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Signed: \_\_\_\_\_ Yasser S. Almogbel

Date: July 8, 2016

**Parenting Stress and Child's Quality of Life on Parents' Expectation/Satisfaction  
and Medication Adherence with Asthmatic Child's Therapy**

By

Yasser S. Almogbel

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**Parenting Stress and Child's Quality of Life on Parents' Expectation/Satisfaction  
and Medication Adherence with Asthmatic Child's Therapy**

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Dedicated to

My Parents

(Mr. Saleh Almogbel and Ms. Fatimah Albulayhi),

My wife

( Najla),

and My Children

(Saleh, Deemah and Nawaf)

## Abstract

**Introduction:** With about 300 million patients, projected to reach 400 million by 2025, asthma is responsible for about 250,000 premature deaths each year. The prevalence of asthma in the U.S. population has continued to grow. Asthma is a chronic disease that affects more children than adults in the U.S. Adhering to asthma medication is the cornerstone for asthmatic treatments. Asthmatic patients need to continue their treatments to prevent symptoms and the recurrence of asthmatic attacks, but maintaining adherence is challenging for parents with young asthmatic children. Failing to adhere to treatment may increase the risk of exacerbations and emergency room visits. The objective of this study is to examine the effect of parenting stress and the child's quality of life on parents' expectation, parents' satisfaction, and medication adherence by the child.

**Methods:** We conducted an observational cross-sectional exploratory study for the parents of asthmatic children who were under 12 years of age. Using convenience sampling methods, we collected data in asthma and pediatrics clinics in the Houston area. Parents of children with asthma who were visiting an allergy center were able to participate anonymously by completing an online survey about asthma using Qualtrics®. We adapted questions about parental intentions to adhere to asthma medication, parental satisfaction, parental confirmation, and parental expectations from Bhattacharjee (2004). The Parental Stress Scale by Berry et al. (1995), which we used to evaluate parental stress, consists of 18 items representing. For the child's quality of life, we used The Pediatric Quality of Life Inventory™ Asthma Module Short Form (PedsQL™ Asthma Module Short Form). It is a self-administered questionnaire consisting of 22 questions with 3 domains. We also collected demographic data for parents and children as well as

information about other factors that might affect the associations, such as health literacy, insurance, family support, number of medications, and the severity of the disease. We then conducted descriptive analyses and hierarchical linear regression and path analyses.

**Results:** A total of 262 surveys were completed. Respondents' average age was 35.1 ( $\pm 8.9$ ), the majority were female (78.6%), around 66.4% were married, and 55.5% were employed full-time. The most common racial group was Whites (34.7%), followed by Hispanics (33.2%) and African-Americans (25.6%). In the Pearson correlation test, we found a significant correlation between parenting stress with medication adherence ( $r = -0.21, p = 0.0005$ ), parental satisfaction ( $r = -0.3, p = 0.0001$ ), parental confirmation ( $r = -0.33, p = 0.0001$ ), parents' perceived performance ( $r = -0.33, p = 0.0001$ ), and parental expectations ( $r = -0.25, p = 0.0005$ ). The child's quality of life was significantly correlated only with parenting stress ( $r = -0.24, p = 0.0001$ ). In the final model of the hierarchical linear regression, the results indicated a positive relationship between parenting stress and health literacy ( $\beta = 2.05, p < 0.0151$ ), holding other variables constant. There was a negative association between parenting stress and the child's quality of life ( $\beta = -0.162, p < 0.0151$ ), as well as the relationship with the healthcare provider ( $\beta = -0.37382, p = 0.0096$ ) after controlling for other variables. After conducting three path analyses, the model did not fit the data.

**Conclusions:** We found a significant correlation between parenting stress with medication adherence, parental satisfaction, and parental expectations in asthmatic children. However, the child's quality of life, the only significant correlation was with parenting stress. After conducting hierarchical linear regression, we found that only parental expectations and the number of medications were associated with parental

intention to adhere to asthma medications. Meeting parents' expectations is crucial for controlling asthma. Physicians should know and manage their patients' expectations, through education, for example, to increase the likelihood of adherence. Based on the hierarchical linear regression and the correlation test, we found that parenting stress indirectly affects parental intentions to adhere to asthma medication. Controlling parenting stress by controlling actors that can aggravate parenting stress is important because such stress might impact parental expectations and consequently might affect parental intention to adhere to asthma medications.

## Table of Content

Copy Authorization.....	i
Title Page.....	ii
Approval Page.....	iii
Acknowledgement.....	iv
Dedication.....	v
Abstract.....	vi
Table of Contents.....	ix
List of Appendices.....	xiii
List of Tables.....	xiv
List of Figures.....	xv

## Chapter 1

<b>Introduction</b> .....	1
Asthma Around the World.....	1
Prevalence of Asthma in the United States (US).....	1
Cost of Asthma.....	5
Medication adherence .....	6
Role of parenting stress and children's quality of life .....	7
Research Questions.....	8
Dissertation Overview .....	8

## Chapter 2

<b>Background and Literature Review</b> .....	9
Asthma: Definition and Background .....	9
Triggers of Asthma.....	10
Treatment of Asthma.....	11
Scenario about family having a child diagnosed with asthma .....	14
Parenting Stress .....	15
Quality of Life .....	21
Asthma Treatment Goals.....	26
Adherence. ....	27
Satisfaction .....	28
Expectations .....	32
Literature Review for Adherence in Asthmatic Children.....	33
Literature Review for Satisfaction.....	33
Literature Review for Expectation.....	35
Research Objectives.....	36

### Chapter 3

<b>Conceptual Theories and Hypotheses</b> .....	37
Expectation Confirmation Theory Background .....	37
Expectation Confirmation Theory Example .....	40
Conceptual Definitions of the Constructs.....	45
Research Hypotheses.....	46

### Chapter 4

<b>Methodology</b> .....	47
Overview of the Study Design.....	47
Study Design and Participants.....	48
Pretesting .....	55
Data Collection Tools.....	56
Sample Size.....	59
Data Coding.....	60
Assumptions.....	60
Statistical Hypotheses.....	61

## Chapter 5

<b>Results</b> .....	63
Sample Size Illustration .....	63
Descriptive analysis psychometric properties.....	64
Spearman correlation matrix.....	71
Minimum Sample Size Required to Find an Effect of Child's QOL on PS .....	73
The hierarchical linear regression .....	73
Path analyses .....	79

## Chapter 6

<b>Discussion</b> .....	84
Limitations .....	95
Implications.....	96
Future research .....	97
Conclusion.....	97

## **List of Appendices**

APPENDIX A: CONSENT TO ASSIST ON DATA COLLECTION.....	99
APPENDIX B: THE DEPARTMENT INVITATION LETTER TO CLINICS.....	100
APPENDIX C: THE QUESTIONNAIRE ALONG WITH THE CONSENT TO PARTICIPATE IN THE STUDY.....	101
APPENDIX D: THE VARIABLES CODE BOOK.....	110

## List of Tables

Table 1. Dissertation timeline for conducting the study.....	55
Table 2. Sample size calculation using G*Power software.....	60
Table 3. Reliability Test for the Instruments.....	65
Table 4. Descriptive Analysis for Parents.....	67
Table 5. Descriptive Analysis for Children.....	69
Table 6. Simple Statistics for the Tested Constructs.....	70
Table 7. Pearson's Correlation Matrix for the Tested Model.....	72
Table 8. Minimum Sample Size Required to Find an Effect of Child's QOL on PS...	73
Table 9. The Hierarchical Linear Regression for Tested Model for Parental Intention to Adhere to Asthma Medications.....	77 and 78
Table 10. Model Fit for the Path Analysis.....	80

## List of Figures

Figure 1. Proportion of asthmatic patients in the general population around the world .....	2
Figure 2. Prevalence of asthma by race and ethnicity in the United States, between 2001 and 2010 .....	3
Figure 3. Prevalence of asthma attacks among children and adults diagnosed with asthma in United States.....	4
Figure 4. Asthma attack prevalence by gender groups in the United States, between 2008 and 2010.....	4
Figure 5. Asthma attack prevalence among asthmatics by poverty status between 2008 and 2010.....	6
Figure 6. A model of stress, coping, and resilience.....	17
Figure 7. Influences on children’s QOL. ....	26
Figure 8. Hierarchy of satisfaction levels of health .....	30
Figure 9. The theoretical construct in the ECT model. ....	39
Figure 10: The theoretical construct in the ECT model after modification.....	40
Figure 11. An example of ECT.....	42
Figure 12. The proposed model. ....	44
Figure 13. Study design.....	51
Figure 14. Example of the flyer parts. ....	52
Figure 15. The distributed stands. ....	52
Figure 16. Image of the participation card. ....	53
Figure 17. Data collection procedure. ....	54

Figure 18. Patient attrition flowchart. ....	64
Figure 19. Distribution of health disorders among parents. ....	68
Figure 20. First model path model (the original model).....	81
Figure 21. Second model path model (the correlation matrix model). ....	82
Figure 22. Second model path model (the correlation matrix model) .....	83



## CHAPTER 1

### **Introduction**

This research sought to study the relation between parenting stress and children's quality of life on parents' expectation, satisfaction, and medication adherence in asthmatic children. In this chapter, we will briefly introduce the research topic recognize the problems and research questions.

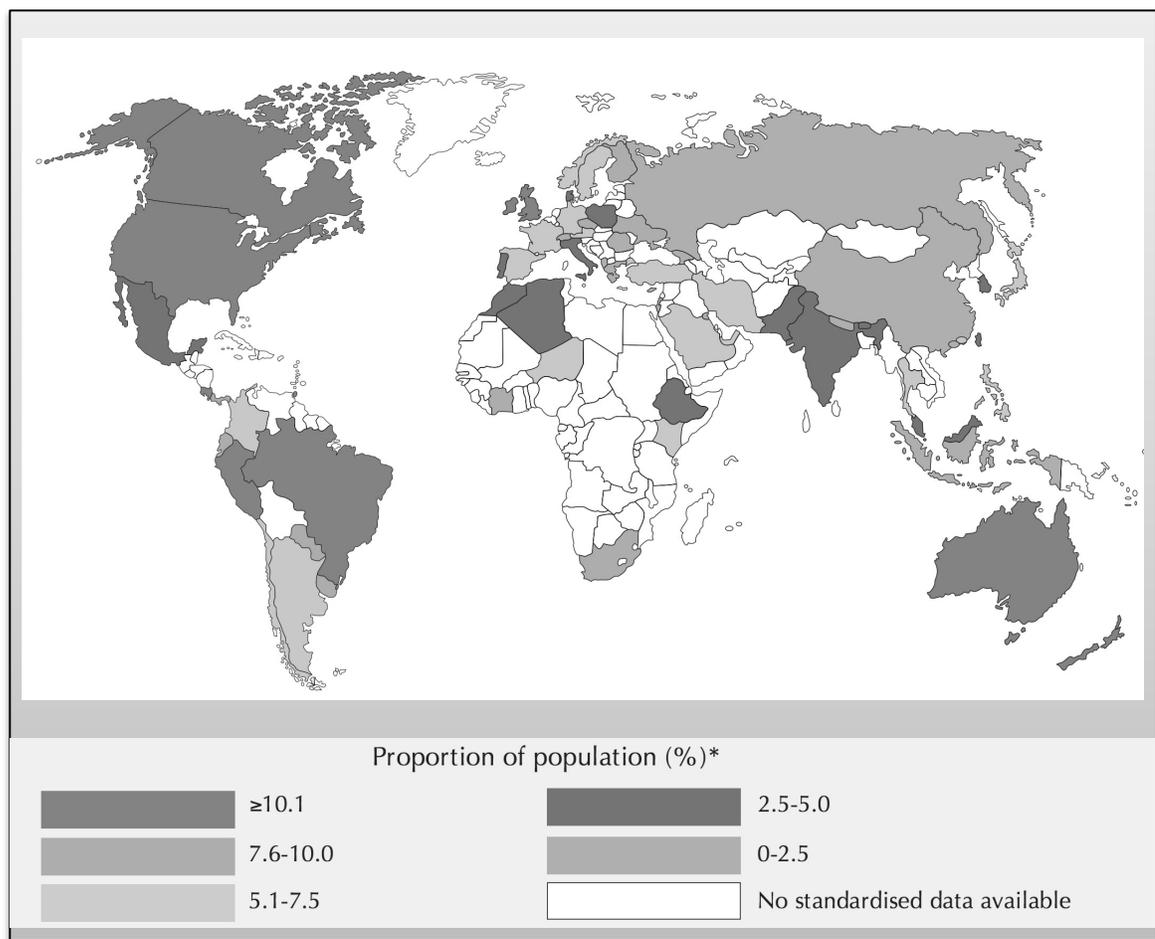
### **Asthma Around the World**

There are an estimated 300 million asthmatic patients worldwide (Cruz, Bousquet, and Khaltaev, 2007). The prevalence of asthma is growing, and it is projected to reach 400 million patients by 2025 (Cruz et al., 2007). Asthma is responsible for about 250,000 premature deaths each year. These deaths can be prevented, as they are caused by a lack of proper treatment (Cruz et al., 2007). Thus, this make low- and middle-income patients more vulnerable to mortality.

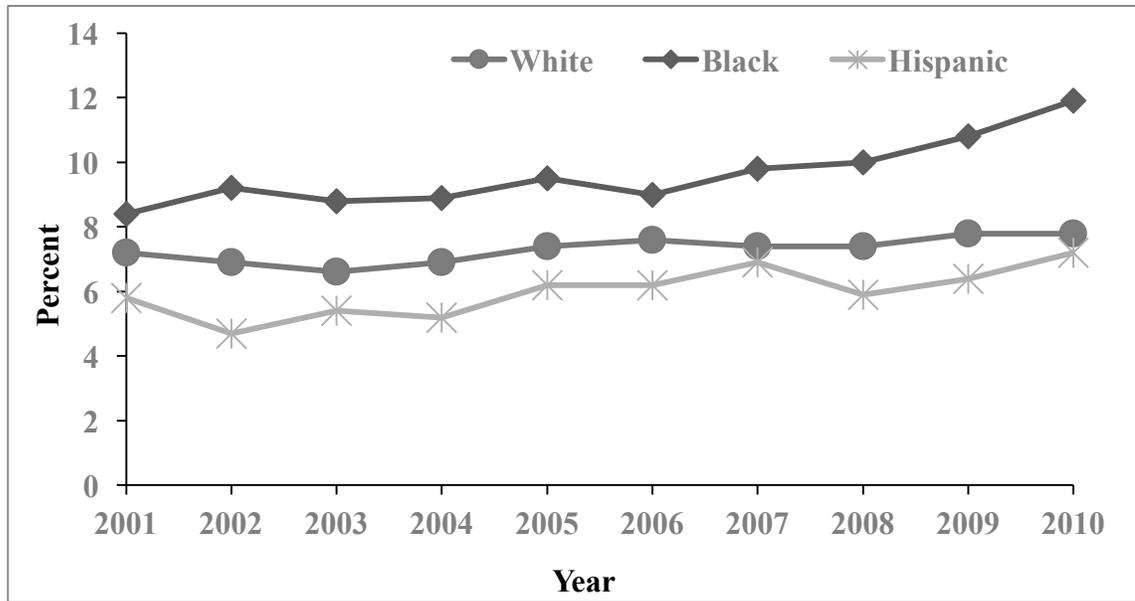
### **Prevalence of Asthma in the United States (US)**

The prevalence of asthma in the total population of the US grew from 20 million (7%) in 2001 to 25 million (8%) in 2009 (CDC, 2011). In 2012, 6.8 million (9.3%) American children had been diagnosed with asthma (Rothwell, Madans, and Gentleman, 2013). As Figure 1 illustrates, the US has one of the highest asthma prevalence rates in the world. Asthma is a difficult and expensive disease that can add more burden to societies, families, and patients. In 2008, 53% of asthmatic patients in the US had at least one attack, and of these, children comprised the highest percentage (57%) (CDC, 2011). In 2010, about two million patients visited an emergency department, and approximately half a million patients were admitted to the hospital because of asthma (CDC, 2011). In

terms of mortality in the US, the CDC (2011) reported that 3,262 asthmatic adults and 185 asthmatic children died from asthma (CDC, 2011). Regarding ethnicity and race, African Americans were more likely to have asthma than White patients. Hispanics were reported to the lower race between African Americans and White patients (see Figure 2).



*Figure 1.* Proportion of asthmatic patients in the general population around the world (Masoli, Fabian, Holt, and Beasley, 2004).



*Figure 2.* Prevalence of asthma by race and ethnicity in the United States, between 2001 and 2010 (CDC, 2011).

Based on data that was collected by CDC between 2001 and 2010, asthma affects more children than adults. In 2001, about 62% of asthmatic children suffered from at least one asthma attack in the past year versus 58.3% in 2010. Despite this decline, their rates were still higher than adult asthmatic patients (Moorman et al., 2012; see Figure 3). In terms of gender, Moorman et al. (2012) reported that more females diagnosed with asthma (52.7%) had asthma attacks within the past year than males (49.2%; see Figure 4).

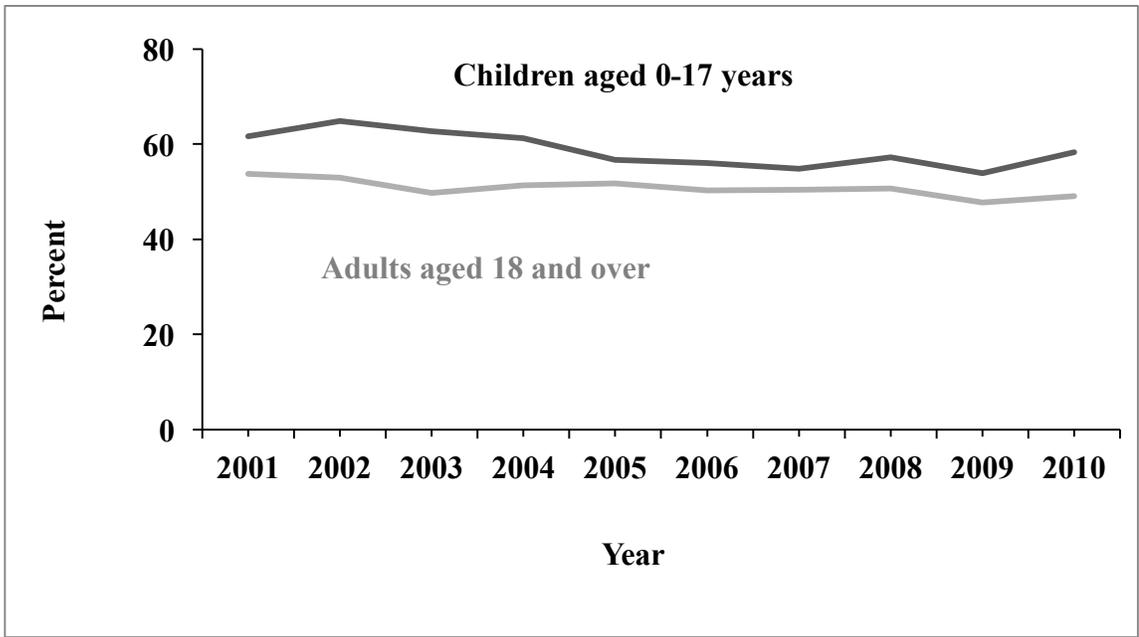


Figure 3. Prevalence of asthma attacks among children and adults diagnosed with asthma in United States (Moorman et al., 2012).

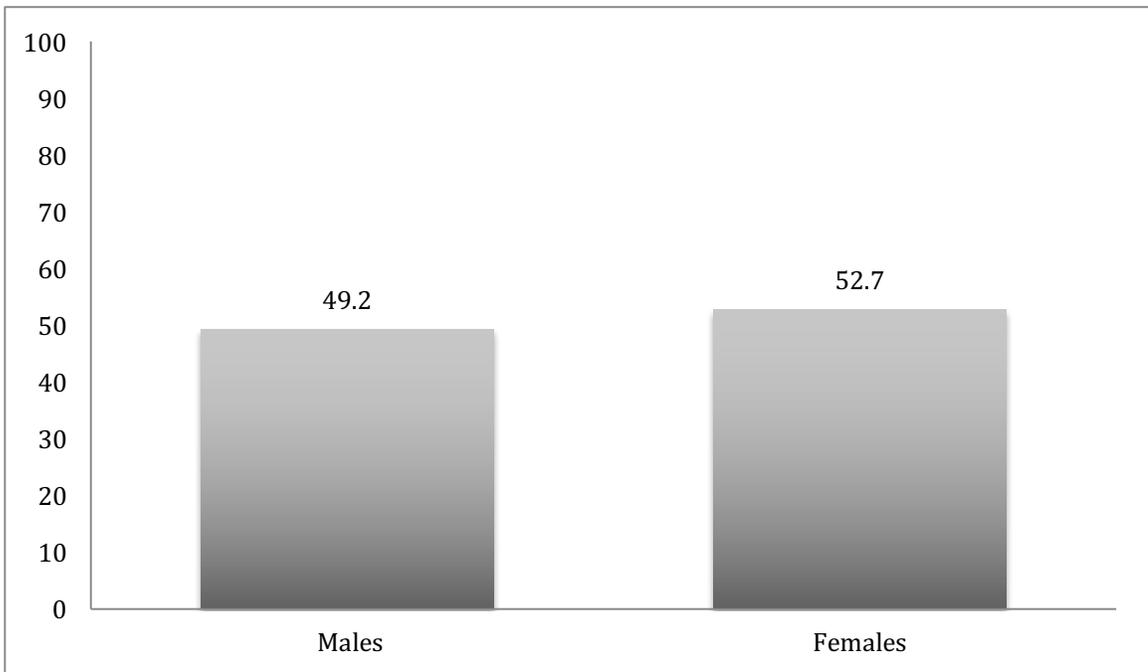
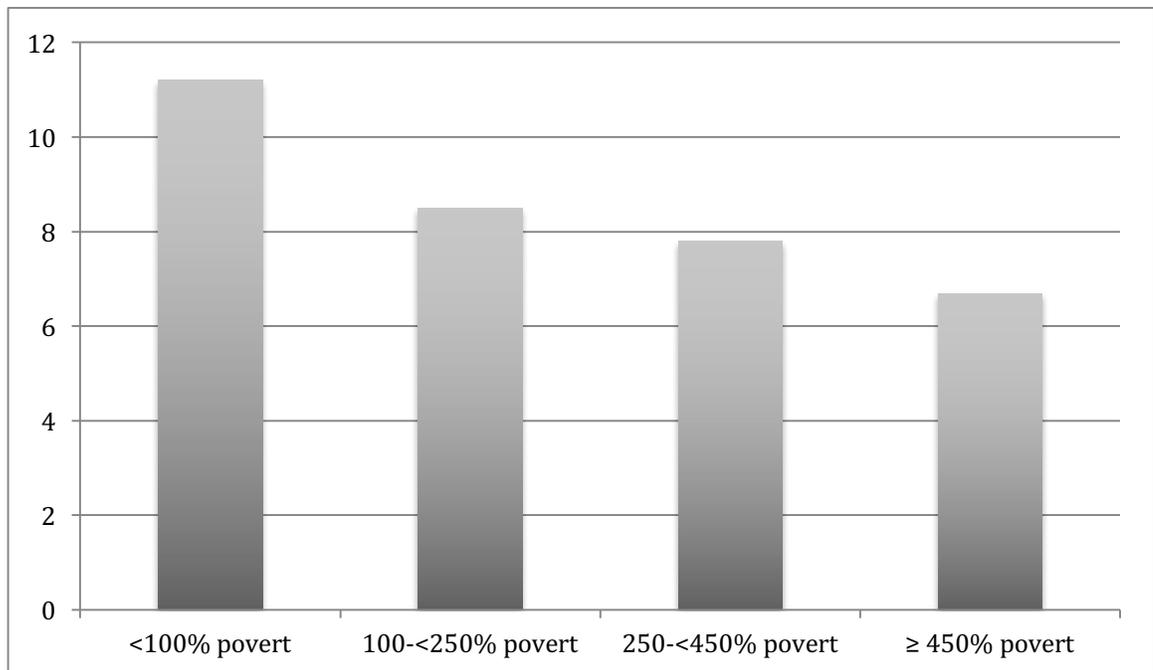


Figure 4. Asthma attack prevalence by gender groups in the United States, between 2008 and 2010 (Moorman et al., 2012).

## **Cost of Asthma**

From 2001 to 2008, each asthmatic patient cost the US \$3,300 per year. This amount includes medical costs and non-medical costs such as missed work, missed school days, and death (CDC, 2011). In 2008, around 30% of adults who experienced an asthma attack missed an average of five days of work (CDC, 2011). Further, about 60% of children who experienced an asthma attack missed approximately four days of school (CDC, 2011). Usually, a caregiver's absences are associated with children's absenteeism due to illness. Thus, an employed parent of a child with asthma has a 60% greater chance of missing four days than a parent whose child does not have asthma (CDC, 2011).

The prevalence of asthma attacks was greater among patients with family incomes less than 100% of the federal poverty threshold (11.2%). The prevalence decreased as family incomes increased, with 8.5% of those whose families earned 100%–250% of the federal poverty level having an asthma attack, compared to 7.8% of those who earned 250%–450% and only 6.7% of those who earned 450% or higher (CDC 2011; see Figure 5).



*Figure 5.* Asthma attack prevalence among asthmatics by poverty status between 2008 and 2010 (CDC 2011).

### **Medication adherence**

Adhering to asthma medication is the cornerstone for asthmatic treatments. Asthmatic patients need to continue their treatments to prevent the symptoms and the recurrence of asthmatic attacks.

Maintaining adherence is challenging for parents with young asthmatic children (Bender, 2002). Adherence to treatment in asthmatic children is low and it is range between ranges between 30% and 70%,(Jentzsch, Camargos, Colosimo, and Bousquet, 2009; McQuaid, Kopel, Klein, and Fritz, 2003; Rand, 2002) Failing to adhere to treatment may increase the risk of exacerbations and emergency room visits (Rand,

2002). Also, it may cause physicians to prescribe overly large doses due to the low effects of the asthmatic medication. The Expert Panel Report 3 in 2007 had three treatment goals for asthma: 1) the control of the symptoms; 2) maintain respiratory function; and 3) meet the parents' expectations.

Medication adherence is achieved by controlling symptoms and maintaining respiratory function and is affected by parents' expectations and satisfaction. Adherence might be negatively affected by low satisfaction in chronic diseases patients (Dang, 2013). Meeting the patients' expectations could also improve satisfaction (Zebiene, 2004).

### **Role of parenting stress and children's quality of life**

Asthma affects a child's symptoms, daily functioning (e.g., school attendance, extra-curricular activities), emotional functioning, social functioning, and family functioning. The exacerbation of asthma may limit the children's activities, and consequently, might affect their emotions and their relations with peers. Asthma exacerbation may also cause a loss of school days. All of those factors might affect the child's quality of life.

Parents caring for asthmatic patients may suffer from the cost medical care. Asthmatic medication is expensive. Also, Caregivers of asthmatic children may suffer from lost days of work. Parents are limited in their normal daily activities because of their asthmatic children (Townsend et al., 1991). Furthermore, the multiple complex regimen of medications can increase the stress on the family (Rand, 2002). In general, patients adhere more to a treatment if it is simple. Thus, stress levels might be elevated and could

affect the child's therapy.

Until now, no studies have explored the effects that a child's quality of life and parenting stress have on medication therapy in asthmatic children.

### **Research Questions**

What is the effect of parenting stress on parental intention to adhere to asthma medications?

What is the effect of parenting stress on child's quality of life on intention to adhere to asthma medications?

### **Dissertation Overview**

Detailed information will be discussed in the further chapters:

Chapter 2: A detailed review about asthma, parenting stress, child's quality of life, intention to adhere, satisfaction and expectation.

Chapter 3: Detailed discussion of theories and hypotheses in this research.

Chapter 4: The methodology to collect and analyze data.

Chapter 5: Results of the descriptive and the statistical tests

Chapter 6: Detailed discussion about the results, implications, limitations and future research recommendations.

## CHAPTER 2

### **Background and Literature Review**

The section describes the asthma disease, triggers and treatment. Then, the next section presents factors that affects intention to adhere to asthma medication. The final section explores the literature review and discusses the objectives of the research.

#### **Asthma: Definition and Background**

Asthma, a Greek word that means “to pant,” was first used by Hippocrates to describe incidental shortness of breath. Aretaeus, a Greek physician in the second century, offered the first definition of the clinical symptoms of asthma (Rosenblatt, 1976; Karamanou and Androustos, 2011). Aretaeus described exercise as a cause of asthma: “If from running, gymnastic exercises or from any other work, the breathing becomes difficult, it is called asthma” (Adams, 1856, p. 73). The National Asthma Education and Prevention Program Expert Panel Report 3 (EPR 3) defined asthma as:

a chronic inflammatory disorder of the airways in which many cells and cellular elements play a role: in particular, mast cells, eosinophils, T-lymphocytes, macrophages, neutrophils, and epithelial cells. In susceptible individuals, this inflammation causes recurrent episodes of wheezing, breathlessness, chest tightness, and coughing, particularly at night or in the early morning. These episodes are usually associated with widespread but variable airflow obstruction that is often reversible either spontaneously or with treatment. The inflammation also causes an associated increase in the existing bronchial hyper-responsiveness (BHR) to a variety of stimuli. Reversibility of airflow limitation may be

incomplete in some patients with asthma.” (National Asthma Education and Prevention Program, 2007)

The World Health Organization defined asthma as a chronic disease identified by frequent and mutable attacks. These attacks cause difficulty of breathing and may cause wheezing because of the airway constructions. Those symptoms may vary based on the severity and frequency of the diseases and differ between patients. Asthma symptoms may be observed multiple times in a day, a week, or a month, depending on the severity of the patient’s asthma. In an asthma attack, the inner layer of the bronchial tubes become swollen, which affects air flow. This difficulty may cause sleeplessness, fatigue during the daytime, low levels of productivity, and absenteeism from work and school (WHO, 2016).

### **Triggers of Asthma**

Symptoms of asthma can be aggravated by several factors, called triggers that affect the severity of the asthma. Respiratory viral infections are the main factor responsible for exacerbating asthma, particularly in children under the age of 10 (Sears, 2008). One major psychosocial trigger is stress. Previous studies found an association between increased stress of patients and worsening asthma (National Asthma Education and Prevention Program, 2007). Bronchoconstriction that is related to psychological factors is caused by parasympathetic input (DiPiro, Talbert, Yee, and Matzke, 2011). Rhinitis, sinusitis, and other respiratory problems are also linked to asthma. Radiographs revealed that about 40% to 50% of patients with asthma showed sinus abnormality, which is considered to be a nonbacterial condition that causes asthmatic reactions from

histologic and anatomical changes (National Asthma Education and Prevention Program, 2007). Gastro-esophageal reflux disease (GERD) and either symptomatic or asymptomatic reflux are common in both adults and children with asthma (National Asthma Education and Prevention Program, 2007). Dust mites are one of the most crucial risk factors for exacerbating asthma; they thrive in humidity greater than 50% and in warm temperatures, residing in soft toys, furniture, carpets, and mattresses (Duffy, Mitchell, and Martin, 1998; Platts-Mills, Sporik, Wheatley, and Heymann, 1995; Sporik, Holgate, Platts-Mills, and Cogswell, 1990). Cockroach allergens also increase the risk of exacerbating asthma in children. Asthmatic children who are exposed to cockroach allergens have reported more wheezing, more emergency room visits, and more hospitalizations than non-exposed asthmatic children (Rosenstreich et al., 1997). Exposure to molds also exacerbate asthma due to an allergic reaction to the spores (Pope, Patterson, and Burge, 1993). Finally, asthmatic children with parents who smoke are at a higher risk of asthmatic attacks; in addition, they have more severe symptoms and more frequent asthma attacks (Martinez, Cline, and Burrows, 1992; Weitzman, Gortmaker, Walker, and Sobol, 1990).

### **Treatment of Asthma**

Asthma cannot be cured but it can be controlled. Asthma medications are divided into two categories: long-term asthma control medication and quick relief asthma medication. These medications are delivered using several different methods (e.g., via pills such as prednisolone and inhalers such as beclomethasone). The pills are taken orally, while the inhalers deliver the drug directly to the lungs to avoid the side effects

associated with corticosteroids (National Asthma Education and Prevention Program, 2007). Long-term control drugs stabilize the majority of patients.

**Long-term control asthma medication.** Long-term control treatment drugs are used on a daily basis to maintain asthma control and prevent the recurrence of asthma. This group of drugs does not alleviate acute asthmatic symptoms, but it controls normal long-term symptoms. Long-term control medications include corticosteroids, cromolyn sodium, immunomodulators, leukotriene modifiers, long-acting b2-agonists, and methylxanthines (National Asthma Education and Prevention Program, 2007).

***Inhaled corticosteroids.*** One of the most-used groups of medications for maintenance therapy or long-term control, corticosteroids are anti-inflammatory drugs that decrease the hyper-responsiveness of the airways and block the migration of inflammatory cells. Corticosteroids are considered to be the most effective long-term medication for adults and children, relieving swelling in the airways. While corticosteroids do not reduce the progression or severity of asthma, daily use of corticosteroids has been found to reduce asthmatic symptoms and the recurrence of symptoms. It is well known that corticosteroids have some side effects, but the benefits outweigh the risks (Department of Health and Human Services, 2102) Thrush, which is an infection, is a common side effect of using inhaled corticosteroids. Decreasing the amount of medicine that settles in the throat or the mouth by using mouth-holding chambers or spacers that are attached to the inhaler alleviates this risk. Short oral systemic corticosteroids are used to gain control of symptoms in patients with asthma. Long-term oral corticosteroids are used for severely asthmatic patients.

***Cromolyn sodium.*** This works by stabilizing mast cells and intervening via a chloride channel. It is not a preferred medication, but it is an alternative option to using a beta agonist. It is also used for exercise asthma and allergen exposure.

***Immunomodulators (omalizumab).*** Also known as anti-immunoglobulin E, this inhibits immunoglobulin E from binding to its receptor. Omalizumab is usually used as an adjunctive treatment for asthmatic patients aged 12 years or older who are sensitive to allergens such as dust mites and who have severe persistent asthma. Omalizumab should be used with caution because it can cause anaphylactic shock.

***Leukotriene modifiers.*** These intervene in the leukotriene mediators' pathways, which are secreted from eosinophils, mast cells, and basophils. Several leukotriene medications are available on the market, including Montelukast, Zafirlukast, and Zileuton.

***Long-acting b2-agonists.*** These are used as maintenance therapy for long-term inhaled control medications. Salmeterol and formoterol are two of the available inhaled bronchodilators from this group; they last for at least 12 hours. This group is not used as monotherapy but in combination with inhaled corticosteroids as adjunctive therapy for moderate to persistent asthma.

***Methylxanthines.*** Theophylline with sustained release is used in mild to persistent asthma. It is considered to be a mild to moderate bronchodilator. Theophylline concentration should be monitored to prevent toxicity.

**Quick-relief asthma medication.** The second group of asthmatic control medications is comprised of quick-relief medications, which are used to control the

exacerbation of asthma or acute symptoms. This group includes anticholinergics, short-acting b2-agonists, and systemic corticosteroids.

*Anticholinergics.* These work by blocking the muscarinic cholinergic receptors and decreasing the vagal nerve tones that control the airway. Ipratropium bromide is an example of a medication from this group; it is used in the emergency room for patients that cannot tolerate short-acting b2-agonists.

*Short-acting b2-agonists.* These bronchodilators are used for alleviating acute symptoms. This group includes several medications such as albuterol, pirbuterol, and levalbuterol. Using short-acting b2-agonists more than twice in a week to relieve acute symptoms may indicate that the dose of the maintenance control asthma medications should be increased. Systemic oral corticosteroids are used in moderate to severe exacerbations in combination with short-acting b2-agonists to aid recovery from exacerbations and acute symptoms.

**Scenario about family having a child diagnosed with asthma:**

Sara and James have been married for seven years and have three children: (a) Bill is a six-year-old boy, (b) Mary is a four-year-old girl, and (c) Johan is one-year-old boy. Sara is a full-time employee, and she feels exhausted and always behind in her work and housework. James is a full-time engineer who is always at work and sometimes on call. Bill is an asthmatic patient who may have an asthma attack during the night which might lead to an emergency room visit. Even if he were not admitted to the hospital, he would most likely have to be absent from school and stay at home. His medical condition might affect both his parents' work and his performance at school. Asthma is affecting Bill's quality of life by limiting his activity and freedom. In addition, they should take

care with his medications and avoid any triggers that can affect his disease, such as pets, grass, chemicals, and physical activities. Sara and James have two other children who are younger than Bill and also need parenting, especially the one-year-old child. These increased demands on the family will increase the risk of having parenting stress (PS). Therefore, the family has a crucial need to control Bill's asthma to alleviate the parents' stress that might affect their adherence to asthma medications.

### **Parenting Stress (PS)**

To begin, the concept of stress must be defined. Stress in general is “any uncomfortable emotional experience accompanied by predictable biochemical, physiological and behavioral changes” (Baum, 1990, p. 653). Sarafino in 2014 defined stress as the inconsistency between the demands of individuals and the available resources that would be used to fulfill this requirement or demands (Sarafino and Smith, 2014).

In 1915, Walter Cannon proposed the Stress Fight or Flight Theory, which was one of the first to discuss stress (Ogden, 2012). This model indicated that arousal and rate of activity would be increased by facing an external threat that affected individual. The result would be to trigger the individual's fight-or-flight response, giving the individual two choices: either face the situation or escape from it.

The modern model of stress broke down stress into stages, as described below.

- Stage one: An external demand or pressure begins to affect the individual, such as a new responsibility (presentation or needing to completing an important project; see Figure 6).

- Stage two: If the individual perceives the external demand or pressure as a stressful situation, then this triggers stress. The individual categorizes the situation negatively, perhaps by thinking “It’s too difficult” or “I cannot do it.” Also, the person might imagine some scenario such as being lost while giving a speech (presentation). In contrast, some people may be able to adapt to this demand and consider it a challenge to be enjoyed. Such an individual may feel equipped and knowledgeable enough to cope with and control the stressor.
- Stage three: An individual will have responses to stress that are behavioral, psychological, and physiological. The physiological response involves the release of hormones that are responsible for stress (e.g., adrenaline and noradrenaline that have an effect on different organs such as the heart and lungs). Sugars will be sent out into the blood stream to provide energy.
- Stage four: Individuals begin to reappraise and reevaluate the original situation or condition before deciding if they have effectively resolved the problem. If the problem has been resolved, controlled or managed, the response of the stress will be switched off and vice versa.
- Stage five: An individual reaches this stage if the external stress effect has not been removed or controlled efficiently, resulting in physical or psychological problems.
- Stage six: If an individual reaches stage six, the result might be an increase in negative effects on work as a result of physical or psychological stress.

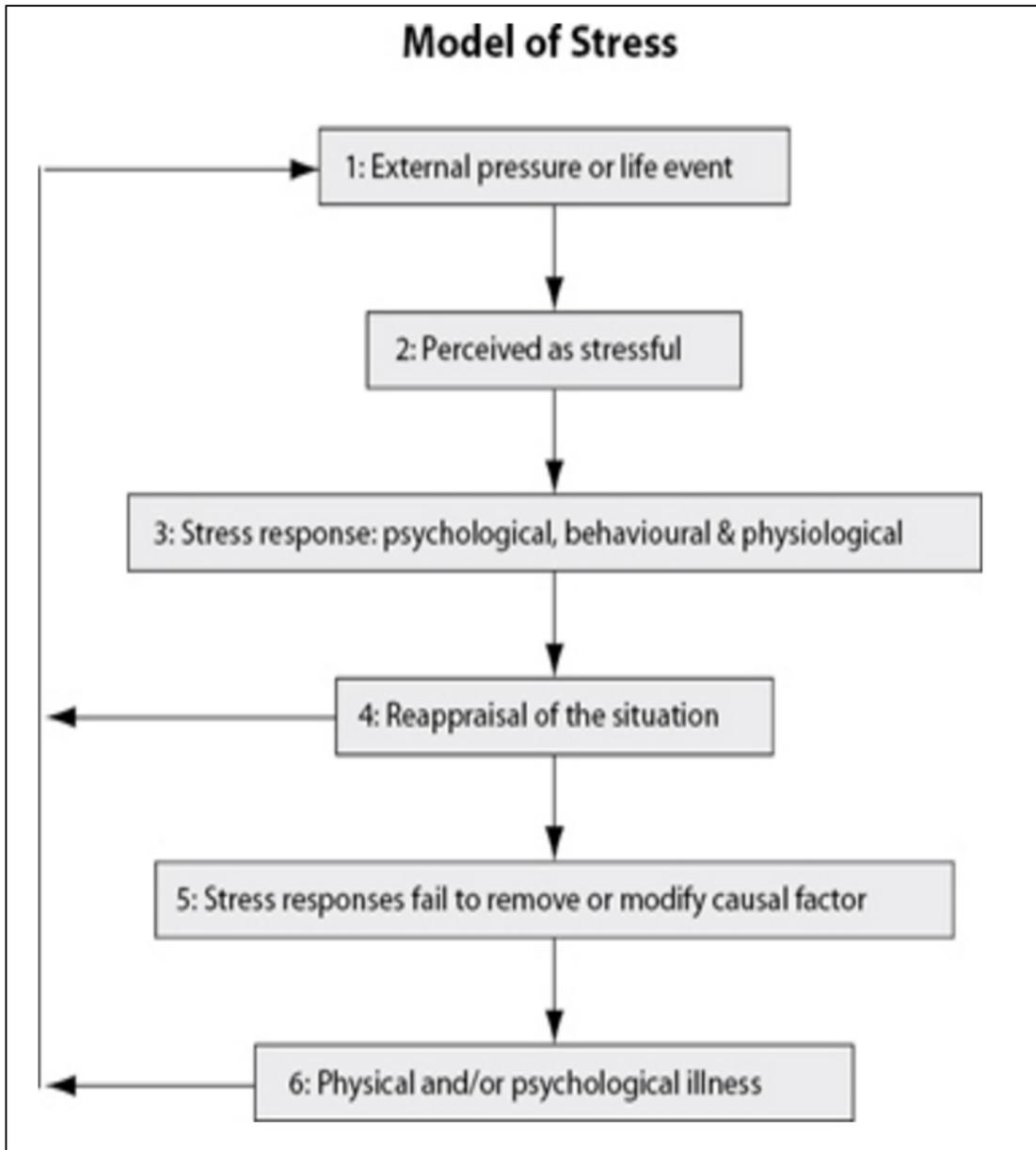


Figure 6. A model of stress, coping, and resilience (Palmer and Strickland 1996).

In the 1950s, Lazarus and Selye developed the theory of general adaptation syndrome (GAS), which has three stages (Ogden, 2012). The first stage is the alarm stage, defined as an elevation in activity that happens directly after exposure to a stressful

event or situation. After that, the individual enters the resistance stage, which is the coping stage to reverse the effect. Finally, the third stage is called the exhaustion stage. At this stage, the patient has faced multiple continuous stressful factors and been unable to catch up with them.

In another way, stress can be categorized in two categories:

1. Eustress, which is known as “good stress” or “positive stress,” is the general response to fulfill any demand requested (Selye, 1936).
2. Distress, which is known as “bad stress” or “negative stress,” may take place when the demand exceeds tolerability and the body will not be able to maintain homeostasis (Fevre, Matheny, and Kolt, 2003). Individuals who have high levels of stress might develop physical or mental diseases (Brown and Harris, 1989).

The cost of stress is very high. Studies have found that stress is linked to different diseases (Palmer and Cooper, 2013), including heart attack, angina, high blood pressure, diabetes, ulcers, cancer, rheumatoid arthritis, and psychological diseases (e.g., depression, anxiety).

Being a parent for the first time will change the parent’s life and will open a new world filled with challenges and responsibilities. Some parents are concerned about their children, responsibilities, relationship changes (within the family and outside the family), and mental and physical health conditions that might affect their performance at work and/or home. Children bring various challenges including psychological demands (affection, attention, and help in controlling emotions) and survival demands (feeding and protection) (Deater-Deckard, 2008). Stress may be more among poor or/and minority group individuals (Sarafino and Smith, 2014)

While parenting has many different meanings for individuals, almost all parents agree that parenting is difficult, stressful, and requires adaptation. The day-to-day stress of caregivers becomes one of the most important aspects of parenting in terms of mental health and functioning, and it might affect the parent–child relationship (Deater-Deckard, 2008). PS has a stronger impact on children’s development and parenting behavior than work stress (Creasey and Reese, 1996; Quittner, Glueckauf, and Jackson, 1990). In a study involving a sample of homeless families, those families were at risk of having physical and mental health problems due to different types of stress, including PS (Gorzka, 1999). Regarding parent resources, parents should have enough physical and mental supporters such as survival protection, knowledge, and emotional support from others. Survival protection includes food, housing, and income (Deater-Deckard, 1996).

The cornerstone of PS theories is the balance between demand and available resources (Hobfoll, 2004; Lazarus, 2006). Thus, stress is negatively associated with resources and positively associated with demands (Goldstein, 1995). PS is defined as “as the aversive psychological reaction to the demands of being a parent and are perceptions made by the parent in the context of the parenting role” ( Bender and Carlson, 2013, p. 113). Deater-Deckard (2008) noted that “parenting stress can be defined succinctly as a set of processes that lead to aversive psychological and physiological reactions arising from attempts to adapt to the demands of parenthood” (p. 6). It is likely that all parents have PS as the negative feelings come from the parenting role in taking care of a child; however, when it increases, negative outcomes can occur (Deater-Deckard, 1998). Because PS is an important measure for parents with diseased children, it was used to evaluate stress caused by asthmatic children. High levels of PS can decrease parents’

ability to implement interventions for their children (Kazdin, 1995). What follows are the factors that influence PS.

### **Factors That Influence PS in Children with Asthma**

**Complexity of treatment.** Between 28% and 68% of patients do not use an inhaler in the correct manner to benefit from the prescribed medication (Fink and Rubin, 2005). Treatment plans change based on symptoms (Bender, 2002), and multiple, complex medication regimens increase the burden on the family. Patients are more likely to adhere to a treatment plan if it is simple (Bender, 2002).

**Refusal to take medication.** More than 50% of children refused to take their medication because of its taste, and 75% of their parents were noncompliant in giving medications (Milne and Bruss, 2008).

**Cost of treatment.** Asthmatic medication is expensive (Bender, 2002). Rosenthal (2013) discussed the high prices of asthma medication in a *New York Times* article. For example, the price of a Pulmicort inhaler is \$175 in the US, but in the United Kingdom, it costs the equivalent of \$20 (Rosenthal, 2013). About two in five uninsured and one in nine insured asthmatic patients cannot afford their asthma medication (CDC, 2011). In addition, parents of asthmatic children may suffer from lost days of work. Wang, Zhong, and Wheeler (2005) reported that more than 50% of indirect costs regarding parents' loss of productivity can be prevented by effective treatment of their children's asthma. They also reported that the direct medical cost of an asthmatic child was approximately double the medical cost of a child without asthma.

## **Quality of Life (QOL)**

QOL is one of the outcomes of asthma management and the end point in clinical studies (Hallin, Sullivan, and Kreuter, 2000; Juniper et al., 1992). One of the main goals in controlling chronic diseases is to improve the QOL by controlling the effect of the disease on the patient (Carr, Higginson, and Robinson, 2003). Severely diseased patients may score low in QOL (Carr et al., 2003). QOL in children may differ from QOL in adults because of the difference of age (Carr et al., 2003). Diseases and their outcomes can affect the lives of children and their families (Carr et al., 2003); in particular, asthma impacts the QOL of both children and their primary caregivers (Schmier, Chan, and Leidy, 1998).

QOL is a broad concept that covers all aspects of life (Calman, 1984). Bowling (1995) defined *quality* as the characteristic degree of excellence. Aristotle presented the idea of QOL in around 300 BC (Bowling, 1995). The term *quality of life* did not exist at the time, but Aristotle mentioned that “both the multitude and persons of refinement conceive ‘the good life’ or ‘doing well’ to be the same thing as being happy” between 384 and 322 BC (Fayers and Machin, 2007, p. 1981). People may evaluate various areas of life when considering their QOL, making it an individual measure. A broad definition may cause overlapping between the developed models of QOL (Carr et al., 2003).

The concept of QOL, which became more popular after World War II, evolved in the social sciences in the 1960s to cover well-being in the population and to measure individuals’ subjective experiences and evaluate the effect of chronic disease (Campbell, 1976; Hallin et al., 2000). Although QOL has been researched for years, no concise definition has been established (Bowling, 1995). Schipper, Clinch, and Olweny (1996)

defined QOL as “the functional effects of an illness and its consequent therapy upon a patient, as perceived by the patient” (Schipper, Clinch, and Olweny, 1996). Campbell (1976) defined QOL as “a term that everyone can understand but very few can define. It is a vague and ethereal entity, something that many people talk about but which nobody clearly knows what to do about” (Campbell, 1976). Broadly, according to Bowling (1995), QOL means the level of a patient’s life regarding a different lifestyle that may be limited by health. QOL may also be affected by non-health factors such as income, marital status, and social aspects (Janssens, 2001). The World Health Organization Quality of Life (WHOQOL) definition is

an individual’s perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, and standards and concerns. It is a broad-ranging concept affected in a complex way by the person’s physical health, psychological state, level of independence, social relationships, and their relationships to salient features of their environment.

(WHOQol Group, 1994)

“Quality of life in relation to health” or “health-related quality of life” (HRQOL) has been used for illness. It was used to measure mental and physical drop, impairment, and social functioning. The definition of HRQOL measures shows a general theme that presents how individuals define their health or illness (ability to complete tasks such as dressing oneself.). The main concept of HRQOL is how concerned individuals are with the effect of the disease and whether this impairment or this disease can limit their ability to fulfill their normal daily activity, such as climbing stairs. However, HRQOL does not focus on how or why patients rated themselves in this way (Carr et al., 2003). HRQOL is

a multidimensional concept that captures participants' perceptions of crucial factors that affect their everyday lives. HRQOL focuses on the effects of an illness and specifically on the impact treatment may have on QOL (Calman, 1984). HRQOL was defined by Juniper (1997) as "the component of overall quality of life that is determined primarily by the person's health and can be influenced by clinical interventions." Wenger, Mattson, Furberg, and Elinson (1984) defined it as "a wide range of capabilities, limitations, symptoms and psychosocial characteristics that describe an individual's ability to function and derive satisfaction from a variety of roles" (p. 908). Jones et al. (1995), who suggested renaming HRQOL as "health status," defined it as the "quantification of the impact of disease on daily life and well-being in a formal and standardized manner." (p119). Schipper et al. (1996) defined HRQOL as "the functional effects of an illness and its consequent therapy upon a patient, as perceived by the patient" (p. 11). As these various definitions illustrate, researchers have reached no consensus on a single definition for HRQOL. In contrast, there more trend to agree to a constant concept (Carr et al., 2003).

Although the terms *functional status*, *QOL*, *HRQOL*, and *perceived health status* have been used interchangeably, there are slight differences in the dimensionality, scope, and perspective of the terms (Revicki et al., 2000). Also, other factors such as age, socioeconomic status, gender, and support from relatives or society may be considered as confounders of QOL (Ford et al., 2003). HRQOL measures are used as primary and secondary outcomes in clinical trials (Fayers et al., 1997; Shikiar and Rentz, 2004). HRQOL can also be used as a predictor for satisfaction with the treatment (Shikiar and Rentz, 2004). Hospitalization, medical interventions, and survival uncertainty may have a

negative impact on children. Thus, it is important to evaluate children's QOL efficiently. Any deficiency or shortage in the conceptual models of the QOL in children will affect the development of a valid measure for children's QOL (Carr et al., 2003).

### **Influences on Children's QOL**

**Asthma severity.** Children with more symptoms typically have higher levels of impairment in their day-to-day lives. A study conducted on 183 American children found that children with persistent asthma had higher absenteeism from school than did those children with mild intermittent asthma (5.79% versus 3.56%, respectively) (Horner, Kieckhefer, and Fouladi, 2006). A study of 200 American families found a significant correlation between asthma symptoms and QOL in children (Zorc et al., 2006).

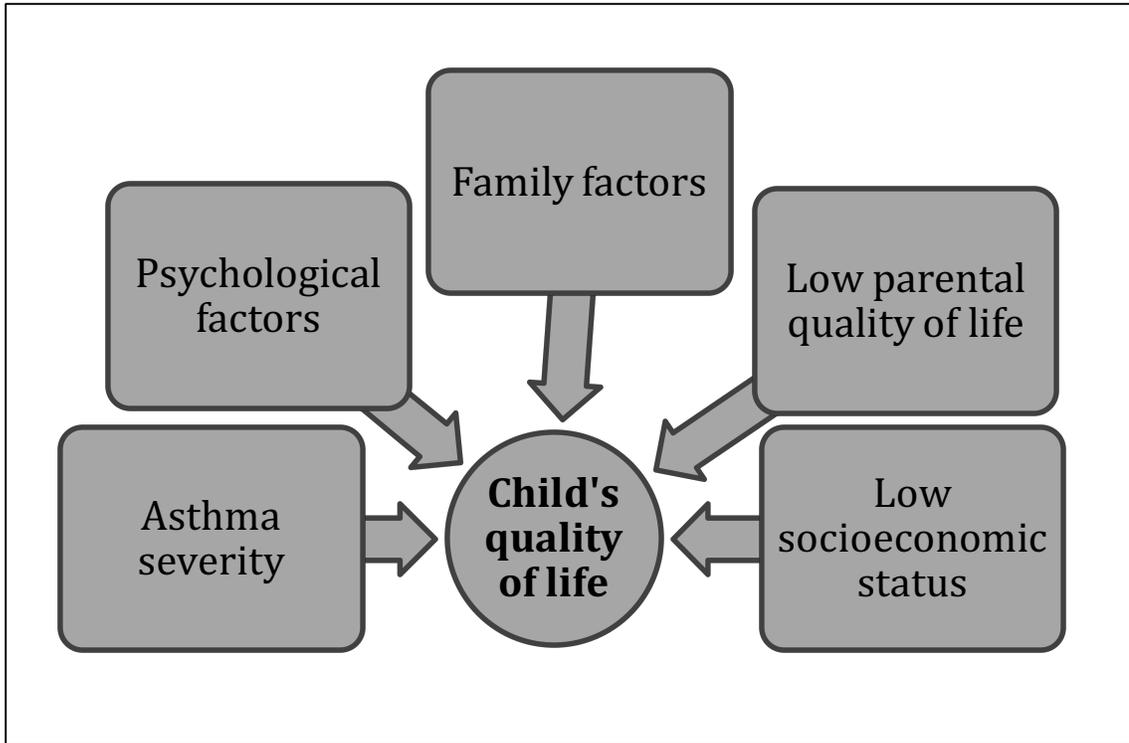
**Psychological factors.** A study of 64 adolescents suggested that psychological factors (e.g., anxiety) significantly influenced asthma-specific QOL (Hommel, Chaney, Wagner, and McLaughlin, 2002).

**Family factors.** These also play a role in the QOL of asthmatic children. Family functioning is one of those factors. A study of 84 Australian parents of children aged 7 to 12 years found that the children's QOL influenced family functioning (general functioning, problem solving, communication, roles, affective responsiveness, affective involvement, behavior control) (Sawyer, Sawyer, Spurrier, Kennedy, and Martin, 2001). Family stress level is another family factor that can affect a child's QOL. A study of 51 American parents of children aged 4–17 years reported that having a low QOL for their child was associated with high PS (Clougherty, Levy, Hynes, and Spengler, 2006). Low parental QOL is the third of the family factors. A study of children aged 3–7 years with mild persistent to severe persistent asthma found a significant correlation between the

children's asthma and parental QOL which consequently affect Child' QOL (Haltermann et al., 2004). Low socioeconomic status may also affect a child's QOL. A study of 99 American patients (aged 9–17 years) with one caregiver found that both the patients' and the caregivers' QOL were significantly related to household income (Erickson et al., 2002). Figure 2 illustrates the various influences on children's QOL.

**Low parental QOL.** A parent's QOL influences the child's QOL. In a study conducted on 100 adolescents with asthma (aged 12–19 years) found a significant positive correlation between children's QOL and parental QOL (Vila et al., 2003).

**Low socioeconomic status.** Income can affect the QOL in children. A study conducted on 99 American patients (aged 9–17 years) with one caregiver revealed that both the patient's and the caregiver's QOL were significantly related to household income (Erickson et al., 2002; see Figure 7).



*Figure 7.* Influences on children’s QOL.

### **Asthma Treatment Goals**

The EPR 3 includes the most recent guidelines for the diagnosis and management of asthma. The EPR 3 has three goals for asthma control. The first two goals are controlling symptoms and maintaining respiratory function, which can be achieved by administering appropriate treatment (based on the physician’s expertise, which is beyond the scope of the current study) and by parents’ adherence to treatment regimens. Meeting parents’ expectations and satisfying them comprise the second section of the EPR 3. Thus, the current study uses the EPR 3 to examine the effect of PS and children’s QOL on parents’ adherence to treatment and meet their expectations and satisfaction.

**Adherence.** Non-adherence to asthma medication regimens is linked to poor outcomes; as such, maintaining adherence is crucial for asthmatic patients, especially children (Busse, 1998). A low level of adherence may cause physicians to prescribe overly large doses of medication due to the low effects of the asthmatic medication. In this situation, doctors think that patients need more aggressive treatment, but the reality is that they are not taking their medication. On the other hand, under dosage or insufficient treatment may increase morbidity and mortality in patients with asthma as well as increase the cost of treatment (Elliott, Barber, and Horne, 2005; Stempel et al., 2005; L. Williams et al., 2004).

The terms *adherence*, *compliance*, and *concordance* have been used interchangeably. They appear in the literature to describe the level of agreement and commitment between doctors and patients about medication regimens. Sabaté et al. (2003) defined adherence as “the extent to which a person’s behavior – taking medication, following a diet, and/or executing lifestyle changes, corresponds with agreed recommendations from a health care provider.” (p.3). The International Society for Pharmaco-economics and Outcomes Research (ISPOR) gave a different definition for each aforementioned term. ISPOR defined *compliance* as “following doctors’ orders” and *adherence* as “the extent to which a person’s behavior corresponds with recommendations from a health care provider,” which is an advanced level of compliance. Finally, ISPOR defined *concordance* as “shared decision-making, a coming to an agreement that respects the patients beliefs and wishes” (Berger, Binglefors, Hedblom, 2003) This last term is used mostly in England to describe the relationship between a patient and a prescriber regarding the prescription (Horne, 2006).

In the literature, non-adherence is subcategorized into unintentional or intentional. Lacking the ability to understand the instructions on how to use an inhaler is an example of unintentional non-adherence. However, refusing or intentionally not taking medication is categorized as intentional non-adherence (Gillissen, 2007).

**Satisfaction.** The last 20 years have witnessed an increased interest in patient satisfaction regarding healthcare services (Aharony and Strasser, 1993; Bradley and Lewis, 1990; Etter, Perneger, and Rougemont, 1996; Hall, 1997; Harpole, Orav, Hickey, Posther, and Brennan, 1996; Kaplan and Olsson, 1996; Shikiar, Halpern, McGann, Palmer, and Seidlin, 1999; Sitzia and Wood, 1998; Weaver, Markson, Frederick, and Berger, 1997). This was prompted by patients' increasing wish to be evaluated as active consumers of healthcare services instead of as passive recipients (Shikiar and Rentz, 2004).

Feedback from customers is crucial to meet their expectations about goods and services, including medical services (Shikiar and Rentz, 2004). Satisfaction with healthcare is one component that the National Committee for Quality Assurance (NCQA) uses to evaluate healthcare plans (Thompson, Bost, Ahmed, Ingalls, and Sennett, 1998; Weaver et al., 1997). Thus, pharmaceutical and medical companies solicit patients for input about their medications or services by asking questions such as "Are our patients satisfied with our medication?" and "How satisfied are our patients compared to patients on our competitor's products?" (Shikiar and Rentz, 2004). Shikiar and Rentz (2004) defined *satisfaction*, which was similar to Weaver et al.'s (1997) definition, as "the patient's evaluation of the process of taking the medication and the outcomes associated with the medication." (p 205). Mittal and Frennea (2010) defined customer satisfaction as

“customer satisfaction a customer’s post-consumption evaluation of a product or service” (Mittal and Frennea, 2010).

The current study focuses on medication satisfaction and excludes the effects of other factors such as satisfaction with treatment experience, which includes the provider’s experience (Shikiar and Rentz, 2004). Shikiar and Rentz (2004) divided satisfaction with treatment into a hierarchical pyramid (Figure 8). The lower level broadly comprises satisfaction with treatment experience, which includes medication satisfaction regarding all of the factors that affect medication delivery, such as accessibility and physician–patient relationship, and other factors including quality of medical facilities and medical staff responsiveness.

The top of the pyramid is about satisfaction with medication, which is the current study’s focus. It is less broad and comprises patients’ satisfaction with their medications, including therapy and procedures. It also includes patient–physician interaction. This does not mean that the broader sections are not important, but the study requires a narrow focus in order to gain precise answers to its questions.

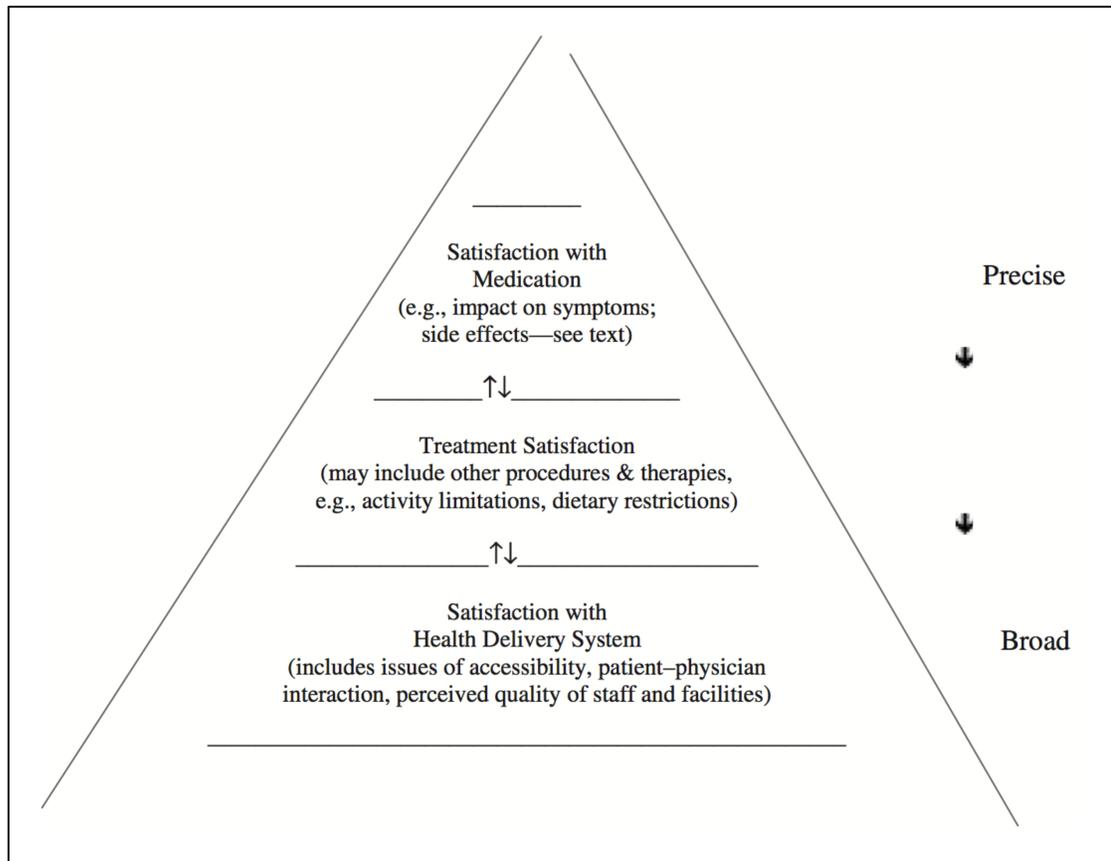


Figure 8. Hierarchy of satisfaction levels of health (Shikiar and Rentz, 2004).

### Measuring Patients' Satisfaction

This measurement is important in patient-reported outcomes for several reasons. First, patients' medication satisfaction may affect their medication adherence, which is a complicated issue (Christensen and Johnson, 2002; L. Stockwell Morris and Schulz, 1992; Lisa Stockwell Morris and Schulz, 1993; Murphy and Coster, 1997; O'Brien, Petrie, and Raeburn, 1992; Roter et al., 1998). However, few studies have proven a link between patients' satisfaction and their adherence. The gap in this area of research is because most studies have focused on satisfaction with care and not satisfaction with medications (Shikiar and Rentz, 2004). To be more precise, the current study concentrates on the effect of medication on adherence, which is at the top of the

triangle.

Second, having patients' satisfaction feedback about their medication is crucial for improving adherence and determining the factors that affect taking medication. Improving medication adherence cannot be done without improving satisfaction (Shikiar and Rentz, 2004).

The outcome of taking medications (e.g., reduction in symptoms, changes in HRQOL) may impact patient satisfaction. Patient satisfaction is an important factor in healthcare and has been targeted as one issue for physician reimbursement in the US (Hudak, Hogg-Johnson, Bombardier, McKeever, and Wright, 2004); thus, healthcare providers intend to satisfy their patients by providing healthcare services that meet their needs (Hudak et al., 2004).

One of the goals of the EPR 3 is to create high-level satisfaction and meet expectations in asthmatic patients and their families (National Asthma Education and Prevention Program, 2007). Mittal and Frennea (2010) confirmed that, in marketing, a high level of satisfaction results in higher customer loyalty and favorable referrals. This concept will be used to detect the effect of satisfaction on intention to adhere for parents of asthmatic children in a similar manner to how it was used in patients with Human Immunodeficiency Virus (HIV) (Dang, Westbrook, Black, Rodriguez-Barradas, and Giordano, 2013). Patients' satisfaction can be achieved if there is high patient loyalty, which can be earned by fulfilling their expectations (Duckro, Beal, and George, 1979). This study predicted that expectation may affect satisfaction; therefore, it could also affect parents' intention to adhere to treatment regimens.

## **Expectations**

Today, expectations about treatment are created via information from the internet, doctors, friends, and family members. Current experience is also considered to be one way of building expectations (Jayasankar, 2009). Williams, Weinman, Dale, and Newman (1995) defined *expectations* as a patient's needs and requests before deciding to go to a physician. Buetow et al. (1995) defined it as the combination of want and prediction.

There is a growing interest in patients' expectations in the field of medical care, which shows that providers have begun to deal with patients as active consumers instead of as passive consumers (Afkhamebrahimi et al., 2012). A higher level of expectation is linked to greater satisfaction with care and vice versa. Also, satisfaction is correlated with intention to do something. For example, a patient's satisfaction with a consultation would be correlated with his or her intention to change doctors (Afkhamebrahimi et al., 2012). Patients who are seeking medical advice for a disease have certain expectations. If these are not met, the patients will not be satisfied (Kravitz, Cope, Bhrany, and Leake, 1994). Less satisfaction leads to less compliance with the physician's recommendations (Holloway, Rogers, and Gershonhorn, 1992). Further, the dissatisfied patient may continue to call or visit the physician until his or her expectations are met or choose another provider.

## **Literature Review**

### **Adherence in Asthmatic Children**

Adherence to treatment regimen in asthmatic children ranges between 30% and 70%, with the majority of studies around 50% (Jentzsch, Camargos, Colosimo, and Bousquet, 2009; McQuaid, Kopel, Klein, and Fritz, 2003; Rand, 2002). Maintaining adherence in children is challenging (Bender, 2002), but failing to adhere to treatment might increase the risk for exacerbations and emergency room visits (Rand, 2002).

### **Stress and Intention to Adhere**

Lou, Yu, Hsu, and Dai (2007) found a significant association between stress and intention to quit in 91 male nurses from Taiwan. Abualrub and Al-Zaru (2008) found a significantly negative correlation between job stress and intention to stay at work among 206 Jordanian staff nurses.

### **QOL and Intention to Adhere**

Lee, Dai, Park, and McCreary (2013) found that quality of work life was a significant predictor of intention to leave in 1,412 Taiwanese nurses.

### **Effect of Satisfaction on Children**

Satisfaction is defined as the patient's evaluation of the process of taking the medication and the outcomes associated with the medication (Shikiar and Rentz, 2004). Marketing studies have found that positive satisfaction impacts customer favor, referral of the product or service, and loyalty (Mittal and Frennea, 2010). Adherence might be negatively affected by low satisfaction in patients with chronic diseases (Dang et al., 2013).

## **Stress and Satisfaction**

Elangovan (2001) found a significant association between stress and intention to quit in 155 Canadian graduate business students. Hassall et al. (2005) revealed a significantly negative correlation between job stress and intention to stay at work in 46 mothers in England (Hassall et al., 2005). E. S. Williams et al. (2007) found that job stress negatively affected job satisfaction in 500 American physicians. Dunning and Giallo (2012) found that PS was significantly associated with lower parenting satisfaction in 185 parents with children aged 0–5 years. Bigras et al. (2012) found that parental satisfaction with daycare was a significant negative predictor of PS in 163 families of four-year-old Canadian children.

## **QOL and Satisfaction**

A study on 1,348 type 2 diabetic patients in the Netherlands investigated the relationship between satisfaction of treatment and HRQOL, finding a significant correlation between the two (Redekop et al., 2002). Sanda et al. (2008) revealed that changes in QOL were significantly associated with the degree of outcome satisfaction among patients in 1,201 Americans who survived prostate cancer. Furthermore, Michaud, de Grandmont, Feine, and Emami (2012) found a positive association between oral HRQOL and denture satisfaction in 1,255 Canadian elderly edentate patients. Chinomona and Dhurup (2014) studied 320 employees from Zimbabwe to evaluate the association between quality of work life and job satisfaction. They found that quality of work life positively influenced employee job satisfaction.

### **Stress and Expectations**

Viana and Welsh (2010) evaluated the predictors of PS and found a significant relation between expectations and PS in 143 internationally adopting mothers. This study found that expecting more child development problems was significantly associated with PS within the six months after adoption.

### **QOL and Expectations**

In 1997, Wan, Counte, and Cella conducted a study on 466 American inpatient and outpatient subjects diagnosed with cancer to examine the effect of personal expectations on HRQOL. They found a strong positive association between personal expectations and patient HRQOL. Another study on 30 adult cancer patients to evaluate the effect of QOL on patient expectations found that the QOL of patients might have an effect on benefit expectations from experimental therapy (Cheng et al., 2000).

### **Satisfaction and Adherence to Medication**

Marketing studies have found that positive satisfaction impacts customers' favor, referrals, and loyalty (Mittal and Frennea, 2010). Adherence might be negatively affected by low satisfaction in patients with chronic diseases. A study conducted on 498 American adult patients with HIV found that patient satisfaction influenced patient adherence to Highly Active Antiretroviral Therapy medications (Dang, et al., 2013).

### **Expectation and Satisfaction**

Meeting patients' expectations would improve their satisfaction. A study conducted on 609 patients from Lithuania in 1998 found that medical consultation satisfaction was associated with a greater number of expectations being met (Zebiene et al., 2004).

## **Research Objectives**

### **Objective 1**

To assess the impact of PS and children's QOL on parents' expectation/satisfaction.

### **Objective 2**

To assess the impact of PS and children's QOL on medication adherence.

## CHAPTER 3

### **Conceptual Theories and Hypotheses**

Consumer satisfaction has been a fundamental aspect of marketing studies since the early 1950s. Consumer satisfaction is considered to be the single most crucial construct that shows and translates consumers' subsequent behavior (Oliver, 1999). The goal of those studies was to improve customer retention because the more satisfied a consumer was, the more likely a consumer was to repurchase a product or service. On the other hand, the less satisfied the consumer was, the less likely he or she would be to repurchase the product or service. Repurchase intention is important because having new consumers costs five times more than retaining existing consumers. Thus, customer satisfaction is vital in marketing research, and expectation–confirmation theory (ECT) has been used extensively as one of the primary theories in marketing literature.

#### **ECT**

The ECT states that consumers' satisfaction or dissatisfaction influences post-purchase intention (whether to repurchase, not to purchase, or a combination of the two). Thus, correctly detecting the level of satisfaction is crucial because companies are better able to predict consumers' behavior and develop marketing strategies based on the consumers' levels of satisfaction.

Also known as expectation–disconfirmation theory (EDT), this concept has been used in different areas such as automobile repurchasing (Oliver, 1993), camcorder repurchasing (Spreng, MacKenzie, and Olshavsky, 1996), and restaurant service improvement (Swan, Trawick, and Carroll, 1981). It has also been used in areas such as sociology to evaluate the satisfaction US citizens have about police performance (Reisig

and Stroschine Chandek, 2001) and in public policy to evaluate US citizens' satisfaction with urban services (Van Ryzin, 2004)

In the marketing field, the ECT framework shows that consumers reach a repurchasing intention via the following steps (Oliver, 1980): First, consumers shape and form their primary expectation about a new product or service before the purchase (pre-purchase) based on previous knowledge or experience (Zeithaml, Parasuraman, and Berry, 1990). Also, they adopt information from friends (Everett, 1995) or from the TV, the radio, or the internet. Mass media transmits information about a product via advertising, media reports, package information, and interviews. Interpersonal communication such as advice from previous users, personal selling, or a discussion with peer consumers is another method of information acquisition (Bhattacharjee and Premkumar, 2004; Everett, 1995). A wrong expectation can be created by a lack of knowledge or by misleading information (Boulding, Lee, and Staelin, 1994; Oliver, 1980). In the second step, if consumers perceive and find a product or service to be useful and worth buying, they will commit to purchasing and using it, at which point consumers start to form perceptions about the product (performance). Third, consumers evaluate the new product or service (perceived performance) based on the expectation that was formed before committing the purchase, which creates the level of confirmation of a product. In other words, if the product performed better than what the consumer expected (perceived performance is greater than expectation), then a positive confirmation would occur. On the other hand, if the consumer's product evaluation was below his or her expectation (perceived performance is lower than expectation), then a negative confirmation would occur. If the product performance was equal to the expectation, a

simple confirmation would occur. Fourth, satisfied consumers have more intention to repurchase a product, whereas dissatisfied consumers will not repurchase a product and will search for a substitute product instead. White and Yu (2005) found that dissatisfied consumers still repurchase products if there is no other option (see Figure 9).

The terms *customer* and *consumer* are usually used interchangeably. When referring to a subject within the ECT framework, *consumers* is a more appropriate term than *customers*. This is because a customer pays for a product or service, but a consumer consumes or uses a product or service. In some situations, these are one and the same.

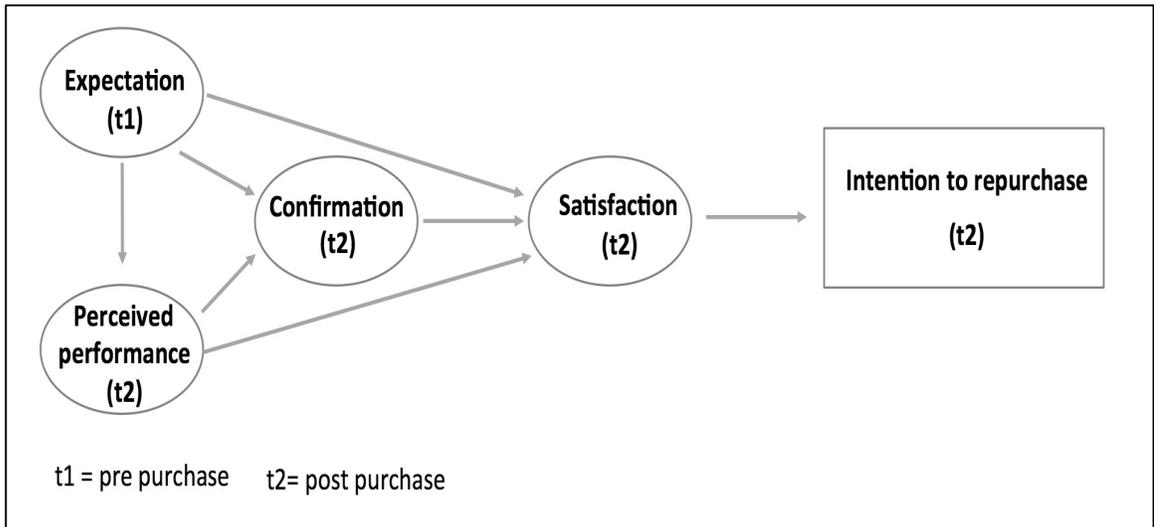


Figure 9. The theoretical construct in the ECT model.

ECT has been used extensively in marketing research. This study employs ECT because it simulates the understanding about the relation between the the expectations, satisfaction, and intention to adhere. The construct was modified to fit the specific goals of this study: expectation was changed to parental expectation, confirmation was changed to parental confirmation, perceived performance was changed to parental perceived

performance, and satisfaction was changed to parental satisfaction. Finally, intention to repurchase was modified to parental intention to adhere to asthma medications (see Figure 10).

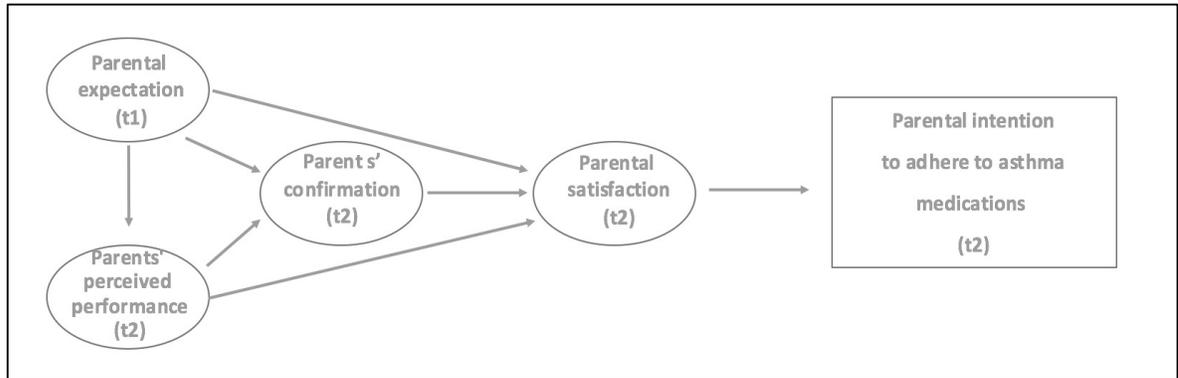


Figure 10: The theoretical construct in the ECT model after modification.

An example of how the model works follows. First, a child suffers from asthma symptoms, so the parents think about solutions and may search the internet or ask friends. Then, they begin to form parental expectations. The second step is to go to the doctor, where the doctor prescribes medication, passing from t1 to t2. The parent starts to evaluate the treatment's effect, forming parental perceived performance. Taking this and comparing it to parental expectation will convey parental confirmation. If parental perceived performance is higher than parental expectation, then parental confirmation will be positive. On the other hand, if parental expectation is higher than parental perceived performance, then parental confirmation will be negative. The third step is parental satisfaction. The more positive the confirmation, the more satisfied the parent is. If the parent displays negative confirmation with the treatment, he or she will be

dissatisfied with the treatment. Parental satisfaction will improve parental intention to adhere to asthma treatment. However, parental dissatisfaction will decrease parental intention to adhere to asthma treatment (the fourth step; see Figure 11).

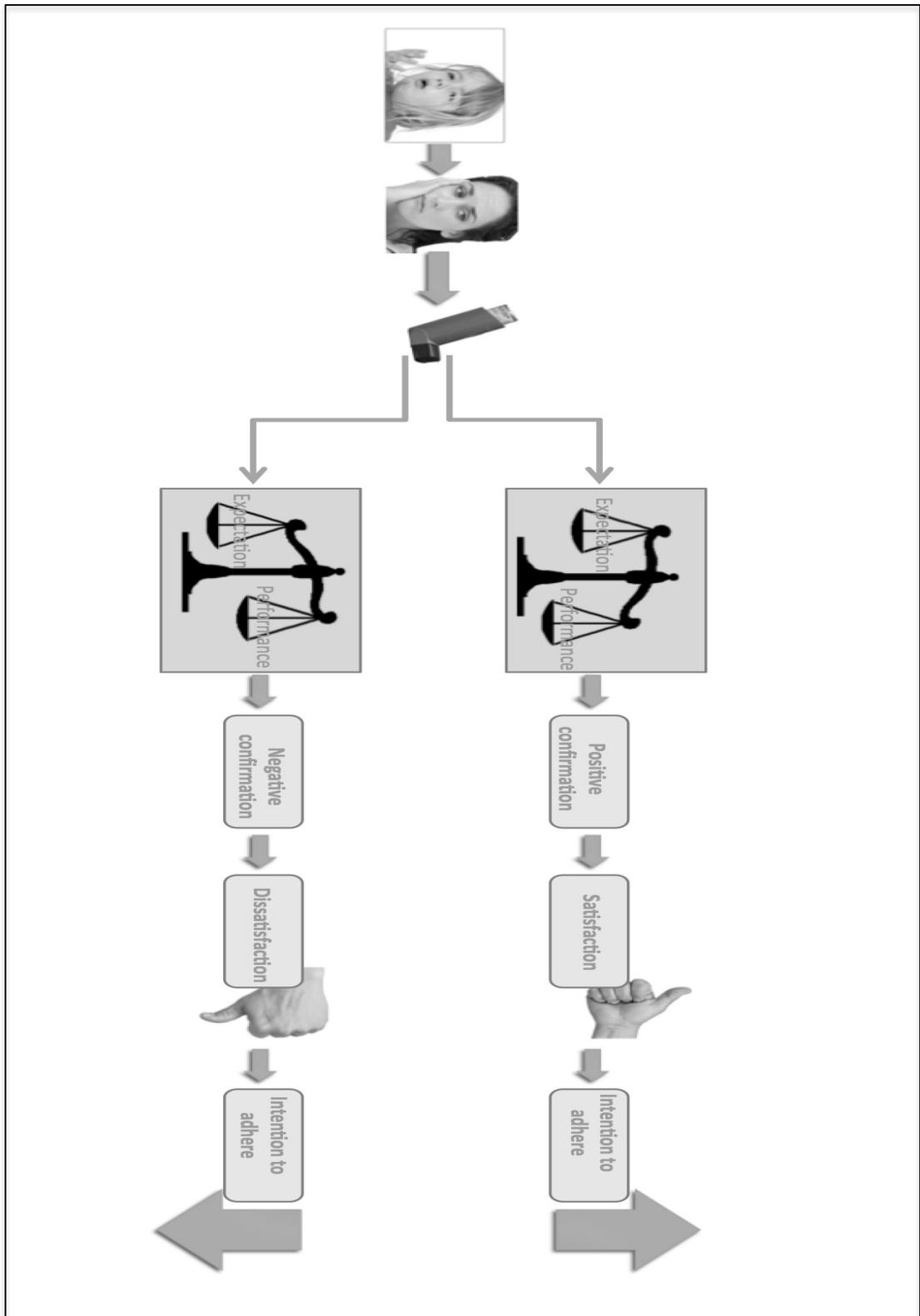


Figure 11. An example of ECT.

The main goal of the present study is to examine the effect of PS and children's QOL on parental expectation, parental satisfaction, and parental intention to adhere to asthma medications. The model is divided into two sections. The first section comprises the parental expectation/satisfaction paradigm, which includes parental expectation, parental satisfaction, and parental confirmation. The second section regards parental intention to adhere to asthma medications.

This study has three main hypotheses. The first hypothesis studies the effect of PS on the parental expectation/satisfaction paradigm (H1a) and parental intention to adhere to asthma medications (H1b). The second hypothesis evaluates the effect of children's QOL on the parental expectation/satisfaction paradigm (H2a) and parental intention to adhere to asthma medications (H2b). The third hypothesis studies the effect of the parental expectation/satisfaction paradigm on parental intention to adhere to asthma medications (H3). It will control for demographics and other variables in each test (Figure 12).

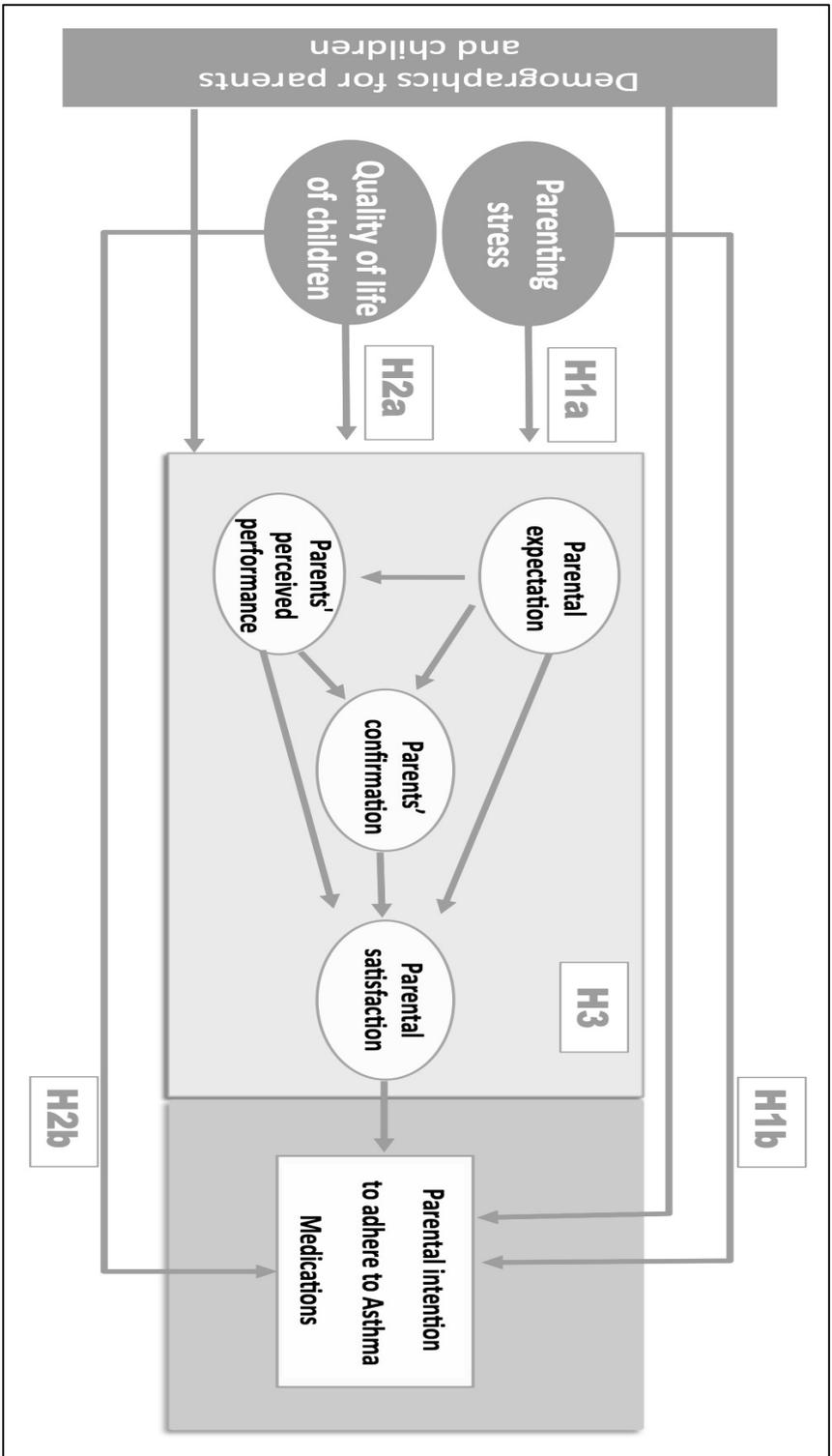


Figure 12. The proposed model.

## **Conceptual Definitions of the Constructs**

**Parental intention to adhere to asthma medications.** The parents' intention to follow the provider's recommendation regarding timing, frequency, and dosage of medicine (AHRQ, 2012).

**Parental satisfaction.** The sense of pleasure and gratification gained from an outcome (e.g., controlling asthma symptoms) (Salonen, 2010).

**Parental expectation.** The parents' beliefs about the effect of the treatment in the future (Webster, 2015).

**Parental perceived performance.** The parents' experience after using the treatment (Bhattacharjee, 2001).

**Parental confirmation.** The result of subtracting perceived performance from expectation (Bhattacharjee, 2001).

**Parenting stress.** This occurs when there is inequality between the demands of parenting and the available resources to fulfill these demands (Abidin and Brunner, 1995).

**Children's QOL.** The children's QOL due to asthma.

**HRQOL.** The extent to which the children's usual or expected physical, emotional, and social well-being are affected by a medical condition (asthma) or its treatment (asthma treatment) (Cella, 1995).

## **Research Hypotheses**

**Hypothesis 1a.** PS will have an influence on the parental expectation/satisfaction paradigm.

**Hypothesis 1b.** PS will have an influence on parental medication adherence.

**Hypothesis 2a.** Children's QOL will have an influence on the parental expectation/satisfaction paradigm.

**Hypothesis 2b.** Children's QOL will have an influence on parental medication adherence.

**Hypothesis 3.** The parental expectation/satisfaction paradigm will have an effect on adherence to medication.

## CHAPTER 4

### **Methodology**

This chapter will discuss the methodology involved in the process of data collection. The first part presents the study design in general, followed by a discussion of each step. The following sub-categories will be addressed: study design/participants, data collection tools, sample size, assumptions, statistical analysis, and statistical hypotheses.

#### **Overview of the Study Design**

This study was designed to be conducted as a cross-sectional, exploratory study that investigates the effect of PS and children's QOL on parental expectation, parental satisfaction, parental perceived performance, parental confirmation, and parental intention to adhere to asthma medications. For data collection, the design used a self-administered questionnaire available through an online survey software called Qualtrics<sup>®</sup>. Sample size was calculated using G\*Power and was found to be approximately 300 parents.

We made several assumptions regarding participants. First, participants will respond accurately about demographic questions. Also, parents will be logical (rational) regarding their responses while completing the survey. Parents' responses will show their exact evaluation regarding each response.

Data was analyzed using two approaches: (a) descriptive statistics, (b) hierarchical linear regression analysis, (c) path analysis. Also, reliability and validity tests were performed. The primary goal of the study was to investigate the associations between the sample characteristics and the outcome variables.

## **Study Design and Participants**

This is an observational, cross-sectional, exploratory study that investigates the effect of PS and children's QOL on parental expectation, parental satisfaction, parental perceived performance, parental confirmation, and parental intention to adhere to asthma medications (Figure 13). The research design used a self-administered questionnaire via Qualtrics<sup>®</sup> to collect the data for the study. Qualtrics<sup>®</sup> is an online survey software located in Provo, Utah, USA. Qualtrics is a powerful tool for online data collection which allows user to customize questions based on their preference. Also, the company offers customer service and electronic support. The program is available for students and faculties for free.

First, we obtained approval from the institutional review board (IRB) at the University of Houston before starting data collection. Then, another approval was obtained from clinics (Appendix A and B). After that, the survey was advertised using flyers that were posted in the participating clinics. Stand advertisements or laminated wall advertisements were used based on space availability, location, and center preference (see Figure 14). Two sizes (5 x 7 inches and 8.5 x 11 inches) were used (see Figure 15). These advertisements were distributed in 20 clinic location (5 allergy and asthma clinics and 15 pediatric clinics) in and around the Houston, Texas area of the US. Parents visiting these clinics with their children found the flyers on site and could take a participation card (see Figure 16) that was attached with the flyers. Each stand had a card holder to attach the cards. If the card holder was empty, the same information was included in the main flyer.

The attached cards had three sections. The first section was an invitation to participate with the message: “Receive a \$10 gift card if you participate with our study.” The second section described the inclusion criteria: “You should be the parent of an asthmatic child who is between 2–12 years old.” The third section informed parents of how to access the questionnaire through one of three procedures. The first was to enter a short website address that was generated using the Google URL Shortened website. A short website was provided because the original address that was generated by Qualtrics was long and complicated, creating a potential barrier against study participation. The second procedure invited the parents to send the researchers an e-mail (provided) and receive a link to the questionnaire. For the third option, a Quick Response (QR) code was generated using the ([www.qr-code-generator.com](http://www.qr-code-generator.com) website). This QR code was provided on all the cards and the flyers. Parents could use the QR code scanner program available on their smartphones to direct them to the survey website (see Figure 9).

When participants opened the link, they received an informed consent form along with questions about whether (a) the participant had an asthmatic child aged 2–12 years and (b) was willing to participate in the survey (Appendix C). If the participant agreed to participate, the website took him or her to the survey. If he or she declined, the system thanked the individual and took him or her to the end survey. The participants who gave consent found a link on the last screen of the survey asking them if they would like to receive a \$10 gift card. Once they clicked on the link, the system transferred them to another website that was not linked to the survey. There, they could provide their name and e-mail or mailing address as well as identify what type of gift card they would prefer. We gave a choice of physical or e-gift card and offered two types of cards, namely

Starbucks or Walmart cards. After the participants completed the survey, the system redirected them to the end of the survey after thanking them (see Figure 17). The project was planned to be finished within one year and was divided in to several steps (Table1).

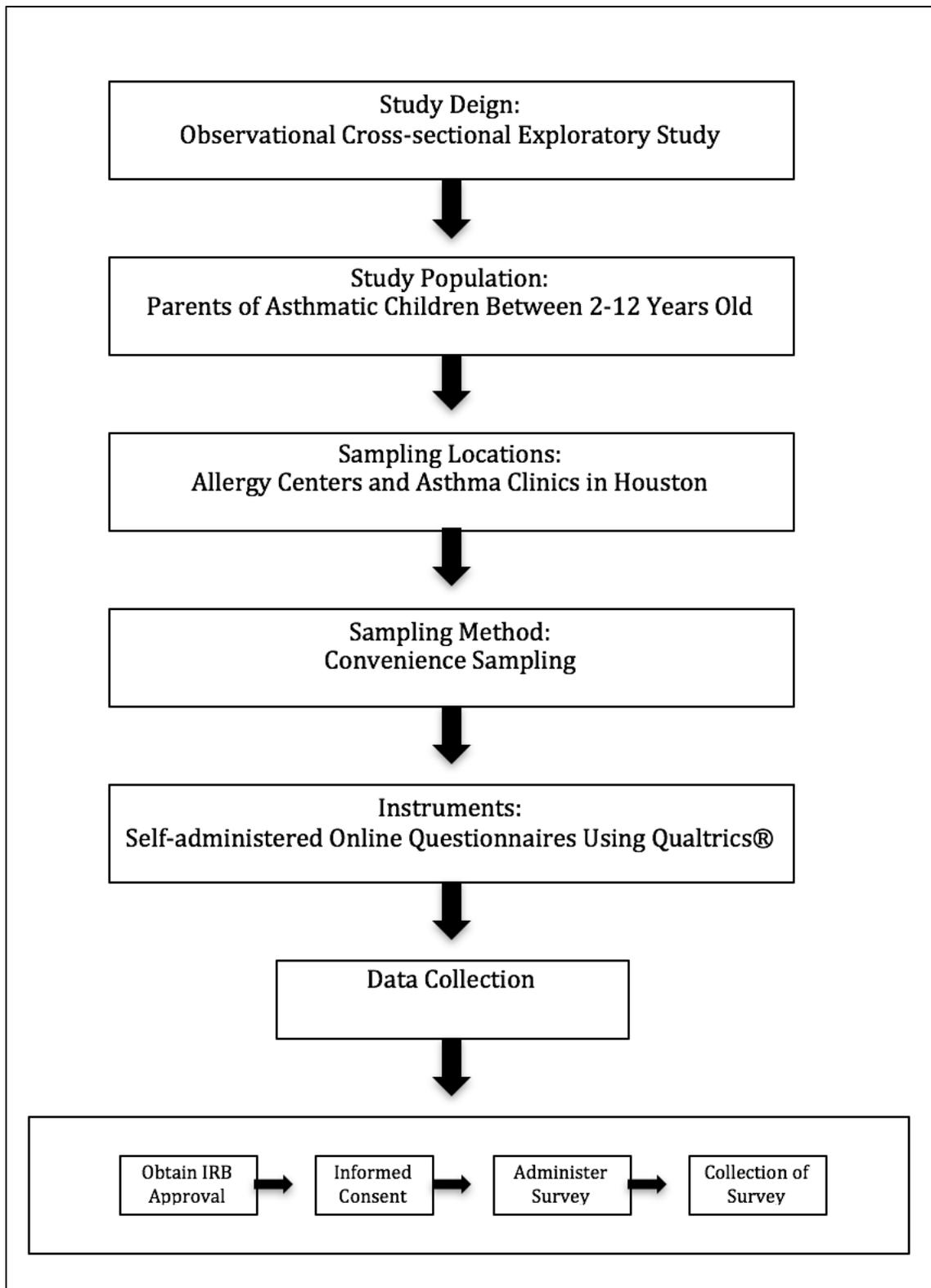


Figure 13. Study design

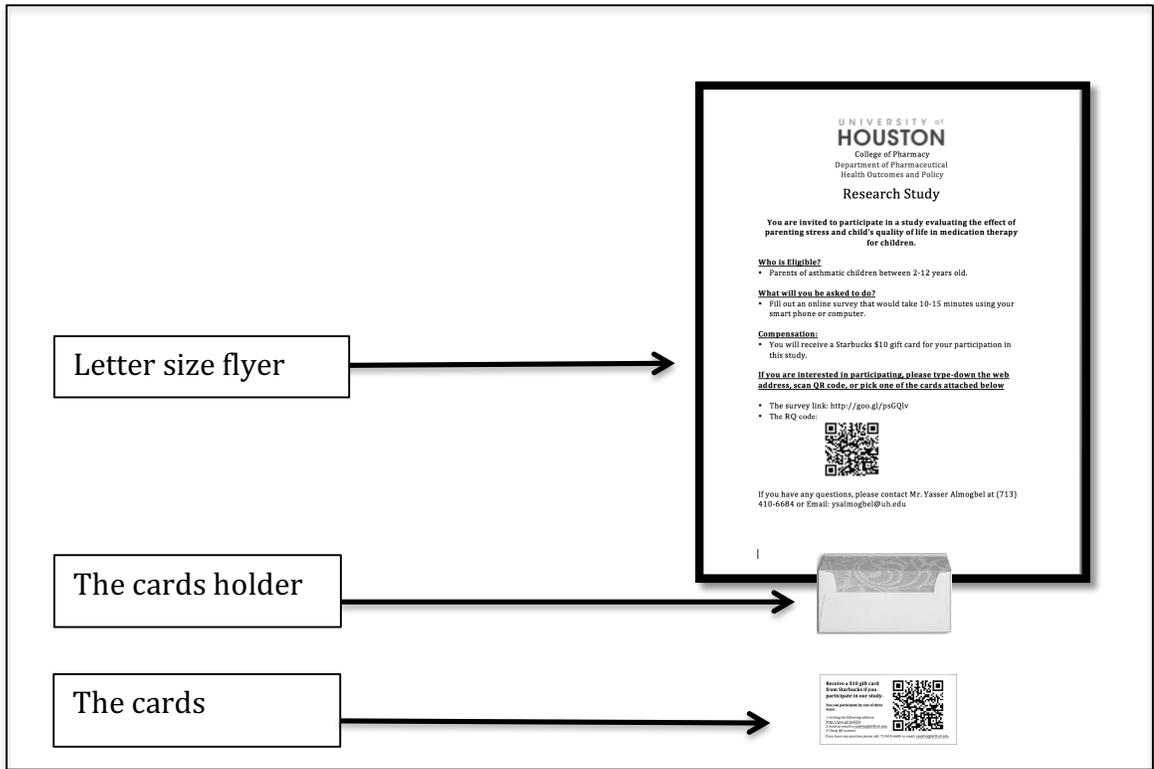


Figure 14. Example of the flyer parts.



Figure 15. The distributed stands.

**Receive a \$10 gift card  
from Starbucks or \$10 gift  
from Walmart if you  
participate in our study.**

**You can participate by one of three  
ways:**

1-visiting the following address:

<http://goo.gl/psGQlv>

2-Send an email to [ysalmogbel@uh.edu](mailto:ysalmogbel@uh.edu)

3-Using QR scanner



This project has been reviewed by the University of Houston Committee for the Protection of Human Subjects (713) 743 - 9204. If you have any questions, please contact Mr. Yasser Almogbel at (713) 410-6684 or Email: [ysalmogbel@uh.edu](mailto:ysalmogbel@uh.edu)

*Figure 16.* Image of the participation card.

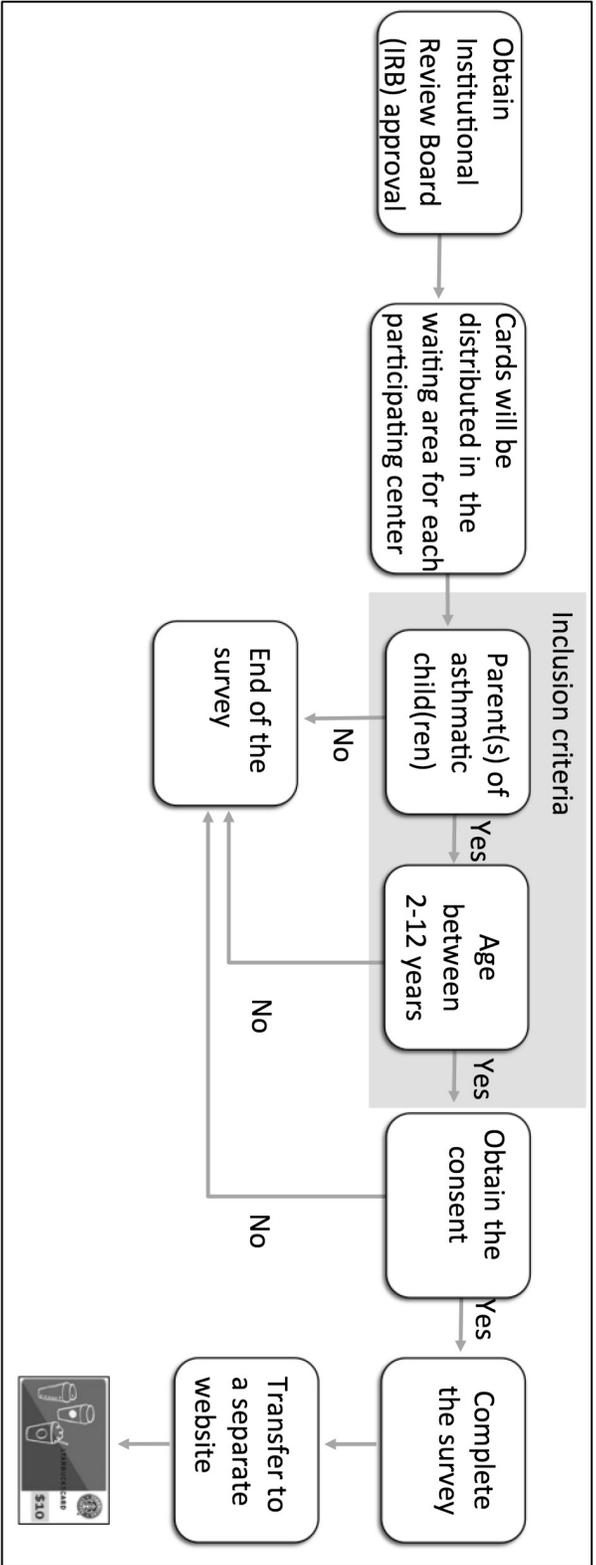


Figure 17. Data collection procedure.

**Table1**

*Dissertation timeline for conducting the study*

Activity	Study Period: 12 months												
	1	2	3	4	5	6	7	8	9	10	11	12	
From June 22, 2015 to June 30, 2016													
Review the study design and the questionnaire	■	■	■										
Obtain IRB approval				■									
Distribute the participation cards and send the gift cards					■	■	■	■	■	■	■		
Code data; analyze and report the results										■	■		
Develop presentations and manuscripts												■	■

**Pretesting.** Pretesting (systematic checking) is a crucial step before conducting a survey study. Pretesting is tool to identify problems associated with new questions. Those problems may affect how respondents and/or interviewers understand and respond to questions. Problems may rise from content that may cause confusion with the meaning of the question or the misinterpretation of its goal. Pretesting methods are divided into two

sub-categories: (a) pre-field and (b) field. Pre-field methods are utilized during the preliminary step in the survey development. They include the use of respondent focus groups and cognitive laboratory interviews. Regarding field sub-categories, six field techniques can be used to test the survey in the operational conditions. These include: (a) coding of behavior respondent response to the survey (interactions), (b) debriefing the interviewer, (c) debriefing the respondent, (d) testing a split-sample, (e) analyzing item nonresponse rates, and (f) analyzing the distribution response rate.

Therefore, the survey was pretested using both field pre-field and field techniques. We interviewed different types of people, including clinical pharmacists, physicians, parents, and people from the general population. We included this diverse cross-section of people to make sure that the survey was understandable for different people from different backgrounds and to gather input from them. We conducted an interview with each participant. During each interview, we gave the participants a copy of the survey and asked them to tell us what did they thought about it.

### **Data Collection Tools**

**Demographic and socioeconomic characteristics of the parents.** We collected age by asking parents to provide their birth date. Then, we calculated the parents' current age. We collected ethnicity information by providing a list of ethnicities in the questionnaire and having parents select the appropriate choice (White, Black, Hispanic, Asian). If their ethnicity was not available, they were able to choose "Other" and specify their ethnicity. We collected gender by asking respondents to choose between two options (male or female). Marital status was also collected. The options included single,

married, divorced, or widowed. Parents were asked whether they were employed full time (worked for 30 hours or more per week). In addition, they were asked if anyone helped them with their asthmatic child.

In addition to gathering demographic information, we evaluated the parents' health literacy and their relationship with the healthcare provider. To assess health literacy, we used the Single Item Literacy Screener created by Morris, MacLean, Chew, and Littenberg (2006). It uses a five-point Likert scale to identify adults in need of help with printed health material via their answer to the question "How often do you need to have someone help you when you read instructions, pamphlets, or other written material from your doctor or pharmacy?" (1 = never, 2 = rarely, 3 = sometimes, 4 = often, and 5 = always). Scores of > 2 are considered to be positive, indicating some difficulty with reading printed health-related material. We measured the relationship with the provider by asking the parents three questions that were adapted from the Consultation and Relational Empathy (CARE) measure by Mercer, Maxwell, Heaney, and Watt (2004); the Healthcare Relationship (HCR) trust scale by Bova, Fennie, Watrous, Dieckhaus, and Williams (2006); and the Patient-Doctor Relationship Questionnaire-9 (PDRQ-9) by Feltz-Cornelis, Oppen, Marwijk, Beurs, and Dyck (2004).

**Parenting stress.** The parental stress scale proposed by Berry and Jones (1995) is a self-report scale that consists of 18 items explaining two main constructs: positive or pleasure components of parenthood (self-enrichment, emotional benefits, and personal development) and negative components of parenthood (resources demands, restrictions, and opportunity costs). We asked the parents in the current study to answer the items in terms of their relationship with their children. The scale uses a five-point Likert scale

ranging from 1 (disagree) to 5 (strongly agree). The total scores range from 18–90, with a higher score indicating higher stress. The scale evaluates PS in mothers and fathers of children with and without clinical diseases; it shows an acceptable level of reliability ( $\alpha = .83$ ) and test-retest reliability (.81).

### **Demographic Characteristics of the Children**

We collected the ages of the children via a multiple choice option that the parents selected. We also asked the parents to provide us with the number of children they had. We asked about the asthmatic child's gender, followed by three questions about the severity using perceived severity survey by Witte et al. in 1996. The parents also reported on their children's medication via choosing from a list of asthma medications.

### **Evaluation of the ECT Constructs**

**Parental intention to adhere to medication.** The parental intention to adhere survey was adapted from Bhattacharjee and Premkumar's survey (2004). It consists of three questions that ask the parents about their intention to adhere to their children's medication regimens. The items were measured on a seven-point Likert scale from 1 (very unlikely) to 7 (very likely).

**Parental expectation.** The parental expectation survey was also adapted from Bhattacharjee and Premkumar's survey (2004) and modified. Items were measured on a seven-point Likert scale from 1 (strongly disagree) to 7 (strongly agree).

**Parental perceived performance.** The questions were similar to the parental expectation measurement, but they measured parental experience with treatment (treatment performance). The questions were modified from Bhattacharjee and

Premkumar's survey (2004) using a seven-point Likert scale from 1 (strongly disagree) to 7 (strongly agree).

**Parental confirmation.** As with the earlier aspects, the parental confirmation measure was adapted from Bhattacharjee and Premkumar's survey (2004). The questions were similar to the parental expectation measurement, but they compared parental experience (treatment performance) and parental expectation using a seven-point Likert scale from 1 (strongly disagree) to 7 (strongly agree).

**HRQOL.** A measure for QOL, whether used in a clinic or in research, should be sensitive, valid, conceptually clear, accurate, reliable, and able to detect change with time (Carr et al., 2003). We measured HRQOL using the Pediatric Quality of Life Inventory™ (PedsQL™) Asthma Module Short Form for Parents by Varni, Burwinkle, Rapoff, Kamps, and Olson (2004). It consists of 22 items in two dimensions: asthma (11 items) and treatment (11 items). The response scale ranges from 0 (never) to 4 (almost always). The responses were converted as follows: 0 = 100, 1 = 75, 2 = 50, 3 = 25, and 4 = 0. A higher score indicates a better QOL. If more than 50% of the items were missing, then the score was not counted. The mean score is the sum of the items over the number of items answered.

### **Sample Size**

Different researchers have offered various guidelines for calculating sample size. One method is to calculate ten cases or participant for each one independent variable. Sample size was calculated using the G\*Power software package (version 3.1.9)

(Table.2). Three different level of effect size were considered based on Cohen in 1988. Medium level was used because it has been used mostly in the literature.

**Table 2**

*Sample size calculation using G\*Power software*

<b>Effect size</b>	0.02 (Small)*	0.15 (Medium)*	0.35 (Large)*
<b>Alpha level</b>	0.05	0.05	0.05
<b>Power</b>	0.99	0.99	0.99
<b>Number of predictors</b>	15	15	15
<b>Total sample size</b>	1842	257	118

*Note.* \*Effect size is derived from Cohen (1988).

### **Data Coding**

The collected data were coded using Qualtrics<sup>®</sup>. Data were downloaded as a Microsoft Excel file and by the SAS program. Also, AMOS IBM was used to perform the path analysis. The code is available under appendix C.

### **Assumptions**

Before data was collected, we considered three assumptions:

- Parents will give accurate responses about demographic information.
- Parents will be rational about their responses.
- Parents' responses will show their exact evaluation regarding their PS and children's QOL, revealing the impact on the parental expectation/satisfaction paradigm and medication adherence.

## Statistical Hypotheses

- **H<sub>0</sub> 1a**
  - **$\beta_1 = 0$  for  $E(Y) = \beta_0 + \beta_1 X$**
  - There will be no statistically significant association between PS and the parental expectation/satisfaction paradigm.
  - X = PS and Y = the parental expectation/satisfaction paradigm.
- **H<sub>0</sub> 1b**
  - **$\beta_1 = 0$  for  $E(Y) = \beta_0 + \beta_1 X$**
  - There will be no statistically significant association between PS and medication adherence.
  - X = PS and Y = medication adherence.
- **H<sub>0</sub> 2a**
  - **$\beta_1 = 0$  for  $E(Y) = \beta_0 + \beta_1 X$**
  - There will be no statistically significant association between a child's QOL and the parental expectation/satisfaction paradigm.
  - X = child's QOL and Y = the parental expectation/satisfaction paradigm.
- **H<sub>0</sub> 2b**
  - **$\beta_1 = 0$  for  $E(Y) = \beta_0 + \beta_1 X$**
  - There will be no statistically significant association between child's QOL and medication adherence.
  - X = child's QOL and Y = medication adherence.

- **H<sub>0</sub>3**
  - **$\beta_1 = 0$  for  $E(Y) = \beta_0 + \beta_1 X$**
  - There will be no statistically significant association between the parental expectation/satisfaction paradigm and medication adherence.
  - X = the parental expectation/satisfaction paradigm and Y = medication adherence.

## CHAPTER 5

### Results

This chapter will cover the results of this research, beginning with a presentation of the descriptive analysis and demographics results in two sections, one for parents and the other for children. Then statistical analyses were performed to assess the correlations and the associations between hypothesized variables. The first analysis presented is a correlation matrix between all the theory variables. Then, a hierarchical regression was conducted to evaluate the effect of each variable included in the model. After that, path analysis was done to evaluate the effects of the hypothesized causal relationships and their significance. The chapter also presents a discussion of the reliability and validity tests.

#### **Sample Size Illustration (Patient Attrition)**

A total of 498 parents visited the link that was provided with the cards and the flyer that was attached to the card stands; of these, 262 completed the survey. Respondent non-respondents test was conducted to evaluate the effect of the excluded participants (80 parents). Demographics was compared between participants who have started the survey but were excluded because they did not complete the survey and the participants who completed the survey. The analysis concludes that there was no statistical difference between the two groups. The average filling time for the survey was fourteen minutes. Data was collected from November 8, 2015 to April 8, 2016. Figure 18 is the patient attrition flowchart that show number of participants that completed the survey.

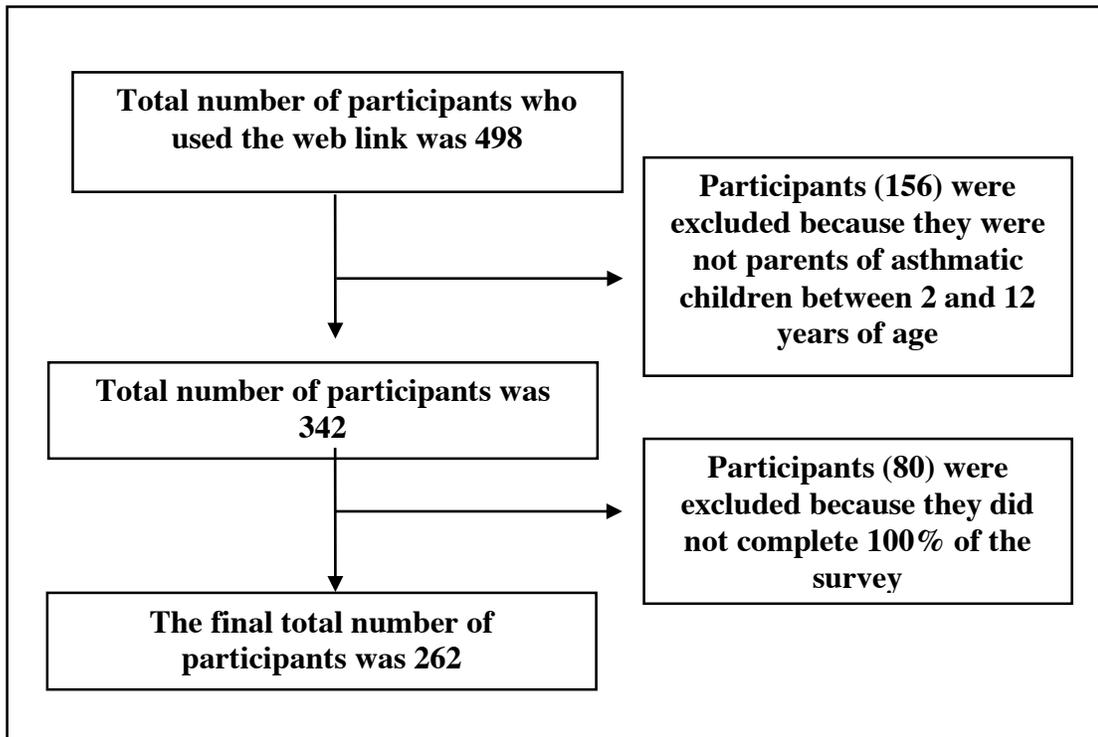


Figure 18. Patient attrition flowchart.

### Descriptive analysis psychometric properties

We used Cronbach's alpha to test the reliability of the seven instruments used in this study. Although some instruments included a small number of items, we found that all of those instruments were reliable ( $\alpha \geq .7$ ). Although the parental intention to adhere instrument produced the lowest reliability (.87), it still represented a high level of reliability (Table 3). In addition, we conducted a confirmatory factor analysis to check for validity and we found all the instruments were valid.

Table 3

*Reliability Test for the Instruments*

Variable	<i>N</i>	Number of items	Cronbach's alpha
Parental intention to adhere	262	3	0.87
Parental satisfaction	262	4	0.89
Parents' confirmation	262	4	0.90
Parents' perceived performance	262	4	0.91
Parental expectations	262	4	0.88
PS	262	18	0.89
QOL of children	262	22	0.91

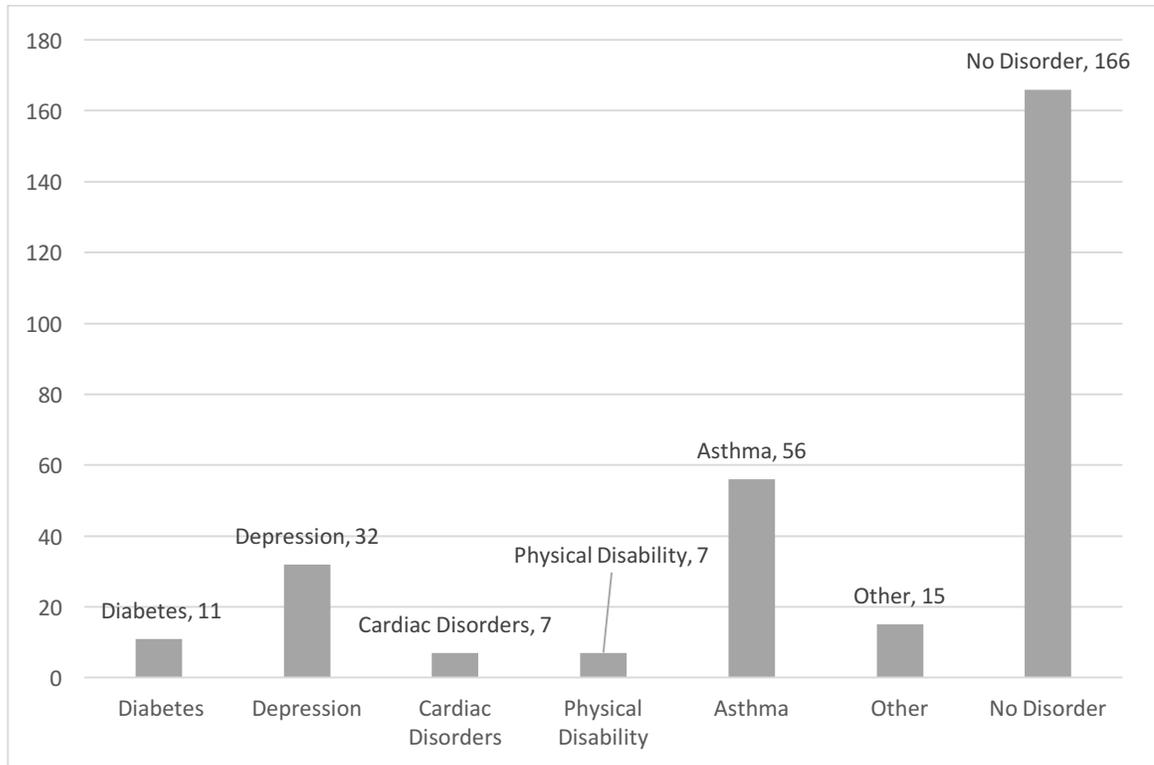
Table 4 provides descriptive statistics information about our study. The mean age of parents was 34.6 SD 7.5 years after winsorization (Ghosh and Vogt, 2012). Winsorization was preferred because age was not included in any statistical analysis. Thus, taking the benefit of not losing those observations and use them with other analyses. The majority of sample were females (79%). The dominant race was White (35%), followed by Hispanic (33%). About 66% of respondents reported that they were married. About 47% of parents had less than a college education. Most participants were full-time employed, while 26% were not employed and the lowest percentage were part-time employed. The vast majority of the respondents had combined household incomes of more than \$50,000. Figure 19 is about the distribution of health disorders

among parents and it shows that most of them do not have health problem. However, the highest parents disorder reported was asthma.

Table 4

*Descriptive Analysis for Parents*

Variable	Categories	Frequency (%) (N = 262)
Gender	Male	56 (21.37)
	Female	206 (78.63)
Race	White/Caucasian	91 (34.73)
	African American	67 (25.57)
	Hispanic	87 (33.21)
	Asian	9 (3.44)
	Other	8 (3.05)
Marital status	Married	174 (66.41)
	Not married	88 (33.59)
Level of education for parents	Having college level	139 (53.05)
	Not having college level	123 (46.95)
Current employment status	Full-time	145 (55.34)
	Part-time	49 (18.70)
	Not working	68 (25.95)
Total combined household income	More than \$50,000	186 (70.99)
	Less than or equal to \$50,000	76 (29.01)
Having help with asthmatic child	Spouse	10 (3.82)
	Partner	59 (22.52)
	Family	2 (0.76)
	No help	124 (47.33)
	Other	67 (25.57)



*Figure 19.* Distribution of health disorders among parents.

Regarding children, about 56% of children in this sample were males. The majority of children were covered by governmental insurance. About 40% of children were taking one medication, with the percentage decreasing as the number of medications increased (Table 5).

Table 5

*Descriptive Analysis for Children*

Variable	Categories	Frequency (%) ( <i>N</i> = 262)
Gender	Male	146 (55.73)
	Female	116 (44.27)
Child's health insurance coverage	Private insurance	100 (38.17)
	Governmental insurance	146 (55.73)
	None	16 (6.11)
Number of child's medication(s)	One medication	101(39.30)
	Two medications	92 (35.80)
	Three medications	39 (15.18)
	Four medications	17 (6.61)
	Five medications	4 (1.56)
	Six medications	4 (1.56)

It is clear from Table 6 that most respondents intended to adhere to asthma medications by having an average greater than the median of 13. Also, most respondents were satisfied with their children's treatment. Moreover, parents exhibited a high level of expectations, confirmation, and performance. However, respondents scored a low score in stress (mean = 35.95), and the median was 54. Also, situational stress analysis was conducted to see if there is a statistical difference between parents who filled up the

survey in the clinic and parents who filled it at home. There was no statistical difference between the two groups. Regarding the child's QOL, most parents reported a low QOL for their children. All of the scales had the same number of participants.

Table 6

*Simple Statistics for the Tested Constructs*

Variable	N	Mean	SD	Min	Max	Number of items
Parental intention to adhere	262	17.20	4.42	3.00	21.00	3
Parental satisfaction	262	22.12	4.11	5.00	28.00	4
Parents' confirmation	262	21.35	4.85	4.00	28.00	4
Parents' perceived performance	262	20.09	4.61	4.00	28.00	4
Parental expectation	262	21.89	5.40	4.00	28.00	4
PS	262	34.95	11.911	18.00	68.00	18
QOL of children	262	65.03	16.98	0.00	100.00	22

### **Spearman correlation matrix**

We have conducted a Spearman's correlation matrix for the tested constructs (i.e., parental intention to adhere, parental satisfaction, parents' confirmation, parents' perceived performance, parental expectation, PS, and QOL of children). We found a correlation between all the tested constructs except for child's QOL. All the correlations were positive except for PS. The highest positive correlation was parents' confirmation with parents' perceived performance parental expectations ( $r = 0.64, n = 262, p < 0.0001$ ). In contrast, the highest negative correlation was between PS with parents' confirmation and parents' perceived performance ( $r = -0.33, n = 262, p < 0.0001$ ). Regarding QOL of children, we have found a single significant correlation between the QOL of children and PS ( $r = -0.33, n = 262, p < 0.0001$ ), as shown in Table 7.

Table 7

*Pearson's Correlation Matrix for the Tested Model*

The correlated variables	Parental intention to adhere	Parental satisfaction	Parents' confirmation	Parents' perceived performance	Parental expectation	PS	QOL of children
Parental intention to adhere	1.00						
Parental satisfaction	0.31	1.00					
Parents' confirmation	0.46	0.60	1.00				
Parents' perceived performance	0.31	0.49	0.64	1.00			
Parental expectation	0.55	0.41	0.64	0.49	1.00		
PS	-0.21	-0.30	-0.33	-0.33	-0.25	1.00	
QOL of children	-0.08	0.07	-0.03	-0.01	-0.03	-0.24	1.00
	0.1712	0.2784	0.6633	0.8292	0.6383	<.0001	

\*Top number is the correlation and bottom number is the *p* value.

### **Minimum Sample Size Required to Find an Effect of Child's QOL on PS**

Unexpectedly, we found that the child's QOL became insignificant with all of ECT. Therefore, we conducted a post hoc test to determine how many more participants would be needed to find a significant effect. We made our calculations based on one predictor, with an  $\alpha < 0.05$  and power = 0.8. We found the lowest sample size required to have a significant effect was with parental satisfaction, and the sample size was about 1,500 (Table 8).

Table 8

*Minimum Sample Size Required to Find an Effect of Child's QOL on PS*

The dependent variable	R-Square	Sample size required
Parental intention to adhere to asthma medications	0.00001	784,881
Parental satisfaction	0.0050	1,564
Parents' confirmation	0.0017	4,612
Parents' perceived performance	0.0002	39,239
Parental expectation	0.0001	78,483

### **The hierarchical linear regression**

We conducted hierarchical linear regression to determine the effect of each variable on the dependent variable (parental intention to adhere to asthma medications) on the model. Hierarchical linear regression is different than a hierarchical linear model. When we compare the hierarchical linear regression to a similar test, we should compare it to stepwise multiple regression. However, stepwise regression is not appropriate for theory-based analysis. It is used to explore and predict the association but not to test

theories. In theory-based research, the investigator prefers to select variables and predictors based on the order of the tested theory.

We conducted the analysis using four models according to our hypotheses (see Table 9). In the first model, we included parental intention to adhere to asthma medications as the dependent variable and parental satisfaction as the independent variable. We controlled for any significant demographic variables and other confounders. In the first model, we found a significant positive association between parental intention to adhere to asthma medications and parental satisfaction ( $B = 0.329, t = 3.885, p < 0.0001$ ) after controlling for other included variables. Additionally, parental intention to adhere to asthma medications showed a negative significant association with poor health literacy ( $B = -0.660, t = -0.219, p = 0.027$ ) holding other variables constant. The third significant positive association was between parental intention to adhere to asthma medications and perceived severity ( $B = 0.071, t = 2.258, p = 0.025$ ) after controlling for confounders. The last significant association was between parental intention to adhere to asthma medications and college holders ( $B = 0.385, t = 2.296, p = 0.022$ ) after holding other variables constant. The model was able to predict 44.1% of the variability, and it was statistically significant. In the first model, we used ANOVA to test the overall significance of the models and here will be just repetitive of the  $R^2$  change because  $R^2$  came from zero.

The second model was done by including parents' confirmation. When parents' confirmation was included, parental satisfaction, perceived severity, and level of education for respondents became insignificant. However, health poor literacy remained significant. Parental intention to adhere to asthma medications was associated with poor

health literacy ( $B = -0.207, t = -2.254, p = 0.025$ ) after controlling for included variables. Furthermore, we found a significant positive association between parental intention to adhere to asthma medications and number of asthma medications ( $B = 0.183, t = 2.241, p = 0.026$ ), holding other variables constant. Lastly, parental intention to adhere to asthma medications was associated with parents' confirmation ( $B = 0.398, t = -6.333, p < 0.0001$ ) after controlling for included variables. The second model was able to predict 30.6% of the variability, and it was statistically significant ( $p < 0.0001$ ) based on the ANOVA test. Regarding the  $R^2$  change after including parents' confirmation, the change in the ability to predict the variability ( $R^2$ ) was 11.1%, and it was statistically significant ( $p < 0.0001$ ).

In the third model, two independent variables were included: parents' perceived performance and parental expectations. In this model, only two predictors became significant. We found a significant association between parental intention to adhere to asthma medications and number of asthma medications ( $B = 0.219, t = 2.901, p = 0.004$ ) after controlling for the remaining variables. Second, we found a significant association between parental intention to adhere to asthma medications and parental expectations ( $B = 0.083, t = 6.293, p < 0.0001$ ) after controlling for the confounders. This model was able to predict 44.1% of the variability, and the F value was statistically significant ( $p < 0.0001$ ) using ANOVA. Regarding  $R^2$  change after including parents' confirmation, the change in the ability to predict variability was 10.6%, and it was highly significant ( $p < 0.0001$ ).

The fourth model included two independent variables: parents' perceived performance and parental expectations. In this model, only two predictors became significant. First, we found a significant association between parental intention to adhere

to asthma medications and number of asthma medications ( $B = 0.649, t = 2.901, p = 0.004$ ) after controlling for the remaining variables. In addition, we found a significant association between parental intention to adhere to asthma medications and parental expectations ( $B = 0.368, t = 6.293, p < 0.0001$ ) after controlling for the remaining variables.

Table 9

*The Hierarchical Linear Regression for Tested Model for Parental Intention to Adhere to Asthma Medications*

Variable	Model 1			Model 2		
	B	SE B	$\beta$	B	SE B	$\beta$
Parental satisfaction	0.329	0.085	0.230***	-0.019	0.096	-0.013
Practitioner for asthma (Pediatrician)	-0.137	0.178	-0.046	-0.057	0.166	-0.019
Parent's gender (male)	-0.197	0.207	-0.055	-0.183	0.193	-0.051
Poor health literacy	-0.219	0.099	-0.128*	-0.207	0.092	-0.121*
Perceived severity	0.071	0.031	0.141*	0.024	0.030	0.047
Level of education for respondent (college level)	0.385	0.169	0.131*	0.263	0.158	0.090
Number of asthma medications	0.157	0.088	0.118	0.183	0.082	0.137*
Child's age	0.041	0.026	0.095	0.026	0.024	0.060
Parents' confirmation				0.398	.063	0.437***
Parents' perceived performance						
Parental expectations						
PS						
QOL of children						
R2		0.195			0.306	
F for change in R2		<0.0001			<0.0001	
ANOVA		<0.0001			<0.0001	

\* P value <0.05, \*\* P value <0.01, \*\*\* P value <0.001 (continued)

Table 9 (continued)

*The Hierarchical Linear Regression for Tested Model for Parental Intention to Adhere to Asthma Medications*

Variable	Model 3			Model 4		
	B	SE B	$\beta$	B	SE B	$\beta$
Parental satisfaction	-0.055	0.090	-0.038	-0.044	0.069	-0.041
Practitioner for asthma (Pediatrician)	0.026	0.154	0.009	0.066	0.470	0.007
Parent's gender (male)	-0.113	0.179	-0.032	-0.339	0.540	-0.032
Poor health Literacy	-0.156	0.086	-0.091	-0.461	0.273	-0.089
Perceived severity	-0.011	0.028	-0.022	-0.036	0.092	-0.024
Level of education for respondent (college level)	0.273	0.147	0.093	0.820	0.444	0.093
Number of asthma medications	0.219	0.076	0.165**	0.649	0.230	0.162**
Child's age	0.009	0.022	0.022	0.029	0.067	0.022
Parents' confirmation	0.114	0.07498	0.126	0.115	0.076	0.127
Parents' perceived performance	0.492	0.07835	0.065	0.058	0.067	0.060
Parental expectations	0.083	0.08638	0.452***	0.368	0.060	0.450***
PS				-0.006	0.022	-0.017
QOL of children				-0.002	0.015	-0.007
R2		0.441			0.441	
F for change in R2		<0.0001			0.959	
ANOVA		<0.0001			<0.0001	

\* P value &lt;0.05, \*\* P value &lt;0.01, \*\*\* P value &lt;0.001

## Path analyses

We conducted a path analysis, which is a special case of structural equation modeling that can define or tell if data can fit well with a pre-defined model. Also, it can estimate the significance of hypothesized causal relationships between pre-defined variables. Although this study was cross-sectional study, the ECT original model was created for longitudinal data. Hence, path analysis was conducted, and it was declared in the limitation.

The first model that we conducted was the original model (Figure 20). The results were consistent with the correlation matrixes except for the relationship between parental expectations and parents' perceived performance with parental satisfaction. However, this model did not show a good level of fit (Table 10). The Chi-square Minimum / Degrees of Freedom (CMIN/DF) was around 30, and it should not exceed 2–3. Also, (Normed Fit Index) NFI and Comparative Fit Index (CFI) were less than 0.9 when they should be equal to or greater than 0.9. Furthermore, Root Mean Squared Error of Approximation (RMSEA) should be equal to or less than 0.05. The only indicator that showed that this model fit the data was the Goodness of Fit Index (GFI), which was considered as an acceptable level of fit because it was more than 0.9.

We performed another path analysis based on Spearman's correlation matrix. The path from child's QOL was removed from the ECT based on the results from the correlation, and one path was added from child's QOL to PS. After running the model, we found a significant association between PS and child's QOL ( $\beta = -0.208, p < 0.0001$ ). In this model, one more path (PS with parents' confirmation) became insignificant. The rest of the relations showed significant associations between variables. However, this

model did not fit the data (Figure 21). Thus, we conducted another final model.

In the last model, all of the insignificant paths were removed before the model was run. Although the model fit indicators improved, this model did not show a good fit (Figure 22).

Table 10

*Model Fit for the Path Analysis*

Model	CMIN/DF	GFI	NFI	CFI	RMSEA
Original model	29.46	0.924	0.866	0.866	0.33
The model based on the correlation matrix	12	0.916	0.854	0.862	0.205
The model after removing the insignificant variables	9.014	0.914	0.849	0.862	0.175

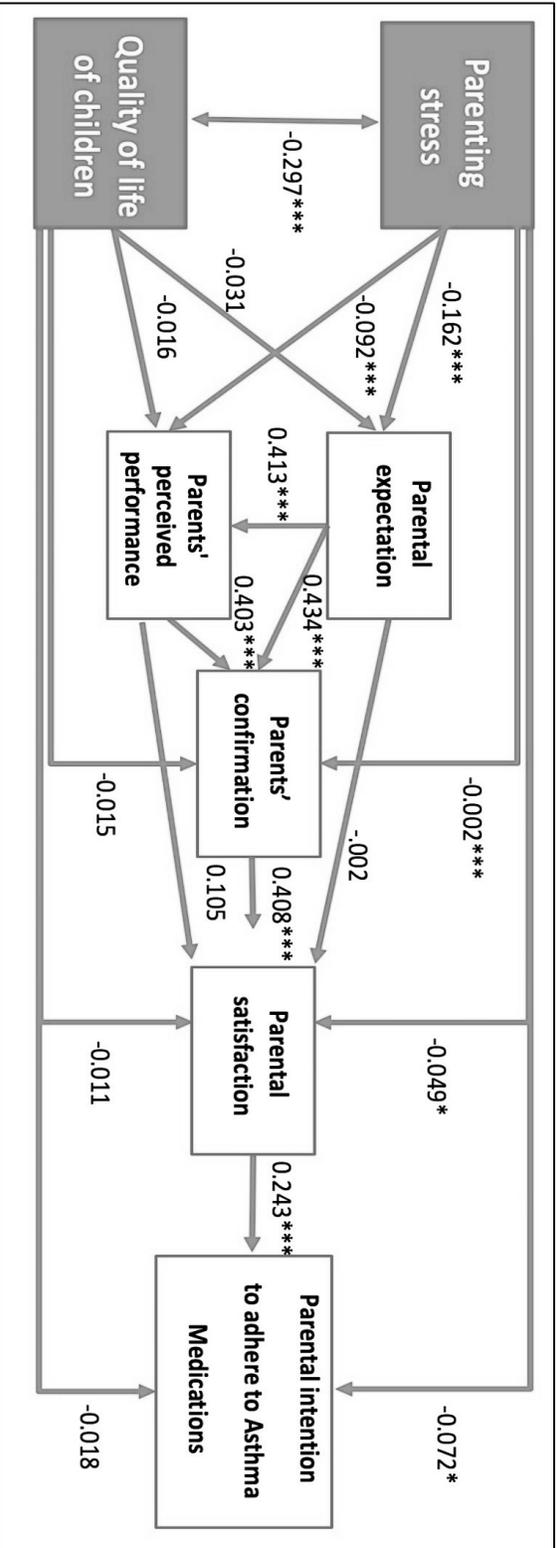


Figure 20. First path model (the original model).

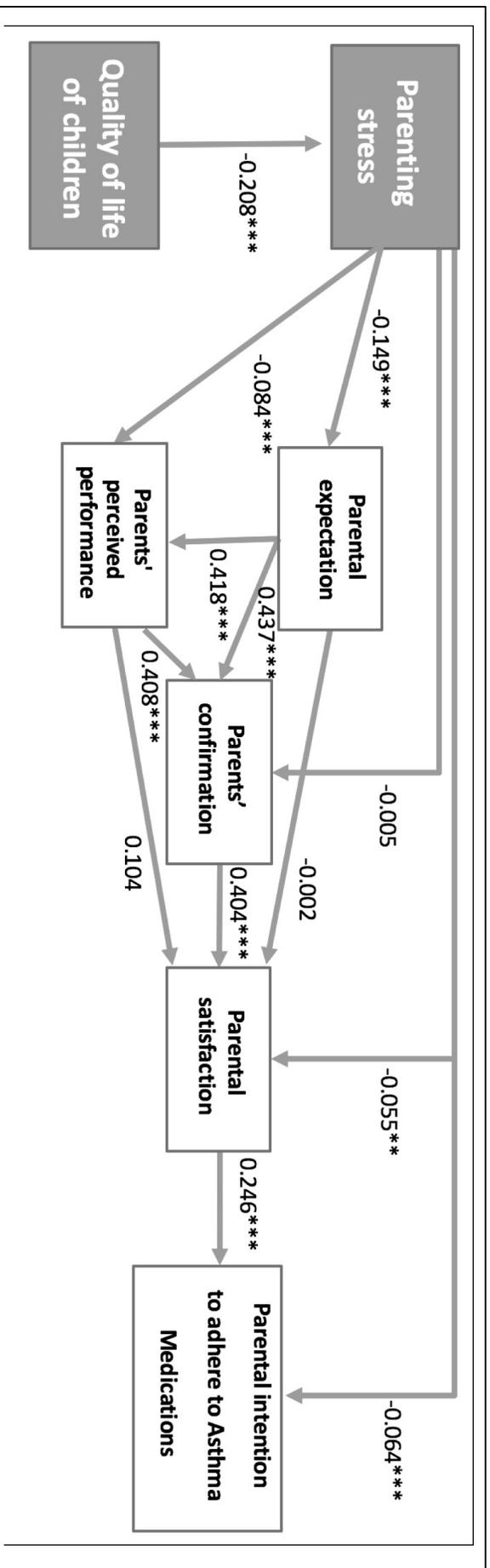


Figure 21. Second path model (the correlation matrix model).

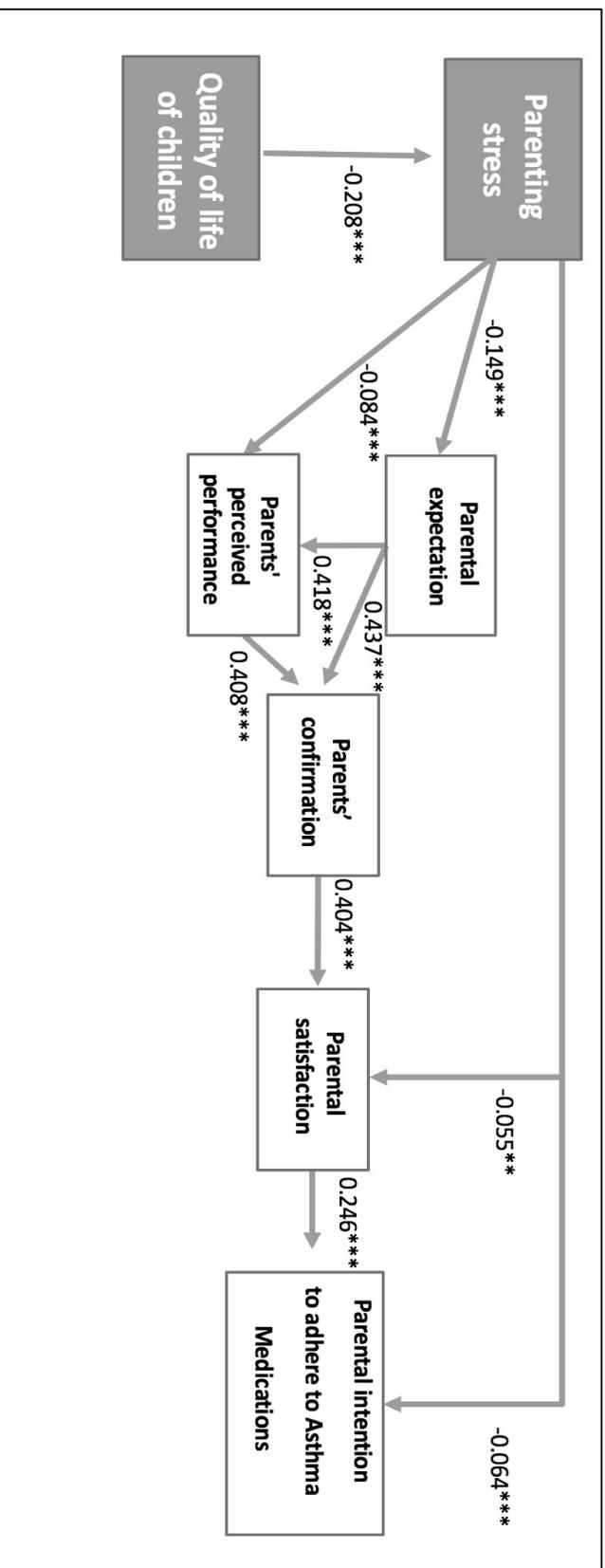


Figure 22. Third model path model (the correlation matrix model after removing all of the insignificant paths)

## CHAPTER 6

### **Discussion**

The goal of this research was improve parents' adherence to their children's medications as well as to assess the effects of PS and children's QOL on parents' expectations/satisfaction and medication adherence among children diagnosed with asthma. This chapter presents a discussion of the research results, compares the study with previous studies, and examines how to apply and benefit from the findings in the real world. The chapter begins with a discussion of the demographic results, including population characteristics and other confounders, as well as statistical analyses and the associations between variables. Additionally, this chapter sheds light on research strengths and limitations. The chapter ends with recommendations, future research avenues, and the conclusion.

We found significant associations between PS and parents' expectations, parents' performance, parents' satisfaction, and medication adherence among children diagnosed with asthma. In addition, we found a significant association between PS and children's QOL. However, we did not found any association between children's QOL and parents' expectation, parents' performance, parents' satisfaction, or medication adherence in asthmatic children. The magnitude and the significance of the association changed based on predictors that were added.

This study was conducted in clinics in and around Houston. We conducted this study using convenience sampling, which is one type of non-probability sampling. To gather information about patients with different levels of asthma, we included all the clinics that children would visit to receive treatments for asthma. We contacted all the

pediatric and asthma clinics in Houston area. Twenty locations agreed to participate in our study; of these, five were asthmatic centers while the rest were pediatric clinics. We asked each participating organization to post the study flyer in their clinic. The method of posting a flyer for an online survey may raise some problems; for example, some parents may not see the flyer or may not have access to complete an online survey. The response rate can be a major limitation for behavioral studies that use questionnaires as an element for evaluation. A low response rate may affect the quality of the study (Groves and Couper, 1998; Singer, Van Hoewyk, and Neugebauer, 2003). In addition, the process of data collection took us about six months to complete, possibly because we conducted the study online. Duncan D. Nulty from Griffith University compared the response rates to online and paper surveys and found that paper-based administration had a higher response rates than online survey (Nulty, 2008). As researchers, we would prefer to conduct our study face to face and distribute paper-based surveys. However, the Health Insurance Portability and Accountability Act (HIPAA) limited this option to talk to patients inside clinics and obtain their information. Thus, to improve the sample size and engage more participants, we provided incentives of \$10 gift cards from Walmart or Starbucks.

A total of 498 parents opened the link. The first page was of the survey asked participants to consent to participating in the study and indicate whether they had a child between the ages of 2 and 12 with asthma. A total of 156 parents declined this question, perhaps because they did not have a child with asthma or their child fell outside the designated age range. We selected this age range for two reasons: (a) the children must be 12 years or younger and (b) the minimum age was 2 years to accommodate the QOL

survey, namely the PedsQL, intended to be used on children at least 2 years of age. Further, the PedsQL was the only survey that could be used with children of this age, and no surveys could be used with children less than 2. The final sample size was 262 participants, all of which were included in the final statistical analysis.

Regarding the psychometric probability, Cronbach's alpha was conducted to evaluate the level of reliability. We found that all of the instruments that were used in this research were highly reliable including the short surveys (3–4 questions). Also, we conducted confirmatory factor analysis and determined that our instruments were valid.

Asthma prevalence is increasing around the world, including in the United States. Studies have reported that more children are diagnosed with asthma than adults. Asthma is a chronic disease which has no cure, and the key is controlling the disease by alleviating symptoms. Children are more sensitive to the disease because they are young and they need someone to care for them. Controlling symptoms can be achieved by taking the prescribed medication, which is called adherence to asthma medication. Most studies have reported that asthmatic children's adherence is around 50% (range 30%–70%; Jentzsch, 2009; McQuaid, 2003; Rand, 2002). Also, adherence has been linked to satisfaction. Further, parental expectations are also linked to satisfaction and adherence. Those three factors are the treatment goals of the Expert Panel Report 3 in 2007. The Expert Panel Report 3 recommended that doctors attempt, to control symptoms, to maintain respiratory function, and to meet parents' expectations and satisfaction. With this information in mind, we are going to discuss those goals in detail along with PS, child's QOL, and other factors that become significant in our analysis.

We found a negative correlation (using Spearman's correlation test) association (using path analysis) between parental intention to adhere to asthma medications and PS. In other words, the more stress a parent has, the less that parent intends to adhere to the medication. Based on our knowledge, this study is the first study that has evaluated the association between PS and parental intention to adhere to asthma medications. However, some studies have evaluated the effect of stress on an individual's intentions. One study, which involved 206 Jordanian nurses, explored the relation between job stress and intention to stay at work. The study found a significant negative correlation between job stress and intention to stay at work. Another study involving 76 Taiwanese male nurses found a significant association between stress and intention to quit. Although we did not share the same specific objective, the results of those studies were consistent with our findings. A higher level of stress indicates a stronger intention to leave work. Thus, improving (alleviating) PS is an important step in improving parental intention to adhere to asthma medications. Several factors can increase the level of PS, such as complexity of treatment, refusal to take medication, and cost of treatment. Fink and Rubin (2005) reported that 28% to 68% of adult patients do not use an inhaled medication as prescribed. Administering asthma medications adds more burden to the family, and a more complex regimen will lead to low adherence (Bender, 2002). Further, children may refuse to take their medication for a variety of reasons (e.g., the taste). Milne and Bruss (2008) reported that 50% of children do not take their prescribed medication because of the taste. Other children may refuse their medication because they have been taking them for a long time. Another major causes of PS are the cost of care. Asthma medications in the US are expensive compared to other developed countries. Also, a child diagnosed with

asthma is incurs twice the amount of medical costs/bills as a child without asthma (Wang, Zhong, and Wheeler, 2005). Controlling those factors would alleviate PS and consequently may improve adherence.

We found a significant association (in the first model of the hierarchical regression between and the path analysis) and correlation between parental intention to adhere to asthma medications and parental satisfaction with asthma medication. This relation was positive, which means that an increase in satisfaction will improve adherence. This was consistent with our hypotheses and with a study involving 649 patients from England which found that a high level of satisfaction was associated with a high level of adherence (Horne, Hankins, and Jenkins, 2001).

As we previously discussed, parental intention to adhere to asthma medications is linked to satisfaction with treatment. Adherence might be negatively affected by low satisfaction in patients with chronic diseases (Dang et al., 2013). One of our objectives is to study the effect of PS on satisfaction, which is defined as the evaluation of the end point (outcome) of the treatment that consequently affects adherence. This study revealed that parental satisfaction has a significant correlation with PS. Also, in the path analysis, we found a significant association between parental satisfaction and PS. Our results were consistent with the literature and with our theory. In research involving 155 Canadian graduate business students to study the association between job stress and satisfaction, Elangovan (2001) found a significant association between stress and low satisfaction. In a second study including 500 American physicians to evaluate the association between job satisfaction and job stress, the authors discovered that job stress negatively affects job satisfaction ( Williams, Manwell, Konrad, and Linzer, 2007). In the last study, conducted

among 185 parents with a child aged 0–6 to explore the associations between parenting satisfaction and PS, Dunning and Giallo (2012) found that lower parenting satisfaction was significantly associated with higher PS. This study contradicts our hypothesis but was consistent with our correlation test.

In this study, we have explored the effect of PS on parental expectations. An expectation is the hope and reason to do something. For example, individuals work to gain money, exercise to be healthy, and eat to stay alive. Thus, people act for a reason or purpose. The expectation of treatment is to get well. These expectations are shaped by information that is available on the internet, in a doctor's office, through discussion with friends, or from the media. The experience should match the expectation to form the confirmation, according to the ECT. However, most researchers have not differentiated between the expectation, perceived performance (experience) and confirmation. Improving expectations will improve satisfaction and consequently will improve adherence (Afkhamebrahimi et al., 2012; Holloway et al., 1992). In our study, we found a significant negative association between parental expectation and PS in the path analysis. This finding was consistent with the literature and our theory. In a study involving 143 internationally-adopting mothers to investigate the predictors of PS, the authors found a significant relation between expectations and PS (Viana and Welsh, 2010).

We proposed that child's QOL may affect ECT by affecting parental intention to adhere to asthma medications, parental satisfaction, and parental expectations. Regarding the effect of child's QOL on parental intention to adhere to treatment, we found a study that was conducted on 1,412 Taiwanese nurses to examine the association between quality of work life and intention to quit. The authors found that quality of work life was

a significant predictor of intention to leave (Lee, Dai, Park, and McCreary, 2013). For the association between child's QOL and parental satisfaction, we found a study conducted among 1,348 type 2 diabetic patients from the Netherlands to uncover the relation between satisfaction of treatment and HRQoL. This study revealed a significant correlation between treatment satisfaction and health-related QOL (Redekop, 2002). Another study involving 1,201 Americans with prostate cancer evaluated the association between QOL and outcome satisfaction, and found that the degree of outcome satisfaction was significantly associated with the changes in QOL (Sanda, 2008). Unexpectedly, child's QOL did not have any effect on the expectation confirmation theory. Thus, we have conducted post hoc analysis to estimate the sample size required to find a significant effect. The result of the post hoc analysis showed that the lowest number required to have a significant effect would be 1,564, which would be impossible to collect under these circumstances.

After conducting Pearson's correlation, we found a significant relation between the child's QOL and PS. Then, we developed an evolved model which is only a modification of the direction of the child's QOL from ECT to the PS. The association between the child's QOL and PS was confirmed from one study that conducted with 150 parents of children and adolescents diagnosed with autism, found that PS was affected by the child's QOL (McStay et al., 2013). However, a study conducted on parents of children with neuromuscular disease found no significant association between PS and QOL in children (Mah, Thannhauser, Kolski, and Dewey, 2008).

In models three and four and in the correlation test, we found an association between intention to adhere to asthma medications and parental expectations. This result may imply that, when a patient has more expectations, this might increase the level of intention to adhere to treatment. Our results were consistent with the literature. In a study conducted among 2,051 American patients with depression, the authors found a significant association between adherence and high expectations of the effect of the antidepressant (Lin et al., 2003). Another study was done on 600 American patients with multiple sclerosis and revealed that adherence was associated with hope to have an effect from medications (Fraser, Hadjimichael, and Vollmer, 2001). However, one study was not consistent with our study. This study conducted among 65 patients with rheumatoid arthritis from the Netherlands, the authors determined that there was no relation between compliance and expectations about the effect of the medication (Brus et al., 1999).

We have controlled for several variables in our analysis, beginning with health literacy. In the first and second model of the hierarchical regression, parental intention to adhere to asthma medications was negatively associated with poor health literacy. We have used The Single Item Literacy Screener to detect the level of health literacy. Specifically, we asked, “How often do you need to have someone help you when you read instructions, pamphlets, or other written material from your doctor or pharmacy?” Participants chose one of the following answers: 1 (never), 2 (rarely), 3 (sometimes), 4 (often), or 5 (always). Thus, a higher number indicates a higher level of poor health literacy. Here, we found a negative association between parental intention to adhere to asthma medications and poor health literacy. This association indicates that a lower level

of poor health literacy indicates a greater parental intention to adhere to asthma medications. This association was consistent with our hypothesis and with the literature. One study was conducted on 182 patients who were HIV-positive to evaluate the effect of health literacy on medication adherence. The study found that patients with low literacy were more likely to adhere less to their medications (Kalichman, Ramachandran, Catz, 1999). Also, in another study conducted on 138 African American patients diagnosed with HIV, the authors found that low health literacy was a major reason for missing medications and a barrier for medication care (Kalichman, Catz, Ramachandran, 1999). In the last study involving 128 American HIV patients, lower adherence was associated with a lower level of health literacy (Miller et al., 2003).

In the first model of hierarchical regression, parental intention to adhere to asthma medications was associated with perceived severity. As the number of medications is related to disease severity, parents may tend to adhere to asthma medications to avoid the consequences of exacerbation, such as emergency room visits and school absences. Comparison of our findings with the literature produced inconsistent results. Some studies found a positive association between intention to adhere and severity. For example, in a study of 468 American patients with cardiac disease, the authors revealed that patients with coronary artery disease were more compliant than patients without coronary artery disease (Pettinger et al., 1999). The second study involved 72 patients with HIV from the UK, and found that patients with complications were more likely to adhere to their medication than patients without complications (Gao, Nau, Rosenbluth, Scott, and Woodward, 2000). The third study was conducted on 3,923 patients with asthma who were more compliant when having more severe airway obstructions (Rand,

Nides, Cowles, Wise, and Connett, 1995). Conversely, other studies reported a negative association between intention to adhere and severity. For example, in a study of 180 American patients diagnosed with HIV, Wagner (2002) found that lower adherence was associated with severity. In another study involving 74 American female patients diagnosed with breast cancer, Ayres et al. (1994) found that patients with more severe diagnoses were less likely to adhere to their medication. Lastly, in a study conducted on 300 adolescent Japanese patients (aged 13–17) with epilepsy, the author revealed that an increased severity of the disease was associated with less compliance with epilepsy medication (Kyngäs, 2000). In those studies, the causality is not guaranteed. Thus, those patients may have low level of adherence, and this might cause their disease to be aggravated.

We have found parental intention to adhere to asthma medications was associated with level of education. Educated individuals tend to be more open to the media and to evaluate the risks and benefits of their choices. Thus, educated people tend to search more information regarding what is good for their life. Published studies produced inconsistent results (indicating positive, negative, or no effect). Among the studies finding positive associations, one was conducted on 182 American patients diagnosed with HIV and found that years of education were associated with greater adherence (Kalichman, Catz, Ramachandran, 1999). Also, a study involving 121 patients doing hemodialysis found compliance for medication increased with the patient's level of academic knowledge (Gago et al., 2000). In contrast, other studies did not find an effect between education and adherence. One study, which involved 74 American female patients diagnosed with breast cancer, found no relation between level of adherence to

their medication and level of education (Ayres et al., 1994). In another study, which included 63 patients from the Netherlands, the authors uncovered no relation between adherence and education (Brus, van de Laar, Taal, Rasker, and Wiegman, 1999). One study found that the level of education may decrease adherence. This study was conducted among 403 Americans diagnosed with hypertension and found that patients who received more education were less compliant (Daniels, Rene, and Daniels, 1994).

The number of medications was added in the hierarchical regression from the first model; however, it was not significant. It became significant in the second, third, and fourth models. Usually the magnitude of variables decreases when the number of predictors is increased, but this is not always the case. Thus, when researchers add more variables, some variables become significant or more significant, which was clear in our study with the number of medications. It became significant after we added parents' confirmation in model two and became more significant after we added parents' perceived performance and parental expectation. Thus, number of medications may be negatively confounded by parents' confirmation, perceived performance and parental expectation. With respect to the association, we found a positive association between parental intention to adhere to asthma medications and the number of asthma medications. Clinically, the more severe the asthma the higher risk for exacerbation and asthma complication. Consequently, health care provider tends to prescribe more medication to control the disease. Thus, caregivers (parents) tend to adhere to asthma medication to decrease the number of exacerbation and asthma attacks. However, our finding was inconsistent with the literature. In a study conducted on 1,028 American elderly patients, the authors found that compliance decreased with the number of

medications prescribed (Coons et al., 1994). Another study involving 94 American patients with ulcerative colitis found that nonadherence was linked to multiple medications (Kane, Cohen, Aikens, and Hanauer, 2001). Furthermore, a study that involved 348 elderly patients found a negative relation between adherence and the use of three or more medications (Barat, Andreasen, and Damsgaard, 2001). In a study on 468 American patients with cardiac disease, the authors found no association between compliance and number of medications (Pettinger et al., 1999). However most of those studies have been conducted in elderly patient who have multiple chronic diseases and have memory problem.

As with any research, this study has some limitations. Any cross-section study lacks evidence of causality since it was collected in one period of time, but it can show associations. We situated our causality in theory-based literature to control this limitation in the study design. The results produced some controversy in some associations, but most of the time, literature was consistent with our hypothesis. Second, this study was conducted using a convenience sample. Convenience sampling is considered to be a non-probability sampling method. Some have defined convenience sampling as using a sample that is easy to reach. However, we used this method because our population was difficult to reach and because of HIPAA law. Also, we offered incentives to overcome those difficulties in data collection. Although the use of convenience sampling may be considered to be a limitation in data collection, we determined that it was the only way to collect our sample. Third, we conducted this study using a questionnaire in the English language even though the study setting of Houston has a high number of Hispanic individuals who might not read English. Thus, this approach might have created a barrier

to participating in this research. Fourth, this study was conducted using an online survey. We were not able to distribute the survey and meet patients in the clinic. Thus, we found that the only way to collect the data was by placing a stand for a flyer describing the study and inviting individuals to participate online. However, an online survey does not allow us to identify the patients who participated. As a result, patients may have participated more than once because of the incentives. Fifth, this study can be generalized only to the given population and no other populations. Sixth, the survey looked lengthy and had 83 questions. However, the average duration for completing the survey was 14 minutes. Seventh, filling the survey in the clinic may affect the level of stress. In contrast, we did not find a difference between the groups who filled the survey in the clinic and the group that filled the survey outside the clinic. Eighth, path analysis was used here because the ECT model was originally created for longitudinal data. Nevertheless, this study was conducted as a cross-sectional design due to financial and regulatory limitations.

This study has multiple implications. First, meeting parents' expectations may improve medication adherence in asthmatic children and consequently improve asthma control. Second, controlling QOL in children is crucial for controlling PS, which consequently affects parental intention to adhere to asthma medications. Also, chronic stress may cause increase the chance of physical and psychological diseases. Third, offering early support programs for parents having children with asthma may decrease the level of stress in parents and then improve adherence. Also, controlling PS may improve parent's health in future.

This work may be extended for future research. First, this model may be tested on other chronic diseases that may cause a high level of PS, such as neurodevelopmental disorder, renal failure and physical disability. Second, this research may be replicated with the addition of interventions, allowing a clear view of how much control those factors may add to the final goal (adherence to asthma medication). Fourth, future research may include other constructs, such as parent's QOL. Based on the literature review and the results of this study, we are interested in determining if the QOL of a parent would affect the ECT. Fifth, future researchers may want to replicate the study on adults with chronic diseases by substituting PS with patient stress and the child's QOL with the patient's QOL.

## **Conclusion**

We found a significant correlation between PS and medication adherence, parental satisfaction, and parental expectations in asthmatic children. However, after conducting hierarchical linear regression, we found that only parental expectations and the number of medications were having a direct association with parental intention to adhere to asthma medications. When we ran the path analyses, and the results were consistent with the correlation of PS with ECT. We did not find any significant association between the child's QOL and medication adherence, parental satisfaction, and parental expectations among parents with children diagnosed with asthma. However, when we conducted the correlation test, we found that only child's QOL was correlated with PS. Thus, we developed an evolved model that directed the effect of the child's

QOL from the ECT to PS. Then, we found a significant association between the child's QOL and PS in children with asthma using pat analysis.

## APPENDIX A: CONSENT TO ASSIST ON DATA COLLECTION

### Consent to Assist in Data Collection

Dr. Sujit Sangiry, PhD  
Associate Professor  
University of Houston College of Pharmacy  
1441 Moursund St. Houston, Texas 77030

Dear Dr. Sangiry,

Our center/clinic will be glad to assist Mr. Yasser Almogbel in his project and help him in data collection for his project entitled “parenting stress and child's quality of life on parents' expectation/satisfaction and medication adherence in asthmatic children”.

I understand the data collected will not include any participant’s names or identification markers.

Regards,

Person in charge: \_\_\_\_\_

Center/ Clinic \_\_\_\_\_

Address: \_\_\_\_\_

Telephone number: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

## APPENDIX B: THE DEPARTMENT INVITATION LETTER TO CLINICS

UNIVERSITY of  
**HOUSTON**  
COLLEGE OF PHARMACY

September 17, 2015

To whom it may concern,

Dear Sir /Madam,

We at the college of pharmacy at the University of Houston are conducting an a survey to study the effects of parenting stress and child's quality of life on medication therapy in asthmatic children.

We are requesting your assistance by providing us an opportunity to post our study participation flyer at your clinic.

The project is titled: "Parenting Stress and Child's Quality of Life on Parents' Expectation/Satisfaction and Medication Adherence in Asthmatic Children".

The flyer and the cards will be posted in the waiting areas in your clinic. Participation will be voluntary, anonymous, and has no risks for the subjects. Data collection will be conducted an online survey method after the approval of the Committee for the Protection of Human Subjects at the University of Houston. Informed consent from the participants will be considered before data collection.

We need your support by approving our request and completing the attached support letter.

We will greatly appreciate your help if you give us the permission to post our flyer at your clinic. If you have any questions, please feel free to ask and we will do our best to respond. You can reach me at (713)410-6684 or email at [ysalmogbel@uh.edu](mailto:ysalmogbel@uh.edu).

Thanking you for your time courtesy and understanding.

Sincerely,

Yasser Almogbel, M.Sc.  
PhD Candidate

Sujit S. Sangiry, PhD  
Associate Professor

College of Pharmacy  
Department of Pharmaceutical Health Outcomes and policy  
Texas Medical Center  
1441 Moursund Street  
Houston, TX 77030  
832-842-8327 Phone  
713-795-8383 Fax  
[www.uh.edu/pharmacy](http://www.uh.edu/pharmacy)

YOU ARE THE PRIDE

# APPENDIX C: THE QUESTIONNAIRE ALONG WITH THE CONSENT TO PARTICIPATE IN THE STUDY

## Introduction

Dear Parent,

We are requesting your participation in a research project entitled "Parenting Stress and Child's Quality of Life on Parents' Expectation/Satisfaction and Medication Adherence in Asthmatic Children". The goal of this research is to study the effect of parenting stress and child's quality of life in medication therapy for children between the ages of 2-12 years old who have asthma. This project is conducted by a Graduate student at the College of Pharmacy at the University of Houston. The survey will be conducted with approximately 300 parents in the Houston area. It is estimated that it will take about 10-15 minutes of your time to complete the survey.

There are no risks involved in participating in this project. Also, there is no direct benefit to you in participating in this project. However, the results will shed light on the effect of parenting stress and child's quality of life on medication therapy adherence. Participation in this study is voluntary. You may decide to withdraw at any time. Your participation is anonymous, and you are not required to mention your name or any identification at any part of the survey. All data collected for this study will be used for education and publication purposes only and only group data will be reported.

If you have any questions about this research, you may contact Yasser Almogbel at (713)-410-6684. You may also call the faculty supervisor for this project, Dr. Sujit S. Sanggiry, Associate Professor, Department of Clinical Sciences and Administration, University of Houston, College of Pharmacy, at (832)-842-8392. Any questions regarding your rights as a research subject may be addressed to the University of Houston Committee for the Protection of Human Subjects at 713-743-9204. All research projects that are carried out by investigators at the University of Houston are governed by requirements of the University and the Federal Government.

As a token of appreciation, we would like to provide you a Starbucks \$10 gift card for completing the survey. If you would like to receive the gift card for your participation in the survey, please provide your name and email address on the separate link at the end of the survey. Please note that your name or information will not be linked to the survey. We will only use your information provided to send the gift card.

Your time and cooperation are highly appreciated.

Thank you for all your help by participating in this survey.

Sincerely,

**Yasser Almogbel, M.Sc.**  
PhD Candidate  
University of Houston College of Pharmacy  
**Sujit S. Sanggiry, Ph.D.**  
Faculty and associate Professor  
University of Houston College of Pharmacy

**Please indicate if you agree to participate in this study and that you have a child between the ages of 2-12 years who has asthma?**

Yes

No

**A) The following questions request some information about your children in general.**

1) Please indicate the number of children in your household.

2) Please indicate the number of children in your household who are diagnosed with asthma.

**B) The following questions request some demographic information about your asthmatic child.**

**If you have more than one child diagnosed with asthma, please consider the child with the most severe asthma according to you as you answer the rest of the questions in this survey.**

1) Please indicate your child's age completed in years.

2) Please indicate your child's gender.

- Male  
 Female

3) Please indicate if your child has health insurance coverage.

- Private insurance  
 Governmental insurance  
 None

4) Please indicate how many medication(s) does your child take for asthma.

5) Please choose the medication/s that your child uses for treating asthma. (you may need to check your child's asthma medications at this time)  
If your child uses less than two medications, please choose not applicable for the other boxes.  
If your child uses more than two medications, please indicate it in the space provided below. If your child's medications is not in the list below, please use the space provided below.

1-

Frequency

2-

Frequency

If your child's asthma medications were not mentioned in the above list or he is using more than four medications, please write them down in the text box below.

6) Please indicate your level of agreement with the following statements regarding the severity of your child's asthma.

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
I believe that my child's asthma is severe.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I believe that my child's asthma is serious.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I believe that my child's asthma is significantly affecting my child's lifestyle.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7) Please indicate which practitioner do you seek care for your asthmatic child.

- Asthma specialist  
 Pediatrician  
 Other

C) Please answer the following questions about your child's asthma medications.

1) How likely are you to do the following:

	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Neither Agree nor Disagree (4)	Somewhat Agree (5)	Agree (6)	Strongly Agree (7)
I intend to use my child's asthma medication(s) as prescribed.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My intention is to continue using my child's asthma medication(s) rather than using any other therapy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In the near future, I plan to continue using my child's asthma medication(s) as prescribed.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

2) When your child was first diagnosed with asthma what was your expectation with the asthma medications prescribed for your child.

Based on my expectation:

	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Neither Agree nor Disagree (4)	Somewhat Agree (5)	Agree (6)	Strongly Agree (7)
Using asthma medications will improve my child's performance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using asthma medications will increase my child's school activities.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using asthma medications will enhance my child's ability to perform normal activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Asthma Medications will be useful for my child	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

3) Please answer the following questions considering your experience after using your child's asthma medication(s).

Compared to my initial expectations the ability of the asthma medications:

	Much worse than expected (1)	Worse than expected (2)	Somewhat worse than expected (3)	Neither worse nor better than expected (4)	Somewhat better than expected (5)	Better than expected (6)	Much better than expected (7)
To improve my child's performance was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To increase my child's school activity was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To enhance my child's ability to perform normal activities was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To be useful for my child was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4) Please answer the following questions by considering both your initial expectation and current experience in using asthma medication(s) for your child.

	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Neither Agree nor Disagree (4)	Somewhat Agree (5)	Agree (6)	Strongly Agree (7)
Using asthma medications improves my child's performance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using asthma medications increases my child's school activities.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using Asthma medications enhances my child's ability to perform normal activities.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I find asthma medications to be useful for my child.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5) Please indicate your level of satisfaction with using your child's asthma medication(s).

I am \_\_\_\_\_ with the my child's asthma medication(s)

Extremely displeased (1)	Displeased (2)	Somewhat displeased (3)	Neither pleased nor displeased (4)	Somewhat pleased (5)	Pleased (6)	Extremely pleased (7)
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I am \_\_\_\_\_ with the my child's asthma medication(s)

Extremely frustrated (1)	Frustrated (2)	Somewhat frustrated (3)	Neither contented nor frustrated (4)	Somewhat contented (5)	Contented (6)	Extremely contented (7)
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I am \_\_\_\_\_ with the my child's asthma medication(s)

Extremely terrified (1)	Terrified (2)	Somewhat terrified (3)	Neither delighted nor terrified (4)	Somewhat delighted (5)	Delighted (6)	Extremely delighted (7)
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I am \_\_\_\_\_ with the my child's asthma medication(s)

Extremely dissatisfied (1)	Dissatisfied (2)	Somewhat dissatisfied (3)	Neither satisfied nor dissatisfied (4)	Somewhat satisfied (5)	Satisfied (6)	Extremely satisfied (7)
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**D) Children with asthma sometimes have special problems. On the following page is a list of things that might be a problem for your child. Please tell us how much of a problem each one has been for your child during the past ONE month**

**1) In the past ONE month, how much of a problem has your child had with**

**ASTHMA (problems with)**

	Never (0)	Almost never (1)	Sometimes (2)	Often (3)	Almost always (4)
Pain or tightness in his or her chest	<input type="radio"/>				
Feeling wheezy	<input type="radio"/>				
Having asthma attacks	<input type="radio"/>				
Getting scared while having asthma attacks	<input type="radio"/>				
Getting out of breath	<input type="radio"/>				
Coughing	<input type="radio"/>				
Taking a deep breath	<input type="radio"/>				
Having a stuffy or runny nose	<input type="radio"/>				
Waking up at night with trouble breathing	<input type="radio"/>				
Playing with pets	<input type="radio"/>				
Playing outside	<input type="radio"/>				

**2) In the past ONE month, how much of a problem has your child had with**

**TREATMENT (problems with)**

	Never (0)	Almost never (1)	Sometimes (2)	Often (3)	Almost always (4)
Medicines making him or her feel sick	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Trouble sleeping because of medicines	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Trouble using his or her inhaler	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Not liking to carry his or her inhaler	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Refusing to take medicines	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Forgetting to take medicines	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Getting anxious when he or she has to have medical treatments	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Getting anxious about going to the doctor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Getting anxious about going to the hospital	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Being responsible for his or her medicines (this question for children with age of 5-12 years old)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Controlling his or her asthma (this question for children with age 5-12 years old)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

E) The following statements describe feelings and perceptions about the experience of being a parent. Think of each of the items in terms of how your relationship with your child or children typically is. Please indicate the degree to which you agree or disagree with the following items.

	Strongly Disagree (1)	Disagree (2)	Undecided (3)	Agree (4)	Strongly Agree (5)
I am happy in my role as a parent.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There is little or nothing I wouldn't do for my child(ren) if it was necessary.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Caring for my child(ren) sometimes takes more time and energy than I have to give.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I sometimes worry whether I am doing enough for my child(ren).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel close to my child(ren).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I enjoy spending time with my child(ren).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My child(ren) is an important source of affection for me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having child(ren) gives me a more certain and optimistic view for the future.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The major source of stress in my life is my child(ren).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having child(ren) leaves little time and flexibility in my life.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having child(ren) has been a financial burden.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is difficult to balance different responsibilities because of my child(ren).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The behavior of my child(ren) is often embarrassing or stressful to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I had it to do over again, I might decide not to have child(ren).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel overwhelmed by the responsibility of being a parent.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having child(ren) has meant having too	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

few choices and too little control over my life.	<input type="radio"/>				
I am satisfied as a parent.	<input type="radio"/>				
I find my child(ren) enjoyable.	<input type="radio"/>				

**F) The following questions request some demographic information about you (the respondent).**

1) Please indicate the year that you were born.

2) Please indicate your race.

- White/Caucasian
- African American
- Hispanic
- Asian
- Native American
- Pacific Islander
- Other

3) Please indicate your gender.

Male

Female

4) Please indicate your current marital status.

Single

Married

Divorced

Widowed

5) Please indicate your current employment status.

Full-time (30 hours or more per week)

Part-time (<30 hours per week)

Not working

6) Please indicate the highest level of education you have completed.

7) Please indicate your total combined household income range (including spouse) in US dollar.

8) How often do you need to have someone help you when you read instructions, pamphlets, or other written material from your doctor or pharmacy?

- Never                      Rarely                      Sometimes                      Often                      Always
- 

9) Please indicate if you were diagnosed for one or more of the following diseases (you may select more than one option).

- No Disorder
- Diabetes
- Depression
- Cardiac Disorders
- Physical Disability
- Asthma
- Other

10) Please rate the relationship between you and your child's health care provider.

	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Neither Agree nor Disagree (4)	Somewhat Agree (5)	Agree (6)	Strongly Agree (7)
I trust my child's healthcare provider	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My child's healthcare provider is supportive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My child's healthcare provider listens to me carefully	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

11) Please indicate your response for the following questions.

	Never (1)	Rarely (2)	Sometimes (3)	Often (4)	Always (5)
Did you consider any precautions, such as giving few puffs from inhaler, for your asthmatic child before he/she go to the park?	<input type="radio"/>				
Did you consider any precautions before your asthmatic child perform any physical activity, such as playing football, dancing, etc?	<input type="radio"/>				

12) Please indicate who is helping you with your asthmatic child.

- No help                      Spouse                      Partner                      Family                      Other
- 

13) Based on your previous answer, please indicate your level of agreement with the following statements.

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	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Neither Agree nor Disagree (4)	Somewhat Agree (5)	Agree (6)	Strongly Agree (7)
My spouse/partner/family/other helps me in taking care of my child.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The survey is complete. Thank you very much for your time!

**If you wish to receive a \$10 gift card, please click on the link below:**

**(Please note that this link is not connected to the survey)**

[http://uhcop.co1.qualtrics.com/SE/?SID=SV\\_8CVQfJeT1xahMMZ](http://uhcop.co1.qualtrics.com/SE/?SID=SV_8CVQfJeT1xahMMZ)

**APPENDIX D: THE VARIABLES CODE BOOK**

1	V12	Please indicate if you agree to participate in this study and that you have a child between the ages of 2-12 years who has asthma?	Yes=1 No=2
2	V13	Please indicate the number of children in your household.	1=1 child 2= 2 children 3= 3 children 4= 4 children 5= 5 children 6= 6 children 7= 7 children 8= 8 children 9= 9 children 10= 10 children 11= >10 children
3	V14	3. 2) Please indicate the number of children in your household who are diagnosed with asthma.	1=1 child 2= 2 children 3= 3 children 4= 4 children 5= 5 children 6= 6 children 7= 7 children

			8= 8 children 9= 9 children 10= 10 children 11= >10 children
4	V15	4. 1) Please indicate your child's age completed in years.	1- 2 years 2- 3 years 3- 4 years 4- 5 years 5- 6 years 6- 7 years 7- 8 years 8- 9 years 9- 10 years 10- 11 years 11- 12 years
5	V16	2) Please indicate your child's gender.	1- Male 2- Female
6		6. 3) Please indicate if your child has health insurance coverage.	1= Private insurance 2= Governmental insurance 3= None

7		<p>7. 4) Please indicate how many medication(s) does your child take for asthma.</p>	<p>1= 1 medication  2= 2 medications  3= 3 medications  4= 4 medications  5= 5 medications  6= 6 medications</p>
8		<p>8. 5) Please choose the medication/s that your child uses for treating asthma. (you may need to check your child's asthma medications at this time) If your child uses less than two medications, please choose not applicable for the other boxes. If your child uses more than two medications, please indicate it in the space provided below. If your child's medications is not in the list below, please use the space provided below.</p> <p>1-</p>	<p>2= Accolate (Tablets)  3= Accuneb (Solution for Inhalation)  6= Albuterol (Inhalation Aerosol) 8= Albuterol Sulfate (Solution for Inhalation)  9= Albuterol Sulfate (Syrup)  10= Albuterol Sulfate (Tablets)  12= ARNUITY ELLIPTA (Powder for Inhalation)  13= Asmanex HFA (Inhalation Aerosol) 14= Asmanex (Twisthaler)  17= Decadron (Tablet)</p>

			<p>22= Elixophyllin (Elixir)</p> <p>26= Flovent Diskus (Powder for Inhalation)</p> <p>27= Flovent HFA (Inhalation Aerosol) 29= Levalbuterol Hydrochloride USP</p> <p>30= Levalbuterol (Solution for Inhalation)</p> <p>31= Montelukast Sodium (Chewable Tablet)</p> <p>32= Montelukast Sodium (Granules) 33= Montelukast Sodium (Tablets) 34= PROAIR HFA (Inhalation Aerosol)</p> <p>35= ProAir RespiClick (Powder for Inhalation)</p> <p>36= Proventil (Inhalation Aerosol) 37= Proventil HFA (Inhalation Aerosol)</p> <p>38= QVAR (Inhalation Aerosol) 39= ReliOn</p>
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			<p>Ventolin HFA (Inhalation Aerosol) 40= Serevent Diskus (Powder for Inhalation)</p> <p>41= Singulair (Chewable Tablets) 42= Singulair (Tablets)</p> <p>44= Theo-24 (Extended-Release Capsules)</p> <p>45= Theochron (Extended-Release Tablets)</p> <p>46= Theophylline (Extended-Release Tablet)</p> <p>47= Other, please specify below</p> <p>48= Theophylline (Solution)</p> <p>50= Ventolin HFA (Inhalation Aerosol) 51= VoSpire ER (Extended-Release Tablet)</p>
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			<p>52= Walgreens Bronchial Mist (Inhalation Aerosol)</p> <p>53= Xopenex HFA (Inhalation Aerosol)</p> <p>54= Xopenex (Solution for Inhalation)</p> <p>55= Zafirlukast (Tablets)</p>
		<p>Frequency</p>	<p>1= One time daily</p> <p>2= Two times daily (every 12 hours)</p> <p>3= Three times daily (every 8 hours)</p> <p>4= Four times daily (every 6 hours)</p> <p>5= When needed</p> <p>6= Every night at bedtime</p> <p>7= Six times daily (every 4 hours)</p>
8		2-	<p>2= Accolate (Tablets)</p> <p>3= Accuneb (Solution for Inhalation)</p> <p>6= Albuterol (Inhalation Aerosol)</p> <p>8= Albuterol</p>

			<p>Sulfate (Solution for Inhalation)</p> <p>9= Albuterol Sulfate (Syrup)</p> <p>10= Albuterol Sulfate (Tablets)</p> <p>12= ARNUITY ELLIPTA (Powder for Inhalation)</p> <p>13= Asmanex HFA (Inhalation Aerosol)</p> <p>14= Asmanex (Twisthaler)</p> <p>17= Decadron (Tablet)</p> <p>22= Elixophyllin (Elixir)</p> <p>26= Flovent Diskus (Powder for Inhalation)</p> <p>27= Flovent HFA (Inhalation Aerosol)</p> <p>29= Levalbuterol Hydrochloride USP</p> <p>30= Levalbuterol (Solution for Inhalation)</p> <p>31= Montelukast Sodium (Chewable Tablet)</p>
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			<p>32= Montelukast Sodium (Granules) 33= Montelukast Sodium (Tablets) 34= PROAIR HFA (Inhalation Aerosol) 35= ProAir RespiClick (Powder for Inhalation) 36= Proventil (Inhalation Aerosol) 37= Proventil HFA (Inhalation Aerosol) 38= QVAR (Inhalation Aerosol) 39= ReliOn Ventolin HFA (Inhalation Aerosol) 40= Serevent Diskus (Powder for Inhalation) 41= Singulair (Chewable Tablets) 42= Singulair (Tablets) 44= Theo-24 (Extended- Release Capsules)</p>
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			<p>45= Theochron (Extended-Release Tablets)</p> <p>46= Theophylline (Extended-Release Tablet)</p> <p>47= Other, please specify below</p> <p>48= Theophylline (Solution)</p> <p>50= Ventolin HFA (Inhalation Aerosol) 51= VoSpire ER (Extended- Release Tablet)</p> <p>52= Walgreens Bronchial Mist (Inhalation Aerosol)</p> <p>53= Xopenex HFA (Inhalation Aerosol) 54= Xopenex (Solution for Inhalation)</p> <p>55= Zafirlukast (Tablets)</p>
		Frequency	1= One time daily

			<p>2= Two times daily (every 12 hours)</p> <p>3= Three times daily (every 8 hours)</p> <p>4= Four times daily (every 6 hours)</p> <p>5= When needed</p> <p>6= Every night at bedtime</p> <p>7= Six times daily (every 4 hours)</p>
9		9. If your child's asthma medications were not mentioned in the above list or he is using more than four medications, please write them down in the text box below.	(Empty space to be filled out by the patient if their medicine was not mentioned in the list)
10		<p>10. 6) Please indicate your level of agreement with the following statements regarding the severity of your child's asthma.</p> <p>1. I believe that my child's asthma is severe.</p> <p>2. I believe that my child's asthma is serious.</p> <p>3. I believe that my child's asthma is significantly affecting my child's lifestyle.</p>	<p>1= Strongly Disagree</p> <p>2= Disagree</p> <p>3= Neither Agree nor Disagree</p> <p>4= Agree</p> <p>5= Strongly Agree</p>

		36. 7) Please indicate which practitioner do you seek care for your asthmatic child.	1= Asthma specialist 2= Pediatrician 3= Other
11		11. 1) How likely are you to do the following: 1. I intend to use my child's asthma medication(s) as prescribed. 2. My intention is to continue using my child's asthma medication(s) rather than using any other therapy. 3. In the near future, I plan to continue using my child's asthma medication(s) as prescribed.	1= Strongly Disagree 2= Disagree 3= Somewhat Disagree 4= Neither Agree nor Disagree 5= Somewhat Agree 6= Agree 7= Strongly Agree
12		12. 2) When your child was first diagnosed with asthma what was your expectation with the asthma medications prescribed for your child. Based on my expectation: 1. Using asthma medications will improve my child's performance. 2. Using asthma medications will increase my child's school activities.	1= Strongly Disagree 2= Disagree 3= Somewhat Disagree 4= Neither Agree nor Disagree 5= Somewhat Agree 6= Agree 7= Strongly Agree

		<p>3. Using asthma medications will enhance my child's ability to perform normal activities</p> <p>4. Asthma Medications will be useful for my child</p>	
13		<p>13. 3) Please answer the following questions considering your experience after using your child's asthma medication(s). Compared to my initial expectations the ability of the asthma medications:</p> <p>1= To improve my child's performance was ...</p> <p>2= To increase my child's school activity was ...</p> <p>3= To enhance my child's ability to perform normal activities was ...</p> <p>4= To be useful for my child was ...</p>	<p>1= Much worse than expected</p> <p>2= Worse than expected</p> <p>3= Somewhat worse than expected</p> <p>4= Neither worse nor better than expected</p> <p>5= Somewhat better than expected</p> <p>6= Better than expected</p> <p>7= Much better than expected</p>
14		<p>14. 4) Please answer the following questions by considering both your initial expectation and current experience in using asthma medication(s) for your child.</p>	<p>1= Strongly Disagree</p> <p>2= Disagree</p> <p>3= Somewhat Disagree</p> <p>4= Neither Agree nor Disagree</p>

		<p>1. Using asthma medications improves my child's performance.</p> <p>2. Using asthma medications increases my child's school activities.</p> <p>3. Using Asthma medications enhances my child's ability to perform normal activities.</p> <p>4. I find asthma medications to be useful for my child.</p>	<p>5= Somewhat Agree</p> <p>6= Agree</p> <p>7= Strongly Agree (7)</p>
15		<p>15. 5) Please indicate your level of satisfaction with using your child's asthma medication(s). I am_____ with the my child's asthma medication(s)</p>	<p>1= Extremely displeased</p> <p>2= Displeased</p> <p>3= Somewhat displeased</p> <p>4= Neither pleased nor displeased</p> <p>5= Somewhat pleased</p> <p>6= Pleased</p> <p>7= Extremely pleased</p>
16		<p>16. I am_____ with the my child's asthma medication(s)</p>	<p>1= Extremely frustrated</p> <p>2= Frustrated</p> <p>3= Somewhat frustrated</p> <p>4= Neither contented nor frustrated</p> <p>5= Somewhat contented</p> <p>6= Contented</p>

			7= Extremely contented
17		17. I am _____ with the my child's asthma medication(s)	1=Extremely terrified 2= Terrified 3=Somewhat terrified 4=Neither delighted nor terrified 5= Somewhat delighted 6= Delighted 7= Extremely delighted
18		18. I am _____ with the my child's asthma medication(s)	1= Extremely dissatisfied 2= Dissatisfied 3= Somewhat dissatisfied 4= Neither satisfied nor dissatisfied 5= Somewhat satisfied 6= Satisfied 7= Extremely satisfied
19		19. D) Children with asthma sometimes have special problems. On the following page is a list of things that might be a problem for your child. Please tell us how much of a problem each one has been for your child during the past ONE	0= Never 1= Almost never 2= Sometimes 3= Often 4= Almost always

		<p>month      1) In the past ONE month, how much of a problem has your child had with    ASTHMA (problems with)</p> <p>1. Pain or tightness in his or her chest</p> <p>2. Feeling wheezy</p> <p>3. Having asthma attacks</p> <p>4. Getting scared while having asthma attacks</p> <p>5. Getting out of breath</p> <p>6. Coughing</p> <p>7. Taking a deep breath</p> <p>8. Having a stuffy or runny nose</p> <p>9. Waking up at night with trouble breathing</p> <p>10. Playing with pets</p> <p>11. Playing outside</p>	
20		<p>20.      2) In the past ONE month, how much of a problem has your child had with    TREATMENT (problems with)</p> <p>12. Medicines making him or her feel sick</p> <p>13. Trouble sleeping because of medicines</p> <p>14. Trouble using his or her inhaler</p>	<p>0= Never</p> <p>1= Almost never</p> <p>2= Sometimes</p> <p>3= Often</p> <p>4= Almost always asthma</p> <p>(this question for children with age 5-12 years old)</p>

		<p>15. Not liking to carry his or her inhaler 16. Refusing to take medicines</p> <p>17. Forgetting to take medicines</p> <p>18. Getting anxious when he or she has to have medical treatments</p> <p>19. Getting anxious about going to the doctor</p> <p>20. Getting anxious about going to the hospital</p> <p>21. Being responsible for his or her medicines (this question for children with age of 5-12 years old)</p> <p>22. Controlling his or her asthma (this question for children with age 5-12 years old)</p>	
21		<p>21. E) The following statements describe feelings and perceptions about the experience of being a parent. Think of each of the items in terms of how your relationship with your child or children typically is. Please indicate the degree to</p>	<p>1= Strongly Disagree</p> <p>2= Disagree</p> <p>3= Undecided</p> <p>4= Agree</p> <p>5= Strongly Agree</p>

	<p>which you agree or disagree with the following items.</p> <ol style="list-style-type: none"><li>1. I am happy in my role as a parent.</li><li>2. There is little or nothing I wouldn't do for my child(ren) if it was necessary.</li><li>3. Caring for my child(ren) sometimes takes more time and energy than I have to give.</li><li>4. I sometimes worry whether I am doing enough for my child(ren).</li><li>5. I feel close to my child(ren).</li><li>6. I enjoy spending time with my child(ren).</li><li>7. My child(ren) is an important source of affection for me.</li><li>8. Having child(ren) gives me a more certain and optimistic view for the future.</li><li>9. The major source of stress in my life is my child(ren).</li><li>10. Having child(ren) leaves little time and flexibility in my life.</li></ol>	
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22		<p>22. Please indicate the year that you were born</p>	<p>1= 1920  2= 1921  3=1922  4= 1923  5= 1924  6= 1925  7= 1926  8= 1927  9= 1928  10= 1929  11= 1930  12= 1931  13= 1932  14= 1933  15= 1934  16= 1935  17= 1936  18= 1937  19= 1938  20= 1939  21= 1940  22= 1941</p>

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			69= 1988 70= 1989 71= 1990 72= 1991 73= 1992 74= 1993 75= 1994 76= 1995 77= 1996 78= 1997 79= 1998 80= 1999 81= 2000
23		23. 2) Please indicate your race.	1= White/Caucasian 2= African American 3= Hispanic 4 Asian 5= Native American 6= Pacific Islander 7= Other
24		24. 3) Please indicate your gender.	1= Male 2= Female
25		25. 4) Please indicate your current marital status.	1=Single 2= Married

			3= Divorced 4= Widowed
26		26. 5) Please indicate your current employment status.	1= Full-time (30 hours or more per week) 2= Part-time (<30 hours per week) 3= Not working
		37. 6) Please indicate the highest level of education you have completed.	1= None 2= Elementary school 3= High school 4= College degree 5= Master degree 6= Doctoral degree
		38. 7) Please indicate your total combined household income range (including spouse) in US dollar.	4= Less than \$ 10,000 5= \$ 10,000 to \$19,999 6= \$ 20,000 to \$ 29,999 7= \$ 30,000 to \$ 39,999 8= \$ 40,000 to \$ 49,999 9= \$ 50,000 to \$ 59,999 10= \$ 60,000 to \$ 69,999 11= \$ 70,000 to \$ 79,999 12= \$ 80,000 to \$ 89,999 13= \$ 90,000 to \$ 99,999

			14= \$ 100,000 to \$ 109,999 15= \$ 110,000 to \$ 119,999 16= \$ 120,000 to \$ 129,999 17= \$ 130,000 to \$ 139,999 18= \$ 140,000 to \$ 149,999 19= \$ 150,000 to \$ 159,999 20= \$ 160,000 to \$ 169,999 21= \$ 170,000 to \$ 179,999 22= \$ 180,000 to \$ 189,999 23= \$ 190,000 to \$ 199,999 24= \$ 200,000 and more
27		27. 8) How often do you need to have someone help you when you read	1= Never 2= Rarely

		instructions, pamphlets, or other written material from your doctor or pharmacy?	3= Sometimes 4= Often 5= Always
28		28. 9) Please indicate if you were diagnosed for one or more of the following diseases (you may select more than one option).	2= Diabetes 3= Depression 4= Cardiac Disorders 5= Physical Disability 6= Asthma 7= Other 8= No Disorder
29		29. 10) Please rate the relationship between you and your child's health care provider.	1= I trust my child's healthcare provider 2= My child's healthcare provider is supportive 3= My child's healthcare provider listens to me carefully
30		30. 11) Please indicate your response for the following questions: 1. Did you consider any precautions before your asthmatic child perform any physical activity, such as playing football, dancing, etc?	1= Never 2= Rarely 3= Sometimes 4= Often 5= Always

		2. Did you consider any precautions, such as giving few puffs from inhaler, for your asthmatic child before he/she go to the park?	
31		31. 12) Please indicate who is helping you with your asthmatic child.	1= Spouse 2= Partner 3= Family 4= Other 5= No help
32		<b>32. 13) Based on your previous answer, please indicate your level of agreement with the following statements.</b> My spouse/partner/family/other helps me in taking care of my child.	1= Strongly Disagree 2= Disagree 3= Somewhat Disagree 4= Neither Agree nor Disagree 5= Somewhat Agree 6= Agree 7= Strongly Agree

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