotional, and social problems that are most bothersome to children with asthma. The questionnaire items, 23 in number, were developed based on data that were gathered from youth ages 7-17 years about the problems they experience as a result of their asthma. Participants were asked to score the identified problems according to the level of trouble they posed; items that were identified most frequently and that scored highest were included in the instrument. Questions were classified into three domains: symptoms (10 items), activity limitation (five items), and emotions (eight items). The response options are on a 7-point scale where 7 indicates “not bothered at all” or “none of the time” and 1 indicates “extremely bothered” or “all the time”. The final instrument was pretested and evaluated for its validity, reliability, and internal consistency by the developer. The instrument developers conducted a longitudinal construct validity study measuring correlation between QOL scores with clinical measures (FEV1 and β agonist use). The study findings demonstrated that activity and symptom domains moderately correlated with changes in clinical asthma control, additionally all three domains showed correlation with morning peak flow and β-Agonist use. A cross-sectional correlation showed moderate correlation of all three domains and of the total QOL scores with β agonist use, but not with FEV1% values. Reliability was measured by comparing the data between consecutive visits from ‘asthma stable’ subjects for three age groups
in years: 7-10, 11-14, and 15-17. For all domains, the standard deviation of change within subject was relatively low, showing minor changes among the group of subjects with stable asthma (Juniper et al., 1996a). The questionnaire is commonly used in the field of pulmonology and was tested for its psychometric properties in various languages and populations. Internal consistency of the various versions demonstrated values of Cronbach’s that ranged from .7-.95 and construct validity similar to the measures reported by Juniper et al. (Poachanukoon, Visitsunthorn, Leurmarnkul, & Vichyanond, 2006; Raat et al., 2005; Tauler et al., 2001). The full questionnaire can be found in Appendix D. The PAQLQ has been used as a subjective, self-reported measure for asthma control in the research arena (Dinakar & Chipps, 2016). It was found to be significantly correlated with clinical and functional indices, including asthma control and severity (Nogueira, Silva, & Lopes, 2009; Wilson et al., 2012). For instance, Matsunaga et al. (2015) showed significantly lower scores on the PAQLQ among adolescents with severe asthma and those with uncontrolled asthma. In the presented study, I used the global PAQLQ score to serve as a subjective proxy for asthma control/severity.

**Data Analysis**

**Phase 1**

**Qualitative Data**

Interview sessions were audio recorded and subsequently transcribed by an external transcription service. Transcripts were then uploaded to the qualitative data analysis software MAXQDA (VERBI, 2019). To avoid personal biases, parts of the data coding were performed by two trained coders (the PI and a second coder). Thematic analysis was conducted to identify common concepts (Grbich, 2012; Miles, Huberman, & Saldana, 2014); transcripts were
deconstructed to small coded sections that later were reconstructed into broader emerged themes (Yin, 2015). First, I developed an initial codebook including codes’ names, definitions, and examples to assist with consistency and reliability of the coding process. This first draft of the codebook was guided by initial a priori codes reflecting the SEM levels (individual, interpersonal, organizational, environmental and policy), facilitators, barriers, and other constructs. I then shared the codebook with the second reviewer and incorporated comments she shared. Next, data analysis occurred in an iterative manner starting as soon as the first interview transcript was available. The second coder and I analyzed the first interview, gathered notes, and suggested adjustments to the codebook. We then reconvened to compare coding, shared concerns and agreed upon revisions (Lichtman, 2013). Applying the constant comparative approach, I revisited the data and updated the codebook after the coding completion of each transcript to incorporate any additional codes and/or emerging ideas (Miles et al., 2014). Twenty percent of the interviews were coded by two coders (N=4). A discussion took place after each coding to reconcile discrepancies and update codes and themes as needed. Inconsistencies between the coders mainly stemmed from the length of the coded segments and double or multi coding of certain segments. Calculations of Cohen’s Kappa values were performed twice; first before the discussion between the two coders and a second time after revisions were made. As recommended in the literature, Kappa values that are equal or higher than 0.80 were considered as reflecting acceptable intercoder agreement (Guest, MacQueen, & Namey, 2011). Once coding was finalized, inter-rater reliability was calculated to assess the level of agreement between the two coding sets using MAXQDA (2019) intercoder agreement feature; this feature tests code existence, frequency and percent segment agreement. Based on this analysis, coding discrepancies were then addressed (Lichtman, 2013) and, a post reconciliation Kappa score
yielded a value of 0.80. In the next phase, I identified patterns and gathered codes into larger themes. Finally, I organized the overall analysis around main categories linking them back to the SEM model, interpreted and summarized the findings. Valuable quotations were highlighted to provide support from the interviews as displayed in chapter 4 (Tolley, Ulin, Mack, Succop, & Robinson, 2016).

**Quantitative Data and Data Convergence**

All responses to the PAQLQ were uploaded to the data analysis software MAXQDA and linked to their corresponding participants and their interview transcripts. PAQLQ scores were calculated for the entire scale (mean of the 23 items) and for each subscale separately (symptoms, activity limitation, and emotions- an average of the items in each domain). The scores were then classified as follows: 1-2.9 – poor QOL - severe impairment related to asthma, 3-4.9 intermediate QOL- moderate degree of impairment caused by asthma, and 5-7 – high QOL- minimal impairment caused by asthma. Questionnaire scores, categories and coding were consolidated for each participant; the completed PAQLQ of each participant was linked to the coded transcripts. This step of data integration allowed me to detect themes (from students interviews) associated with different levels of QOL and its subscale (PAQLQ) to determine the degree to which asthma’s influence on students overall QOL (and its subscales- symptoms, activities, and emotions) is reflected in their school experiences and is congruent with students’ perceptions of asthma-related educational/school disparities. For that, I used software features to outline code distributions across QOL categories and to relate and compare the levels of asthma QOL and its subscale (symptoms, activity limitation, and emotion) with the corresponding perceived educational disparities shared by the participants (Onwuegbuzie & Teddlie, 2003). A joint display of the qualitative and quantitative data can be seen in chapter 4. I then qualitatively
evaluated and interpret the relationship between the disparity themes and the different levels of asthma influence on QOL by detecting patterns in school disparities in relation to the reported quality of life scale.

**Phase 2**

Data gathered from the stakeholders’ discussion sessions were coded in a similar fashion to the interviews in phase 1. While some of the stakeholders’ insights were linked to themes that emerged from the students’ interviews, additional themes were identified to reflect stakeholders’ unique perceptions. Themes were then mapped in relation to the SEM model; suggestions for solutions were then mapped in response to the barriers and disparities they address. A discussion guide can be seen in Appendix F.

**Research Standards and Validity Considerations**

When addressing the issue of quality criteria and research standards in mixed-methods research, researchers developed the concept of legitimation as an alternative for validity in quantitative research and trustworthiness in qualitative research (Johnson & Turner, 2003; Onwuegbuzie & Johnson, 2006). In their article “*Validity Issues in Mixed-Method,*” Johnson and Onwuegbuzie (2006) recommend a typology of legitimation forms that serves as a set of criteria researchers need to take into account when conducting mixed-method studies. In this study, I consider the following legitimation types:

*Sample integration* – concerning the relationship between the sampling design of the two sets of data (qualitative and quantitative) and the degree to which it produces quality meta-inferences. In this study, the same sample that was interviewed also complete the PAQLQ, and therefore, offers
a perfect match of the two data sets to maintain integration validity (Onwuegbuzie & Teddlie, 2003).

*Inside-Outside legitimation* – takes into account the degree to which the etic viewpoints those of the outsider observer - match those of the emic viewpoints - members of the studied group. To assure that my understanding and interpretation of the collected data reflects the perspectives of the interviewees, I shared via email or other means preferred by the participants a summary of my analysis findings and reports with participating adolescents to review, confirm, or provide any additional input or highlight biases they might identify in the summary. Members checking yielded a low response of one that could be alluded to the long time period of nine months between recruitment, data collection and analysis. The one participant that shared his feedback, was overall in agreement with key concepts however this specific student didn’t think that asthma affects his performance. He also thought that peers don’t show they thoughtful/care about his asthma. He is fortunate to be in one of the charter schools that offer make up sessions for students that misses school.

*Weakness minimization* – addresses the way that one study approach compensates for the weaknesses of the other approach. In the presented study, I believe that the PAQLQ provides a measure of the impact of asthma on the QOL in general (rather than in relation to school) of the participants and the limitations and constraints it poses in their life. These measures help in dividing the qualitative input into three groups of students - 1. Well controlled and less bothered by asthma, 2. Somewhat controlled and moderately bothered by asthma, and 3. Minimally/not controlled and highly bothered by asthma. Dividing/classifying participants’ insights into the three groups enabled me to assess how students’ perceptions on asthma-related educational disparities differed based on asthma control/status.
Multiple validities legitimation – assure that both qualitative and quantitative strategies separately meet research validity standards. To address this legitimation type, I took the steps needed to address validity issues, specifically related to the qualitative component as it is the more prominent element throughout the presented study.

This included addressing:

- Credibility- through triangulation of data from: a. adolescents with a variety of asthma-related asthma experiences (indicated through the PAQLQ), and b. capturing of insights on the topic from other key stakeholders.

- Dependability - through logging the study processes and keeping field notes and memos. Additionally, a detailed codebook was developed and adjusted by the two analysts to reduce the likelihood of misinterpretation of codes.

- Confirmability- by incorporating the assistance of a second analyst of the interviews and discussion sessions data. An intercoder reliability testing was conducted for coding, and summarization of findings were discussed to achieve an agreement among viewers.

- Transferability - by using thick and rich descriptions that allows applicability of study findings in similar contexts.

Political legitimation – relates to key stakeholders’ or other consumers’ value of the findings yielded by the mixed-method research. Two recommended strategies to address this legitimation is to collect perceptions on the studied topic and provide practical results that can be applied in the field (Johnson & Turner, 2003; Onwuegbuzie & Johnson, 2006). I believe that the planned discussion with key stakeholders from the Florida Asthma Coalition and other public entities meet both strategies and enhance the political legitimation.
Ethical Considerations

Ethical considerations were an absolute priority in this study as expected in all research. Because the study involves direct contact with human subjects, the research protocol was submitted for a review and approval by the University of South Florida Institutional Review Board (USF IRB).

Before the implementation of the study, potential participants and caregivers of participating adolescents were informed of the study purpose and details of the research activities entailed in the process. Given the age of participating adolescents, parents were required to sign an informed consent in addition to the assent forms the adolescent completed (Appendix B). Adult participants (mainly key stakeholders) signed their own consent forms (Appendix B). Participants’ confidentiality was assured, and materials were stored in a locked filing cabinet and password protected computers. Names and other identifying variables were kept separate from the actual research data. Furthermore, no information was used for purposes other than the current study. Participants’ permission was required in order to record interviews and discussion sessions. Adolescents received incentives for their participation and willingness to share valuable information and devote their time to participate in meetings. Efforts were made to select a diverse sample reflecting the varied population of students although this could not be fully controlled.

It is important to mention that participants in the study, specifically adolescents, were sharing personal experiences some of which were quite personal and therefore building rapport with participants was crucial for the collection of relevant insight while assuring their confidentiality. To the best of my understanding, the study did not pose any risk to the participants; however sharing private and sensitive information has the potential to increase
emotional discomfort. Beyond the potential risks of emotional unease and the discomfort of being identified, the literature identified multiple benefits for participants in qualitative research such as a platform to express their feelings, self-reflect and share experiences they wouldn’t share elsewhere and resulting in a sense of relief, and helping others living in a similar situations (Opsal et al., 2016; Wolgemuth et al., 2015). Throughout the interviews, I was careful to ensure that participants felt safe and comfortable sharing their thoughts and avoiding any discomfort. I also ensure participants recognized the potential benefits and they were fully aware they could withdraw from the interview at any time if they felt uncomfortable.

This chapter presented the research design, data collection strategies and data analysis approaches. Additionally, research integrity and human subject considerations were described. Chapter 4 will describe the results yielded by employing the research activities and approached described in this chapter.
CHAPTER 4 – RESULTS

The following chapter presents the results of the study correspondent to the research questions. For each of the phases, I first present the sample characteristics followed by a summary of the findings. Qualitative findings of both adolescents and key stakeholders shared thoughts and experiences (research questions 1 and 2) are displayed for each of the individual, interpersonal, organizational, and environmental tiers in line with the Social-Ecological Model (SEM). Then a summary of the quantitative measures is presented as a preparation for the joint display (research question 3) that exhibits the link between the qualitative themes and the level asthma severity as well as the quality of life (QOL – high, intermediate and low).

Phase 1

Research question 1

- What are the perceptions of adolescents with asthma regarding the influence of their medical condition on their academic achievement and school experiences?
  - Sub-question 1a. What are the roles of individual interpersonal, organizational, community and policy factors in educational disparities among adolescents with asthma?
  - Sub-question 1b. How can the individual, interpersonal, organizational, community and policy influencers affecting academic/school disparities among adolescents with asthma be overcome?
Sample Description

A total of 20 adolescents participated in the study, and the sample characteristics can be seen in Table 3. All the participants resided in the Tampa Bay area of Florida and were enrolled in either middle or high school. They were recruited through local pediatric pulmonology clinics, primary care clinics, social media (Facebook and Instagram), or USF listserv. In most cases, interview sessions took place at the participants’ pulmonology clinics, before or after their scheduled appointments. In some instances, interviews were completed at a location selected by the participants and/or their parents, such as the local library, the participant’s neighborhood clubhouse, the participant’s house, or the researcher’s office. The average age of the sample was 13.85 years of age, and the sex distribution indicated that there were 12 males and 8 females. Concerning school enrollment, 13 attended middle school and 7 attended high school at the time of the data collection, with a majority of 18 enrolled in public schools and an additional 2 in charter schools. None of the participants were enrolled in private schools. Regarding asthma status, 7 participants reported mild asthma, 7 reported moderate asthma, and the remaining 6 reported severe asthma. Most participants reported taking their asthma maintenance medication regularly (n = 15) or most of the time (n = 4). One participant indicated taking medication sometimes. Answers varied from 0 to 10 days as a response to the question, “How many days did you miss from school in the past month due to asthma?”

1 The demographic questionnaire intended to collect data about the average grade point average (GPA) of each participant; however, these data are not reported, as some participants were not able to provide this information, specifically those enrolled in middle school.
**Observation and Themes**

Based on the interview sessions and informed by the SEM, I recognized emerging themes by their repetition across multiple students. I highlighted additional themes due to their
prominence despite their relatively lower frequency. I present the themes in the paragraphs below in correspondence with the SEM (individual, interpersonal, organizational, environmental) tier they represent; for each theme I provided example quotes to illustrate and support the observations. The overarching themes encompass asthma knowledge and awareness, school performance and experiences, asthma control and prevention, triggers, social and educational support system, and suggested solutions.

Themes: Individual level

When discussing school success, overall, the students perceived accomplishment at school as achieving good grades—mainly As, although some were satisfied with Bs or any grade not lower than a C - *Passing grades with all A’s, B’s, making honor rolls and principal’s list. Going to the top because I don't want to be underestimated, because a lot of people underestimate me* (MS, Male, Mild_4). Another common response to this question was related to the ability to participate or excel in sports. Some indicated graduating high school and college as measures of success - *To achieve myself so that I can push myself to get the better grades, higher scores, and get to stay in school, get an education or a job, study about our wildlife’s situations and go to school and graduate from college and not go into poverty* (HS, Male, Severe_2). A few talked about broadening their career opportunities or realizing their dream job, while others mentioned the development of social interactions (e.g., having good friends) and personal standards (e.g., avoiding getting in trouble and keeping up with completing tasks as part of their school goals).

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2 Each quote indicates the students ID that provides whether they are enrolled in middle (MS) or high school (HS), their gender, and reported severity of asthma including their participant number.
Asthma, in the view of the students, had negative connotations, although the majority felt that asthma would not interfere with their school and academic goals if they work hard or “if they just put their mind to it.” As one student noted, *having asthma is not an excuse not to do my best.* Some acknowledged that asthma would not stand in the way of their school success “unless it’s off-balance.” When discussing how asthma makes them feel, words such as *annoyed,* *frustrated,* *aggravated,* *being mad,* *bother/interfere* (i.e., with their life), *tired,* and *setback* were noted. Many agreed that “asthma slows them down” and “gets in the way of some things”; however, they “try not to think about it.” Some mentioned that asthma makes them feel different or as if they are not a normal human being.

*Well, asthma is really annoying sometimes. I don’t know if I said this already, but it doesn’t allow me to do what I really want to do.*

*(MS, Male, Moderate _ 5)*

**Performance**

The students shared three themes that reflect their school performance: the ability to focus in class, attendance, and achievements.

**Ability to focus in class.** The students indicated a few challenges they experienced in their regular school day associated with asthma. Difficulty focusing in class was repeatedly mentioned by the students as compromising their ability to engage in classroom activity and with the material delivered. For some, this difficulty stemmed from handling asthma symptoms or side effects of the medication—specifically Albuterol, which can cause restlessness. Others expressed the concern that the potential for asthma episodes does not allow them the peace of mind to focus in class. Last, some mentioned being sleepy in class.
Sometimes when I have asthma and I’m sick I feel like clouded. I struggle to concentrate so I happen to be sitting there. (HS, Male, Mild_15)

Me personally, it bothers me because sometimes when I do take my medicine, I don’t know why, but it just makes me feel energetic. I’ll start looking around everywhere and just doing everything. It’s just weird. I don’t know why. (MS, Male, Mild_17)

I try to like read in my mind and read quietly, but I can’t because I’m coughing too much. It’s all because of my cough and I can’t answer this, I can’t read that, I can’t listen to what the teacher’s saying or if another person. (MS, Male, Moderate_11)

**Attendance: Missing days, presenteeism, and partial absenteeism.** School attendance was another hurdle for students with asthma. With frequent school absenteeism caused by asthma-related sick days at home or in the hospital, the students expressed difficulties catching up with the taught material. In addition to missing entire school days, students emphasized the concept of presenteeism, in which they miss parts of the school day due to frequently scheduled visits to their healthcare providers, school clinic visits to treat asthma episodes, tardiness caused by morning asthma regimen, or delays caused by asthma flare-ups. Some mentioned missing the first few minutes of class as a result of not being able to make the transfer from one classroom to another on time. Absenteeism not only affected participation in instruction time but also engagement in other school functions such as clubs, volunteering opportunities, and social events.

Well, sometimes in participating in activities. Sometimes, I have to miss some of it because of my asthma. Like soccer practice or sometimes classes in school, I have to miss it because sometimes my asthma bothers me a lot. So, I miss out on those. (MS, Male, Mild_17)
Achievement. Although only some students indicated a lower academic ability (i.e., suggesting that asthma holds them back in school), most students agreed that asthma poses challenges when it comes to physical activity and gym classes. They found it challenging to keep up with peers who are asthma free; most stated that they push themselves in order to avoid interrupting the sports activity and differentiating themselves from the rest of the class, a decision that might trigger an asthma flare-up.

*Asthma in my opinion is like holding me back from running more and being more energetic because that’s the only reason I get worried about because I do. I can’t run longer- run much more distances than other kids can.* (21. MS, Male, Moderate)

*Like if I go to like maybe sports activities, I have to go to the nurse before I go and take my inhaler. Then like I have to take breaks and sit out sometimes. I can't keep up with other students.* (MS, Female, Severe_18)

*I just kept going because we were about to win too, which that we did win, but I just wanted to keep going.* (MS, Male, Mild_17)

*Because I feel like I’m falling asleep in class, because I feel like tired from running around and everything, so I feel like that's why my grades are down. Because I would just sometimes fall asleep in class.* (MS, Female, Severe_8)
Themes: Interpersonal level

On the interpersonal level, the students discussed their relationships with four groups of people with whom they regularly interact: peers, educators, school nurses, and parents or other family members and caregivers. The themes observed at this level included social support, stigma, understanding and accommodating needs, knowledge and awareness, asthma underestimation, and asthma care and advocacy.

When asked about the school psychologist, the students could not recall having one in their school except for the guidance counselor, who mainly assists with academic planning. One student mentioned having one-on-one visits with a counselor and that he found it very helpful in overcoming emotional challenges. With respect to communication between the school, the healthcare providers, and the caregivers, the students agreed that this communication could improve and potentially advance their health and academic needs; however, they were not able to specify in what way this communication flow might benefit them or contribute to their academic success, or what strategies may yield more effective communication.

Social support

Care and social support were mentioned in relation to the students’ peer groups. Students expressed that the social support they receive from close friends is invaluable specifically, a few mentioned having close “buddies” that have asthma as well and who, therefore, understand what the students are experiencing and can provide relevant support. Peers offer help in prompting the students to take their medication, go to the nurse, or simply take a break and rest until their asthma gets better. Others offer assistance by updating them on assignments given in class or sharing the materials that were taught while the students were absent from school.
Sometimes whenever I try to jog with them while talking, it gets in the way because I have to stop sometimes to catch my breath but they, most of the time, understand it so they’ll stop with me for a little bit and then we can keep going. They try to encourage me. (MS, Female, Moderate_16)

He will walk with me just in case like if it was one of those days like I forgot my inhaler, he will be like, “I’ll walk with you just because you have an asthma attack.” (MS, Male, Severe_19)

Some of my friends do have asthma and they do know what I’m going through. So, they’re just trying their best and I feel like that’s really what I need. (MS, Male, Moderate_05)

They help me. Like I have friends they can – like I go to lunch tutoring and the teacher was giving me my make-up work and then there’s somebody that helps me understand it better (MS, Female, Mild_12)

**Stigma**

In contrast to the supportive and caring relationships exhibited by close friends, the students expressed different levels of social struggle when it came to the broader circle of schoolmates. They reported feeling that schoolmates outside of their immediate friend group might perceive them as different or unequal. To avoid these stigmas and the feeling of being an outsider, they preferred not to share their asthma status openly with their wider circle schoolmates. Some mentioned not being selected for sports games and others mentioned being stared at when asthma symptoms were noticeable. Overall, they disliked the special attention that asthma might draw to them. In extreme cases, students reported feeling bullied or picked on by others due to their asthma; for instance, one student shared that his inhaler was replaced by schoolmates as a prank.

*Not social, but at gym and stuff like that, they’ll leave you behind. They won’t play or anything …. Probably because I can’t keep up.*
(MS, Male, Mild _17)

I feel it sets me apart differently like I’m – this kid – there’s the popular kids, the quiet kids and then there’s me. I’m in the quiet kid group and I also have asthma, so I feel I distance away from that. (MS, Male, Moderate_21)

It makes me feel uncomfortable because I feel like I’m not a normal human being, but I could get through it. (MS, Female, Severe_8)

I was coughing so much that I didn’t want to cough at school and mess up everybody else’s learning because they couldn’t hear the teacher and that would be tough, because I’ve been coughing so loud over and over again… I felt like a bother… They don’t really react, other than look at me and sigh a couple of times. (MS, Male, Moderate_11)

The students expressed feeling uncomfortable taking out and using their inhaler while among schoolmates due to the attention it draws from others. Some stated that they ask to go to the restroom to use their inhaler to avoid the attention it would attract.

I remember one time I took it out and everybody started staring at me and asks, “Are you okay?” … Sitting in class. Everybody starts looking at me… I’m like “Can I get this over with?” I’m trying to breath this in, now I get all antsy… I try to do it when the teacher is talking so they won’t focus on me. (HS, Male, Severe_10)

Understanding and accommodating needs

Similar to the notion of care and social support, the students felt that teachers show empathy towards their health and educational needs. They did, however, recognize that teachers lack the time and resources to accommodate these needs and that they cannot stop the entire class to assist them. The students reported that their teachers do allow more time for them to work on and submit assignments. Insufficient recognition is given to students who need to receive more help with the material that was taught in class, although some students reported that their
teachers would suggest make-up or tutoring sessions during lunch breaks or after school hours. These accommodations are based on the availability and capacity of the specific educators and are not a structured system within the school setting. In some cases when the educators were not available to help with the instructed material, students would reach out to other students to seek help.

*For the classes, I really struggle to have an A in math and days that I would miss, my teacher would be so busy because she was the head of the math department then I would have to ask the smarter kids in the class for help.* (HS, Male, Mild_15)

*They can kind of better explain what they taught because sometimes it’s just like, “This is what it is, and there you go. Now you know what it is.” They need to kind of better explain it to me, so I’ll understand it more.* (MS, Female, Moderate_16)

*They know that I have asthma. So, if something happens, they’ll give me a couple of extra days and stuff like that to complete everything.* (MS, Male, Mild_17)

*the coaches are encouraging you. They know I have asthma, so they know my limits. If I don’t perform as good as other people, they understand what I’m going through, so they won’t get mad at me and all that.* (HS, Male, Severe_10)

Certain educators use the teaching platform like Blackboard or applications such as Edsby to communicate with students that miss school, checking how they are doing and providing them with materials and updates on class activity and assignments.

*I can ask them or they usually have stuff posted on Edsby or they have little like absent log or whatever. I can look at it and see what I missed.* (HS, Male, Severe_10)

*For Math, what just happened was I asked my Math teacher, maybe three times before - she gave me some of my work and then she gave some more of my work, and then on Edsby, where we can check our*
assignments before we turn it in, all of a sudden, a quiz, three popped up, and she never told me we had a quiz. It would have been very nice of her to tell me that there had been a quiz, but she never told me. I just took it and I did pretty well on it. (HS Female Severe_1)

Knowledge and awareness of asthma

Despite the care and support students mentioned receiving from peers, educators, and other school personnel, they found that knowledge about asthma and ways to treat it is rather limited among these groups. This can result in ineffective assistance being given to students during asthma events. Some educators are not aware of the students in the class who have asthma or other health conditions that might require extra attention.

I guess it should be like they should know about what asthma is just because it’s super common. Like protocol, I don’t need to know - dealing with the protocol, I’m aware of this, the inhaler. (HS, Male, Mild_15)

Yes. Just sit there. They don’t really understand that I need to go or else I could stop breathing. They usually never really understand that I have to go. Sometimes I tell them “I need to go, or I will stop breathing. (MS, Female, Moderate_16)

I feel like they know of us, but they don’t know really what’s going on with asthma and what to do. That’s the only thing they really know the asthma. (HS, Male, Severe_10)

Coaches, in contrast, are perceived as being more knowledgeable about asthma and other health conditions.

I think one of them has asthma and they follow what the coach is saying. I have a coach that’s – how to breathe and they all understand how to catch your breath. (HS, Male, Severe_10)

Well, not necessarily, because they don’t talk about asthma. The only one that really cares about asthma is the coach. (MS, Male, Mild_4)
Asthma underestimation

In various instances, students expressed that schoolmates, teachers, and other school personnel underestimate the severity of asthma and the implications it might have. A common way in which teachers offer help is to suggest that students experiencing an asthma episode rest at their seat until the asthma calms down—a solution that is unlikely to assist with treating asthma episodes. The students advised that this type of suggestion is a result of a lack of knowledge about asthma in general and treating asthma in particular. In extreme cases, the students felt they were being accused of using their asthma as an excuse to get away with neglecting academic and school-related responsibilities.

Like she sometimes just thinks that I’m using my asthma for an excuse to not be at class. (MS, Female, Severe_8)

Try to take them more seriously because sometimes it could be really serious. It would be very helpful if you would understand that asthma is something that isn’t really something to play around with, that you need to take it more seriously and then kind of like, “I’ll just go to the nurse.” (MS, Female, Moderate_16)

The teacher of the class I went to was just like, “Just sit in the back and sit down, (HS Female Severe_1)

Try not to make fun of the kid that has the asthma because if you make fun of them, and then they start breathing, some kids, they’ll be like, “Oh, stop playing around.” It’s not something to play round about asthma like if you say you’re having asthma attack, you’re probably going to have an asthma attack, because it’s not something that you joke around about. That’s not something funny that you need to play around about saying like, “Oh, I have an asthma attack,” but you really don’t. That’s not something to play around about. (MS, Female, Moderate_16)
Asthma care and advocacy

The students found the school nurse and their parents to be the most knowledgeable about asthma and their specific care plans. With respect to school nurses, students mentioned going to the clinic only when asthma flare-ups occurred or if they needed to get their inhaler (e.g., “She just helps, like she just gets my inhaler for when I need it” MS, Male, Moderate_14). Students with controlled asthma and those who carry their inhalers with them do not visit the clinic frequently, if at all. The nurse seldom provides the students with guidance during asthma events but instead offers a safe place where they can relax and recuperate from the asthma event before going back to class. The nurse is also the one to keep asthma-related paperwork on file and ensure these are updated annually. In some cases, the nurse provides encouragement and compassion; more proactive nurses play the role of an advocate for students with asthma to their teachers. Overall, the students seemed to think that the role of the school nurse is underutilized and that nurses can serve a key role in educating both them and school personnel and other students about asthma. Some students mentioned not having a certified nurse but rather a clinic aide on campus to be a limitation.

She’s [the nurse] helpful because she helps me with the breathing treatments and the pumps. She always reminds me how many to take, when to take them, and what time I need to take them. (MS, Male, Mild_17)

I do sometimes go up there and she does know what I’m going through, so she’ll just do her best and try to help me the best way that she can. (MS, Male, Moderate_5)

She knows when I'm like wheezing. There are sometimes that I can't feel it and she’d be like “You're wheezing. I think you need to use your inhaler.” I'm like, “Oh, okay.” (MS, female, Moderate_9)
I always have mine [inhaler] in my backpack ... I never really went up to them for asthma, so they never gave me nothing. HS, Male, Mild - 6

The caregivers, in the students’ opinion, are the ones who play a key role in advocating for their health and academic needs and who often serve as ambassadors who communicate with teachers and school nurses to convey any educational and health updates.

My mom will call and pick it up because my mom knows him and he’s a teacher assistant so if I’m in that class, he knows I’m in that class so he’ll get the work and give it to the office or just like to give it someone. (MS, Male, severe_19)

Helping me with homework and make-up work because sometimes I don’t go to lunch tutoring because sometimes, they can’t have lunch tutoring, so I have to take the make-up work home and my mom helps me. (MS, Female, Mild_12)

Some students viewed coaches to be another figure who understands health, asthma, and their specific limitations. These students believed that coaches would provide guidance when needed or assist during asthma events.

He[coach] makes sure that no one sprays anything, for example, like hairspray or anything like that that may be severe. (MS, Male, Mild_4)

The coaches are encouraging you. They know I have asthma, so they know my limits. If I don’t perform as good as other people, they understand what I’m going through, so they won’t get mad at better-controlled and all that. (HS, Male, Severe_10)

Themes: Organizational and environmental levels

Prioritization of asthma

Overall, the students reported a positive and supportive school culture for those with health-related conditions. However, they felt that asthma, as common as it is, is not prioritized at
the school level when compared to other health conditions or illnesses, such as diabetes, epilepsy, and mental health. In their opinion, schools do not perceive asthma to be a serious condition; they suggested that schools should put more effort into raising awareness and knowledge about asthma among both staff and students.

Like education like posters on the wall. They always have anti-bullying posters. They always have autism awareness posters for students... with asthma because asthma is wide, it’s more widespread than these other issues. (HS, Male, Mild_15)

The school doesn’t really focus that much on asthma (MS, Male, Moderate_21)

Students also expressed that schools lack a structured system to assist students who have missed school make up for the lost days. In addition to allowing more time to submit assignments, they expressed the need to have an option to get instruction time on the taught material.

Well, basically like extra help with the class work that you don’t understand and stuff. (MS, Female, Severe_18)

Try to understand that if they missed school, it could be because of their asthma. You kind of need to tell them what they missed. If they missed school because of their asthma, you need to tell them more about it than just saying, “This is what it is. This is why you need to know about it. Okay, now go about it.” You need to kind of explain to them more about the subject that they missed. (MS, Female, Moderate_16)

**Campus, allergens, and quality of air**

With respect to the built environment, some of the students who attended schools with large campuses expressed challenges in getting to class on time when transitioning from one end of campus to the other. They mentioned occasionally arriving short of breath or being late to
class. Additionally, the students talked about the quality of the indoor air, which can trigger their asthma. Classroom temperature and air conditioning settings seemed to affect the students; however, this factor varied between those for whom cold temperatures trigger their asthma and those who are mainly affected by warmer temperatures. Other triggers included classroom cleanliness—mainly, the accumulation of dust—and, in some cases, certain detergents that are used to clean the classrooms. Another aspect of indoor air is personal hygiene products, such as perfumes, Axe spray, and body mists. Students were concerned about triggering asthma flare-up when schoolmates use these products across the campus.

*That. Yes. Because I have my allergies, the severe allergies, that affects my asthma. If it’s cold, it’s going to be harder to breathe because of the cold air. (HS, Male, Severe_10)*

*Yes. If like someone comes in with a lot of perfume or something on I'll get mini contact with them and I'll start to feel my... (HS, Male, Severe_2)*

*I don’t like that sometimes I have to walk all the way across school. If I really don’t want to be late, I’ll maybe speed walk. That’s the most I’ll ever do. (HS, Male, Mild_7)*

Outdoor triggers such as pollen, humidity, blooms, and other seasonal allergens were mentioned in the context of the school campus and outdoor instruction sessions, as well as gym classes.

*I’m allergic to dust, so that brings on my – what’s it called? Allergies. The allergies sometimes can trigger asthma too, so basically, mostly dust. (MS, Male, Mild_17)*
Themes: Policy and community levels

Although not familiar with specific school-level or schoolboard policies, the students did recommend policies that might help advance their school experiences. These suggestions included having a full-time nurse on campus during school hours, granting students with asthma elevator privileges, and the ability to carry an inhaler with them without the requirement of having formal approval. Similar to school policies, the students were not knowledgeable enough to be able to speak about resources that should be available or that are necessary in the local/proximal community.

*I would allow them to have their own – their Symbicort and albuterol with them, and I’ll do everything I can to help them with their asthma.* (MS, Male, Moderate_14)

*I have a different type of permit that allows you to use your inhaler and carry it with you and use it on yourself. For all the other students who don’t have that, they have to go to this clinic to get it to give it to them. Sometimes if they’re having a flare-up and a severe one then they can’t breathe, that would be hard for them to get it when they’re on the other half of the school.* (HS, Male, Mild_15)

*For the nurses and the asthma people, I’ll probably hire real nurses. I would say either retired nurses that like just retired or nurses that like have time for another job so then in the school.* (MS, Male, Moderate_11)

*Probably get an expert or medical person to work inside the clinic because if they’re an expert, they’ll actually know what to do. Some teachers out there, especially the medics, they just take classes for the school or whatever, to help people with the medicine and stuff.* (MS, Male, Mild_17)
Themes: Suggested solutions

In response to the above concerns, the students suggested strategies through which academic challenges could be overcome. The recommendations varied from a better controlled asthma episode prevention mechanism—to allow students to fully engage in their school activities and meet their academic demands—to a better structured system that educators or the school at large could establish to assist students in making up for academic content that was taught while the students were absent. Asthma education was repeatedly mentioned as a strategy, to better inform teachers, school personnel, and schoolmates about asthma, its severity, and how to assist students who are struggling with asthma or experiencing asthma episodes at school.

Asthma education and awareness

As noted above, the students expressed concerns about the limited knowledge about asthma and treatment strategies among schoolmates and school personnel. In response to that, asthma education and awareness was mentioned across all SEM tiers: individual, interpersonal, and organizational. At the individual level, the students mentioned education—specifically, the learning self-management skills and counseling on coping mechanisms—to facilitate the prevention of asthma events and allow them to focus more on other aspects of life, including realizing their school goals.

*I’d say those that have more severe than others with asthma that’s like very severe. I think counseling should help because they could feel like everything’s falling in the back and they’ll never succeed at their goals. Counseling could help them increase for better chances of confidence, because they may miss all [opportunities] to take because they think, “I might have an asthma attack if I try this.” For example, you want to try out for the hockey team but it involves a lot of movement.* (MS, Male, Mild_4)

*She probably can talk to me or something. They might tell me what to do to calm down or something.* (MS, Female, Severe_18)
On the interpersonal level, the students stressed how essential it is for educators and other school personnel to be knowledgeable about asthma and receive training on asthma, its manifestation, and how to respond in emergencies. They highlighted that, as educators spend most of the day with their students, they should know who in their class has asthma (and other health conditions) so that they can know how to help these students in case of asthma events and absenteeism. They expressed that asthma training should be offered to other students as well.

_I guess it should be like they should know about what asthma is just because it’s super common. Like protocol, I don’t need to know - dealing with the protocol. Shouldn’t it be their responsibility? We can’t really say civic duty but duty to know that these conditions affect their students._ (HS, Male, Mild_15)

_Educators could influence that because they really are the ones that do watch you throughout their day and they are the ones who know you and how you feel. So, them knowing more about your condition and more about asthma in general could help the learning process._ (MS, Male, Moderate_5)

_They [teachers] need to understand that if I start having an asthma attack, that they need to start understanding that I have asthma. If I start having an asthma attack, they need to support me and that they need to tell me I need to go to the nurse or stuff like that._ (MS, Female, Moderate_16)

_They [other students] could have a medic class in there to tell them. So, if someone has an asthma attack for example, the kids, they’ll know what to do just in case no one’s around. That would be helpful._ (MS, Male, Mild_17)

At the organizational level, students suggested that schools should be more proactive in raising awareness about asthma and have a structured way to train school personnel and students
about asthma, asthma care, and ways to assist students with asthma. The students suggested the school nurse as a credible figure for facilitating asthma training and for conveying information to educators regarding specific students.

They [the school] can help somebody, make sure somebody is okay. Just like how people are taught CPR and all this to make sure, because you never know when it’s going to happen, and it can save lives the same thing with asthma. You could teach somebody or they have trouble breathing, you know what to do to make sure they’re breathing or when they have an asthma attack to help them out. (HS, Male, Severe_10)

She [the nurse] could probably teach kids about medical stuff... Just students in general. (MS, Male, Mild_17)

In addition to asthma education and awareness, the students posed further suggestions corresponding with each of the SEM tiers.

**Individual level: Suggested solutions.** On the individual level, students talked about self-regulation, asthma prevention, and the early detection of asthma episodes. The students recognized that having their asthma under control allows them the peace of mind to focus on schoolwork and other parts of life. As ways to control their asthma, they suggested having an accessible inhaler and taking their medication regularly, as prescribed. Additionally, they acknowledged that prevention and the detection of early signs of asthma would avert flare-ups, as would inhibiting pushing themselves too hard when those signs appear.

If you don’t take the medication, it’s not all the time, but you’ll start to have chest pain. You’ll be more worried about yourself instead of doing your work. (MS, Male, Mild_17)

I take medicine daily. I feel like it's pretty controlled, but sometimes, I might forget my medicine and I might be a little more short of
breath. It's like getting to class would be a little harder than other days that I have remembered – (HS Female Severe_1)

I never let it get to the point where I can't breathe. I always feel it before it heats up. (MS, female, Moderate_9)

**Interpersonal level: Suggested solutions.** On the interpersonal level, students made suggestions for the school nurse and educators. They thought that the nurse’s role is currently underutilized. Their recommendations focused on utilizing nurse time for more training and counseling about asthma, both for students with asthma and others in the school, such as faculty, staff, and other students.

*I know they can’t legally give other medication other than asthma. I think the nurses aren’t doing to the best of their ability of what they can do legally. (HS, Male, Mild_15)*

*She could probably teach kids about medical stuff... They could have a medic class in there to tell them. So, if someone has an asthma attack for example, the kids, they’ll know what to do just in case no one’s around. That would be helpful. (MS, Male, Mild_17)*

In relation to educators, the students suggested that they garner more ways to assist students during asthma events, provide social support, and establish strategies to help students catch up with curricula when they must miss school. First, the students believed it to be essential that educators identify the students in their class who have asthma (or other medical conditions), so that they will be aware of specific action plans and health and treatment needs. Students agreed that educators should encourage students to seek help from the nurse when experiencing asthma events rather than suggesting that they rest in class and wait until the asthma calms down. Additionally, the students thought that the simple gesture of asking them if they are all right or if they need anything might facilitate better asthma management.
What I think would be helpful is talking to the kid and asking them if they need help. If they need help with anything then they’re allowed to ask and yes. (MS, Male, Moderate_21)

I could have gotten myself to the nurse, but it would have been helpful if the teacher was like, “Let’s get you to a nurse.” I feel I could have been a little more helped to get there on my own. Not like helped by another student, but encouraged to go up to the nurse (HS Female Severe_1)

Maybe give the staff some more awareness saying like, “Hey, there are kids with asthma. Be cautious with them if they were to do something that would affect them.” Especially PE teachers, because the physical activity can agitate their asthma or anything. [HS, Male, Mild_7]

Suggested strategies through which educators can help students understand material and make up for missed work included providing printed material, holding one-on-one sessions, and recording instruction time. Alternatively, they suggested that educators communicate directly with the students or their caregivers to convey any assignments or updates from class.

Have a teacher record the lesson that they did in class. (HS, Female, Moderate_13)

Let me borrow stuff so I could pass stuff or give me the work that we did or homework. Especially give me homework, so if I didn’t do the work on class, I could do homework so I could put up that grade that I missed. (MS, Female, Severe_8)

I think contacting my parents. Just letting them know what happened throughout the day, like especially when I do have my asthma attack. Just letting them know that I did have one and they may need to help me a bit more. (MS, Male, Moderate_5)

Other ways educators can improve is to provide moral support to students by bolstering their motivation and self-efficacy, encouraging them, and telling them that they are indeed able to overcome the educational, social, and mental challenges they are facing. The students also
mentioned that they would appreciate more psychosocial support by having teachers show that they care about their students’ health and wellbeing; they wanted their teachers to verify with them whether they are doing all right or need any assistance.

That’s like I want people like push me to do better. They tell me I can do better than this, “Please, you could do better.” (HS, Male, Severe_10)

Moral support, I guess. “Yes, you got this. You can get an A. You can do good on this test and pass.” (MS, Male, Moderate_21)

**Organizational and environmental levels: Suggested solutions.** With reference to the indoor environment, the students mentioned increasing the standards for classroom and school cleanliness as well as enforcing policies prohibiting the use of known triggers such as perfumes, sprays, and certain detergents. They also expressed the need to compromise on a room temperature that is comfortable to all and that will not result in the triggering of asthma.

Try to wipe down on the surfaces before you leave because dust collects over time. Then it kind of blows around the room and it can irritate some people. Try to wipe down stuff and get rid of all the - try to wipe down the hard surfaces and stuff that might collect dust in the classrooms so that it doesn’t irritate some people. (MS, Female, Moderate_16)

Definitely make sure that they clean it, especially the dust because that can trigger a lot of things for people with asthma and allergies. Make sure that they change the floor and the walls because the walls can be dirty and have germs on it that make people sick sometimes. (MS, Male, Mild_17)

I will change that to milder temperatures for everybody. (MS, Male, Mild_4)

The kids who want to spray cologne or wear perfume and all those and certain people can’t be around them, have them in one
and then have other kids walk around and have that. (HS, Male, Severe_2)

The students further recommended holding certain activities indoors so that students with asthma will be able to attend without compromising their asthma control.

*I would like if the pollens are high outside, just in case, keep the asthma students inside and they can do something inside like kickball, basketball, or volleyball. (03)*

*Make us all kids don’t have to go outside. Have all the classrooms inside because of allergies. 13*

Among other recommendations, the students emphasized the need to establish a system to assist students with asthma in making up for missed days and understanding the material that was taught. This would help them stay on top of their academic progress. Some referred to having an expert in the school, similar to a case manager, who can assist them with both health and educational needs.

*Try to understand that if they missed school, it could be because of their asthma. You kind of need to tell them what they missed. If they missed school because of their asthma, you need to tell them more about it than just saying, “This is what it is. This is why you need to know about it. Okay, now go about it.” You need to kind of explain to them more about the subject that they missed. (MS, Female, Moderate_16)*

*They can probably get some experts out there too to try to help the kids understand more because sometimes in class, kids don’t really fully understand it, but if we have experts, we can have them try to get the kids to better understand it in their type of way. (MS, Male, Mild_17)*
like afterschool help with like tutor - like a tutor that could help...
Yes, like - well, basically like extra help with the class work that you
don’t understand and stuff. (MS, Female, Severe_18)

If there’s that one specific person that has really bad asthma, just
have a person to constantly check on them and be like, “Are you
okay. Do you need to come in to get a breathing treatment?” I can't
think of any rules, necessarily, but just that one person that can just
come in – just add extra support (MS, female, Moderate_9)

**Policy level: Suggested solutions.** As mentioned earlier, the policy suggestions revolved
around access to school nurse, transition time between classes, and elevator privileges. The
students believed that it is essential to have a “real nurse” (as opposed to a clinic aide) on campus
at all times who is available to assist them during asthma incidences.

*For the nurses and the asthma people, I’ll probably hire real nurses.*
*I would say either retired nurses that like just retired or nurses that
like have time for another job so then in the school. (MS, Male,
Moderate_11)*

Some students stated that moving around campus and climbing up the stairs triggers their
asthma and often causes them to be late to class. To avoid this, they recommended allowing the
use of elevator pass for students with asthma and allowing more time for them to transfer from
one class to another, especially in large, sprawling campuses.

*I would want to know if your child had asthma, so that if they had
more severe asthma, I would let them use the elevator because we
do have elevator. (MS, Female, Moderate_16)*

*I think that again, longer switching times and what else? Elevators
for kids who have problems breathing, walking up. Who have
problems really like asthma because we have lung intolerability so
you have to walk up two flights of stairs and it gets tiring for some
people. The fact that they’re really crowded, some kids should be
allowed to use elevators if they need to. (MS, Male, Moderate_21)*
Last, the students suggested that schools be more flexible about students carrying their inhalers. Having an accessible inhaler was perceived as useful in order to avoid the worsening of asthma when early symptoms appear.

*I would make sure that the students especially with worst asthma know that the nurses can help them. I’d also remove restrictions like the only way you can administer your inhaler on yourself is if you have that permit. I would take that off. (MS, Male, Moderate_21)*

**Quality of Life (QOL) Score Distribution**

To answer the third research question (i.e., “How do students with varying levels of QOL [poor, intermediate, and high] describe their academic achievement and school experiences?”), the data were first analyzed quantitatively to understand the distribution of QOL levels for the entire scale and the subscales (i.e., symptoms, activity, and emotional functioning) individually and across students.

Table 4 displays the score for the total QOL scale, and its subscales based on reported asthma status for each participant and as a mean for each group of asthma status (i.e., severe, moderate, and mild). None of the group means indicated low QOL scores (< 3). The students who reported having severe asthma indicated mean QOL scores that are classified as intermediate (3–4.99), although some of the individual scores were lower (1–2.99). Those who reported mild and moderate asthma statuses showed mean QOL scores that are classified as high (5–6.99), except for the mean score in the activity domain of the group with mild asthma (4.94). The individuals’ mean scores in these two groups corresponded with intermediate and high QOL categories. Across the three groups, the emotional functioning subscale was relatively higher than it was for other scores, and this difference was more noticeable in the severe asthma group. The mean differences are illustrated in Figure 6.
According to the total, the activity and the symptoms subscales QOL scores—only two of the six severe asthma students are classified as having a low QOL score. While only students who reported severe asthma were classified as having a low QOL, those classified as having an intermediate QOL could fall under any of the asthma statuses—mild, moderate, or severe. It is safe to say that, for the study sample, the asthma QOL classifications were only partially related to the reported asthma status; hence, is not shown to be a perfect indicator.

Table 4. Quality of life score by reported asthma severity/status

<table>
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<tr>
<th>Participant ID</th>
<th>Asthma Status</th>
<th>Symptoms domain</th>
<th>Symptoms Level</th>
<th>Activity Domain</th>
<th>Activity Level</th>
<th>Emotional domain</th>
<th>Emotional Level</th>
<th>Total Score</th>
<th>Total Level</th>
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<td></td>
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When reviewing the mean number of missed days from school (Figure 7), we can see an increase of absenteeism as the asthma status worsens. While the mild asthma group reported, on average, one absence in the past month, those in the moderate and severe asthma groups indicated an average of three (+) and six missed days of school, respectively. Similar patterns can be seen for the Total QOL category: the lower QOL category was, the more days of missed school were reported.

Figure 6. Mean Quality of Life scores by reported asthma status.
Mixed-Methods Analysis

Two steps took place in the mixed-method analysis. First, the existence of themes for each participant were checked by running a code matrix analysis in MAXQDA. Students were scored a 1 if a theme/code was mentioned by them and 0 if the theme/code was not stated. Then, the scores were summed for each of the three categories based on asthma status, by total QOL level (which is almost identical to the symptoms QOL categories), and by activity QOL level (data are presented in tables 5–7). The data were reviewed for patterns across codes/themes according to the different categories. In the next step, a quote matrix function was run in MAXQDA to review the theme narrative (quotes) for the three QOL categories and to explore the similarities, differences, and patterns in the way students from the different categories perceived school and academic experiences. For this analysis, only the quotes, categorized by the total QOL scores, were used.
For the individual level, Table 5 shows that occurrence of performance mentioned by students of all asthma severity levels. Attendance, and catching up with material were mentioned more among those who reported severe asthma. However, difficulty focusing in class was stated more often by students who reported moderate and mild asthma. Interestingly, more mild and severe asthma students compared to severe asthma students reported difficulty in PE performance. Similar patterns are seen when looking at different categories of total QOL score and activity QOL score. As for interpersonal level themes (Table 6), students who reported a severe asthma status were more likely than those who reported moderate and mild asthma to mention the following: 1) being accused of using their asthma as an excuse to get away with neglecting school responsibilities, 2) that asthma’s potential severity is often underestimated; and, 3) social challenge, however, they also tended to mention more social support more often, as well as the fact that educators are thoughtful about their condition. Patterns were less evident when students were classified according to QOL scores.

For the organizational, policy, and environmental levels (Table 7), students who reported moderate asthma were the ones to mention classrooms cleanliness more often, those with mild asthma talked more about the need for inhaler policies, while those with severe asthma talked more about nurse policies. Once again, patterns were less apparent for the different QOL categories. Interestingly, the students with low activity QOL scores did not discuss nurse or inhaler policies. Overall, whereas themes’ occurrences were related to reported asthma status, similar patterns were not clearly observed for the varying QOL categories.
Table 5. Individual level themes occurrence (n and %) by asthma status and QOL category

<table>
<thead>
<tr>
<th>Reported asthma status</th>
<th>N</th>
<th>Performance Difficulty to focus</th>
<th>Feeling Tired</th>
<th>PE related performance</th>
<th>Attendance</th>
<th>Catching up</th>
<th>Social Challenge</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Asthma severity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>7</td>
<td>7(100%)</td>
<td>6(86%)</td>
<td>2(29%)</td>
<td>4(57%)</td>
<td>3(43%)</td>
<td>2(29%)</td>
</tr>
<tr>
<td>Moderate</td>
<td>7</td>
<td>7(100%)</td>
<td>6(86%)</td>
<td>3(43%)</td>
<td>4(57%)</td>
<td>5(71%)</td>
<td>2(29%)</td>
</tr>
<tr>
<td>Severe</td>
<td>6</td>
<td>6(100%)</td>
<td>3(50%)</td>
<td>2(33%)</td>
<td>1(17%)</td>
<td>6(100%)</td>
<td>5(83%)</td>
</tr>
<tr>
<td><strong>Total QOL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>10</td>
<td>10(100%)</td>
<td>9(90%)</td>
<td>3(30%)</td>
<td>5(50%)</td>
<td>5(50%)</td>
<td>2(20%)</td>
</tr>
<tr>
<td>Intermediate</td>
<td>8</td>
<td>8(100%)</td>
<td>5(63%)</td>
<td>2(25%)</td>
<td>3(36%)</td>
<td>7(88%)</td>
<td>5(63%)</td>
</tr>
<tr>
<td>Low</td>
<td>2</td>
<td>2(100%)</td>
<td>1(50%)</td>
<td>2(100%)</td>
<td>1(50%)</td>
<td>2(100%)</td>
<td>2(100%)</td>
</tr>
<tr>
<td><strong>QOL Activity</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>8</td>
<td>8(100%)</td>
<td>7(88%)</td>
<td>3(36%)</td>
<td>5(63%)</td>
<td>3(36%)</td>
<td>1(13%)</td>
</tr>
<tr>
<td>Intermediate</td>
<td>10</td>
<td>10(100%)</td>
<td>7(70%)</td>
<td>3(30%)</td>
<td>9(90%)</td>
<td>7(70%)</td>
<td>7(70%)</td>
</tr>
<tr>
<td>Low</td>
<td>2</td>
<td>2(100%)</td>
<td>1(50%)</td>
<td>1(50%)</td>
<td>1(50%)</td>
<td>2(100%)</td>
<td>1(50%)</td>
</tr>
</tbody>
</table>

Table 6. Interpersonal level themes occurrence (n and %) by asthma status and QOL category

<table>
<thead>
<tr>
<th>Reported asthma status</th>
<th>N</th>
<th>Being accused</th>
<th>Asthma effect underrated</th>
<th>Social support</th>
<th>Educator Understanding</th>
<th>Hiding asthma</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Asthma severity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>7</td>
<td>0(0%)</td>
<td>1(14%)</td>
<td>1(14%)</td>
<td>4(57%)</td>
<td>2(29%)</td>
</tr>
<tr>
<td>Moderate</td>
<td>7</td>
<td>4(57%)</td>
<td>1(14%)</td>
<td>4(57%)</td>
<td>4(57%)</td>
<td>1(14%)</td>
</tr>
<tr>
<td>Severe</td>
<td>6</td>
<td>3(50%)</td>
<td>3(50%)</td>
<td>4(67%)</td>
<td>6(100%)</td>
<td>1(17%)</td>
</tr>
<tr>
<td><strong>Total QOL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>10</td>
<td>3(30%)</td>
<td>2(20%)</td>
<td>4(40%)</td>
<td>6(60%)</td>
<td>2(20%)</td>
</tr>
<tr>
<td>Intermediate</td>
<td>8</td>
<td>3(38%)</td>
<td>2(25%)</td>
<td>4(50%)</td>
<td>6(75%)</td>
<td>1(13%)</td>
</tr>
<tr>
<td>Low</td>
<td>2</td>
<td>1(50%)</td>
<td>1(50%)</td>
<td>1(50%)</td>
<td>2(100%)</td>
<td>1(50%)</td>
</tr>
<tr>
<td><strong>QOL Activity</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>8</td>
<td>3(38%)</td>
<td>2(25%)</td>
<td>4(50%)</td>
<td>5(63%)</td>
<td>2(25%)</td>
</tr>
<tr>
<td>Intermediate</td>
<td>10</td>
<td>4(40%)</td>
<td>3(30%)</td>
<td>3(30%)</td>
<td>7(70%)</td>
<td>1(10%)</td>
</tr>
<tr>
<td>Low</td>
<td>2</td>
<td>0(0%)</td>
<td>0(0%)</td>
<td>2(100%)</td>
<td>2(100%)</td>
<td>1(50%)</td>
</tr>
</tbody>
</table>
Table 7. Organizational and environmental level themes occurrence (n and %) by asthma status and QOL category

<table>
<thead>
<tr>
<th>Reported asthma status</th>
<th>N</th>
<th>Inhaler policy</th>
<th>Nurse policy</th>
<th>Moving around campus</th>
<th>Classrooms Cleanliness</th>
<th>Environmental allergens</th>
<th>School culture support</th>
<th>Tutoring &amp; make up sessions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asthma severity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>7</td>
<td>4(57%)</td>
<td>1(14%)</td>
<td>3(43%)</td>
<td>1(14%)</td>
<td>5(71%)</td>
<td>6(86%)</td>
<td>2(29%)</td>
</tr>
<tr>
<td>Moderate</td>
<td>7</td>
<td>3(43%)</td>
<td>2(29%)</td>
<td>3(43%)</td>
<td>3(43%)</td>
<td>4(57%)</td>
<td>6(86%)</td>
<td>4(57%)</td>
</tr>
<tr>
<td>Severe</td>
<td>6</td>
<td>1(17%)</td>
<td>2(33%)</td>
<td>2(33%)</td>
<td>1(17%)</td>
<td>4(67%)</td>
<td>4(67%)</td>
<td>2(33%)</td>
</tr>
<tr>
<td>Total QOL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>10</td>
<td>4(40%)</td>
<td>2(20%)</td>
<td>4(40%)</td>
<td>4(40%)</td>
<td>6(60%)</td>
<td>10(100%)</td>
<td>5(50%)</td>
</tr>
<tr>
<td>Intermediate</td>
<td>8</td>
<td>3(38%)</td>
<td>2(25%)</td>
<td>3(38%)</td>
<td>0(0%)</td>
<td>6(75%)</td>
<td>5(63%)</td>
<td>2(25%)</td>
</tr>
<tr>
<td>Low</td>
<td>2</td>
<td>1(50%)</td>
<td>1(50%)</td>
<td>1(50%)</td>
<td>1(50%)</td>
<td>1(50%)</td>
<td>1(50%)</td>
<td>1(50%)</td>
</tr>
<tr>
<td>QOL Activity</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>8</td>
<td>4(50%)</td>
<td>2(25%)</td>
<td>4(50%)</td>
<td>3(38%)</td>
<td>5(63%)</td>
<td>8(100%)</td>
<td>3(38%)</td>
</tr>
<tr>
<td>Intermediate</td>
<td>10</td>
<td>4(40%)</td>
<td>3(30%)</td>
<td>3(30%)</td>
<td>1(10%)</td>
<td>7(70%)</td>
<td>6(60%)</td>
<td>4(40%)</td>
</tr>
<tr>
<td>Low</td>
<td>2</td>
<td>0(0%)</td>
<td>0(0%)</td>
<td>1(50%)</td>
<td>1(50%)</td>
<td>1(50%)</td>
<td>2(100%)</td>
<td>1(50%)</td>
</tr>
</tbody>
</table>

Tables 8-10 present quotes in support of the various themes observed in the varying total QOL categories. When looking at the shared experience narrative, some differences in perspectives were noticed. With regard to focusing in class, students with lower QOL scores talked more specifically about the fear of a potential asthma event and how they would manage it as a main source of concern. Although most students talked about feeling tired or sleepy in class, those with low QOL scores made a direct connection between these feelings and asthma control/status. Students of all QOL categories showed concern about missing days of school—or even parts of school days—due to asthma events, with a main concern surrounding the need to catch up on missed materials and assignments. Students also linked absenteeism with achieving lower grades. Students of all QOL scores attributed compromised grades, lower engagement levels in gym classes or sports, and lower academic achievement to asthma, primarily when asthma is not controlled.
For interpersonal themes (Table 9), students in all QOL categories expressed that educators underestimate the seriousness of asthma and how it can affect the students’ engagement. Whereas all groups expressed some level of doubt about using asthma as an excuse, those who reported severe asthma described incidents where school personnel or teachers assumed they were—and even accused them of—taking advantage of the situation for a particular personal benefit (e.g., not going to class). No particular patterns were noticed in relation to the way students described their educators’ understanding and accommodation of their educational needs. Most talked about their teachers sharing the material they missed and trying to answer questions or provide clarification to the best of their capacity. In reference to the disclosure of their asthma to their broader circle of schoolmates, students of all categories preferred not to share their status. Two students in the intermediate QOL category mentioned bullying as a matter related to social interaction at school. When talking about the school culture (Table 10), students’ viewpoints varied; however, in general, they thought that, although the school understands their condition, it does not have special accommodations to better their academic experience.

**Table 8.** Joint-display of the qualitative and quantitative data - Individual level

<table>
<thead>
<tr>
<th>Theme</th>
<th>QOL</th>
<th>Quotes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Performance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>FOCUS</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Low | Well, it’s different because I want to not think of class. I want to think how I will get home and control the asthma. It’s difficult because I will lose learning on asthma. **MS, Female, Severe – 8**  
Because I would think on how to control it and what I would do if I had to go to the hospital. I will lose days of class and stuff like that. **MS, Female, Severe – 18** | |
| High | Me personally, it bothers me because sometimes when I do take my medicine, I don’t know why, but it just makes me feel energetic. I’ll start looking around everywhere and just doing everything. It’s just weird. I don’t know why.  **MS, Male, Mild - 17**  
I take a lot of time to focus and stuff. I take longer than most kids. **HS, Male, Mild - 6** | |
| Intermediate | Sometimes I just won’t focus as I normally would so basically, I just won’t focus.  
**MS, Female, Moderate - 16**  
I just don’t pay attention. I just go to sleep. **HS, Female, Moderate - 13** | |
<table>
<thead>
<tr>
<th>Table 8 (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FEELING TIRED</strong></td>
</tr>
<tr>
<td>Low</td>
</tr>
<tr>
<td>Because I feel like I’m falling asleep in class, because I feel like tired from running around and everything, so I feel like that's why my grades are down. Because I would just sometimes fell asleep in class. <em>MS, Female, Severe - 8</em></td>
</tr>
<tr>
<td>Sometimes like I'm sleepy or not feeling good. So, I just lay my head down or something. <em>MS, Female, Severe - 18</em></td>
</tr>
<tr>
<td>High</td>
</tr>
<tr>
<td>Sometimes I just get really tired and wanted to sleep. <em>MS, Male, Moderate – 14</em></td>
</tr>
<tr>
<td>Intermediate</td>
</tr>
<tr>
<td>I just don’t pay attention. I just go to sleep. <em>HS, Female, Moderate - 13</em></td>
</tr>
<tr>
<td><strong>ABSENTEEISM &amp; PRESENTEEISM</strong></td>
</tr>
<tr>
<td>Low</td>
</tr>
<tr>
<td>So when I have to miss like some of my classes and stay home from school, it makes it hard for me to make it go work, and if I can't do it all the time, I get a bad grade. <em>MS, Female, Severe - 18</em></td>
</tr>
<tr>
<td>It could get hard because when you got the asthma attack, you don’t want to be absent. <em>MS, Female, Severe – 8</em></td>
</tr>
<tr>
<td>High</td>
</tr>
<tr>
<td>Yes, actually. Like I said before, you’ve got to catch up on stuff because you miss stuff. Sometimes, you’ll even be behind especially when I have to go home because I did not a whole bunch of class, the classes that I missed. I have to get the work, and then I have to catch back up on it in just a couple of days. <em>MS, Male, Mild - 17</em></td>
</tr>
<tr>
<td>Intermediate</td>
</tr>
<tr>
<td>Sometimes if I get sick like in bad timing, I’ll have to miss tests and make them up or I’ll miss assignments and then that will affect my grades. <em>HS, Male, Mild - 15</em></td>
</tr>
<tr>
<td>I want to go to the nurse but I’ve got to stop everything. I want to make sure I’m all right before anything else. <em>HS, Male, Severe - 10</em></td>
</tr>
<tr>
<td>If I’m in a hospital for a long time, messing with my grades because I’m not there so I can’t like do so it would drop my grade. <em>MS, Male, Severe – 19</em></td>
</tr>
<tr>
<td>I missed school for a week due to getting sick with something, asthma related. I wasn't able to be there for a week and I missed a week of classes. <em>HS Female Severe - 1</em></td>
</tr>
<tr>
<td><strong>ACHIEVEMENT</strong></td>
</tr>
<tr>
<td>Low</td>
</tr>
<tr>
<td>Like I can't do some stuff like other students because of my asthma…. Uhm, sometimes it’s too stressful so I just don’t do it. <em>MS, Female, Severe – 18</em></td>
</tr>
<tr>
<td>Sometimes when you got asthma or you got the problems, the asthma attack, it could get really hard for asthma. <em>MS, Female, Severe – 8</em></td>
</tr>
<tr>
<td>High</td>
</tr>
<tr>
<td>Asthma in my opinion is like holding me back from running more and being more energetic because that’s the only reason I get worried about because I do. I can’t run longer– run much more distances than other kids can. <em>MS, Male, Moderate 21</em></td>
</tr>
<tr>
<td>Intermediate</td>
</tr>
<tr>
<td>No, it doesn’t affect that and kind of test stuff. <em>MS, Male, Moderate - 14</em></td>
</tr>
<tr>
<td>I feel like it doesn’t really bother me because I’m just going to push through with it. Whatever happens, I’m just going to go past it and feel better and all that. <em>HS, Male, Severe - 10</em></td>
</tr>
<tr>
<td>Sometimes if I get sick like in bad timing, I’ll have to miss tests and make them up or I’ll miss assignments and then that will affect my grades. <em>HS, Male, Mild - 15</em></td>
</tr>
<tr>
<td><strong>Table 8 (continued)</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>ASTHMA REGULATION</strong></td>
</tr>
</tbody>
</table>

| **Table 9. Joint-display of the qualitative and quantitative data – interpersonal level** | **Theme** | **QOL** | **Quotes** |
| | **Low** | Like she sometimes just thinks that I’m using my asthma for an excuse to not be at class. *MS, Female, Severe - 8* |
| ACCUSE | **High** | If you miss class and you don’t have a pass then they start getting questionable like asking if, “Why are you late?” *MS, Male, Moderate - 21* |
| | **Intermediate** | She would get mad at me and always send me out of the classroom and to the principal’s office. *MS, Male, Moderate – 14* |
| | | I feel like teachers - it depends because - I’ll go back to the time I had an asthma attack and I just sat in the middle of - I sat near a pole, but still the teacher yelled at me to get to class. I feel like the teacher could have done a little more like walked up to me, not like in the motherly way like, "Hey, Sweetie. Are you okay? What's going on?" but more of a, "What's going on? Are you okay? What's happening?" They care on what happened. *HS Female Severe – 1* |
| ASTHMA UNDERRATE | **Low** | It could get hard because the teacher sometimes, they would just be like, “Hurry out to class, don’t be late and if not you’re going to get in trouble. *MS, Female, Severe – 8* |
| | **High** | Yes. Just sit there. They don’t really understand that I need to go or else I could stop breathing. They usually never really understand that I have to go. Sometimes I tell them “I need to go or I will stop breathing. *MS, Female, Moderate – 16* |
| | **Intermediate** | I feel like they just go, "Go by yourself to the nurse." What if the kid can’t breathe and passes out in the middle of the hallway? Some kid could come by and see them and be like, “Oh, push him off the side of the rails,” like I don't know. That’s pretty unrealistic. *HS Female Severe – 1* |
| SOCIAL SUPPORT | **Low** | They [ nurse and teachers] might tell me what to do to calm down or something. *MS, Female, Severe – 18* |
| | | I’m good at like not showing myself, like my - the people who know. Like I would say - I would say my asthma is working up but you wouldn’t know it, like you have to know me really, really well for you to know. *MS, Female, Severe – 18* |
### Table 9 (Continued)

| SOCIAL SUPPORT | High | He[coach] makes sure that no one sprays anything, for example, like hairspray or anything like that that may be severe. *MS, Male, Mild - 4*  
I feel like they really do help me with my struggles with asthma. They provide assistance and I feel like that’s really helpful. *MS, Male, Moderate - 5*  

| Intermediate | That’s like I want people like push me to do better. They tell me I can do better than this, “Please, you could do better.” *HS, Male, Severe - 10*  
He’ll be like, “Brandon, are you okay? Are you okay?” I’m like, “I’m having an asthma attack.” He’ll be like tell the teacher. He said he would tell the teacher himself. He’ll be like, “Can I tell [Unintelligible], the nurse?” and he’s like the only person I know who’s like when I’m about to have an asthma attack… *MS, Male, Severe - 19*  

| Low | There’s like they got the other students to teach. They just can’t stop their lesson to come and help me. *MS, Female, Severe – 8*  
I might go to the teacher but if I’m not – if I'm still not understanding it, I’ll just not do it. *MS, Female, Severe – 18*  

| High | So sometimes we have to go ask them classmates] before we ask the teacher. They don’t know that I go ask the teacher but if they think that they can help me, then they will help me with it. *MS, Female, Moderate - 16*  
After class, we have this thing called “Sail.” Basically what it is, if you need help catching up on work and something, then they’ll sign your paper or whatever, and then you can go to their class. They’ll help you out and catch up on stuff. That’s pretty much what it is. *MS, Male, Mild - 17*  

| Intermediate | For the classes, I really struggle to have an A in math and days that I would miss, my teacher would be so busy because she was the head of the math department then I would have to ask the smarter kids in the class for help. *HS, Male, Mild - 15*  

| Low | Yes, but they don’t give me it [extra time]. They just be like, “Get to class early”. *MS, Female, Severe – 8*  
They just give me the exams and they would just say, “Take it,” or they just will tell me to study from the week. *MS, Female, Severe – 8*  

| High | I’ll just ask the teacher, and the teacher will give me the work that I missed, and will tell me what I missed. *MS, Female, Moderate - 16*  
they know that I have asthma. So if something happens, they’ll give me a couple of extra days and stuff like that to complete everything. *MS, Male, Mild - 17*  

| Intermediate | Yes, I ask the teachers and they help me a little bit on it or they’ll just – it doesn’t give me – they’ll just put an X in the grade book and that won’t help me or hurt me in the grades. *MS, Male, Moderate – 14*  
My teachers were pretty good about giving you work that you missed and it’s like if you need to go to the nurse, they wouldn’t question you. They will just let you go. *HS, Male, Mild - 15*  

| Low | I don’t like those kids to really find out about my asthma like that. *MS, Female, Severe - 18*  

| High | Yes. I don’t really say that I have asthma. *HS, Male, Mild - 6*  

Phase 2

This section summarizes the insights captured through discussions with key stakeholders in response to research question 2.

Research question 2

- What are the perceptions of key stakeholders regarding the influence of adolescent asthma on academic achievement and school experiences?
Sub-question 2a. What are the roles of individual interpersonal, organizational, community and policy factors in educational disparities among adolescents with asthma?

Sub-question 2b. How can the individual, interpersonal, organizational, community and policy influencers affecting academic/school disparities among adolescents with asthma be overcome?

**Qualitative Stakeholders’ Perspective/Insights**

The stakeholder sample comprised 10 individuals who had direct interaction with the focal population: adolescents with asthma; the sample included healthcare providers (n = 3), school nurses (n = 4), a parent, a representative of the Florida Asthma Program, and an educator. Discussion sessions were done individually with each stakeholder. All sessions except one took place via phone or an online audio platform. The sessions were audio-recorded and transcribed. During the sessions, the stakeholders were introduced to the themes and insights that were gathered during the interviews with adolescent participants. They then provided their own insights into the adolescents’ themes, added their perspective on the topic, and shared strategies they use or propose to address some of the issues that were discussed. Overall, the stakeholders validated the ideas, themes, and challenges that the students shared; they further shared additional thoughts on the topic of adolescent asthma and school life that represented their unique perspectives on the topic.
Shared thoughts on adolescents’ insights

In response to the viewpoints shared by the student participants, the stakeholders provided their perspective on the following themes: asthma knowledge, environmental and policy factors, attitude towards asthma as exhibited by schoolmates and personnel, overall school culture toward asthma, academic performance, and accommodations provided to address educational needs.

All levels: Knowledge and education

Similar to the adolescent participants, knowledge of asthma and asthma care was mentioned repeatedly by the stakeholders. They, too, indicated that knowledge is relevant across all SEM tiers. In contrast to the students, the stakeholders emphasized the importance of knowledge about asthma and self-management among the students with asthma themselves. Patient education that includes the caregivers also was perceived as crucial for achieving asthma control and as an additional preventative measure. Once again, the school nurse was suggested as a credible figure to facilitate asthma education to students with asthma. The stakeholders further suggested online sources and the involvement of after-school activity personnel as another source of education for adolescents with asthma and their caregivers.

The more education you have, hopefully, the better - the less exacerbation you’re going to have that’s going to affect all the things you just spoke about. That’s the one thing that I would really hope that would be able to affect. There needs to be a lot more in terms of education for these kids. A lot of them just don’t know. It’s not that they aren’t willing to do it. It’s just that they just don’t understand it. They just don’t know. (Pediatric Pulmonary Nurse Practitioner,1)

I mean, I think that it all comes down to education of health because if we're doing our preventative measures to try to keep our asthma
attacks down and we're keeping ourselves healthy. No asthma is it a hundred percent preventable, but it's educational measure and it's a preventative thing that we should do to lower our flare-ups. (School Nurse, HS 1)

I would say it's probably just a matter of education for the parents for the student and just patient education and teaching them how to use it [inhaler]. (School Nurse, MS)

I do think that there is a lot of opportunity for education around asthma with the school nurses, help them identify ways that they can either help identify kids that are at need or at risk or that are having symptoms, help them better identify ways that they can do education with the kids potentially, help them identify their triggers and help educate them, because they see them in a different light. (Pediatric Pulmonologist)

The stakeholders emphasized the need to educate teachers and school personnel about asthma, its potential severity, and ways to respond when a student in class experiences an asthma event. Some mentioned the local asthma coalition as a source of reliable educational material on the topic. Additional emphasis was given to teachers’ awareness of the specific individuals in their classes who have asthma and their asthma action plans. One idea was to use the “flagging” of those students who need specific accommodations to inform a better response to asthma episodes. Time would need to be allotted to this type of training across all educators and personnel in the school.

The teachers don't know a lot about it and I have to talk. Like I said before [name] he has nine periods, and I have to talk to each teacher to tell them whether he wants to stand up he can stand up he when he wants to sit he needs to sit, that they need to work with him. (Parent)

I don't know if there’s education at the beginning of the year of what preparation for scenarios medically. I definitely think in that
orientation aspect or orientation to the kids in your class. When you get your list of kids and you know that they have this diagnosis, even if it’s just a paper, that’s very clear cut of this is the different flavors that I thought – the triggers, what to be aware of environmentally, what we can control and then how to respond. On even a handout or a two-page note, if you know you have a kid in your class. (Pediatric Pulmonary Nurse Practitioner 2)

The Florida Asthma Coalition, the asthma-friendly school program has education for the school nurses and education programs. Certainly, that would be, I think, a good opportunity, as well as educating the school personnel, the teachers, the gym teachers, that kind of stuff, and making them aware of some of the issues around perception and recognition of symptoms and appropriate use of medicine. (Pediatric Pulmonologist)

There are some classrooms where the teachers don’t even know how many asthmatics they have in their classroom potentially (Pediatric Pulmonologist)

**Individual level: Performance**

The stakeholders identified reasons for students’ inability to sufficiently focus in class or perform to their fullest potential. These reasons varied from underdiagnosis, inappropriate or inadequate treatment, uncontrolled asthma, and the side effects of some medications that temporarily cause restlessness. They also talked about anxiety as an accompanied condition that can interfere with one’s ability to focus on academics.

*He’s not he's not concern about it, but he does keep him distracted when he needs to get a standing up and he's just end up he can sit for when the asthma is not under control when there are hard days... Day, he can't sit he can't, you know, pay attention by like other students (Parent)*

*It’s interesting, the observation or their feeling regarding their own ability to focus or perform in class, because in most of the typical pure asthma medicine, you’re going to wonder how much of that is related to symptom burden or shortness of breath or how much of it...*
is related to a side effect of the medicines they’re on or how much of that may be related to disturbed sleep from their asthma, or it might just be related to their general, more of the psychosocial maybe impact of having a chronic disease (Pediatric Pulmonologist)

If they are on a lot of the albuterol, you know, I have had some that say they get shaky or jittery. But if they try to focus on something that time passes, and they feel better. (School Nurse, MS)

So much of it, initially, the early diagnosis and the appropriate diagnosis of asthma is the core foundation. A lot of these kids, they’re either misdiagnosed or underdiagnosed or their symptom control is not appreciated by their physician or their parent. Having them on appropriate medicine and having their asthma under control is an important foundation. Unfortunately, because there are so many asthmatics, in general, we rely on the safety net of the primary care providers, especially for the initial diagnosis (Pediatric Pulmonologist)

The stakeholders suggested engaging in an open conversation between students, providers, and educators about asthma in the school context. They suggested offering to check with students not only how they are doing with asthma in general but also how it is affecting their educational process. Further inquiry should revolve around ways to facilitate better asthma management and control, or to generate strategies to accommodate individual students’ needs.

It probably would be more helpful, and I don’t know if the pediatricians even ask this, but talking to the middle-schoolers and high-schoolers about how they’re doing in school, just asking just general screening questions about how they’re doing in school, how their grades are and how their asthma is impacting their school performance might be helpful (Pediatric Pulmonologist)

**Individual level: Attendance**

According to the stakeholders, the number of days of school missed can serve as an indicator of the level to which asthma is being controlled. One provider emphasized that
uncontrolled or under-controlled asthma is disproportionately displayed in certain populations that have limited resources and, potentially, inconsistent access to care and medication; this can result in excessive absenteeism of both the students and their caregivers. Prolonged absenteeism exacerbates the gaps in instruction time and, for certain students, result in lagging behind in their knowledge of school material, grades, and completion of assignments.

That’s a tough one. I mean, that’s a tough one. When you have a kid who is in junior high hospitalized every year for asthma, prolonged hospitalization for asthma, and just as he’s gone into high school he hasn’t been on the prolonged hospitalizations, he’s taking his meds but he’s still getting up at night, he’s still having to come down for nebulizer treatments during the day, missing classes, missing instruction time for that, that stuff can last for two-week. It’s hard when the lungs are that severe. (School Nurse, HS 2)

Then that’s just a big snowball because then you’ve missed so many days and you feel like you’re not caught up with everyone, and then it just starts to get overwhelming and you almost then have this anxiety about not keeping up. (Pediatric Pulmonary Nurse Practitioner, 2)

The school absenteeism, it’s huge, and the makeup work is even harder. Unfortunately, because our asthma is more disproportionally seen. They tend to be, unfortunately, seen in ethnicities that tend to be more at either socioeconomic or there’s more racial disparity or socioeconomic disparity. It’s more often going to be seen in households and families that are either single parent or dual-working parents that it’s also going to be harder to get the help that they may need for that makeup or they may not get the support and the time to get that work made up, or even, honestly, someone to look after to make sure that they’re doing that work right. The parents, they’re so busy. They’re working. They may not even be able to check on their teenagers to know that they’re missing work. Unfortunately, not all teenagers are as conscientious as we would like them to be. (Pediatric Pulmonologist)
To accommodate the educational needs of students with asthma, the stakeholders mentioned utilizing the 504 plans for extreme cases of severe, uncontrolled asthma. They recommended hospital-bound schooling that provides students who miss lengthy periods of time at school more personalized, one-on-one instruction time. For more moderate cases, stakeholders suggested better communication with the students and their caregivers (e.g., through the regular use of teaching platforms such as Blackboard).

*So, I use Blackboard and I have a calendar where I post all the assignments and then they actually log in and do the assignments on blackboard. (HS Educator)*

*No, but other side of it is the parent also working as an advocate for the student because it is going to need to take getting their guidance counselor involved and going to talk to them because a lot of the teachers not a lot but there are teachers who have had acted negatively towards the students and it’s not their fault. (School-Based Clinic Public Health Professional)*

*It’s just hard because there’s so many things going on and - but teachers and nurses should be open to communicate with the parents and also being more understanding with their children and not to judge and say, “They’re just trying to get away or they don’t want to do exercise because - and just be lazy.” No, just going back to communication. Just communicate with that student and tell - ask them what’s going on. What about asthma? (Florida Asthma Program)*

**Interpersonal level: Asthma underestimation**

In conjunction with asthma knowledge, the stakeholders agreed that many educators and school personnel do not ascribe to asthma the significance it deserves or take into consideration the additional impact it might have on a student’s life. As a result, in some cases, it can lead to a negative attitude towards the students or an inadequate response to asthma events.
I can see how that feeling unsupported that the severity of it is underestimated and nobody really takes it a serious and your fears about having another asthma attack or about just having to deal with it on a daily basis as a chronic disorder. (HS Educator)

One school nurse alluded to the fact that some students take advantage of their condition:

Behavioral, mental health, yes. That’s all of the ones with severe asthma. They have something else complicating their life. I mean, there’s something else going on not just asthma. [Pause] One of them who wanted to be just like other kids but can slack off a little bit, has IBS also and can go and park himself in the bathroom for a long time or in particular classes that – you know what I’m saying? So, there’s some that is totally legitimate and then there’s some fudging too. [Laughter] You know what I mean? Yes. (School Nurse HS 2)

Improved communication between students, caregivers, and schools could help schools better understand what is happening with the students, how asthma affects them, how severe the case is, and how to assist effectively.

No, but other side of it is the parent also working as an advocate for the student because it is going to need to take getting their guidance counselor involved and going to talk to them because a lot of the teachers not a lot but there are teachers who have had acted negatively towards the students and it's not their fault. (School-Based Clinic Public Health Professional)

... just going back to communication. Just communicate with that student and tell - ask them what’s going on. What about asthma? (Florida Asthma Program)

**Interpersonal level: Stigma**

The stakeholders recognized that asthma can make students feel stigmatized or left behind, especially in gym classes and other sports events. Asthma, to some students, could cause embarrassment and inhibit their goal of fitting in with other adolescents. They mentioned that
sometimes, students avoid telling others about their health condition to avert the stigma. They further said that, despite this fear, it is crucial that students disclose their condition to others so that, in cases of emergency, it will be clear what is wrong and how to respond.

*The social interaction piece is another piece, the peer pressure and stuff, that I don’t think we appreciate either how stressful middle school is, and how they want to be - they don’t want to be different than their peers. They don’t want to be seen as different. They don’t want to be seen taking medicines or seen as fragile or just anything that separates them from the crowd in general. They don’t like any kind of spotlight. Unfortunately, if they’re coughing, if they’re wheezing, or if they can’t do the sports that’s needed, especially if their asthma is not under control, and they have to sit out of gym class or whatever, that puts an undue focus on that. I don’t think that we as adults appreciate, at least I didn’t... They want to be cool like their friends and their peers, and image is very important to them, that impact of being separate or different. (Pediatric Pulmonologist)*

*I’m sure with sports, them wanting to participate in sports and those kids often feeling in this certain position or status in a team setting or like if it’s shortness of breath or inability to keep up with their peers. It does make them - not outcasted but sort of like – or even in PE class, you think they’re lagging behind, they’re always going to be isolated. (Pediatric Pulmonary Nurse Practitioner 2)*

**Organizational level: School prioritization of asthma**

The stakeholders agreed that asthma is often ascribed less importance than other healthcare conditions. They indicated that with growing concerns about mental health and diabetes, along with limited resources, asthma is being pushed lower on the list of priorities. Additionally, they noted that asthma tends to be overlooked in terms of its severity and associated implications, resulting in less urgency being placed on schools to address asthma-related needs. Communication between the school nurse and the educator was mentioned as
essential for identifying not only students with asthma but those with severe cases in particular. Communication should also include recommendations for appropriate courses of action in the event of an asthma flare-up. The utilization of parent–teacher association (PTA) meetings was mentioned as a strategy to improve school–family communication and deliver asthma education content.

*I think asthma definitely underappreciated in this severity. I think a lot of the lay person thinks of it as exercise abuse. Pretty much, “Well, I’m like I was out of breath doing the exercise but there’s so many flavors of asthma just simple awareness that there are, and obviously degree of severity. It’s not officially obvious so I think it does get like kind of brushed under as a minor deal. (Pediatric Pulmonary Nurse Practitioner, 2)*

*Asthma is rampant. It’s the most reportable condition in every school. There are 100,000 kids, more than that, that say they’re being diagnosed with asthma or they had an asthma attack in the past year or they’ve been diagnosed. It’s just mind blasting for me that it’s so common but very little attention. (Florida Asthma Program)*

*That’s something that we can augment and in one of those meetings say, “Hey, let’s talk about asthma. Hey, let’s talk about diabetes.” Some of the things that the kids are having and it’s important to everybody know to recognize something and just to invest in the idea that this can kill you, your student and it’s important and just you have to treat every flare like it’s the big one because you never know.(Florida Asthma Program)*

*I agree wholeheartedly that those severe allergies anaphylactic allergies. They do take precedence as they should but also if you have Some severe asthmatic that is almost the same circumstance. You know you are way is a is one of the biggest concerns you have to make sure that that are way and it's very similar situation your airways closing up whether it's anaphylaxis or its severe asthma you got to get that airway open and I feel like that definitely should take equal priority. (School Nurse, MS)*
**Organizational Level: Environment**

Regarding the indoor environment, the stakeholders mentioned the use of sprays and air fresheners, the existence of mold typically in older buildings, the presence of dust mites and other allergens in the classroom, and other common triggers as factors that can compromise asthma control for students.

*Some of our schools can be very high in cockroach and dust mite and mold and some patients are just very - even when we really try to control everything, they can be very sensitive.* (Pediatric Pulmonologist)

*That’s a known trigger for allergens. These teachers where they have rows and rows of books and stuff and they’re collecting dust and medium for mice and rats because nothing gets cleaned. I remember having mice droppings in my classroom because the teacher before me have left some food there over the summer.* (Florida Asthma Program)

*And then another classmate around them, one boy has severe bronchospasm related to surrounding kids whether it’s their cologne or body sprays. When they’re sprayed around them in class, that also triggers them into a coughing fit that is obviously very distracting for them. So, the environmental airway irritants as well.* (Pediatric Pulmonary Nurse Practitioner 2)

The stakeholders further brought up the issue of carpets being used as the flooring surface in many classrooms. They shared their concerns about the possible accumulation of the aforementioned allergens (e.g., dust mites and dirt) on the carpets that, ultimately, can cause asthma events among student with sensitivities to these triggers.

*I’d like to see no carpets but I don’t think that’s going to happen, but it’ll reduce the allergens.* (School Nurse, HS)

*My concern is with our asthmatics is that we have carpeted rooms and I don't feel like the classroom should be carpeted ...because you*
get these carpets in the classrooms that could hold these allergens
That Could set the asthmatics off and I definitely think that could be
a factor. (School Nurse, MS)

The solutions suggested by stakeholders might include policy development on the school
level and better enforcement of the existing regulations on the interpersonal level, potentially by
the educators or other assigned individuals.

I think on the educator level like having somebody in your class with
that, being sure that environmental factors aren't there to trigger.
Obviously, making the rules for the body spray kids or for the
cleanliness, or the chemicals that can exacerbate things that are
being needed to clean, just the strength of those. All those
environmental kits, I think, that can be something pioneered in
educating those with them in their class. (Pediatric Pulmonology
Nurse Practitioner 2)

So that's something they can let the school management know as
well as their parents advocate for them and they come out and they
do environmental air quality. (School-Based Clinic Public Health
Professional)

**Policy level: Continuous access to school nurse and inhaler**

The stakeholders agreed with the students that the presence of a school nurse on campus
at all times is essential to allow more opportunities to assist and educate the students and school
personnel. Some mentioned that their school district has developed policies to assure a licensed
practice nurse (LPN) is available on campus. The process of replacing clinic aides with LPN has
begun in those districts but will take some time before it is completed.

One stakeholder introduced the notion of school-based clinics, as these can provide more
comprehensive, accessible health and nurse services. In addition, they offer a solution to students
with limited access to care, as these clinics are located on campus and provide services to under-
covered individuals and families.
Certainly, there's always the expanded funding to provide access to a school to an actual RN to the schools. I know that there’s a push. They’re trying to get RNs for all the schools. I know that the other schools don’t have them, and/or they have LPNs, or they have an RN who’s assigned to the school, but he/she covers multiple schools. It is a bit of a patchwork sometimes (Pediatric Pulmonologist)

So there will be always a full-time nurse at the school, but then there will be also an RN that will rotate between schools.... but they are not firing aides they are waiting until they retire or quit and then they are being replaced with an LPN.(School Nurse, MS)

The stakeholders also thought that inhaler accessibility is crucial to better control asthma and prevent flare-ups. Keeping the inhaler in the nurse’s room does not facilitate this strategy, and they suggested that a policy should be set to allow students to carry their inhaler with them.

The health problem is and I would say like I said about 40% of them have asthma and some of them I think that the school's policy is for them to keep their inhaler at the nurse's office, which doesn't really work for me and P, you know, I need them to have their inhaler right there in case they need it. e health problem is and I would say like I said about 40% of them have asthma and some of them I think that the school's policy is for them to keep their inhaler at the nurse's office, which doesn't really work for me, you know, I need them to have their inhaler right there in case they need it.(HS Educator)

I definitely think that it should be made readily available to patients who need them and as providers, we should not have to be fighting for that. (Pediatric Pulmonary Nurse Practitioner, 1)

A few also suggested that an inhaler could be used prior to gym classes to ensure the students are able to take part in class, as a preventative measure.

Pre-medicating with the albuterol, definitely ensuring that they have it on hand because some of them don’t even bring it to classes which is scary. Just making sure they have it before they get started, either pre-medicate or at least have it close either whether it’s in their pocket or just close within reach, to then obviously address the
system before they get so severe that then they're having to sit out completely. (Pediatric Pulmonary Nurse Practitioner 2)

**Themes Unique to the Stakeholders**

Although the stakeholders validated the themes that emerged from the students’ interviews, they suggested further insights that were not mentioned by the students themselves. These insights related to quality of sleep, self-advocacy, mental considerations (e.g., anxiety, depression, and stress), limited time and resources, and the locally available community resources.

**Individual level: Self-advocacy**

While acknowledging the importance of school nurses’ and caregivers’ roles in advocating for the students’ health and academic needs, the stakeholders said that the students, especially those in high school, should be more proactive and advocate for themselves.

_They almost need to learn how to advocate for themselves and explain it to people that it's chronic and it's not just going to go away or get better and that this is something that they have to live with on a daily basis and you know, they're always in fear of having another attack and how you know, the different ways that it affects their lives because isn't it different very different how different people experience the disorder. (HS Educator)_

_Another thing to that is that students don't advocate for themselves. They want everyone else to do it for them and they don't stand up for what they need. (School Nurse HS 1)_

_What is this smell like doesn't smell good, you know the students going to have to do that. So that goes back to advocating for themselves. (School-Based Clinic Public Health Professional)_
**Individual level: Quality of sleep**

Unlike the student participants, the stakeholders talked about the connection between quality of sleep and academic performance. They linked a lack of sleep or lack of uninterrupted sleep to the ability of students to focus and engage in class on the following day and, ultimately, perform well academically. A parent participant shared that nights of uncontrolled asthma affect the quality of sleep of both the students and the caregivers.

*I can think of a student who is often up in the middle of the night, in the bathroom with the shower for the steam, and just having nebulizer treatments, doesn’t sleep well, and additionally, his medication. There are a lot of factors in that, so yes, I totally get the being tired and having trouble focusing in class.* (School Nurse, HS 2)

*Wow, and you know because the attacks will come at night and there was no sleep at all.* (Parent)

*Oh, I know. Exactly. There’s a lot of things that go into sleep like good hygiene and [Unintelligible] why they’re getting poor sleep, whether it’s just early school times or the just the device used, obviously, [Unintelligible] melatonin release there’s a lot of different things.* (Pediatric Pulmonary Nurse Practitioner 2)

*I think the academic performance piece may have to do with if they’re not well-controlled they’ve been symptomatic through the night, interrupted sleep with cough and night waking, some things like that or time spent doing treatment following school, things like that, but defer from them completing things and then it impacts their attention the following day. Their being alert, engaged without quality sleep.* (Pediatric Pulmonary Nurse Practitioner, 2)

**Individual level: Psychological implications – anxiety, depression, and stress**

Special attention was given to the psychological impact that asthma has on adolescents and how these factors affect their overall school experiences, including the ability to focus and
perform academically. The stress and anxiety caused by asthma can exacerbate asthma symptoms. In the opinion of the stakeholders, students with asthma and other chronic conditions are more prone to developing depression, anxiety, and stress. The stakeholders claimed that insufficient attention is being paid to the psychological implications of asthma and helping students know how to cope with them.

Anxiety can absolutely. Some of those kids are where we kind of have a piece of anxiety or exercise kind of reduce symptoms with excitement or emotion as well but they have a little bit of a hybrid of vocal cord dysfunction that also plays a part. So, those case is both happening but either way definitely that emotion worsens their asthma symptom. (Pediatric Pulmonary Nurse Practitioner 2)

I don’t know if we really always appreciate, especially in our more significant asthmatics just what impact having a chronic condition does in terms of stress to them, and if that’s impacting some of their ability to focus as well. There’s some interesting - not so much ability to focus, but some interesting impact or some interesting stuff that was recently done. (Pediatric Pulmonologist).

They are that kid at the back of the classroom who is being interruptive, and they are looked at weird, because they have asthma, they can’t participate, they’re that “kid.” They’re more likely to be depressed, and when you’re depressed, you’re more likely to be non-compliant and when you’re non-compliant, like they more symptoms, they may even be more of that there because they’re [Unintelligible] and non-compliant, so it’s that vicious circle. That’s something that we don’t want to pay that much attention to. I think it deserves a lot (Pediatric Pulmonary Nurse Practitioner 1)

**Interpersonal level: Communication triangle**

Continuous communication between the caregivers, school nurse, educators, and healthcare providers was seen by the stakeholders to be an essential component in enhancing asthma control and keeping all involved parties abreast of a student’s asthma status and course of
treatment. In some cases, communication can assist in tracking asthma patterns to develop an effective treatment plan.

*Then the attention - it’s their recognition of those the sleepy ones or the inattentive ones. It’s obviously a provider’s job to identify whether they have the control of that but just really just communication like you say between the faculty, the teachers and recognition of those like just awareness of what they’re doing. Communication with the parents and then communication with the parent to be sure that the quality - the sleep and in all these things are -they’re not impacting things.* (Pediatric Pulmonary Nurse Practitioner 2)

**Organizational level: School health and educational accommodation**

As far as educational accommodations that can be utilized for students with asthma, the stakeholders mentioned assessing qualification for 504 to address academic needs in addition to the health-related documentations. The use of online teaching portals also was mentioned as a means to provide reminders and handouts and to inform students and their caregivers about scheduled tasks and assignments. For students with severe asthma that causes chronic absenteeism, they recommended the use of homebound or virtual school to ensure the continuity of instruction time and to help the students stay on track with the material.

*We put out alerts for a lot of these kids, especially if we start seeing more frequent problems of you know, maybe a health condition that is not under control that we feel like the teacher needs to be aware of we put out what's called health or to the teachers and on those Health alerts.* (School Nurse, MS)

*Definitely there’s another kid that’s almost identical situation from her and he has Your Live Virtual School as an adjunct and chipped away at it, and he has caught up and actually started to go into college credits. You just have to have a good support and drives it to overcome it. I don't know if the... The resources are there. You
just got to sign up for it. (Pediatric Pulmonary Nurse Practitioner 2)

Of course, I don’t know if you’re going to mention that before but having a 504 and IEP, it’s just - at least it’s legal documentation that something has to be done. That’s only for academic performance. (Florida Asthma Program)

So, it was going on Portal the parenting to pick up work, you know, there's rules with the unions also depending on different schools or counties you're in. (School-Based Clinic Public Health Professional)

Organizational level: Technology

The stakeholders proposed using technology in a variety of ways. First, they mentioned that technology such as teaching platforms, emails, and messaging can be used to communicate with students and caregivers. Second, they viewed technology a source for credible educational material about asthma, both for the school and for individual students. They also mentioned that technology can enhance the communication among caregivers, healthcare providers, and schools, although some concerns were expressed with regard to compliance with Health Insurance Portability and Accountability Act (HIPPA) regulations. As mentioned before, virtual online schools and recorded lectures/videos can be realistic, effective platforms by which to deliver the material taught while students were absent. Last, technology was brought up in the context of tracking inhaler use and asthma patterns, as well to learn about asthma control.

Technology is evolving so quickly and I feel that’s something that we should grasp and start getting these teens involved in this technology that they will probably love to. Yes, that’s something that they’re not afraid of. [Laughter] Technology. (Florida Asthma Program)
Organizational level: Time and resource constraints

Limited time and resources were mentioned as the main barriers to prioritizing asthma support and providing more asthma education in schools. Time limitations were mentioned in the context of school nurses, the promotion of asthma education by nurses, and the training of the educators themselves. On one hand, nurses must complete many activities throughout their day and lack assigned time for training educators on health topics. On the other hand, educators, too, have minimal or no free time for training; professional days are already filled with other required activities and training on competing topics, such as mental health. Additionally, asthma education materials and resources are not readily available at schools for an easy delivery of content on the topic.

*I agree, and you know, it would be great if we could have professional days and do pick a disease process, and educate the faculty and staff. The students, in high school, it's very, very difficult. In the lower grades, it's not so hard. In high school, there is so much content that you have to get through for FSAs, for EOCs, for any number of tests that we never took when we were, that I never took when I was in high school, so there’s constant pressure. Even when we asked, we’re not allotted time with the kids. The one thing that we do get into the classroom for is in HOPE class. (School Nurse, HS 2)*

*One of the things that School nurses are always saying is that you know, they don't have enough time to teach and they don't have enough time to do their care plans or. Stuff like that for safety, which is true. But, know your nurse time more time to actually be with the students and treat the students, you know. (School Nurse, HS 1)*

*They have a lot on their plate obviously in the sense of adjusting every need and every isolated med with the scheduled meds, and all of that and all of that. I’m sure that consumed a lot of their day. (Pediatric Pulmonary Nurse Practitioner 2)*
**Environmental level: Community resources**

When asking about community resources that are in use or could potentially be used, the stakeholders described mobile clinics that come to school campuses and provide healthcare services to those that cannot afford them otherwise. They also mentioned collaborations with local churches to assist with providing tutoring services for students who struggle academically or need more one-on-one instruction time. Some stakeholders—mainly those involved with the Asthma Coalition—also mentioned the coalition as a reliable source of information for schools to learn and teach about asthma, as well to provide them with strategies to transform their schools to become more asthma friendly. Unfortunately, the school nurses and educators interviewed were not familiar with the Florida Asthma Coalition and the work it is doing to promote asthma locally.

> We have a mobile clinic. It’s a big bus, and it’s got several exam rooms. It’s staffed by some nurse practitioners and MAs. It’s staffed by a case worker, like a social worker who helps with access to care and helps navigate insurance issues.... One of the things that I’ve wanted to do was try to maybe take some of the isolated schools or some of the schools that are really struggling in terms of their performance and see if we can do interventions around a specific disease state, like asthma, and park the bus and provide some interventions, counseling, evaluation, testing, that kind of stuff at the school and see if we can make a difference in terms of decreasing school absenteeism with managing their asthma more. (Pediatric Pulmonologist)

Last, access to care was mentioned by several stakeholders. Some talked about access to care in the context of access to specialists and advanced services, while other mentioned regular access to medication and having a second inhaler at school. One stakeholder also talked about access to any healthcare coverage, specifically for underserved populations, as a lack of or limited access to quality health care could result in underdiagnosed asthma, insufficient
treatment, and uncontrolled asthma; this can negatively influence students’ academic and school experiences, as described in previous themes.

Maybe the other side of it is educating teachers as well as parents ways for children, especially in Florida to get health care. (School-Based Clinic Public Health Professional)

Location for both the student and the parent I would say that would make the medication more available to the student and then in turn that would cut the asthma attack and half and then turn that would help with the anxiety that they may have with I feel like not what really hot so just more for availability for you know, patient education (School Nurse, MS)

I know I’m biased, but I really would encourage referral to pediatric pulmonologists for anything more than just mild, intermittent asthma. (Pediatric Pulmonary Nurse Practitioner 1)
CHAPTER 5 – DISCUSSION

In this chapter, I summarize the findings of the present study and discuss their relevance to adolescent asthma in school contexts. I also assess how consistent the findings are with the existing literature and the contribution of the present work. I acknowledge the strengths and limitations of the study and its implications for research, policy, and practice. Finally, I suggest future directions for research and practice.

Research Summary

The prevalence of asthma is growing among adolescents (Centers for Disease Control and Prevention, 2017a, 2017b), creating challenges for more students in their daily routines. This study explored adolescents’ perceptions of how asthma affects their school life and academic performance in the context of the social ecological model (SEM). The SEM facilitates an understanding of the personal factors, the various relationships, and organizational and environmental elements that contribute to students’ school experiences and to potential educational and school disparities among them. The conversation about possible solutions to these barriers also was guided by the SEM. At the individual level, the interviews incorporated personal and behavioral elements and the way these interconnected with the environment, as suggested by the social cognitive theory. The study further sought stakeholders’ views on the adolescents’ insights and on any other factors and strategies they perceived. Lastly, a convergent mixed-methods design was used to examine the role of asthma severity and related QOL scores in the students’ school experiences.
Summary and Discussion of Findings

Five overarching domains appear to intersect with students’ school lives and academic experiences (Figure 8): 1. Knowledge and awareness; 2. Communication between the school, the students and their families, and healthcare providers; 3. Accommodation of health and academic needs; 4. Asthma control and prevention of flare-ups; and 5. Social support from friends and schoolmates, educators, and school nurses and other personnel. These elements intertwine to shape the school experiences of students with asthma.

Figure 8. Overarching themes that influence students’ school life and academic experiences.

Asthma Control

Student participants in this study perceived asthma in a negative overtone. Although not all of them felt that asthma is an academic threat, most described ways in which asthma sets them behind their peers and makes school performance more difficult.
Their largest concern was the inability to focus in class because of asthma symptoms, concerns about flare-ups, and medication side effects. Both students and stakeholders credited asthma control with improving the ability to focus in class: the better their asthma was controlled; the better students could focus in class and engage with the material.

Poor sleep quality also is common among people with asthma (Basch, 2011; Diette et al., 2000; Florida Asthma Program, 2013). Stakeholders referred to students’ quality of sleep as another factor in their inability to focus on academics. This is consistent with the students’ reports of being sleepy in class, although they didn’t connect their sleepiness to their quality of sleep. Researchers have concluded that uncontrolled asthma leads to low-quality sleep that, as a result, affects people’s functioning during the day (Diette et al., 2000; Florida Asthma Program, 2013; Basch, 2011a).

Although students reported increased absenteeism with worsened asthma status, concerns about the instruction and materials they missed while absent were universal. Similarly, asthma control has been cited in the literature in reference to absenteeism. Previous studies have shown that students with uncontrolled asthma miss more days of school (Dean, Calimlim, Kindermann, Khandker, & Tinkelman, 2009; Hsu, Qin, Beavers, & Mirabelli, 2016; Kohen, 2010; Moonie, Sterling, Figgs, & Castro, 2008) or parts of days (Schmier et al., 2007).

Students further indicated that schools in general, and educators individually, lack a systematic strategy for helping students make up for the school work that they missed while being absent. Asthma, as many students indicated, sets them behind in physical education classes, sports, and other social and school activities. Some suggested that asthma could also compromise their academic achievements through the pathway of absenteeism, missed materials, and difficulty focusing and engaging in class.
These shared experiences are consistent with the current literature, in particular Basch (2011), who proposed several mechanisms by which asthma might affect school success: cognition, connectedness, and absenteeism. In addition, stakeholders suggested that the mental and psychosocial implications of asthma and other chronic conditions, such as stress, anxiety, and depression, are easily overlooked and could influence students’ school success as well. In line with these views, researchers have established a correlation between asthma and psychological conditions such as anxiety and depression. These comorbid conditions were shown to interact in a bidirectional manner (Clark et al., 2010; Hertz, Everett Jones, Barrios, David-Ferdon, & Holt, 2015; Krenitsky, 2006; Sadof & Kaslovsky, 2011).

Social Support

Both participant groups (students and stakeholders) acknowledged the importance of social support either from peers, educators, or school nurses. Social support could take the form of encouragement, technical assistance with asthma (offering inhalers, water, etc.), or help with school tasks and activities (tutoring, providing missed materials). Participants described social support, encouragement, and caring as important influences on their self-efficacy, self-worth, and sense of connectedness, and ultimately on their motivation and confidence in school. According to Lum (2017) and Harver and Kotses (2010), positive, supportive relationships can improve students’ school experiences, success, self-esteem, and sense of connectedness.

As in previous studies (Bruzzese, 2009; Panzera et al., 2013), students in this study reported concerns about stigmatization and feeling excluded from sports and other activities. To address these concerns, they often hid their health condition or avoided adhering to treatment regimens around peers. These coping strategies have been noted in the literature as circling back
to a lack of asthma control and its health and academic implications (Harris, 2018; Sadof & Kaslovsky, 2011). Stakeholders in the present study recommended that students with asthma be encouraged to practice self-advocacy by sharing their condition with the school and expressing their health and academic needs.

**Asthma Knowledge and Awareness**

Knowledge and awareness of asthma appear to be lacking on all levels: the school as a whole, and educators, staff members, and students as individuals. Knowledge and awareness were linked to a better understanding of asthma, its consequences, and ways to assist students with their health and academic needs. Langton et al. also noted the gap in teachers’ knowledge of asthma and of specific students with asthma in their classes. They found that teachers were often not well trained on asthma and were unfamiliar with school policies on asthma management. These gaps were greater in middle and high school than in elementary school.

As students in the current study also reported, Langton et al. indicated that coaches at all school levels were more knowledgeable of asthma and of their students’ care plans (Langton, Hollenbach, Simoneau, & Cloutier, 2019). In addition, a study on school professionals’ knowledge and beliefs about youths with chronic conditions concluded that unlike with other illnesses, school personnel did not perceive students with asthma as needing educational assistance or as facing more barriers to academic achievement (Berger, Valenzuela, Tsikis, & Fletcher, 2018). Moreover, participants in the current study suggested that this limited knowledge and awareness could contribute to stigmatization and unsympathetic attitudes towards them. Previous research has reported similar testimonials from students describing teachers and school personnel as “unsympathetic to their condition or disbelieving of their symptoms or
difficulties” (Newbould, Francis, & Smith, 2007).

**Communication**

Stakeholders reiterated the need for improved communication among schools, families of students with asthma, and their health care providers to ensure effective disease management and school functioning. Students were not able to attest to this matter, although they thought that communication among these parties would facilitate their health and academic interests. This argument is validated by literature demonstrating the contribution of communication within the family–medical–school triangle to students’ overall health, social and emotional wellbeing, and academic success (Centers for Disease Control and Prevention, 2019).

Numerous frameworks have acknowledged the benefits of communication among key stakeholders to the developmental, social, medical, and educational well-being of students with chronic conditions. The Biopsychoeducational model, for example, offers a comprehensive approach in which key stakeholders in the child’s life collaborate to design an intervention specific to the student to improve his or her health, social, and educational experiences. In this model, the school psychologist acts as the liaison in the partnership, and the team focuses on a “structured problem-solving process of assessment, intervention, and evaluation” to “promote the child’s success in all areas and across settings” (Grier & Bradley-Klug, 2011).

The introduction of the school psychologist could broaden the scope of care for the child in the educational setting. Students in this study did not recall having a school psychologist on campus, although psychological support was perceived as helpful, particularly in light of the prevalent comorbidities of chronic conditions such as asthma and mental illness. The largest challenges continue to be the limited time and resources, and restrictions in the flow of
communication given its sensitive medical content.

**Accommodation**

Students in this study reported that educators do their best to accommodate their academic needs, but had limited time and resources for doing so. They expressed interest in a more structured system in which the school addressed their academic needs and offered tutoring. An insufficient focus on the academic implications of asthma and ways to accommodate these also was reported. Nurses recognized that hospital or schooling or a 504 plan could be beneficial to students with severe asthma, although these resources are typically underutilized. The U.S. Department of Education noted the eligibility of asthma sufferers for 504 plans in “Managing Asthma: A Guide for Schools.” According to the National Association of School Nurses, accommodations on the teacher’s part could include regular communication with nurses and caregivers about asthma management, a missed-classwork plan for absences, coordination of one-on-one help with students for teaching new concepts that were missed, and the provision of extra time for makeup work to be submitted (Isik & Isik, 2017; National Association of School Nurses, 2013).

According to the study’s participants, the school as an organization can also make several structural and social changes to reduce disparities for students with asthma. First, it can prioritize asthma and facilitate asthma education among students, educators, and other personnel. A better understanding of asthma, its severity, and its treatment needs could clarify the consequences asthma can have and the health and education needs it can introduce. Previous research has also endorsed education and training of teachers and staff members on how to identify and respond to asthma episodes as a practice for improving asthma control (Evans-Agnew, Klein, & Lecce,
Second, the school can enforce policies that promote asthma control and health and academic support. The participants mentioned policies such as accessible medication, the presence of a nurse on campus throughout school hours, and the banning of certain detergents and sprays. Furthermore, the literature recommends mandating policies to ensure that the school nurse has an updated, individualized asthma action plan for every student with asthma and that there is a school-wide emergency response plan. The action plan would ensure appropriate responses to asthma events and guide the monitoring of symptoms and exposure to triggers (Centers for Disease Control and Prevention, 2017). Third, the school can establish tutoring services to help students make up for missed instruction time. Finally, the school can improve its communication with caregivers and healthcare providers to ensure the appropriate assistance and care of students with asthma. Nurses also may work directly with educators to inform them about students with asthma, their treatment plans, and any academic accommodations they require. Recommendations for 504 plans should be considered as well.

These steps will improve the school’s culture and lead to better acceptance of students with asthma and better addressing their needs, and it could set an improved tone on the interpersonal level in educators’ and schoolmates’ perceptions of and attitudes toward asthma. To facilitate these steps, stakeholders suggested that schools and educators make use of new technologies, such as digital learning platforms and apps to assist students with school materials, and tutoring and online educational resources to teach people about asthma. They also suggested collaboration with community organizations and the use of local resources to improve health and academic support. It is important to note that the stakeholders had limited knowledge of locally available resources, such as area asthma coalitions. It would be beneficial for organizations and communities to collaborate and publicize their services across schools, districts, other academic
institutions (e.g., colleges of education), health departments, and elsewhere to raise awareness and usage of the services they offer.

In the context of the reciprocal determinism of the SCT (person ↔ behavior ↔ environment), several multi-directional relationships could influence asthma and the school experiences of students with asthma. A change in one of the elements can lead to changes in the others. Figure 9 depicts the possible connections between the individual, interpersonal, and organizational factors that were mentioned by participants, and their possible impacts on the school lives and educational disparities faced by students with asthma. The findings suggest that personal factors such as asthma status (severity and control), psychological state (anxiety, stress, depression), and poor sleep quality can affect students’ attendance, focus, and engagement in class; their engagement and connectedness with peers in social and academic activities; and the students’ prevention practices and adherence to medication regimens, both in general and at school.

From an environment standpoint, the lack of knowledge and awareness of asthma leads to (a) a lower prioritization of asthma practices and policies at the school (e.g., educational and health accommodations, trigger avoidance), which can lead to poorer asthma control and, ultimately, impaired school experiences; (b) insufficient knowledge of asthma among school personnel and students, which can restrict social, health, and educational support and increase the stigma around asthma. Students with asthma therefore lack the reinforcement they need to improve their self-worth and self-efficacy in academic pursuits, and the technical assistance they need to improve their academic performance. These factors can cycle back into more stress and anxiety, and a sense of lagging behind. The health education of the student herself is a key to improving asthma management and control, which can in turn improve the school experiences of
the student. Local resources, access to care, and use of technology could be used to leverage knowledge and awareness among these groups.

Lastly, with reference to the mixed-methods results, in this particular sample the experiences and concerns the participants shared about asthma in the school setting were not perfectly aligned with the reported QOL scores or asthma status. It is to mention that the asthma status was self-reported and not confirmed with healthcare providers, and these reports may not represent the actual severity of the disease in the students. Despite the literature demonstrating a reliable correlation between asthma severity and QOL scores, such connections were not visible in the study sample. It is worth noting that the sample was relatively small, which could have made it more difficult to identify patterns across self-reported severity categories. In addition, the distribution of QOL categories was not proportionate; only 2 students had low QOL scores, while 10 and 8 respectively had intermediate and high scores, a fact that made comparison between the groups more difficult.

Nonetheless, students who reported high severity of asthma also reported more problems with performance, attendance, and social activities. They also were more likely to express concerns about school personnel disbelieving or underestimating their asthma severity or difficulties, and they reported relying on the support of close friends. Interestingly, students with mild or moderate reported asthma talked more about their difficulties focusing in class than those with severe cases. This could be explained by the students’ subjective perspective of their symptoms: per current literature, people with severe and uncontrolled asthma tend to overlook or discount asthma signs (Rhee, Belyea, & Elward, 2008). When comparing QOL categories, the occurrence of different themes corresponded less to mean QOL scores. Similar inconsistencies appeared among the item-specific responses, for example those about sleep interruption:
responses on this item corresponded to the shared experiences of students who reported low QOLs but not of those who reported intermediate or high QOLs. Unfortunately, only a few items could be directly related to the shared themes. This raises the possibility that a general QOL instrument may not be fully relatable to the school setting. The development of a school-specific QOL measure might reflect these connections better.

The sample classification by reported asthma severity seems to be more in line with the experiences that students shared, and it therefore better served the purposes of this study better. Given the discrepancies between the qualitative and quantitative data sets, it might be helpful to test the correlation with a larger sample. Alternatively, one might test different methods of converging the data, for instance by quantifying the shared experiences in a more systematic way or using certain typology groups.

**Implications and Recommendations for Future Directions**

This study shed light on the link between adolescent asthma and school life across the SEM systems. It offers a broad understanding of the topic and presents useful insights from adolescents with asthma and from key stakeholders for a breadth of perspectives on the factors linking asthma with school experiences and academic attainment. In addition, the study identifies several barriers to asthma control and factors that facilitate students’ asthma management and suggests ways to address academic disparities.
**Figure 9.** visual representation of the connections between factors related to the school
The findings of this study present several opportunities for future steps in research, practice, and policy.

Practice. First, the findings could inform key stakeholders and professionals in the field, such as school nurses, educators, healthcare providers, and school psychologists, of the barriers that prevent students with asthma from realizing their academic potential and having better school experiences. A system for communication among these collaborators would help students with asthma medically, psychologically, socially, and academically.

Schools are encouraged to make use of the available resources to become more asthma-friendly. This includes training school personnel, students, and families to raise knowledge and awareness of asthma and eliminate misconceptions about it. This could contribute to a school culture that is more supportive and accepting of students with asthma and is better informed on how to address their needs. Schools can also post informational materials and include it in newsletters and other communications to increase [and maintain] awareness.

With regard to academic challenges, consistent nurse–educator communication is important for ensuring that educators are aware of students with asthma in their classes and of how to respond to asthma events. Schools also can formulate plans for responding to these students’ academic needs; these might include a 504 plan. Having a school psychologist or counselor to address the psychosocial aspect of asthma on school experiences could also benefit these students. Some readily available resources, such as the guidelines developed by the National Association of School Nurses, which include specific actions, procedures, and tools, could be adapted to schools’ needs (Evans-Agnew et al., 2015).

Schools might also develop systems to help students make up for material they miss while absent. Technology could be used for this, for instance by linking students to online
tutoring resource (Kahn Academy, etc.) or providing live streams or recorded video of actual instruction.

A clean learning environment in which dust, pollen and other asthma triggers are not allowed to accumulate, is important for controlling asthma. Schools should also reconsider the use of carpets to avoid the buildup of allergens.

Healthcare providers, on the other hand, might adopt a comprehensive approach to treating students with asthma. They should direct efforts into improving asthma education and addressing the psychological aspects of coping with a chronic disease or any comorbidities. Their approach should include patient–provider discussions of school and social life to identify any other challenges students might encounter.

Policy. Both school and government policies can improve the school experiences and success rates of students with asthma.

At the district level, formulating and disseminating specific guidelines for the management of asthma could lead to better practices in schools. Districts might also allot more funding to ensuring that a nurse is present on each campus at all times and available for students with healthcare needs such as asthma.

School policies, such as bans on certain detergents, sprays, and fragrances, should be enforced regularly. Periodic air-quality assessment is essential to eliminating asthma triggers such as mold and dust mites. Additionally, schools can allow students carry their inhalers while on campus. Although many districts have already adopted such policy, educators, school personnel, families, and students seem not to be well aware of it. Therefore, efforts should be made to inform the school community of existing policies too.

On a more global level, access to high-quality care is crucial to achieving better asthma
outcomes (Grant, 2010). State and federal funding should be focused on ensuring that all citizens have access to healthcare. This might mean allocating more support to the public healthcare system. According to the literature, continuous, affordable access to care could be fostered among students and families through the creation of more school-based health centers. When school-based health centers are not available, linkage of students and their families to care elsewhere is essential.

Research. This study’s findings can also inform future research efforts to explore and validate the link between adolescent asthma and school life using larger samples. Larger-scale studies could show the credibility and relevance of the findings to the student population outside the area addressed in this study. Once validated and refined, the findings could also inform the development of instruments for assessing the quality of life of students with asthma and its effects on their school experiences and functioning. School-based asthma programs and research studies are encouraged to gather data on these students’ academic performance and school functioning to broaden the knowledge on the topic. Research findings could also inform the development of school-based interventions that comprise of elements that address indicators relevant to school life. Such interventions might include asthma education sessions to students with asthma but also to the broader school community, tutoring or online sessions to assist with instructional content, peer support, case management of individual students by the school nurse or school psychologist, supervision of the indoor quality of air, and communication platform internally among school personnel and external across the school, healthcare providers, and families. Finally, evaluations of such programs might incorporate these indicators to assess their impact on various matters that affect the school life of students with asthma, and to secure funding to address the issue and establish evidence-based practices.
On a larger scale, asthma programs across the country could integrate their collection of surveillance data to track trends and patterns in adolescent asthma and school life.

The education community might consider applying the social marketing approach for formative research efforts and intervention design. The social marketing discipline was successfully used in a variety of health-related topics to promote a voluntary behavior or systems change and policy development in public health by utilizing commercial marketing strategies (Bryant et al., 2014). Social marketing could be very beneficial in exploring the barriers and drivers of parents, students, educators, school nurses, and other school personnel and assist in designing interventions that bring about a change in practices and behavior to enhance the school life of students with asthma. Identifying the marketing mix - product, price, place, and promotion - relevant to the different collaborators will inform the design of an effective and feasible product, service, or program to facilitate an asthma-friendly school climate.

Keeping in mind the multi-faceted nature of this topic, future steps should reinforce a multilevel, interdisciplinary approach to asthma-related disparities. The incorporation of environmental, personal, and organizational factors and policies into interventions would address asthma management more effectively and lead to improvements in the disease’s outcomes and implications. Frameworks such as the whole school, whole child, whole community (WSCC) model could guide comprehensive, student-centered interventions that integrate community assets, policies, practices, guidelines, and resources across the systems in which students interact to improve their learning and health (Centers for Disease Control and Prevention, 2017).

**Strengths and Limitations**

Similar to any research effort, this study has both strengths and limitations. In reference
to strengths, it addresses gaps in the research identified in chapters 1 and 2. First, it focuses specifically on the issue of adolescent asthma in the context of middle and high school settings. Guided by the SEM and SCT frameworks, it offers perspectives on a broad range of systems related to adolescents’ lives. The study’s methodology also incorporates qualitative methods, and students themselves were invited into the discourse to bring their own perspectives on, and knowledge about, their experiences and ways to improve them. By capitalizing on a mixed-methods approach, the study adds asthma severity and control to the relationships studied. Data triangulation also is incorporated by including various stakeholders in the discussion to respond to the students’ reports and offer recommendations based on their diverse experiences. Both students and stakeholders suggested practical solutions that could be used to address the health and educational disparities that students with asthma encounter.

However, this study’s small sample size should be kept in mind. There was a limited number of participants, and all the data were gathered from adolescents in a specific area visiting specific clinics, so the findings are not generalizable. In addition to the small size, the sample adolescents’ characteristics was not homogeneous in terms of age, school level, QOL category, and gender, therefore the representation of equally distributed. Future effort should consider larger sample size as well as a more targeted recruitment to ensure certain subpopulations are represented more equally. Since information was collected at only one point in time, changes in students’ perceptions and QOL scores over time remain unidentified. For instance, some interviews were conducted during summer break, when students were not in school, and this might tilt their perceptions on the topic. Furthermore, seasonal sensitivities to environmental triggers or even school workload could vary from student to student and based on the time the discussion took place. The PAQOL questionnaire asks participants to recollect information from
the previous two weeks, and this also introduced the issue of recall bias. The long period of time between recruitment and data collection to data analysis and sharing of the findings for student participant to validate resulted in a response rate of one student only. A shorter time span, and perhaps additional incentive could have yielded feedback from more participants.

The stakeholders participating in the study, like the adolescents, represent only certain locations, school systems, and family and professional communities. As such, the findings gathered from them may not reflect other groups in different locations or with varying professional experiences.

From a methodological standpoint, the QOL categories were established in accordance with the asthma severity categories, but one should keep in mind that asthma severity was self-reported and not confirmed with healthcare providers. Moreover, different classifications of QOL scores might have led to more noticeable differences and pattern across the categories. Future effort might explore a design of interview questions or use of survey instruments that are more align with one another. One should also consider the utilizing different strategies to analyze the merged data for instance use a data conversion or typology strategies that could be more suitable.

**Dissemination Plan**

Findings gleaned from this study will be shared with diverse stakeholders through a variety of channels.

An executive report will be provided to the assisting/partnering USF Health clinics. Information could be shared with caregivers and families through grey literature and local parents’ magazines. A “cheat sheet” brochure could also be distributed in clinic waiting rooms.
Informational sessions or summary recommendations of action steps could be distributed to local and national professional organizations such as the Florida Association of School Psychologists (FASP) and the Florida Association of School Nurses. These associations can then share the recommendations as they see relevance with their members across the nation and the state.

The findings also will be disseminated traditionally, through (a) publication in a peer-reviewed journal, such as the *Journal of Adolescent Health* or the *Journal of School Health*, and (b) presentation at conferences for healthcare providers, public health professionals, and educators. These could include the American School Health Association’s annual meeting and the Florida Association of School Psychologists conference.

Lastly, the findings could be used to guide a practice-based intervention with the local school board and as supporting literature in grant applications to fund further research in the area. A conversation/collaboration can take place with the Department of Education School Psychologists and School Nurses to discuss options for the application of suitable strategies locally.

**Final Words**

As asthma is the most common chronic disease among adolescents, more effort should be invested in increasing knowledge and awareness of it and increasing communication among stakeholders to improve health and educational outcomes for students with asthma. This study covers the complexity of the issue and provides a wide array of viewpoints and strategies for giving students with asthma the opportunity to learn, socialize, and grow safely to their full potential.
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APPENDICES
Appendix A. Recruitment Material

Appendix A1. Recruitment Flyer - Students

**ASTHMA IN THE SCHOOL STUDY**

Who? What? How?
Tali Schneider, a doctoral student at the University of South Florida is conducting a research study on the middle and high school experiences of teenagers with asthma. Qualifying participants would complete a 10-minute survey and a 50-minute long interview. At the end of the meeting, participants would receive a $20 gift card.

You are eligible to participate in the study if you are attending middle or high school, diagnosed with asthma, 12-17-year-old, and speak English.

Living with asthma?
Attending middle or high school?
Want to be heard?
I would like to listen!

FOR MORE INFORMATION CONTACT
Tali Schneider
(941)539-3306
tali.k.schneider@gmail.com

Appendix A2. Recruitment Email – Stakeholder

**Subject Line:** Adolescent Asthma in the School – We need your input

Dear Florida Asthma Coalition Member,
My name is Tali Schneider. I am a Doctoral student and an employee at the University of South Florida and a member of the Florida Asthma Coalition. In the past decade, I have been working with a group of researchers from USF, exploring ways to help adolescents with asthma improve their disease management.

As part of my doctoral dissertation research study (University of South Florida eIRB# Pro 00036637), I am exploring the role that asthma has in adolescents’ lives, particularly school life. Specifically, my study intends to explore how asthma reflects on the school experiences of students in middle and high school. I also intend to explore ways in which the school system and individuals that play a key role in the lives of students with asthma can help them succeed at school and achieve their academic goals.

**AS AN EXPERT IN THIS AREA, YOUR THOUGHTS & IDEAS ARE INVALUABLE!**

**Who is eligible to participate?**

Individuals above the age of 21 that work or interact directly with middle and high school students with asthma in the Tampa Bay surrounding area (for example, health care providers, school nurses, school psychologist, or caregivers) and that speak English.

**What will I be asked to do?**

You will be asked to participate in an online or in-person discussion session. The session will take 1.5-2 hours of your time. I will provide a modest honorarium for your time.

**How will the information be used?**

Information collected from the session will help in planning programs to increase awareness of key stakeholders about the factors influencing the school achievements of adolescents’ students with asthma. This is your opportunity to be part of something that could inform a future intervention to improve the school success of many individuals.

**If you are interested in participating and or would like more information about this study, please let me know by responding to this email:** tali.k.schneider@gmail.com

For additional questions, please contact Tali Schneider: 941-539-3306

Thank you!

Tali Schneider
USF Health Research Study Alert
School Experiences of Adolescents with Asthma

Do you work or interact directly with adolescent with asthma?
Seeking stakeholders that interact directly with asthma adolescent students with asthma to learn about your perception on academic experiences and school life of students with asthma.

Eligibility Includes:
- School nurses, educators, coaches, and parents of adolescent with asthma or work directly with adolescents with asthma.
- Over the age of 21
- Speak English

Eligible participants will complete:
- 45-minute in-person or phone interview
  * Participants will receive a $30 gift card

For more information please contact:
Tali Schneider
tschnei2@usf.edu
Florida Prevention Research Center
College of Public Health

IRB Study#: Pro00038637
Appendix B – Informed Consent Forms

Appendix B1 – Parents agreement - Consent Form

Parental Permission for Children to Participate in Research Involving Minimal Risk

Information for parents to consider before allowing your child to take part in this research study

Pro # Pro00036637

The following information is being presented to help you and your child decide whether or not he/she wishes to be a part of a research study. Please read this information carefully. If you have any questions or if you do not understand the information, we encourage you to ask the researcher.

We are asking you to allow your child to take part in a research study called: Adolescent Asthma and School Disparities: An Ecological Perspective of Students and Stakeholders

The person who is in charge of this research study is Tali Schneider. This person is called the Principal Investigator. However, other research staff may be involved and can act on behalf of the person in charge. She is being guided in this research by Dr. Jennifer Wolgemuth.

The research will be conducted at a location agreed upon with you and the researcher and that is convenient for you. This might include USF clinic, the library, your home, etc.

Purpose of study:
The purpose of this study is to find out your teen’s overall experiences at the school with regards to their asthma, any challenges it might present, and debrief potential ways to address the challenges.
Why is your child being asked to take part?
We are asking your child to take part in this research study because has diagnosed with and being treated for asthma, has no other chronic health condition, and enrolled to middle or high school.

Study Procedures:
If your child takes part in this study, s/he will be asked to:

- Complete a ten-minute paper-based Quality of Life survey.
- Participate in a 50-minute one-on-one interview at a convenient location for you. This interview will involve your child sharing his/her school experiences with the researcher.
- Allow audio-recording of the interview sessions with study staff. The child’s name will be kept confidential and not be included in the recording or attached to any reports.
- Read a follow-up summary of research findings (shared with him/her through email, text, or another preferred method about a month after the meeting) and provide suggestions and feedback on the content.

Total Number of Participants
About 65 individuals will take part in this study at USF

Alternatives / Voluntary Participation / Withdrawal
If you decide not to let your child take part in this study, that is okay. Instead of being in this research study your child can choose not to participate. You should only let your child take part in this study if both of you want to. You or child should not feel that there is any pressure to take part in the study to please the study investigator or the research staff.

If you decide not to let your child take part:
Your child will not be in trouble or lose any rights he/she would normally have.

You can decide after signing this informed consent form that you no longer want your child to take part in this study. We will keep you informed of any new developments which might affect your willingness to allow your child to continue to participate in the study. However, you can decide you want your child to stop taking part in the study for any reason at any time. If you decide you want your child to stop taking part in the study, tell the study staff as soon as you can.

Benefits
We do not know if your child will get any benefits by taking part in this study. However, the information gathered will help to guide potential practices at school that could lead to improved school experiences.

The potential benefits to your child might include: is a sense of relief when discussing their experiences and sharing feelings during interviews.
Risks or Discomfort

There are no known risks to those who take part in this study. This research is considered to be minimal risk. That means that the risks associated with this study are the same as what you face every day. To the best of our knowledge, participation in this study will not harm your child or cause her/him any additional unpleasant experience.

Compensation

Your child will be compensated $20 gift card if he/she completes all the scheduled study visits. If you withdraw your child for any reason from the study before completion of the interview, your child will still receive the gift card. If you choose to cancel the interview prior to the meeting, your child will not receive the gift card.

Costs

If interview meeting is scheduled in a place you choose that is not your home, cost could include travel to the meeting site and parking fees. Aside from travel and/or parking, it will not cost you anything to let your child take part in the study.

Privacy and Confidentiality

There are federal laws that say we must keep your child’s study records private. We will keep the records of this study private by not including any names or identifying information on any records or reports. Your information will be protected and will not be given to others outside of the study team or study monitoring organizations listed later in this section. The audio-recording, report, and other study documents will be kept for five years after study completion. All study records will be kept in a password-protected file on secure USF equipment and servers. After the five years, these documents will be destroyed appropriately.

Certain people may need to see your child’s study records. These individuals include:

- The research team, including the Principal Investigator, study coordinator, and other research staff.
- Certain government and university people who need to know more about the study, and individuals who provide oversight to ensure that we are doing the study in the right way.
- The USF Institutional Review Board (IRB) and related staff who have oversight responsibilities for this study, including staff in USF Research Integrity and Compliance.

We may publish what we learn from this study. If we do, we will not include your child’s name. We will not publish anything that would let people know who your child is.

The following information may be used and disclosed to others:
Your child’s research records
- Your contact information, including your name, e-mail address and your mailing address

Your child’s personal information collected for this research will be kept as long as it is needed to conduct this research. Once your child’s participation in the research is over, their information will be stored in accordance with applicable policies and regulations. Your permission to use your child’s personal data will not expire unless you withdraw it in writing. You may withdraw or take away your permission to use and disclose your child’s information at any time. You do this by sending written notice to the Principal Investigator at the following address:

While we are conducting the research study, we cannot let you see or copy the research information we have about your child. After the research is completed, you have a right to see the information about you, as allowed by USF policies.

If you have concerns about the use or storage of your child’s personal information, you have a right to lodge a complaint with the data supervisory authority in your country.

You can get the answers to your questions, concerns, or complaints.

If you have any questions, concerns or complaints about this study, call Tali Schneider at 941-539-3306.

If you have questions about your child’s rights, or have complaints, concerns or issues you want to discuss with someone outside the research, call the USF IRB at (813) 974-5638 or contact by email at RSCH-IRB@usf.edu.

Consent for My Child to Participate in this Research Study

I freely give my consent to let my child take part in this study. I understand that by signing this form I am agreeing to let my child take part in research. I have received a copy of this form to take with me.

________________________________________________          __________________
Signature of Parent of the Child Taking Part in Study        Date
_____________________________________
Printed Name of Parent of the Child Taking Part in Study

Statement of Person Obtaining Informed Consent

I have carefully explained to the person taking part in the study what he or she can expect from their child’s participation. I confirm that this research subject speaks the language that was used to explain this research and is receiving an informed consent form in their primary language.
This research subject has provided legally effective informed consent.

___________________________________________
Signature of Person Obtaining Informed Consent

Date

___________________________________________
Printed Name of Person Obtaining Informed Consent

Appendix B2 – Adolescents - Assent Form

Assent of Children to Participate in Research

Pro # Pro00036637

Title of study: Adolescent Asthma and School Disparities: An Ecological Perspective of Students and Stakeholders

Why am I being asked to take part in this research?
You are being asked to take part in a research study about the school experiences of students with asthma. You are being asked to take part in this research study because you are an adolescent with asthma that is enrolled to middle or high school. If you take part in this study, you will be one of about 65 people at this site.

Who is doing this study?
The person in charge of this study is Tali Schneider. She is being guided in this research by Dr. Jennifer Wolgemuth. However, other research staff may be involved and can act on behalf of the person in charge.

What is the purpose of this study?
By doing this study, we hope to learn about -
  ▪ the school experiences of adolescents with asthma
  ▪ find ways to improve these experiences
  ▪ Discuss challenges of students with asthma in the school life
  ▪ Identify ways to address these problems
**Where is the study going to take place and how long will it last?**
The study will take place at the Department of Educational and Psychological Studies at the College of Education, University of South Florida. You will be asked to participate in one meeting which will last about one hour. The total number of times you will be asked to volunteer for this study is two over the next month.

**What will you be asked to do?**
- Complete a ten-minute paper-based Quality of Life survey.
- Participate in an approximately 50 minutes one-on-one interview at a convenient location for both you and your caregiver (parent). This interview will involve you sharing your school experiences with the researcher.
- Allow audio-recording of your sessions with study staff. Your name will be kept confidential and not be included in the recording or attached to any reports.
- Read a follow-up summary of research findings (shared with you through email, text, or another preferred method about a month after the meeting) and provide suggestions and feedback on the content.

**What things might happen if you participate?**
This research is considered to be minimal risk. That means that the risks associated with this study are the same as what you face every day. To the best of our knowledge, your participation in this study will not harm you or cause you any additional unpleasant experience.

**Is there benefit to me for participating?**
We cannot promise that you will receive benefit from taking part in this research study. However, some people experience a relief or came up with some solutions when discussing their experiences and sharing feelings during interviews.

**What other choices do I have if I do not participate?**
Participating in the study is voluntary; you do not have to participate in the interview. If you do not want to be in the study, nothing else will happen.

**Do I have to take part in this study?**
You should talk with your parents or guardian and others about taking part in this research study. If you do not want to take part in the study, that is your decision. You should take part in this study because you want to volunteer.

**Will I receive any compensation for taking part in this study?**
You will receive $20 gift card for taking part in this study. If you stop participating before the meeting session is over, you will still receive the gift card.

**Who will see the information about me?**
Study staff will see the feedback and information that you provide. However, your information will be added to the information from other people taking part in the study, so no one will know who you are.
Can I change my mind and quit?
If you decide to take part in the study you still have the right to change your mind later. No one will think badly of you if you decide to stop participating. Also, the people who are running this study may need for you to stop. If this happens, they will tell you when to stop and why.

What if I have questions?
You can ask questions about this study at any time. You can talk with your parents, guardian or other adults about this study. You can talk with the person who is asking you to volunteer by calling Tali Schneider at 941-539-3306. If you think of other questions later, you can ask them. If you have questions about your rights as a research participant you can also call the USF IRB at (813) 974-5638 or contact by email at RSCH-IRB@usf.edu.

Assent to Participate

Name of person agreeing to take part in the study __________

Date

Printed name & Signature of person providing Information (assent) to subject __________

Date

Appendix B3 – Key Stakeholders - Consent Form

Informed Consent to Participate in Research Involving Minimal Risk

Pro # Pro00036637
You are being asked to take part in a research study. Research studies include only people who choose to take part. This document is called an informed consent form. Please read this information carefully and take your time making your decision. Ask the researcher or study staff to discuss this consent form with you, please ask him/her to explain any words or information you do not clearly understand.

We are asking you to take part in a research study called:

**Adolescent Asthma and School Disparities: An Ecological Perspective of Students and Stakeholders**

The person who is in charge of this research study is Tali Schneider. This person is called the Principal Investigator. However, other research staff may be involved and can act on behalf of the person in charge. She is being guided in this research by Dr. Jennifer Wolgemuth.

The research will be conducted at the Department of Educational and Psychological Studies at the College of Education, University of South Florida. The session you are asked to participate might take place online or at a physical location convenient to the majority of the group participants in the session. This might be USF campus, local library, etc.

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**Purpose of the study**

The proposed study will explore links between asthma and academic attainment and school functioning and experiences in middle and high school as perceived by students with asthma and key stakeholders. The proposed study aims are to:

- Explore adolescents’ and stakeholders’ perceptions of the influence asthma has on academic achievements and school experiences;
- Explore the role of asthma severity/control in these relationships;
- Identify the role of individual and contextual factors in student/school disparities among adolescents with asthma; and,
- Identify barriers contributing to these disparities and strategies to overcome those barriers.

In the earlier phases of the study, adolescents’ perceptions will be gathered and analyze. In this phase, findings will be shared with key stakeholders (like you) to confirm barriers to the academic achievements and school experiences of adolescents with asthma and to explore potential policies and practices to overcome barriers.

**Why are you being asked to take part?**

You are being asked to participate in this research study because you have been identified as a person with experience relevant to the topic of adolescent health in the school context.

**Study Procedures:**

If you take part in this study, you will be asked to:
Participate in a discussion session, either in-person or conducted online, to better understand barriers to academic success, and potential school disparities adolescents with asthma might encounter as well as potential solutions.

The discussion will include questions about your knowledge and experience working with students with asthma within the school setting from your perspective as school personnel, health care provider, caregiver, or a researcher. The session will take approximately 1 ½- 2 hours to complete, and you will be asked to participate in one discussion over the course this study. With your permission, the session will be audio recorded. The discussion will be completed at a location and time that you and other participants have agreed upon with the discussion facilitator or via online platform through a link that you will be provided.

**Total Number of Participants**
About ten-fifteen individuals will take part in this study at USF.

**Alternatives / Voluntary Participation / Withdrawal**
You should only take part in this study if you want to volunteer. You should not feel that there is any pressure to take part in the study. You are free to participate in this research or withdraw at any time. There will be no penalty or loss of benefits you are entitled to receive if you stop taking part in this study.

**Benefits**
The potential benefits of participating in this research study include:
Sharing ideas and potential solutions with other stakeholders that might inform future practices and policies.

**Risks or Discomfort**
This research is considered to be minimal risk. That means that the risks associated with this study are the same as what you face every day. There are no known additional risks to those who take part in this study.

**Compensation**
You will be compensated $30 gift card if you complete the scheduled discussion session.

**Costs**
If in-person meeting is scheduled, cost could include travel to the meeting site and parking fees. There is no further cost to participating in the study.

**Privacy and Confidentiality**
There are federal laws that say we must keep your child’s study records private. We will keep the records of this study private by not including any names or identifying information on any records or reports. Your information will be protected and will not be given to others outside of the study team or study monitoring organizations listed later in this section.
The audio-recording, report, and other study documents will be kept for five years after study completion. All study records will be kept in a password-protected file on secure USF equipment and servers. After the five years, these documents will be destroyed appropriately.

Certain people may need to see your child’s study records. These individuals include:

- The research team, including the Principal Investigator, study coordinator, and other research staff.
- Certain government and university people who need to know more about the study, and individuals who provide oversight to ensure that we are doing the study in the right way.
- The USF Institutional Review Board (IRB) and related staff who have oversight responsibilities for this study, including staff in USF Research Integrity and Compliance.

We may publish what we learn from this study. If we do, we will not include your name. We will not publish anything that would let people know who you are.

**The following information may be used and disclosed to others:**

- Your role (healthcare provider, school nurse, school personnel, caregiver, etc.)
- Meeting notes.

**You can get the answers to your questions, concerns, or complaints**

If you have any questions, concerns or complaints about this study, or experience an unanticipated problem, call Tali Schneider at (941)539-3306.

If you have questions about your rights as a participant in this study, or have complaints, concerns or issues you want to discuss with someone outside the research, call the USF IRB at (813) 974-5638 or contact by email at RSCH-IRB@usf.edu.

**Consent to Take Part in this Research Study**

I freely give my consent to take part in this study. I understand that by signing this form I am agreeing to take part in research. I have received a copy of this form to take with me.

_____________________________________________ ____________
Signature of Person Taking Part in Study Date

_____________________________________________
Printed Name of Person Taking Part in Study

**Statement of Person Obtaining Informed Consent**

I have carefully explained to the person taking part in the study what he or she can expect from their participation. I confirm that this research subject speaks the language that was used to explain this research and is receiving an informed consent form in their primary language. This research subject has provided legally effective informed consent.
Signature of Person obtaining Informed Consent  

Date

Printed Name of Person Obtaining Informed Consent
Appendix C. Interview Guide

Introduction

Hi (name of participant). I am Tali. As you already know, I am a student and an employee at the University of South Florida. As part of my schoolwork, I am exploring the role that asthma has in adolescents’ lives, particularly school life (or- the school experiences of students with asthma). I also want to know if there is anything that can help students with asthma succeed at school and achieve their academic goals. As an expert on this, I would like to listen to your thoughts and ideas.

Before we start our conversation, I would like you to complete a short survey named asthma quality of life questionnaire. Please let me know if you have questions or need clarifications in completing the survey. The questionnaire shouldn’t take more than 10-15 minutes. Then, I would like to go through a few questions that will guide our conversation. There is no right or wrong answer; I just want to hear your views on the topic. Our discussion will take about 50-60 minutes. After we finish, you will receive a $20 gift card from Target.

I would like to record this interview to remind me later what you said. I will keep your information confidential/private and your name will not be linked to any information I use in the project. Do you mind if I turn-on the recorder?

[Turn on recorder] Can you please state if it is OK that we record this interview?

Thanks. Let’s get started.
**Icebreaker** - Which three words describe you best? Or - If you could choose, which super power you wish you had? What do you like doing for fun?

1. *What grade are you in?*

2. *How would you describe success in school? Or – what are the goals you wish to achieve at school?*
   
   a. *What about school engagement/involvement in non-academic activities? (clubs, sports, social interaction)/ how involved are you in non-academic activities*
   
   b. *How important is it for you to meet your school goals?*

3. *How well do you think you achieve your goals?*

4. *How do you feel about asthma?*
   
   a. *How does asthma affect your daily routine?*

5. *What is it like to be a student with asthma in class? Probe: in what way?*

6. *Please describe some of the challenges you face with asthma?*
   
   a. *How do these influence/apply in your school day/ life?*
   
   b. *How does it affect your engagement/involvement at non-academic activities at school?*
   
   c. *What about performance in school? Academic/school success (probe: grades, ability to focus?*

7. *In the past month, how much has asthma influenced/affected your ability to do homework, complete school assignments, study for exams, complete exams?*

8. *Think back to the last time you experienced asthma attack at school, how did it affect your learning that day?*
a. Describe to me what happened in that instance?

b. Who helped you?

c. What could make it a more positive experience?

9. How different is your learning experience/your school day when your asthma is uncontrolled compared to times it is controlled?

a. Probe: How confident are you in your ability to succeeding in school in spite of your asthma/these challenges?

10. In what way do you feel you are in control of your school and learning experience?

a. What do you think you can do to improve your school experience?

b. How have your school experiences changed from elementary school to middle school [or from middle school to high school]?

We talked a lot about yourself, let’s move on to people that you interact with throughout the day.

Peers-

11. How are your peers mindful/thoughtful of your asthma condition?

a. How are they responsive to your asthma?

b. How helpful are they?

12. How can peers help in making you academic life easier?

a. When you miss school due to asthma?

b. With other school experience?

School nurse & school psychologist
13. How would you describe your relationship with the school nurse? How does the nurse promote your asthma and your school/academic needs?

14. What type of support do you need from the school nurse/psychologist?
   a. Does your school nurse/psychologist meet these needs?
   b. Give you a good advice?

   **Educators & Parents/caregivers**

15. What factors/elements at home can improve/facilitate your learning process/experience?

16. What do you think are your parents/school expectations for you?

17. How does asthma affect the way your teacher treats you compared to your classmates?
   a. What do you think are your teachers' school expectations from you?
   b. How are these different from other classmates?

18. What type of support do you need from your teacher? How responsive are they to these needs? How helpful are they with your struggle/needs?
   a. In your opinion, how can teachers further assist in improving your academic success/school experience?

19. To your knowledge, what type of communication is there between the school nurse and your doctor/physician? What about the communication between the parents/caregivers and the school?
   a. How can this relationship promote your school experience?

   **Now let's talk about the school environment...**

20. How supporting is your school/to students with specific health needs such as asthma?
21. How does the physical surrounding (the buildings & the outdoors) influence your experience at school related to asthma? From achieving success at school?

Let’s pretend you are in charge of the school district…

22. If you could make any change within the school system to help students with asthma be more engaged, and successful at school, what kinds of things would you suggest?

   a. How would you change the school [system]?

   b. Which individuals [school personnel] could help improve the learning process and school experience of students with asthma? How/what can they do to improve it?

   c. Which services?

   d. Which school policies/rules would facilitate/assist your educational and school needs?

   e. What would you change in the school surrounding to improve your school experience and chances to succeed?

Is there anything else you wish to share with me regarding your experience in school in relation to your asthma?

Thank you for your help on this project! Once I talk with other teens, I will send out a summary of what I’ve heard and will ask for your feedback.
Appendix D. Pediatric Asthma Quality of Life Questionnaire (PAQLQ).

To obtain access to the instrument please use the following link: http://www.qoltech.co.uk/
Appendix E. Demographic Questions

Please circle your answer:

- What is your age?
  - 11
  - 12
  - 13
  - 14
  - 15
  - 16
  - 17
  - 18

- What is your sex?
  - Female
  - Male

- Which grade are you attending this school year?
  - 6
  - 7
  - 8
  - 9
  - 10
  - 11
  - 12

- Which school type are you enrolled in -
• Private
  o Charter
  o Public

• How would you describe your asthma?
  o Mild
  o Moderate
  o Severe

• Do you take your daily medication regularly?
  o Yes
  o No
  o Most of the time
  o Sometimes

• What is your average GPA? ______

• How many days did you miss from school in the past month due to asthma? ___
Appendix F. Discussion Guide – Stakeholders

Introduction

Hello, I am Tali Schneider. As you already/probably know, I am a student and an employee at the University of South Florida.

As you all know, living with asthma and treating asthma has an influence on many aspects of the life of the person with asthma.

As part of my schoolwork, I am exploring the role that asthma has in adolescents’ lives, particularly school life. In other words, how asthma reflects on the school experiences of students in middle and high school. I also want to know if there is anything that can help students with asthma succeed at school and achieve their academic goals. As an expert on this, I would like to listen to your thoughts and ideas. In the first phase of my study, I talked with 20 students from Tampa Bay area, and they shared with me their thoughts/opinion on the link between asthma and their school experiences. I will use the findings from that phase to facilitate the discussion today.

Before we start our conversation, I am sure you have diverse experiences working with youth with asthma, so I wanted to emphasize that there are no right or wrong answers, we do not have to achieve an agreement, so please feel free to express your opinions. I would like for the conversation to flow, so please be respectful of others talking and wait for your turn to share your ideas. Our discussion will take about 60-70 minutes.
I would like to record this session to capture all your ideas and to remind me later what was said. Of course, I will keep your information confidential and your name will not be linked to any information I use in the project. Do you mind if I turn-on the recorder? [Turn on recorder]

Let’s have a short introduction. Please state your first name, your occupation, and the reason you joined the asthma coalition. Are you a: parent, teacher, school nurse/psychologist, healthcare provider?

Let’s start with a general question…

The framework I am using to explore this topic is the ecological model. This model places the individual at the core and (takes into account) examine the various environments and factors associated with them that interact with the individual on a specific topic (health, development, behavior, etc.). These environments include individuals most proximate to the person such as family members and peers. Following are the organization, in our context it can include the schools for example. Next are the community level that might include the larger more distal or indirect relationships such as services available in the community. Lastly policy level the captures xxx. In addition, we consider the built and ecological/natural environment such as air quality and the interactions within and between these tiers.

Before convening this meeting, I had the opportunity to talk with 20 adolescents with asthma and capture their insights on the school and academic experiences. To facilitate the discussion, I will introduce to you some of the themes the adolescents brought
**Discussion talking points**

Let’s start with the core tier, the **individual** (in this case the student with asthma).

Factors suggested by students’ participants:

- difficulty focusing in class
- performance – academic and physical activity
- struggle making up for missed school days
- social struggle - being looked at, or disrupting others in the classroom

- What do you think about these factors?
- Do you have anything to add to that?
- How do you suggest resolving these issues?
- Any strategies you implement in your school that seem to work/not work, any suggested strategies?

Next, on the **interpersonal level**, students talked about four groups:

Peers – social support, stigma, lack of knowledge about asthma.

Educators - academic support, knowledge of asthma and how to treat it, communication

School nurse - underutilized services, lack of asthma education efforts,

Caregivers – assist with academic material, advocate at the school level, assure asthma management

- What do you think about these factors?
- Do you have anything to add to that?
- How do you suggest resolving these issues?
- Who else (individuals or groups) has a key role in promoting the school experience and success of these students?
- How about the communication between these individuals/groups?
- Any strategies you implement in your school that seem to work/not work, any suggested strategies?

On the **organizational** Students mentioned:

Positive and supportive school culture, although they feel that asthma is not being prioritized like other health conditions.

Some expressed the built environment difficulty getting from one end to another, AC – classroom temperature, cleanliness (dust) stairs, suggested adding make-up sessions and special room for those that need to rest or catch up on missing work.

- What do you think about these factors?
- Do you have anything to add to that?
- How do you suggest resolving these issues?
- Can you suggest other school regulation that will assist these students?

The community level was a bit more difficult to be addressed by the adolescent.

- Can you identify elements (or particular role) in the community that might assist students with asthma to maximize their school and academic experience?
- What are the barriers utilizing these?
- How do you suggest resolving these issues?

Finally, **policy level.** Again, students could not elaborate on this level.

Although they mentioned issues such as:
- real nurse at all time,
- keep a locked inhaler in the classroom for easy access,

Perhaps you can suggest policies that will work in favor of these students.

- Which policies do you think can help a student with asthma improve their school and academic outcomes?

Is there anything else you wish to share about the topic that we haven’t covered today?

Thank you for all your input. I will make sure to email a summary of this discussion to you.