Health Care Utilization Among Asthmatic Emerging Adults in the United States

By

DeAndra R. Morris

B.S. Anthropology
University of California, Los Angeles
2013

Thesis Committee Chair: Kimberly Jacob Arriola, PhD, MPH

A thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
in partial fulfillment of the requirements for the degree of
Master of Public Health
in Behavioral Sciences and Health Education
2016

Health Care Utilization among Asthmatic Emerging Adults in the United States

By

DeAndra R. Morris
MPH

Behavioral Sciences and Health Education

_____
Kimberly Jacob Arriola, PhD, MPH
Committee Chair

_____
Dawn Comeau, PhD, MPH, MA
Committee Member

_____
Cam Escoffery, PhD, MPH
Committee Member

_____
Eric Nehl, PhD, MS
Committee Member

_____
Colleen McBride, PhD, MA
Department Chair

Distribution Agreement

In presenting this thesis or dissertation as a partial fulfillment of the requirements for an advanced degree from Emory University, I hereby grant to Emory University and its agents the non-exclusive license to archive, make accessible, and display my thesis or dissertation in whole or in part in all forms of media, now or hereafter known, including display on the world wide web. I understand that I may select some access restrictions as part of the online submission of this thesis or dissertation. I retain all ownership rights to the copyright of the thesis or dissertation. I also retain the right to use in future works (such as articles or books) all or part of this thesis or dissertation.

Signature:

_____   _____
DeAndra R. Morris   Date

<u>Acknowledgements</u>

First, I would like to thank God for guiding me and giving me strength throughout this experience. With him, all things are possible!

I would like to thank my thesis committee for their guidance and support throughout this process:

Dr. Jacob Arriola
Dr. Comeau
Dr. Escoffery
Dr. Nehl

I would also like to thank my family, and friends for their continuous love, conversations, encouragement, and support throughout this experience. I would especially like to thank the following:

Mommy
Daddy
Smitty
Denicia Morris
Antie and Family
Raessah Chears and Family
Mitali T.
Lisa A.
Charity N.
Tiffany L.

Lastly, I would like to thank everyone in the Student Services Office, Career Development, and BSHE staff for their continuous support, guidance, understanding, and support. I would especially like to thank the following:

Dr. Kara Robinson
Emily Lakemaker
Meghan Sullivan
Robbie Freeman Michaux
Brittany Romanson
Sherida Holmes Daniels

Health Care Utilization among Asthmatic Emerging Adults in the United States

By

DeAndra R. Morris

B.S. Anthropology
University of California, Los Angeles
2013

Thesis Committee Chair: Kimberly Jacob Arriola, PhD, MPH

An abstract of
A thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
in partial fulfillment of the requirements for the degree of
Master of Public Health
in Behavioral Sciences and Health Education
2016

Abstract

Health Care Utilization among Asthmatic Emerging Adults in the United States
By DeAndra R. Morris

In this study, three research questions were used to examine the impact of predisposing, enabling, and need factors on health care utilization during the emerging adulthood developmental period from 18 to 24 years of age, in which asthmatics' transition from pediatric to adult health care. This study used the combined 2013 Behavioral Risk Factor Surveillance System (BRFSS) and the BRFSS Asthma Call-Back Survey Statistical Package for Social Sciences data set. The participants were a sample of 253 asthmatic emerging adults between the ages of 18-24. The sample was composed of 123 (48.6%) males and 130 (51.4%) females. Bivariate and multivariate analyses were conducted for each research question to examine the impact of predisposing, enabling, and need factors on emerging adults' health care utilization practices and behaviors. In addition, bivariate analyses were conducted to examine the relationship between demographic characteristics of the sample and key variables.

The results of the bivariate and multivariate analyses showed that the General Knowledge Index was the only predisposing factor significantly associated with health care utilization among the sample of asthmatic emerging adults. The results showed that no enabling factors were significantly associated with health care utilization, and no need factors were significantly associated with health care utilization among the sample of asthmatic emerging adults. Lastly, the study found significant associations between demographic characteristics and key variables. These findings suggest that predisposing factors have the most influence on asthmatic emerging adults' health care utilization during the transition from pediatric to adult health care.

Table of Contents

List of Tables and Figures

Table 1: Sample Demographic Characteristics

Table 2: Relationship Between Health Care Utilization Demographic Characteristics and Key Variables

Table 3: Health Care Utilization Regressed On Predisposing Factors That Were Significant In Bivariate Analyses

Table 4: Health Care Utilization Regressed On Need Factors That Were Significant In Bivariate Analyses

Figure 1: Andersen's Behavioral Model of Health Services Use

List of Appendices

Appendix A: IRB Determination Letter

Chapter 1: Introduction

Asthma is a chronic disease that causes an individual's airways to become inflamed and narrow during an asthma attack (NIH, 2014b). The chornic disease causes wheezing, difficulty breathing, shortness of breath, chest tightness, and coughing (CDC, 2016b; NIH, 2014a; NIH, 2014b). Asthma attacks can be triggered by allergens, such as pollen, tobacco smoke, air pollution, exercise, and other triggers (CDC, 2016b; NIH, 2014a). There is no cure for asthma; however, the disease can be managed through medical care and by avoiding triggers (CDC, 2016b; NIH, 2014a; NIH, 2014b). Therefore, asthmatic individuals always have asthma, but the symptoms of asthma may not always be present (American College of Allergy, Asthma & Immunology, 2014). Instead, symptoms may be triggered at varying times by "symptom triggers," such as allergens and exercise, as discussed below (American College of Allergy, Asthma & Immunology, 2014).

There are two main types of asthma, allergic (extrinsic) asthma and non-allergic (intrinsic) asthma (AAFA, 2005a; AAFA, 2005b; AAFA, 2005c; The Asthma Center, 2016). Allergic (extrinsic) asthma has symptoms that are triggered by an allergic reaction and inhaled allergens, such as pollen (AAFA, 2005a; AAFA, 2005b; AAFA, 2005c; The Asthma Center, 2016). In contrast, non-allergic (intrinsic) asthma is not triggered by allergic reactions, and does not involve the immune system (AAFA, 2005a; AAFA, 2005b; AAFA, 2005c; The Asthma Center, 2016). Instead, non-allergic (intrinsic) asthma is triggered by factors such as anxiety, stress, exercise, smoke, and other irritants (AAFA, 2005a; AAFA, 2005b; AAFA, 2005c; The Asthma Center, 2016).

Asthma impacts the health of millions of Americans. This is shown by estimates that 22.6 million people had asthma in the United States in 2013 (CDC, 2015f). Although asthma impacts all age ranges, this study will focus on the impact that asthma has on the adult population within the United States. In 2012, 13% of adults aged 18 and over stated that they were previously "told that they had asthma, and 8% still had asthma" (Blackwell, Lucas, & Clarke, 2014, p. 4). Additionally, in 2013, the overall national current asthma prevalence percentage among adults aged 18 years and over was 7.0%, and the number with current asthma was 16,540,000 (CDC, 2015f). In 2013, the number of asthma related deaths among adults aged 18 years and older was 3,412, and the death rate was 14.1 per million (CDC, 2015f). Lastly, in regard to health care utilization, 1.8 million emergency department visits in 2011, 14.2 million physician office visits in 2010, and 1.3 million hospital outpatient department visits in 2010 were primarily attributed to an asthma diagnosis (CDC, 2015f).

These statistics show the impact that asthma has on the adult population in the U.S. overall. However, it is also important to specifically study the impact of asthma on the emerging adult population. The asthma prevalence among emerging adults between the ages of 18-24 years is represented by the current asthma prevalence in both the 15-19 and 20-24 age ranges. Among individuals 15-19 years old, the national current asthma prevalence among adults in 2013 was 8.6%, and the number with current asthma was 1,761,000 (CDC, 2015f). Among adults 20-24 years old, the national current asthma prevalence among adults in 2013 was 7.2%, and the number with current asthma was 1,585,000 (CDC, 2015f). Also, increased age is associated with death among asthmatics as shown by the fact that 169 children under the age of 15 died from asthma compared to

633 adults over the age of 85 in 2011 (American Lung Association, 2014). Furthermore, the death rate among children under the age of 18 was 3.0 per million in 2013 (CDC, 2015f). In comparison, the death rate among adults aged 18 and older was 14.1 per million (CDC, 2015f). Therefore, in addition to the current focus on asthmatic children and the broader adult population, it also important to examine the impact of asthma during the emerging adulthood developmental stage of the life course. In order to decrease asthma related deaths among asthmatic emerging adults, it is important to understand the health utilization practices and barriers to health care utilization for the population including health insurance coverage status and cost barriers.

Among the general population, the number of young adults between the age range of 19-25 with private insurance has increased from 2008-2012 (CDC, 2013c). This increase is in part due to the Affordable Care Act (ACA), which expanded coverage for young adults on parental insurance plans up to the age of 26 (CDC, 2013c; U.S. Department of Health & Human Services, 2013). Prior to the ACA, expansion of private insurance for dependent young adults, the number of young adults with private insurance coverage decreased from 57.7% in the beginning of 2008 to 52.0% by the end of 2010 (CDC, 2013c). This decrease was in part due to the removal of children from parental insurance plans at the age of 19 prior to the passage of the ACA (U.S. Department of Health & Human Services, 2013). However, after the expansion of coverage for young adults through the ACA, the number of young adults with private insurance increased from 52.0% at the end of 2010 to 57.9% by the end of 2012 (CDC, 2013c).

The ACA contributed to the decrease in the number of privately insured young adults, that reported being uninsured or experiencing a gap in coverage within the past

year (CDC, 2013c). From July-December of 2010, shortly after the signing of the ACA on March 23, 2010, 9.7% of young adults between the ages of 19-25 reported being uninsured in the past year (CDC, 2013c; U.S. Department of Health & Human Services, 2015). After an increase in the number of uninsured young adults in the first half of 2011 to 13.2% uninsured, the number of uninsured decreased to 6.7% by the end of 2012 (CDC, 2013c).   Therefore, the increase in the number of young adults aged 19-25 with private insurance coverage mirrors and contributed to the decrease in the uninsured among this population. Despite this increase among those with private insurance, the number of young adults with public insurance remained stable from the end of 2010 to the end of 2012 (CDC, 2013c).

According to Asthma-Call Back Survey data from 2006-2010 for 20 U.S. areas, the percentage of asthmatic American adults with no or partial year health insurance coverage ranged from 2.6% to 9.3% in the District of Columbia and Texas, respectively (CDC, 2013a). In contrast, 18.4% of the overall U.S population under the age of 65 had no health insurance in 2010 (U.S. Census Bureau, 2012). The fact that asthmatic Americans are more likely to have health insurance than the general population could explain the increased health care utilization and asthma management among asthmatics (CDC, 2013a). However, the costs of asthma-related care could limit asthmatic individuals' use of health care services, despite their insurance status. As the CDC (2013a) states, having insurance coverage assists in reducing, not eliminating, cost barriers associated with asthma-related care. Despite the increased rates of insurance among asthmatic Americans, children and adult asthmatics report that health care cost

barriers impact their ability to "afford asthma medication, to see a primary care doctor or asthma specialist" (CDC, 2013a, para. 2).

Age and yearly health insurance coverage status (none, partial, or full coverage) also relate to the impact that cost barriers have on asthmatic individuals (CDC, 2013a). Cost barriers are reported more by individuals in the 18-64 age range, than by individuals outside of this age range (CDC, 2013a). Although these statistics apply to the larger adult population, emerging adults are a sub-group of the adult population. Therefore, this information can assist in understanding the factors that influence asthma medication adherence, asthma management, and health care utilization among emerging adults.

Problem Statement

Emerging adulthood is a critical developmental period between adolescence and young adulthood. According to Arnett (2000), the age range for this transition period is 18 to 25 years old. However, literature and statistics often use the inclusive term of "young adults" to refer to both emerging adults and young adults. Therefore, in the discussion of literature and statistics throughout this paper, the term "young adults" is inclusive of "emerging adults" and the "young adulthood" period. Additionally, for the purposes of this study, adolescence is defined as the developmental period prior to emerging adulthood that involves the transition to agency, personal responsibility, independence, and autonomy, in general, and in relation to asthma management (Arnett 2000; Arnett, 2007; Houtrow & Newacheck, 2008; Muyle, Park, Nelson, Adams, Irwin, & Brindis, 2009; Snipes, 2013).

In regard to health care, Blum et al. (1993) define transition as "the purposeful, planned movement of adolescents and young adults with chronic physical and medical

condition from child-center to adult-oriented health-care systems" (p. 570). The transition from pediatric to adult-centered health care should begin during adolescence, and the process continues as individuals' gradually transition from the adolescence developmental stage to the emerging adulthood developmental stage. Therefore the emerging adulthood developmental period may occur both during and after individuals' transition from pediatric to adult-centered health care.

The simultaneous transition between developmental periods and health care providers can have a significant impact on young adults' health and access to health care, specifically among those with chronic diseases and conditions, such as asthma (Rosen, Blum, Britto, Sawyer, & Siegel, 2003; Muyle et al., 2009). Health care transition during the developmental period of adolescence involves adolescences taking greater responsibility for their disease management and medication adherence (Blum et al., 1993; Houtrow & Newacheck, 2008). This transition in health care also occurs during the time that individuals begin to work, have more independent living conditions, are separated from the nuclear family, or attend college (Blum et al., 1993; Muyle et al., 2009; Reider-Demer, Zielinski, Carvajal, Anulao,Van Roeyen, 2008). Individuals may also experience a lack of health insurance during this developmental and health care transition due to the loss of insurance under parental or public-based health insurance (Houtrow & Newacheck, 2008; Muyle et al., 2009). Primary and preventive care services are essential aspects of health care during the transition process (Scal, Evans, Blozis, Okinow, & Blum, 1999). Health insurance status along with various demographic, social, and economic factors can negatively impact young adults' health care utilization patterns, disease management, and medication adherence (Houtrow & Newacheck, 2008;

Muyle et al., 2009). Therefore, access to health services and health utilization is important in managing asthma and in obtaining necessary asthma medication prescriptions.

Research Questions

This research project will focus on health care utilization among emerging adults in the age range of 18 to 24 years old to better understand the factors that impact asthma management and medication adherence among this population as they transition from pediatric to adult-centered health care. Health care utilization is defined as the "point in health systems where patients' needs meet the professional system," and includes the use of primary or routine, urgent care, and emergency health care services (Babitsch, Gohl, and von Lengerke, 2012, p.3). Asthma management is defined as the use of prescribed asthma treatment medications, knowledge of asthma symptoms, and limited interaction with asthma triggers (CDC, 2009). Lastly, medication adherence is defined as the patient's use of medications according to the timing, dosage, and frequency recommended and prescribed by a medical provider for a given amount of time (CDC, 2013b).

This study will use Arnett's Emerging Adulthood Development Theory as a meta-theory or foundational theory, and Andersen's Behavioral Model of Health Services Use as a middle-range theory to examine the following research questions: 1) What is the impact of predisposing factors (e.g., employment status) on health care utilization during the emerging adulthood developmental period from 18 to 24 years of age, in which individuals' transition from pediatric to adult health care?; 2) What is the impact of enabling factors (e.g., insurance status) on health care utilization during the emerging

adulthood developmental period from 18 to 24 years of age, in which individuals'

transition from pediatric to adult health care?; 3) What is the impact of need factors (e.g.,

self-identified work related asthma symptoms and professional work related asthma

symptoms) on health care utilization during the emerging adulthood developmental

period from 18 to 24 years of age, in which individuals' transition from pediatric to adult

health care?

Chapter 2: Literature Review

This literature review will begin with a general discussion of factors that influence asthma treatment, management, adherence, and control. Next, the theoretical frameworks for the study, Arnett's Emerging Adulthood Development Theory and Andersen's Behavioral Model of Health Services Use, will be discussed. Lastly, I will conclude by discussing associations between predisposing, enabling, and need factors and health care utilization as presented in the literature.

Research shows that factors that impact an individual's asthma treatment and management behaviors include the following: beliefs, perceptions of control, knowledge of proper use of asthma medication, asthma knowledge, self-efficacy and social contexts and environments (Bruzzese, Carcone, Lam, & Naar-King, 2014; George, Hufford, Jemmott, Weaver, 2006; Lurslurchachai et al., 2014; Menckeberg, Bouvy, & Bracke, 2008; Naar-King, Lam, Ellis, Bruzzese, & Secord, 2013). Asthma medication adherence and management is also influenced by socioeconomic status, relationships with health providers, attitudes toward medications and asthma itself, and family involvement in asthma management and treatment plans (Bruzzese et al., 2014; George et al., 2006; Lurslurchachai et al., 2014; Menckeberg et al., 2008; Naar-King et al., 2013). Additionally, research shows that the culturally competent asthma treatment plans have enhanced asthma management and reduced emergency department visits among African American and Hispanic children (LaRoche, Konis-Mitchell, & Gualdron, 2006; Snipes, 2013). Therefore, the use of culturally competent asthma management plans should be considered in promoting asthma medication use and medication use among emerging adults.

Adolescents are defined as "a high-risk group" based on the high asthma prevalence, morbidity, and mortality among this population (Bruzzese et al., 2014; Naar-King et al., 2013; Snipes, 2013). Previous research specifically shows that low asthma medication adherence and lack of proper use of medication devices is reflective of "poor asthma management" among adolescents and can be detrimental to their health (Bruzzese et al., 2014; Naar-King et al., 2013). Additionally, adolescents' adherence to asthma medication is influenced by their beliefs and attitudes regarding asthma medication, family involvement, and knowledge about asthma and proper asthma medication use (Bruzzese et al., 2014; Naar-King et al., 2013).

The literature also stresses the importance of asthma control (Dozier, Aligne, & Schlabach, 2006; Guilbert et al., 2011; Molimard & Le Gros, 2008). Asthma control is defined as the prevention of asthma symptoms, which is a necessary for asthma management (Dozier et al., 2006; Guilbert et al., 2011). Studies show that asthma control decreases with increased dosages of corticosteroid asthma medication (Molimard & Le Gros, 2008). Additionally, not using a medication inhaler device decreased an individual's ability to control their asthma (Molimard & Le Gros, 2008). However, increased compliance with prescribed medication dosages was associated with better asthma control (Molimard & Le Gros, 2008). Age and asthma control were also related with individuals' under 45 years old having better asthma control compared to those older than 45 years old (Molimard & Le Gros, 2008). However, there was no evidence of a relationship between asthma control and gender, and asthma control and disease history (Molimard & Le Gros, 2008). Furthermore, previous studies found that asthma that is not well-controlled is associated with increased health care utilization including doctor visits,

urgent care visits, and emergency department visits (Guilbert et al., 2011; Peters, Chen, Markson, Allen-Ramey, & Vollmer, 2006). Therefore, understanding an individual's current level of asthma control can assist in understanding his/her use of acute health care utilization in the future (Peters et al., 2006).

As previously discussed, the transition from pediatric to adult-center care should begin during adolescence. Research has shown that the transition from adolescence to adulthood has an impact on young adults' asthma management due to the cost of medication and one's insurance status (Houtrow & Newacheck, 2008; Muyle et al., 2009; Speck et al., 2014). The successful transition of adolescents from pediatric to adult-centered care is essential to the management of a chronic disease, such as asthma, which requires life-long management (Houtrow & Newacheck, 2008). Asthma management and medication adherence requires asthma control and health care utilization. Asthma management and medication adherence also consists of variations in management and control over the life course due to the sporadic nature of asthma symptoms based on exposure to symptom triggers, such as pollen. Therefore, factors such as moving to a new city can result in changes to an asthmatic's environmental conditions, which can trigger asthma symptoms (Snipes, 2013). For example, moving from a dry climate such as southern California to humid climate such as Georgia can trigger asthma symptoms, and may require changes in an asthmatic's asthma management plan and medication regimen. Consideration of the factors that impact health care utilization, asthma medication management, and asthma medication adherence during adolescence is important and provides a better understanding of the influence of these factors during emerging adulthood.

Theory

Arnett's Emerging Adulthood Development Theory

Arnett's Emerging Adulthood Development Theory will be used as a meta-theory or foundational theory in this research project to examine the impact of predisposing, enabling, and need factors on the emerging adults' health care utilization. Arnett (2000) defines emerging adulthood as the life course developmental period that roughly occurs from 18 to 25 years of age. Arnett (2000) argues that emerging adulthood occurs between adolescence and young adulthood. Although Arnett (2000) defines the transition period as 18 to 25 years old, this project will only focus on the 18 to 24 age range due to limitations of the ages ranges provided in the secondary data set.

The emerging adulthood developmental period involves exploration, independence, and decision making in relation to relationships, careers, and personal perspectives and views (Arnett, 2000). Both adolescence and emerging adulthood are culturally constructed (Arnett, 2000). Therefore individuals' experiences, levels of exploration, and level of independence during the emerging adulthood developmental period are dependent on their cultural context (Arnett, 2000). According to Arnett (2007), emerging adulthood is distinct from adolescence and adulthood because "it is the age of identity explorations, the age of instability, the self-focused age, the age of feeling in-between, and the age of possibilities" (p. 69). Emerging adulthood allows individuals to explore and determine their identity, and does not require individuals to make immediate long-term commitments and/or fully take on adult responsibilities (Arnett 2000; (Arnett, 2007).

Arnett (2000) argues that the diverse demographic characteristics, such as living arrangements and marital status, among the emerging adult population make the developmental period distinct from the periods of adolescence and adulthood during which there is more homogeneity. Additionally, the transition from emerging adulthood to adulthood is subjective, and is not dependent on one's exact age (Arnett, 2000). Instead, Arnett (2000) argues that emerging adults' self-identification as adults is influenced by their perceived self-sufficiency, financial independence, and independent decision making. Identity exploration and development also occurs during emerging adulthood, in which emerging adults explore their identity in the areas of "love, work, and worldviews" (Arnett, 2000, p. 473). Specifically, emerging adults explore and develop clear ideas for what they seek in romantic relationships, define and work toward their career aspirations, and determine their perception on various issues (Arnett, 2000). Emerging adulthood is characterized by exploration, increased independence, and decision making; therefore it is important to understand what factors contribute to emerging adults' health care utilization practices, and asthma management and medication adherence.

Andersen's Behavioral Model of Health Services Use

Andersen's Behavioral Model (BM) of Health Services Use will be used to understand the impact of predisposing, enabling, and need factors on emerging adults' health care utilization practices, and asthma management and medication adherence during this developmental period. The initial BM was developed in the 1960s, and since then the model has undergone various modifications (Andersen, 1995; Andersen, 2008). As of 2008, there were five phases of the BM: Phase 1 (1960s), Phase 2 (1970s), Phase 3

(1980s-19990s), Phase 4 (1990s), and Phase 5 (2000s) (Andersen, 2008). The most noticeable modification is the consideration of not only individual-level factors but also contextual-level factors, which contribute to individuals' utilization of health care services (Andersen, 1995; Andersen, 2008). The BM assists in predicting and explaining health care utilization among individuals (Andersen, 1995; Andersen, 2008). Additionally, Andersen's BM states that the components that influence individuals' health care utilization are predisposing factors, enabling factors, need factors.

This study will predominantly focus on the individual level, and will use the original Phase 1 (1960s) version of the Andersen's BM. The original BM focused on "defining and measuring" the various aspects of access to care (Andersen, 2008). The components in Phase 1 of the BM are predisposing characteristics, enabling resources, need, and use of health services (Andersen, 1995; Andersen, 2008). Throughout this paper, these components will be referred to as factors and components interchangeably.

Predisposing, Enabling, and Need Factors and Health Care Utilization

Predisposing Factors

The predisposing factors that impact health care utilization at the individual level are demographic characteristics, social structure factors, and health beliefs that impact individuals' use of health services (Andersen, 1995; Andersen, 2008). Examples of predisposing factors include: age, gender/sex, race, ethnicity, education, occupation, culture, and health and health services related attitudes, values, and knowledge (Andersen, 1995; Babitsch, 2012).

Previous studies have shown that age, previous use of oral steroid medication, frequency of day and night asthma symptoms, gender, education level, and employment

status are associated with health care utilization (Tinkelman, McClure, Lehr, & Schwartz, 2002). Asthma medication use is included in this discussion of predisposing factors because asthma-related knowledge can refer to an individuals' knowledge about how to properly use asthma medication. Tinkelman et al. (2002) found that females, individuals between the ages of 18-44 years old, those who did not graduate from high school, those who identified as unemployed due to an asthma-related illness, and individuals who reported having high levels of day and night asthma symptoms were more likely to report health care utilization.

Another study that examined health care utilization among asthmatic Arizona Medicaid patients who used inhaled-corticosteroids medication found that age is a predictor of health care utilization and influences the frequency that individuals' use health care services (Smith et al., 2009). The study showed that individuals between the ages of 18 to 62 years old had more asthma-related emergency room visits and hospitalizations than those ages 5 to 17 years old (Smith et al., 2009). A multicenter observational study on use of emergency departments in the U.S. examined frequency of emergency department visits among asthmatic adults with acute asthma symptoms (Hasegawa et al., 2014). Similarly, this study found that age, gender, and use of corticosteroids was a predictor of health care utilization among asthmatics. The study found that older age, male gender, and lower household income were significantly associated with higher frequency of emergency department visits for acute asthma symptoms (Hasegawa et al., 2014). Frequent use of emergency departments was also associated with indicators of severe asthma, such as use of inhaled corticosteroids (Hasegawa et al., 2014). Race and ethnicity was also associated with frequency of

emergency department visits with asthmatics that identify as non-Hispanic black having a higher frequency of visits than other racial and ethnic groups (Hasegawa et al., 2014).

Similarly, another study that examined disparities in health care by race, ethnicity, and language among insured individuals found that there were not only racial and ethnic disparities in care among insured nonelderly adults, but also language related disparities (Fiscella, Franks, Doescher, & Saver, 2002). Specifically, health care utilization was lower for Spanish-speaking Hispanic patients and for Black patients in specific health care settings, in comparison to White, non-Hispanic patients (Fiscella et al., 2002). Additionally, studies suggest that health beliefs, less asthma self-management education, and less access to preventative health care relate to the use of the emergency department to treat irregular asthma symptoms (Hasegawa et al., 2014).

Demographic, socioeconomic, cultural, racial, environmental, and social factors are also associated with asthma prevalence, morbidity, mortality, asthma-related knowledge, medication use, annual household income level, exposures, access to health care services, and the frequency at which health care services are used (American Lung Association, 2012; Asthma and Allergy Foundation of America, 2005; CDC, 2012; NIH, 2012). The Asthma and Allergy Foundation of America (2015) states that differences in asthma prevalence, morbidity, and mortality among ethnic groups are influenced by "poverty, city air quality, indoor allergens, not enough patient education and poor health care" (para. 6). In regard to medication use, there is a lower percentage of Hispanic (23.2%) and African American (25.1%) than Caucasian (35.1%) asthmatic individuals that take medication daily to control asthma symptoms (American Lung Association, 2012). Aside from race and ethnicity, lower annual household income was associated

with a higher current asthma prevalence according to data from 2008-2010 (CDC, 2012).

Living and work environments also impact individuals' exposure to environmental risks,

which can negatively impact their asthma (NIH, 2012).

According to data from 2008-2010, the prevalence of asthma among racial and

ethnic groups was the following: multi-racial (14.1%), African Americans (11.2%),

American Indian or Alaska Native (9.4%), Hispanic (6.5%), Caucasian (7.7%), and Asian

(5.2%) (CDC, 2012). Lastly, children, women, low-income, inner-city, African

American, and Puerto Rican populations have "above-average rates of emergency

department visits, hospitalizations, and deaths," which is displayed by the fact that

asthma-related hospitalization rates and death are three times higher among African

Americans than Caucasians (NIH, 2012).

Enabling Factors

Enabling factors are defined as the financial and organizational factors that

influence individuals' use of health services (Andersen, 1995; Andersen, 2008). Enabling

factors include: income, health insurance status, having a regular source of health care,

transportation to health services, and travel and waiting times related to health care

utilization (Andersen, 1995; Babitsch, 2012).

Studies have found that use of health care services within the past year was

related to current emergency department visits among nearly half of asthmatics with

acute asthma symptoms, such as wheezing (Hasegawa et al., 2014). The study also found

that individuals with higher chronic asthma severity had more frequent emergency

department visits (Hasegawa et al., 2014). However, frequency of emergency department

visits for acute asthma symptoms was not related to having a primary care physician

(Hasegawa et al., 2014). This suggests that having routine care may not influence asthmatics use of emergency health care services. Health insurance status was also significantly associated with a higher frequency of emergency department visits among asthmatic patients (Hasegawa et al., 2014). The study found that asthmatic patients with public insurance or no insurance were more likely to have frequent emergency department visits (Hasegawa et al., 2014). Additionally, another study that examined health care utilization among asthmatic Arizona Medicaid patients who used inhaled-corticosteroids showed that individuals between the ages of 18 to 39 years old had higher asthma-related costs than those ages 5 to 17 or 40 to 62 years old (Smith et al., 2009). These costs may influence individuals' use of health care services.

A systematic review of studies that used Andersen's BM also showed that income was associated with health care utilization (Babitsch, 2012). Income and health care utilization also impacted the way in which patients were diagnosed. Physician diagnosis was associated with less financial strain among underserved populations; whereas more financial strain was associated with self-diagnosis (Babitsch, 2012). Studies also found that the affordability of health care services influenced who provided patients with health diagnosis. Increased affordability of health services was associated with receiving diagnosis from a physician (Babitsch, 2012). Additionally, studies found that having health insurance increased the likelihood that individuals would use health care services, and decreased the delay in use of health care services among various populations (Babitsch, 2012). Studies also found that the type of insurance, such as Medicare, Medicaid, Medicaid with supplemental insurance, or private insurance influenced individuals' use of health care services (Babitsch, 2012). Lastly, the studies found that

individuals with a regular source of health care used health care services more often (Babitsch, 2012).

Need Factors

Need factors include both evaluated and perceived need for health services (Andersen, 1995; Andersen, 2008). Evaluated need is defined as health professionals' opinion of an individual's health status and need for medical care (Andersen, 1995; Babitsch, 2012). Perceived need for health services is defined as an individual's own perception of his/her health and functional state, experience with symptoms of illness, and perception about the need to seek professional medical care based on the perceived seriousness of a health condition (Andersen, 1995; Babitsch , 2012).

The literature shows that evaluated need and perceived need are important factors that influence health care utilization. Evaluated health status is associated with an increase in health care utilization (Babitsch, 2012). This is displayed by an increase in health care utilization among those with poorer physical and mental health based on their evaluated health status or diagnosis (Babitsch, 2012). Additionally, those diagnosed with chronic disease, restricted activity function, and/or depression used health care services more frequently (Babitsch, 2012).

In addition, perceived and self-rated health was significantly associated with the receipt of treatment. Individuals' that perceived that they had worse health received more health care treatment (Babitsch, 2012). Additionally, perceived need influenced patients' decisions to seek care from emergency departments rather than their primary care providers when they did not have urgent symptoms (Babitsch, 2012). Perceived severity of symptoms also influenced patients' decisions to seek emergency care (Babitsch, 2012).

This was also shown in a qualitative study that examined asthmatic urban adults' use of emergency department services for acute asthma symptoms (Lawson et al., 2014) .

The study participants used the emergency department to treat asthma symptoms and to receive asthma medication, although many had routine care providers and prescriptions for controller asthma medications (Lawson et al., 2014). Participants stated that their inability to contact their outpatient providers, such as primary care providers, influence their decision to use of emergency health care services. Additionally, the use of emergency health care services was influenced by patients' inability to refill prescriptions, in some cases due to conflicts between work and pharmacy hours as barriers to using outpatient services (Lawson et al., 2014).

The study also indicated the perceived need factors that influence use of the emergency department, which was referred to as the ED. Patients perceived need for emergency department services to treat their asthma symptoms were influenced by the following factors: "ED as a fast or convenient site of care," " ED resources or expertise," "inability to access outpatient provider," "inability to access medication," "lack of symptom improvement," "severity of symptoms," "referred by outpatient provider," "told to go to ED by a friend or family member," and "insurance status" (Lawson et al., 2014, pp. 3, 4) . In addition to representing perceived need, the "referred by outpatient provider" factor also represents an evaluated need (Lawson et al., 2014). The representation of the "referred by outpatient provider" factor as an evaluated need is shown in the following quote: "When I called my primary care they told me to come to the ER…because something was wrong and they knew that the ER would be the best place to get it fixed" (Lawson et al., 2014, pp. 3, 4). This quote shows that the primary

care provider's evaluation and instruction for the patient to seek care from the emergency department represents an evaluated need that influenced the patient's decision to seek emergency care. Furthermore, this shows that both evaluated need and perceived need influence individuals' health care utilization behaviors.

Conclusion

The transition from pediatric to adult-centered health care begins in adolescence, and this process has serious implications for emerging adults' use and access to health care services. Arnett (2007) suggests that the life course involves the gradual transition through the following developmental periods: adolescence, emerging adulthood, young adulthood, middle adulthood, and late adulthood. This study focuses on the gradual transition from adolescence to emerging adulthood, and from emerging adulthood to young adulthood (Arnett, 2007). Previous research has focused on factors that impact the health utilization of adolescents and young adults. However, there has not been a clear distinction between emerging adults and young adults. Additionally, there is limited research on the factors that specifically impact emerging adults' health care utilization, asthma management, and asthma medication adherence.

According to Arnett (2000, 2007), there is a distinction between emerging adulthood and adulthood; therefore it is important to examine the factors that influence health care utilization, asthma management, and medication adherence among the emerging adult population specifically. The emerging adults' increased independence, increased decision making power, and focus on exploration associated during the emerging adulthood developmental period can both positively or negatively impact their ability and decision to manage their asthma and practice medication adherence (Arnett,

2000). Additionally, the emerging adulthood period is associated with more financial independence, work, college, residence away from the nuclear family, loss of parental and public-based insurance coverage, and health care transition (Arnett, 2000; Muyle et al., 2009).

Therefore, this study will examine the factors that influence emerging adults' health care utilization practices, and asthma management and medication adherence. Additionally, this study will use Arnett's Emerging Adulthood Development Theory and Anderson's BM to answer the following questions: 1) What is the impact of predisposing factors (e.g., employment status) on health care utilization during the emerging adulthood developmental period from 18 to 24 years of age, in which individuals' transition from pediatric to adult health care?; 2) What is the impact of enabling factors (e.g., insurance status) on health care utilization during the emerging adulthood developmental period from 18 to 24 years of age, in which individuals' transition from pediatric to adult health care?; 3) What is the impact of need factors (e.g., self-identified work related asthma symptoms and professional work related asthma symptoms) on health care utilization during the emerging adulthood developmental period from 18 to 24 years of age, in which individuals' transition from pediatric to adult health care?

Chapter 3: Methods

This chapter will discuss the procedures, recruitment and sampling methods, and participants in the study. Next, the measures used to assess each relevant independent and dependent variable will be discussed in detail. Lastly, the data analysis plan used in this study will be discussed.

Procedures

A secondary data set will be used for this research study. The Centers for Disease Control and Prevention (CDC) Behavioral Risk Factor Surveillance System (BRFSS) and the BRFSS Asthma Call-Back Survey (ACBS) data will be used as the secondary data sources for this research study. The 2013 BRFSS is a cross-sectional survey and includes reported information from 53 areas including: the 50 U.S. states, the District of Columbia, Guam, and the Commonwealth of Puerto Rico. The purpose of the BRFSS survey is to collect prevalence data at the state and local level for preventative health practices and risk behaviors that can impact the health of U.S. adult residents that are 18 years of age and older (CDC, 2014d).

The BRFSS survey is conducted over landline and cellular telephones on a monthly basis by state health departments. The standardized BRFSS questionnaire includes questions from national surveys, such as the National Health Interview Survey, and has three areas including: 1) the core component, 2) the optional BRFSS modules, and 3) the state-added questions. All states use the questions in the core component area during the survey interviews. The core component area consists of the standard or "fixed" core, rotating core, and emerging core questions (CDC, 2014b; CDC, 2014d; CDC, 2015e). The fixed core questions are standard questions asked on a yearly basis that

25

consist of demographic questions and questions focused on "current health-related perceptions, conditions, and behaviors" (CDC, 2014b, p.4; CDC, 2014d; CDC, 2015e, para. 4). The emerging core questions are related to "emerging or 'late breaking' health issues" (CDC, 2014b; CDC, 2014d; CDC, 2015e; CDC, 2015g, p. 3). The emerging questions are either included in the "fixed" or standard core, rotating core, optional modules, or no longer used after the first year of use (CDC, 2014b; CDC, 2014d; CDC, 2015e). The rotating core questions are asked every-other year (CDC, 2014b; CDC, 2014d; CDC, 2015e). The optional BRFSS modules consists of questions that focus on specific topic areas, such as stigma. States are not required to conduct the optional BRFSS modules, and decide to do so if they choose. Lastly, the state-added questions area includes questions that are not evaluated or edited by the CDC, and individual states develop or obtain these questions that may discuss health-related topics of interest not included in the other two sections (CDC, 2014b; CDC, 2014d; CDC, 2015e).

The BRFSS ACBS is an in-depth asthma survey conducted approximately two weeks after the BRFSS survey among BRFSS respondents that reported that they "have ever been diagnosed with asthma" (CDC, 2014d). The ACBS is funded by the National Center for Environmental Health's Air Pollution and Respiratory Health Branch (CDC, 2014d). Together, the BRFSS and ACBS comprise the adult and child asthma prevalence data at the state and local levels in U.S. states and territories (CDC, 2015d). The combined 2013 BRFSS and the 2013 BRFSS ACBS Statistical Package for Social Sciences (SPSS) data set will be used for this research study. The data set includes questions from both the 2013 BRFSS Questionnaire and the follow-up 2013 ACBS Questionnaire. Study participants are between the ages of 18 and 24 years. An IRB

Determination Letter from Emory University was provided that approved the use of this data set in this research study (see Appendix A).

Recruitment and Sampling

The BRFSS sampling methodology includes two samples: the landline and cellular telephone samples (CDC, 2014b). The landline telephone sample includes "landline telephone respondents," and uses household sampling or disproportionate stratified sampling (DSS) method (CDC, 2014b, p. 6). The DSS sampling method uses household telephone numbers from "two strata (lists) that are based on the presumed density of known household numbers" including: a high density stratum and a low density stratum (CDC, 2014b, pp. 6-7). The high density stratum is "sampled at the highest rate… [and] contains a large proportion of the target [telephone] numbers," and the medium density stratum "contains a smaller proportion of the target telephone numbers" (CDC, 2014b, p. 7). The sampling ratio was 1:1.5 for the high to medium density strata in the BRFSS household landline sampling (CDC, 2014b). According to the CDC (2014b), the DSS sampling method provides a more efficient way to reach the target telephone numbers than simple random sampling. Lastly, the landline household sampling requires the interviewer to receive information about the number of adults living in a household, and to then randomly select one eligible adult among all eligible adults to participate in the BRFSS survey (CDC, 2014b).

Participants for the cellular telephone sample are randomly selected from a sampling frame developed using "confirmed cellular area code and prefix combinations" (CDC, 2014b, p. 7). The cellular telephone respondents have an equal probability of

being selected, and are viewed and weighted as single adult households in the data set (CDC, 2014b).

The CDC (2014b) defines sample size for landline and cellular phone BRFSS data as "the number of telephone numbers that must be called within a given period of time (p. 7)." The BRFSS sample size goal is 4,000 interviews per state each year at the least, although variations in this goal were due to the cost of data collection and individual state's need to obtain estimates about subpopulations (CDC, 2014b).

Participants

Participants completed both the BRFSS and BRFSS ACBS surveys, and eligible participants had to be 18 years old or older to participate in the BRFSS and BRFSS ACBS. However, the eligibility criteria to participate in this study are that the individual must be an adult asthmatic age 18-24 years, they must have been previously told by a doctor or health professional that they had asthma, and they must currently self-identify as asthmatic. The type of asthma that participants' have will not be specified, and the focus will be on participants' identification as asthmatic and/or being diagnosed with asthma in the past. Based on this criterion, 253 individuals were present in the secondary data set.

Measures

The following Andersen's Behavioral Model of Health Services Use (BM) components will be used in this study: predisposing factors, enabling factors, need factors. Prior to conducting analyzes, the adult landline and cell-phone combined data source, which includes variables from both the BRFSS and follow-up BRFSS ACBS questionnaires, was examined to identify the variables that align with the definitions of

predisposing, enabling, and need factors in Andersen's BM. The data set was also used to generate the list in Figure 1. The predisposing, enabling, and need factors variables identified also represent the independent variables in this study.

<u>Predisposing Factors</u>

<u>Demographic Characteristics/Social Structure</u>

Predisposing factors at the individual level are defined as demographic characteristics, social factors, and health beliefs that impact individuals' use of health services. Predisposing factors consists of the following: age, gender/sex, race, ethnicity, education, occupation, culture, and health and health services related attitudes, values, and knowledge (Andersen, 1995; Babitsch et al., 2012). Previous studies have included either gender or sex as a predisposing factor; however this study will use sex. The variables and indices that represent predisposing factors in this study include the following: sex, age, race/ethnicity, education level, current employment status, time since asthma diagnosis, the general asthma knowledge index, the asthma management index, and the professional asthma inhaler instruction index.

All respondents were asked if they were 18 years or older to determine their ability to participate in the interview. The sex or gender identity of the respondent was also determined through this question, therefore the answer options included: 1) "yes, respondent is male," 2) "yes, respondent is female," and 3) "no." Following this question, <u>age </u>was assessed by asking respondents to report their age in years. In addition, the <u>sex </u>of the respondent was only asked when necessary; otherwise the interview identified the respondent as male or female. If it was necessary to ask the sex of the respondent, the answer options included: 1) male and 2) female.
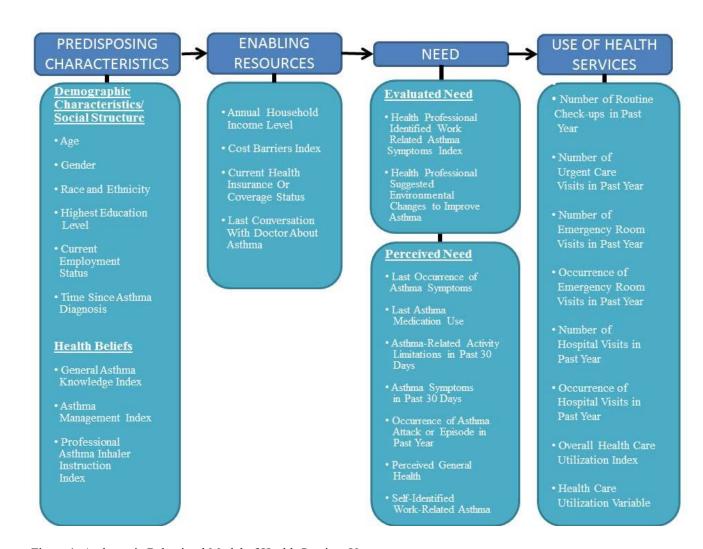
```
PREDISPOSING          ENABLING            NEED            USE OF HEALTH
CHARACTERISTICS       RESOURCES                            SERVICES
```

PREDISPOSING CHARACTERISTICS

Demographic Characteristics/ Social Structure

• Age

• Gender

• Race and Ethnicity

• Highest Education Level

• Current Employment Status

• Time Since Asthma Diagnosis

Health Beliefs

• General Asthma Knowledge Index

• Asthma Management Index

• Professional Asthma Inhaler Instruction Index

ENABLING RESOURCES

• Annual Household Income Level

• Cost Barriers Index

• Current Health Insurance Or Coverage Status

• Last Conversation With Doctor About Asthma

NEED

Evaluated Need

• Health Professional Identified Work Related Asthma Symptoms Index

• Health Professional Suggested Environmental Changes to Improve Asthma

Perceived Need

• Last Occurrence of Asthma Symptoms

• Last Asthma Medication Use

• Asthma-Related Activity Limitations in Past 30 Days

• Asthma Symptoms in Past 30 Days

• Occurrence of Asthma Attack or Episode in Past Year

• Perceived General Health

• Self-Identified Work-Related Asthma

USE OF HEALTH SERVICES

• Number of Routine Check-ups in Past Year

• Number of Urgent Care Visits in Past Year

• Number of Emergency Room Visits in Past Year

• Occurrence of Emergency Room Visits in Past Year

• Number of Hospital Visits in Past Year

• Occurrence of Hospital Visits in Past Year

• Overall Health Care Utilization Index

• Health Care Utilization Variable

Figure 1: Andersen's Behavioral Model of Health Services Use.

_____

Race and ethnicity was assessed by asking two questions. The first question used

to assess race and ethnicity asked respondents to indicate if they are of Hispanic,

Latino/a, or Spanish origin. The response options to this question included: 1) "Mexican,

Mexican American, Chicano/a," 2) "Puerto Rican," 3) "Cuban," 4) "Another Hispanic,

Latino/a, or Spanish origin," 5) "No," 6) "Don't know/Not sure," and 9) "Refused."

The second question used to assess race/ethnicity asked respondents to indicate which answer option represented their race. The participants responded to the question using the following answer options: 1) "White," 2) "Black or African American," 3) "American Indian or Alaska Native," 4) "Asian," 5) "Pacific Islander," 6) "Other," 7) "No additional choices," 8) "Don't know/Not sure," and 9) "Refused." The variable was recoded prior to conducting bivariate and multivariate analyses to only include answer options 1-6, and the remaining response options were recoded as system missing. Additionally, the "Asian" and "Pacific Islander" race options also included sub-categories for the respondents to select and to specify their racial identity within the category. The sub-categories of the "Asian" racial category, response option 4, included the following: 1) "Asian Indian," 2) "Chinese," 3) "Filipino," 4) "Japanese," 5) "Korean," 6) "Vietnamese," and 7) "Other Asian." The sub-categories of the "Pacific Islander" racial category include the following: 1) "Native Hawaiian," 2) "Guamanian or Chamorro," 3) "Samoan," and 4) "Other Pacific Islander." Initially, all respondents were asked if they were 18 years or older to determine their ability to participate in the interview. The answer options included: 1) "yes, respondent is male," 2) "yes, respondent is female," and 3) "no."

Highest level of education was assessed by asking respondents to state the highest grade or year of school they completed. The answer options to the question included the following: 1) "Never attended school or only attended kindergarten," 2) "Grades 1 through 8 (Elementary)," 3) "Grade 9 through 11 (Some high school)," 4) "Grade 12 or GED (High school graduate)," 5) "College 1 year to 3 years (Some college or technical school)," 6) "College 4 years or more (College graduate)," and 7) "Refused." The

variable was recoded prior to conducting bivariate and multivariate analyses to only include answer options 1-6, and the remaining response option was recoded as system missing.

Current employment status was assessed by asking participants to describe their current employment status. The answer options for the question include the following: 1) "employed full-time," 2) "employed part-time," 3) "not employed," 4) "don't know," and 5) "refused." The current employment status variable was recoded prior to conducting bivariate and multivariate analyses to only include answer options 1-3, and the remaining response options were recoded as system missing. Time since asthma diagnosis was assessed by asking respondents how long ago they were first told by a doctor or other health professional that they had asthma. The answer options to the question included the following: 1) "within the past 12 months," 2) "1-5 years ago," 3) "more than 5 years ago," 4) "don't know," and 5) "refused." The time since asthma diagnosis variable was recoded prior to conducting bivariate and multivariate analyses to only include answer options 1-3, and the remaining response options were recoded as system missing.

Health Beliefs

General asthma knowledge was assessed by three questions, which were then used to create the General Asthma Knowledge Index. The first question assessed general asthma knowledge by asking respondents if a doctor or health professional ever taught them how to recognize early signs or symptoms of an asthma episode. The second question assessed general asthma knowledge by asking respondents if a doctor or health professional ever taught them what to do during an asthma episode or attack. The third question assessed general asthma knowledge by asking respondents if a doctor or health

professional ever taught them how to use a peak flow meter to adjust your daily medication. The participants responded to each of the general asthma knowledge questions separately using the following answer options: 1) "yes," 2) "no," 7) "don't know," and 9) "refused." The questions were recoded prior to creating the index and conducting bivariate and multivariate analyses to only include the answer options 0) "no" and 1) "yes." The remaining response options were recoded as system missing. The General Asthma Knowledge index was then computed by summing the three questions. Sample items included: "Has a doctor or other health professional ever taught you what to do during an asthma episode or attack?" The possible range of scores in the index ranged from 0 to 3, with higher scores indicating more general asthma knowledge.

Asthma management was assessed by two questions, which were then used to create the Asthma Management Index. The first question assessed asthma management by asking respondents if a doctor or health professional ever gave an asthma action plan. The second question assessed asthma management by asking respondents if they have ever taken a course or class on how to manage their asthma. Participants responded to each asthma management question individually using the following answer options: 1) "yes," 2) "no," 7) "don't know," and 9) "refused." The questions were recoded prior to creating the index and conducting bivariate and multivariate analyses to only include the answer options 0) "no" and 1) "yes." The remaining response options were recoded as system missing. The Asthma Management Index was computed by summing the two questions. Sample items included: "Have you ever taken a course or class on how to manage your asthma?" The possible range of scores in the index ranged from 0 to 2, with higher score indicating more asthma management knowledge.

Professional asthma inhaler instruction was assessed by asking two questions, which were then used to create the Professional Asthma Inhaler Instruction Index. The first question assessed professional asthma inhaler instruction by asking participants if a doctor or other health professional show them how to use an inhaler. The second question assessed professional asthma inhaler instruction by asking participants if a doctor or other health professional watched them use an inhaler. Participants responded to each asthma management question separately using the following answer options: 1) "yes," 2) "no," 7) "don't know," and 9) "refused." The questions were recoded prior to creating the index and conducting bivariate and multivariate analyses to only include the answer options 0) "no" and 1) "yes." The remaining response options were recoded as system missing. The Professional Asthma Inhaler Instruction Index was computed by summing the two-items included in the index. Sample items included: "Did a doctor or other health professional show you how to use the inhaler?" The possible range of scores in the index ranged from 0 to 2, with higher score indicating more asthma inhaler medication use knowledge.

Enabling Factors

Enabling factors include the financial and organizational level factors that influence individuals' use of health services, however only individual level financial factors will be included in this study. Enabling factors are defined as the following: income, health insurance status, having a regular source of health care, transportation to health services, and travel and waiting times related to health care utilization (Andersen, 1995; Babitsch, 2012). In this study, the variables and index that represent the enabling factors consist of the following: annual household income level, the cost barriers index,

current health insurance or coverage status, and last conversation with doctor about asthma.

Annual household income level was assessed by asking respondents to indicate their annual household income from all sources. The respondents answered using the following answer options: 1) "$0 to less than $10,000," 2) "$10,000 to less than $15,000," 3) "$15,000 to less than $20,000," 4) "$20,000 to less than $25,000," 5) "$25,000 to less than $35,000," 6) "$35,000 to less than $50,000," 7) "$50,000 to less than $75,000," 8) "$75,000 or more," 77) "don't know/not sure," 99) "refused." The annual household income level variable was recoded prior to conducting bivariate and multivariate analyses to only include answer options 1-8, and the remaining response options were recoded as system missing.

Cost barriers to primary care, specialist care, and medication in the past year was assessed by asking participants three questions, which were then used to create the Cost Barriers Index. The first question assessed cost barriers to seeing a primary care doctor in the past year by asking participants if there was a time in the past 12 months when they needed to see their primary care doctor but could not go because of the cost. The second question assessed cost barriers to seeing a specialist for asthma care during the past year by asking participants if there was a time in the past 12 months when they were referred to a specialist for asthma care but could not go because of the cost. The third question assessed cost barriers to purchasing asthma medication during the past year by asking participants if there was a time in the past 12 months when they needed to buy medication for their asthma but could not because of the cost. The response options for the three questions were the same and included the following: 1) "yes," 2) "no," 5) "no

current asthma, skip filled," 7) "don't know," and 9) "refused." The questions were recoded prior to creating the index and conducting bivariate and multivariate analyses to only include the answer options 0) "no" and 1) "yes." The remaining response options were recoded as system missing. The Cost Barriers index was computed by summing the three questions. Sample items included: "Was there a time in the past 12 months when you needed to see your primary care doctor for your asthma but could not because of the cost?" The possible range of scores in the index ranged from 0 to 3, with higher score indicating more cost barriers.

Current health insurance or coverage status was assessed by asking respondents if they have any kind of health care coverage, including health insurance, prepaid plans such as HMOs, or government plans such as Medicare or Medicaid. The response options to the question included the following: 1) "yes," 2) "no," 7) "don't know/not sure," and 9) "refused." The current health insurance or coverage status variable was recoded prior to conducting bivariate and multivariate analyses to only include answer options 1) "yes," and 2) "no." The remaining response options were recoded as system missing.

The last conversation with a doctor about asthma variable was assessed by asking participants how long it has been since they last talked to a doctor or other health professional about their asthma at a doctor's office, hospital, emergency room, or an urgent care center. The participants responded to the last conversation with a doctor question by using the following answer options: 4) "never," 5) "within the past year," 6) "1 year to less than 3 years ago," 6) "3 years to 5 years ago," 7) "more than 5 years ago," 77) "don't know," 88) "never," 99) "refused." The last conversation with a doctor about asthma variable was recoded prior to conducting bivariate and multivariate analyses to

only include the following answer options: 1) "never," 2) "within the past year," 3) "1 year to less than 3 years ago," 4) "3 years to 5 years ago," 5) "more than 5 years ago." The remaining response options were recoded as system missing.

<u>Need Factors</u>

Need factors included both evaluated need and perceived need for health services. Evaluated need is defined as health professionals' opinion of an individual's health status and need for medical care (Andersen, 1995; Babitsch, 2012). The variables and index that represent the evaluated need factors consist of the following: the health professional identified work-related asthma symptoms index and health professional suggested environmental changes to improve asthma.

<u>Evaluated Need</u>

Work-related asthma symptoms identified by a health professional were assessed by asking two questions, which were then used to create the <u>Health Professional Identified Work-Related Asthma Symptoms Index</u>. The first question asked participants if their doctor or other health professional ever discussed with them whether their asthma could have been caused by, or symptoms made worse by any job they ever had. The second question asked participants if their doctor or other health professional ever told them that their asthma was caused by, or symptoms made worse by, any job they ever had. The answer options for both questions were the same and included the following: 1) "yes," 2) "no," 6) "never employed, skip filled," 7) "don't know," 8) "past employment unknown, skip filled," and 9) "refused." The variable was recoded prior to conducting bivariate and multivariate analyses to only include the answer options: 1) "yes" and 2) "no." The remaining response options were recoded as system missing.

Health professional suggested environmental changes to improve asthma was assessed by asking participants if a health professional ever advised them to change things in their home, school, or work to improve their asthma. The participants responded to the question by using the following answer options: 1) "yes," 2) "no," 7) "don't know/not sure," and 9)"refused." The variable was recoded prior to conducting bivariate and multivariate analyses to only include the following answer options: 1) "yes" and 2) "no." The remaining response options were recoded as system missing.

Perceived Need

Perceived need for health services is defined as an individual's own perception of his/her health and functional state, experience with symptoms of illness, and perception about the need to seek professional medical care based on the perceived seriousness of a health condition (Andersen, 1995; Babitsch, 2012). The variables that represent the perceived need factors include the following: last occurrence of asthma symptoms; last asthma medication use; asthma-related activity limitations in past 30 days; asthma symptoms in the past 30 days; occurrence of an asthma attack or episode in past year; perceived general health, and self-identified work-related asthma symptoms.

Last occurrence of asthma symptoms was assessed by asking participants how long it has been since they last had any symptoms of asthma. Last asthma medication use was assessed by asking participants how long it has been since they last took asthma medication. The response options for both questions were the same and included the following: 1) "less than one day ago," 2) "1-6 days ago," 3) "1 week to less than 3 months ago," 4) "3 months to less than 1 year ago," 5) "1 year to less than 3 years ago," 6) "3 years to 5 years ago," 7) "more than 5 years ago," 77) "don't know," 88) "never,"

and 99) "refused." Both variables were recoded prior to conducting bivariate and multivariate analyses to only include the following answer options: 1) "less than one day ago," 2) "1-6 days ago," 3) "1 week to less than 3 months ago," 4) "3 months to less than 1 year ago," 5) "1 year to less than 3 years ago," 6) "3 years to 5 years ago," 7) "more than 5 years ago," and 8) "never." The remaining response options were recoded as system missing.

Asthma-related activity limitations in the past month was assessed by asking participants to indicate if they limited their usual activities due to asthma not at all, a little, a moderate amount, or a lot in the past 30 days. The participants responded to the question using the following answer options: 1) "not at all," 2) "a little," 3) "a moderate amount," 4) "a lot," 5) no current asthma, nothing happened, skip filled; 7) "don't know," and 9) "refused." The variable was recoded prior to conducting bivariate and multivariate analyses to only include answer options 1-4, and the remaining response options were recoded as system missing.

Asthma symptoms in the past 30 days were assessed by asking participants how many days they had any symptoms of asthma during the past 30 days. The participants responded to the question using the following answer options: 1) participants self-report of the number of days, 30) "everyday," 66) "no symptoms past one year, skip filled," 77) "don't know," 88) "no symptoms in the past 30 days," and 99) "refused." The variable was recoded prior to conducting bivariate and multivariate analyses to only include participants' self-reported number of days from the range of 1 to 30. The remaining response options were recoded as system missing.

The <u>occurrence of an asthma attack or episode in the past year</u> was assessed by asking the respondent if they had an episode of asthma or an asthma attack during the past 12 months. The response options to the question included the following: 1) "yes," 2) "no," 6) "no symptoms past 1 year, skip filled," 7) "don't know," and 9) "refused." The <u>v</u>ariable was recoded prior to conducting bivariate and multivariate analyses to only include answer options 0) "no" and 1) "yes." The remaining response options were recoded as system missing.

<u>Perceived general health</u> was assessed by asking participants to indicate the status of their general health using the following answer options: 1) "excellent," 2) "very good," 3) "good," 4) "fair," 5) "poor," 7) "don't know/not sure," and 9) "refused." The variable was recoded prior to conducting bivariate and multivariate analyses to only include answer options 1-5, and the remaining response options were recoded as system missing. <u>Self-identified work-related asthma symptoms</u> were assessed by asking participants if a doctor or other health professional ever told them that their asthma was caused by, or their symptoms made worse by, any job they ever had. The answer options for the question included the following: 1) "yes," 2) "no," 6) "never employed, skip filled," 7) "don't know," 8) "past employment unknown, skip filled," and 9) "refused." The variable was recoded prior to conducting bivariate and multivariate analyses to only include answer options 0) "no" and 1) "yes." The remaining response options were recoded as system missing.

Dependent Variables

Lastly, the health utilization variables represent the dependent variables. The health utilization variables identified within the data set include the following: the number of routine check-ups in the past year, the number of urgent visits in the past year, the occurrence of emergency room visits in the past year, and the occurrence of hospital visits in the past year.

The number of routine check-ups in past year was assessed by asking participants how many times they had seen a doctor or other health professional for a routine checkup for asthma during the past 12 months. The participants responded to the number of routine check-ups question using the following answer options: 1) participants self-report the number of routine check-ups, 555) "No current asthma, nothing happened past year, skip filled," 666) "no MD visit past year, skip filled," 777) "don't know," 888) "none," and 999) "refused." The variable was recoded into a dichotomous variable prior to creating the health care utilization index and variable. The answer options included 0) "No Use of Routine Check-Ups in the Past Year" and 1) "Used Routine Check-Ups in the Past Year." The remaining response options were recoded as system missing.

The number of urgent visits in the past year was assessed by asking participants how many times they had seen a doctor or health professional for urgent treatment of worsening asthma symptoms or for an asthma episode or attack during the past 12 months. The participants responded to the number of urgent visits question using the following answer options: 1) participants self-report the number of urgent visits," 555) "No current asthma, nothing happened past year, skip filled," 666) "no MD visit past year, skip filled," 777) "don't know," 888) "none," and 999) "refused." The variable was

recoded into a dichotomous variable prior to creating the health care utilization index and variable. The answer options included 0) "No Use of Urgent Treatment Services in the Past Year" and 1) "Used Urgent Treatment Services in the Past Year." The remaining response options were recoded as system missing.

The occurrence of emergency room visits in the past year was assessed by asking participants if they had to visit an emergency room or urgent care center because of their asthma during the past 12 months. The participants responded to the question using the following answer options: 1) "yes," 2) "no," 5) "no current asthma, nothing happened past year, skip filled," 6) "no MD visit past year, skip filled," 7) "don't know," and 9) "refused." The variable was recoded into a dichotomous variable prior to creating the health care utilization index and variable. The answer options included 0) "No Use of Emergency Room or Urgent Care Center in the Past Year" and 1) "Used Emergency Room or Urgent Care Center in the Past Year."

The occurrence of hospital visits in the past year was assessed by asking participants if they had to stay overnight in a hospital, not including an overnight stay in the emergency room, because of their asthma during the past 12 months. The participants responded to the question using the following answer options: 1) "yes," 2) "no," 4) "MD visit, no symptoms past year, skip filled," 5) "no current asthma, nothing happened past year, skip filled," 6) "no MD visit past year, skip filled," 7) "don't know," and 9) "refused." The variable was recoded into a dichotomous variable prior to creating the health care utilization index and variable. The answer options included 0) "No Use of Hospital Services in the Past Year" and 1) "Used Hospital Services in the Past Year."

The Overall Health Care Utilization Index was created by summing the four variables discussed above: the number of routine check-ups in the past year, the number of urgent visits in the past year, the occurrence of emergency room visits in the past year, and the occurrence of hospital visits in the past year. Prior to creating the index, the answer options for each variable were recoded as 0) "Limited Use of Health Services in the Past Year" and 1) "Greater Use Health Services in the Past Year." Due to the small number of responses for each variable, all of the variables were combined to create a measure for overall health service utilization. Initially, the possible range of scores for the index ranged from 0 to 4, with higher scores representing more health utilization. However, a dichotomous health care utilization variable was created from the Overall Health Care Utilization Index for use in the analysis, in order to compare use of health care services versus no use of health care services broadly.

The health care utilization variable was created by collapsing the Overall Health Care Utilization Index from five categories to two categories to assist in providing a better understanding of overall health services use in the past year. The two categories were 0) "Limited Use of Health Care Services in the Past Year" and 1) "Greater Use of Health Care Services in the Past Year." The "Limited Use of Health Care Services in the Past Year" category includes those who responded "yes" to less than two of the health services utilization questions, and represent those with less health service utilization, specifically low levels or no use, in the past year. Participants who responded "yes" to 2 or more of the health care utilization questions were included in the "Greater Use of Health Care Services in the Past Year" category, and represent those with more health service utilization, specifically some or high levels of use, in the past year.

43

Data Analysis Plan

Among the 11,962 total participants in the BRFSS and ACBS study, a total of 253 (2.1%) participants were in the age range of 18-24 years old, and only these participants will be included in the analyses for this study. The treatment of the data and the preliminary, bivariate, and multivariate analyses conducted are discussed in detail below.

Treatment of Data

Data entry was completed using the SPSS Version 21. The secondary data was previously entered into SPSS, and downloaded from the source. Statistical analyses were completed using the SPSS Version 21.

The initial data analyses were conducted in the following steps:

1. The Andersen's BM definition of predisposing, enabling, and need factors was used to identify predisposing factors, enabling factors, and need factors within the combined 2013 BRFSS and 2013 ACBS, which included landline and cell-phone responses to the questionnaires.

2. Health services variables were identified within the data set based on the questions used to analyze health care utilization in the 2013 BRFSS and 2013 ACBS questionnaires.

3. Descriptive statistics were conducted for the predisposing factors, enabling factors, need factors, and health utilization variables identified within the data set. Additionally demographic characteristics were assessed for participants within the age ranges of 18-24.

4. Variables with extremely low frequencies, for example frequencies of 0 or 2, were not included in further analyses.

5. The descriptive statistics were analyzed and response options that required recoding were identified. The variables were then recoded and categories were recoded as system missing, when appropriate, specifically for "don't know," "refused," and "skip filled" answer options.

6. Frequency tables were created for the recoded variables to account for data coded as system missing, and to determine the frequencies of the recoded variables.

7. Variables with extremely low frequencies, such as a frequency of 2, after recoding were not included in further analyses. Additionally, when necessary, prior to conducting bivariate and multivariate analyses, variables were recoded by combining categories that had low frequencies and/or cell counts of less than 5.

Preliminary, Bivariate, and Multivariate Analyses

This study examines the following research questions: 1) What is the impact of predisposing factors (e.g. employment status) on health care utilization during the emerging adulthood developmental period from 18 to 24 years of age, in which individuals' transition from pediatric to adult health care?; 2) What is the impact of enabling factors (e.g. insurance status) on health care utilization during the emerging adulthood developmental period from 18 to 24 years of age, in which individuals' transition from pediatric to adult health care?; 3) What is the impact of need factors (e.g. self-identified work related asthma symptoms and professional work related asthma symptoms) on health care utilization during the emerging adulthood developmental period from 18 to 24 years of age, in which individuals' transition from pediatric to adult health care?

<u>Preliminary Analyses</u>

First, descriptive statistics were conducted for the predisposing factors, enabling factors, and need factors variables. Second, the following indices were created: Overall Health Care Index, General Asthma Knowledge Index, Asthma Management Index, Professional Asthma Inhaler Instruction Index, Cost Barriers Index, and Health Professional Identified Work-Related Asthma Symptoms Index. The ranges and meanings of the indexes were then determined. By collapsing the seven categories in the Overall Health Care Utilization Index into two categories, the dichotomous health care utilization variable was then created. The frequency tables of the indices and health services utilization variable were then created. In addition, frequency tables were created for all of the remaining predisposing factors, enabling factors, and need factors variables in the data set.

<u>Bivariate and Multivariate Analyses</u>

Lastly, the same data analysis plan was followed for predisposing, enabling, and need factors. First, bivariate analyses were conducted, which were then followed by multivariate analyses. Chi-square tests and independent t-tests were conducted for the bivariate analyses. Chi-square tests were conducted for categorical variables, and Independent Samples T-tests were conducted for continuous variables to examine their association with the health care utilization outcome variable. Only variables significant at the bivariate level were included in the multivariate logistic regression analyses.

<center>**Chapter 4: Results**</center>

In this chapter, the sample demographic characteristics and results of both the bivariate and multivariate analyses will be discussed. The results of the bivariate and multivariate analyses for the predisposing, enabling, and need factors are discussed in detail below.

Descriptive Statistics

Participant Demographics

Among the 253 participants, the average age was 20.66 years old (SD= 2.16). The sample was 51.4% (n= 130) female and 48.6% (n= 123) male. The majority of participants were White, Non-Hispanic (n= 175; 69.2) and the remaining participants reported different racial and ethnic identities (see Table 1). The highest level of education for 39.9% (n= 101) participants was "some college or technical school," which was followed by "high school graduate or GED" (n= 93; 36.8%; see Table 1). In regard to employment status, 44.3% (n= 112) participants reported that they were "not employed" while other participants' reported that they were "employed full-time" or "employed part-time" (see Table 1). The annual household income level of the largest proportion of participants was "$75,000 or more" (n= 41; 16.2%), and the remaining participants reported annual household income levels below this amount (see Table 1). The majority of participants stated that they currently had health insurance or coverage (n= 198; 78.3%; see Table 1). Additionally, among the 253 participants, 88.5% (n= 224) reported that they were diagnosed with asthma more than five years ago while the remaining participants indicated that their diagnosis occurred less than five years ago (see Table 1). Lastly, 133 (83.6%) of participants had "Limited Use of Health Care Services in the Past Year" and 26 (10.3%) had "Greater Use of Health Care Services in the Past Year."

Table 1

Sample Demographic Characteristics

Variable	Overall (N = 253) n (%)
Sex	
Male	123 (48.6)
Female	130 (51.4)
Race/Ethnicity	
White, Non-Hispanic	175 (69.2)
Black, Non-Hispanic	23 (9.1)
Asian, Non-Hispanic	7 (2.8)
American Indian/Alaskan Native, Non-Hispanic	2 (0.8)
Hispanic	41 (16.2)
Other race, Non-Hispanic	5 (2.0)
Highest Level of Education	
Elementary	3 (1.2)
Some High School	26 (10.3)
High School Graduate or GED	93 (36.8)
Some College or Technical School	101 (39.9)
College Graduate	30 (11.9)
Employment Status	
Employed full-time	53 (20.9)
Employed part-time	88 (34.8)
Not Employed	112 (44.3)
Annual Household Income Level	
$0 to <$10,000	23 (9.1)
$10,000 to <$15,000	9 (3.6)
$15,000 to <$20,000	19 (7.5)
$20,000 to <$25,000	19 (7.5)
$25,000 to <$35,000	22 (8.7)
$35,000 to <$50,000	23 (9.1)
$50,000 to <$75,000	15 (5.9)
$75,000 or more	41 (16.2)
Health Insurance or Coverage Status	
Yes	198 (78.3)
No	47 (18.6)
Time Since Diagnosis	
Within the past 12 months	2 (0.8)
1 to 5 years ago	27 (10.7)
More than 5 years ago	224 (88.5)

Note. n varies based on missing responses. Percentages represent valid percent values.

Demographic Characteristics and Key Study Variables

Bivariate analyses were conducted to examine the relationship between demographic characteristics and key study variables. Chi-square tests were used to test the association between categorical key variables; Independent Samples T-test were used to test the mean differences between two groups in the continuous key study variables, and one-way ANOVA were used to test the mean differences between three or more groups in the continuous key study variables. The categorical race and ethnicity key study variable was recoded and collapsed from six to three categories for the purposes of these analyses. Additionally, the highest level of education and time since diagnosis key study variables were recoded into dichotomous variables for the purposes of these analyses.

The results of the bivariate analyses show that biological sex (male or female) is significantly associated with annual household income ($\chi^2 = 16.75$; df= 7; p=0.02) with more males (n= 28; 33.3%) reporting high annual household incomes of "$75, 000 or more" than females (n= 13; 14.9%). The results also indicate that race and ethnicity is significantly associated with asthma management (F [2,238]= 3.25, p= 0.04). The Tamhane's T2 post-hoc test suggests that the mean asthma management index score for White, Non-Hispanic participants (mean= 0.28; SD= 0.51) is significantly lower than the mean asthma management index score for other racial groups, Non-Hispanic (mean= 0.53; SD= 0.61; p= 0.04).

Highest level of education was significantly associated with general asthma knowledge (t= -2.43; df= 233.80; p=0.02). The results show that participants with some college or higher levels of education (mean= 1.99; SD= 1.08) have a significantly higher general asthma knowledge index score than those that reported high school/GED or lower

as their highest education level (mean= 1.64; SD= 1.14). Additionally, highest level of education was significantly associated with perception of general health (χ^2= 8.05; df= 3; p=0.05). For both the "excellent" and "very good" general health perception categories, more participants reported that their highest level of education was some college or higher than those who reported high school/GED or lower. In contrast, more participants reported that their highest level of education was high school/GED or lower than those who reported some college or higher for the "good" and "fair/poor" perception of health categories. For example, more participants that had some college or higher levels of education (n=53; 40.5%) reported having "very good" health than those who graduated from high school, earned a GED, or completed a lower level of education (n= 31; 25.6%).

Annual household income level and current health insurance or coverage status were also significantly associated with each other (χ^2= 14.97; df= 7; p=0.04). More participants responded "yes" to currently having health insurance or coverage in each of the income level categories than those who responded "no." Furthermore, more participants in the "$75, 000 or more" income level category (n=39; 97.5%) reported "yes" to currently having health insurance or coverage than those in the "$0 to Less than $10,000" income level category (n= 13; 61.9%). Annual household income level was also significantly associated with health professional identified work related asthma (F [7, 145]= 2.25, p= 0.03), although there were no statistically significant mean differences between the income level categories.

Current health insurance or coverage status was significantly associated with cost barriers (t= 3.40; df= 31.41; p< 0.001), and participants who responded "no" to currently having health insurance or coverage (mean= 0.70; SD= 0.95) had significantly higher

cost barriers index scores than those that reported "yes" to currently having health insurance or coverage (mean= 0.10; SD= 0.39). Current health insurance or coverage status was also significantly associated with perception of general health (χ^2= 13.29; df= 3; p < 0.001), and more participants responded "yes" to currently having health insurance or coverage than those who responded "no" for each general health perception category except the "fair/poor" category. For example, more participants that currently had health insurance or coverage (n=72; 36.5%) reported having "very good" health than those who did not currently have health insurance or coverage (n= 10; 21.3%).

Lastly, current health insurance or coverage status was also significantly associated with health care utilization (χ^2= 4.94; df= 1; p= 0.03), and more participants responded "yes" to currently having health insurance or coverage than those who responded "no" for both health care utilization categories. More participants that currently had health insurance or coverage (n=98; 79.7%) reported "no use of health care services in the past year" than those who did not currently have health insurance or coverage (n= 29; 96.7%). Additionally, more participants that currently had health insurance or coverage (n=25; 20.3%) reported "use of health care services in the past year" than those who did not currently have health insurance or coverage (n= 1; 3.3%). Overall, the majority of participants currently had health insurance or coverage and reported "no use of health care services in the past year" (n=98; 79.7%). However, the bivariate analyses show that the remaining key variables were not significantly associated with the demographic characteristics (see Table 2).

Table 2

Relationship Between Demographic Characteristics and Key Study Variables Displayed by Test Statistic Values and P-values

| | Key Study Variables | | | | | | | | | |
| | Predisposing Factors | | | Enabling Factors | | | Need Factors | | | Health Care Utilization |
Variable	General Asthma Knowledge Index	Asthma Management Index	Professional Asthma Inhaler Use Instruction Index	Annual Household Income Level	Cost Barriers Index	Current Health Insurance or Coverage Status	Health Professional Identified Work Related Asthma Index	Asthma Symptoms in Past 30 Days	Perception of General Health	Health Care Utilization
Sex	-	-	-	$\chi^2 = 16.75^*$	-	-	-	-	-	-
Male										
Female										
Race and Ethnicity	-	F[2,238]=3.25*	-	-	-	-	-	-	-	-
White, Non-Hispanic										
Other racial groups, Non-Hispanic										
Hispanic										
Highest Level of Education	t= -2.43*	-	-	-	-	-	-	-	$\chi^2 = 8.05^*$	-
High School/GED or Lower Education Level										
Some College or Higher Education Level										
Current Employment Status	-	-	-	-	-	-	-	-	-	-
Employed Full-Time										
Employed Part-Time										
Not Employed										

Table 2 Continued

Relationship Between Demographic Characteristics and Key Study Variables Displayed by Test Statistic Values and P-values

| | Key Study Variables | | | | | | | | | |
| | Predisposing Factors | | | Enabling Factors | | | Need Factors | | | Health Care Utilization |
Variable	General Asthma Knowledge Index	Asthma Management Index	Professional Asthma Inhaler Use Instruction Index	Annual Household Income Level	Cost Barriers Index	Current Health Insurance or Coverage Status	Health Professional Identified Work Related Asthma Index	Asthma Symptoms in Past 30 Days	Perception of General Health	Health Care Utilization
Annual Household Income Level	-	-	-	†	-	χ^2= 14.97*	F[7, 145]= 2.25*	-	-	-
$0 to <$10,000										
$10,000 to <$15,000										
$15,000 to <$20,000										
$20,000 to <$25,000										
$25,000 to <$35,000										
$35,000 to <$50,000										
$50,000 to <$75,000										
$75,000 or more										
Current Health Insurance or Coverage Status	-	-	-	χ^2= 14.97*	t= 3.40***	†	-	-	χ^2= 15.63***	χ^2= 4.94*
Yes										
No										
Time Since Diagnosis	-	-	-	-	-	-	-	-	-	-
5 years ago or less										
More than 5 years ago										

Note. Race and Ethnicity variable was recoded into three categories for analyses; Highest Level of Education and Time Since Diagnosis variables were recoded as dichotomous for analyses; - = not significant; † = no analyses conducted because cannot run the same variable with itself.
*p ≤ .05. **p < .01. ***p < .001.

Bivariate and Multivariate Results by Research Question

<u>Predisposing Factors</u>

<u>Research Question 1</u>

What is the impact of predisposing factors (e.g., employment status) on health care

utilization during the emerging adulthood developmental period from 18 to 24 years of age, in

which individuals' transition from pediatric to adult health care?

<u>Bivariate and Multivariate Results</u>

Bivariate analyses were conducted to explore the relationship between the hypothesized

predictor variables (sex, age, race, education level, current employment status, time since asthma

diagnosis, the General Asthma Knowledge Index, the Asthma Management Index, and the

Professional Asthma Inhaler Instruction Index) and the health care utilization outcome variable.

Table 3

Health Care Utilization Regressed On Predisposing Factors That Were Significant In Bivariate
Analyses

	Health Care Utilization	
Variable	OR	95% CI
Constant	0.01***	
Highest education level		
College graduate	Referent	
Elementary and/or Some high school	2.70	[0.36, 20.32]
High school graduate/GED	1.20	[0.20, 7.38]
Some college or technical school	2.66	[0.51, 13.89]
General Asthma Management Index	2.70*	[1.32, 5.51]
Asthma Management Index	1.52	[0.65, 3.57]

Note. OR = odds ratios for predictor variables; CI = confidence interval.
*$p \leq .05$. ***$p < .001$.

Chi-square tests were used to test the association between categorical variables; Independent Samples T-tests were used to test mean differences between two groups in the continuous variables. The bivariate results showed a significant association between education level and health care utilization (χ^2= 5.57; df= 3; p= 0.14), General Asthma Knowledge Index and health care utilization (t= -4.22; df=41.18; p<0.001), and the Asthma Management Index and health care utilization (t=-2.01; df= 31.95; p=0.05) at the p<0.20 significance level. No other predisposing factors were significantly associated with health care utilization. Therefore, only these three variables were included in the multivariate analyses. The multivariate analyses indicate that only general asthma knowledge (p= 0.05; see Table 3) is significantly associated with health care utilization. The results of the multivariate logistic regression suggest that for each unit of increase in the General Asthma Knowledge Index, the odds of reporting health care utilization increases by 1.73 (OR=1.73; 95% CI= 0.99, 3.01; p=0.05).

Enabling Factors

Research Question 2

What is the impact of enabling factors (e.g., insurance status) on health care utilization during the emerging adulthood developmental period from 18 to 24 years of age, in which individuals' transition from pediatric to adult health care?

Bivariate and Multivariate Results

Bivariate analyses were conducted to explore the relationship between the hypothesized predictor variables (annual household income level, Cost Barriers Index, current health insurance or coverage status, and last conversation with doctor about asthma) and the health care utilization outcome variable. Chi-square tests were used to test the association between categorical variables; Independent Samples T-tests were used to test mean differences between two groups

in the continuous variables. The bivariate results showed a significant association between current health insurance or coverage status and health care utilization ($\chi^2 = 4.94$; df= 1; p=0.03), and length of time since last conversation with doctor about asthma and health care utilization ($\chi^2 = 28.12$; df= 3; p<0.001) at the p<0.20 significance level. However, due to the low cell counts and presumed similarities with the health care utilization outcome variable at the bivariate level, multivariate analyses could not be conducted for the health insurance or coverage status variable and last conversation with doctor variable. No other enabling factors were significantly associated with health care utilization. Thus, this research question could not be further tested with the available data.

Need Factors

Research Question 3

What is the impact of need factors (e.g., self-identified work related asthma symptoms and professional work related asthma symptoms) on health care utilization during the emerging adulthood developmental period from 18 to 24 years of age, in which individuals' transition from pediatric to adult health care?

Bivariate and Multivariate Results

Need factors have two sub-categories: "evaluated need factors" and "perceived needfactors." However, bivariate and multivariate analyses were not conducted separately for each sub-category.

Bivariate analyses were conducted to explore the relationship between the hypothesized predictor variables (Health Professional Identified Work-Related Asthma Symptoms Index; health professional suggested environmental changes to improve asthma; last occurrence of asthma symptoms; last asthma medication use; asthma-related activity limitations in past 30

days; asthma symptoms in the past 30 days; the occurrence of an asthma attack or episode in past

year; perceived general health, and self-identified work-related asthma symptoms) and the health

care utilization outcome variable. Chi-square tests were used to test the association between

categorical variables; Independent Samples T-tests were used to test mean differences between

two groups in the continuous variables. The bivariate results showed a significant association

between health care utilization and each of the following perceived need predictor variables at

the p<0.20 significance level: health professional suggested environmental changes to improve

asthma (χ^2= 1.81; df= 1; p=0.18), last occurrence of asthma symptoms (χ^2=11.71; df= 6;

p=0.07), last asthma medication use (χ^2= 15.43; df= 7; p= 0.03), asthma-related activity

limitations in past 30 days (χ^2= 4.79; df=2; p=0.09), asthma symptoms in past 30 days (t= -2.25;

df= 69; p=0.03), and the occurrence of an asthma attack or episode in past year (χ^2=6.89; df= 1;

p=0.01). No other need factors were significantly associated with health care utilization.

Therefore, only these variables were included in the multivariate analysis. The multivariate

analysis results indicate that none of the need factors were significantly associated with health

care utilization (see Table 4).

Table 4

Health Care Utilization Regressed On Need Factors That Were Significant In Bivariate Analyses

| | Health Care Utilization | |
Variable	OR	95% CI
Constant	0.04*	
Health Professional Identified Work Related Asthma Symptoms Index	3.36	[0.61, 18.33]
Last occurrence of asthma symptoms		
1 week to less than 1 year ago	Referent	
Less than 1 day ago	12.08	[0.86, 169.86]
1-6 days ago	8.22	[0.71, 94.79]
Last asthma medication use		
3 months ago or more/Never	Referent	
Less than 1 day ago	13.17	[0.71, 243.86]
1-6 days ago	5.88	[0.37, 92.91]
1 week to less than 3 months ago	2.70	[0.12, 63.47]
Asthma-related activity limitations in past 30 days		
A lot or a moderate amount	Referent	
A little	0.08	[0.01, 1.06]
Not at all	0.31	[0.03, 3.51]
Asthma symptoms in past 30 days	1.00	[0.89, 1.12]
Occurrence of asthma attack or episode in past year	1.12	[0.21, 6.12]

Note. OR = odds ratios for predictor variables; CI = confidence interval

*$p \leq .05$.

Summary

This study used the BRFSS and ACBS landline and cell-phone combined data set to examine health care utilization among a sample of 253 emerging adults. Bivariate and multivariate analyses were conducted to examine the relationship between predisposing, enabling, and need factors and health care utilization. The multivariate results of this study showed that only the General Asthma Index predisposing factor was significantly associated with health care utilization among emerging adults. The study also found significant associations between demographic characteristics and key study variables. The general findings, findings by research question, implications, recommendations for future research, and conclusions will be discussed in this chapter.

Findings by Research Question

Predisposing Factors

Research Question 1

What is the impact of predisposing factors (e.g., employment status) on health care utilization during the emerging adulthood developmental period from 18 to 24 years of age, in which individuals' transition from pediatric to adult health care?

Findings

The bivariate and multivariate analyses showed that the General Asthma Knowledge Index was significantly positively associated with health care utilization among emerging adults. As individuals' general asthma knowledge index score increases; their odds of reporting health care utilization increases as well. However, the remaining predisposing factors (sex, age, race, education level, current employment status, time since asthma diagnosis, the Asthma

59

Management Index, and the Professional Asthma Inhaler Instruction Index) were not associated with health care utilization.

The positive relationship between asthma knowledge and health care utilization found in this study differs from findings in previous studies. A study examining the characteristics of individuals with a high frequency of emergency visits for asthma found that less asthma knowledge and skills was associated with increased frequency of emergency department for asthma (Boulet, Bélanger, & Lajoie, 1996). Previous studies have also found that inadequate health literacy is associated with less chronic disease knowledge among chronic disease patients, such as asthmatics (Gazmararian, Williams, Peel, & Baker, 2003; Williams, Baker, Honig, Lee, & Nowlan, 1998). Furthermore, a longitudinal study that examined the impact of health literacy on asthma outcomes found that less health literacy was associated with more emergency department use by asthmatic female adult patients over a two year period (Mancuso & Rincon, 2006). Therefore, collectively previous studies suggest that less health literacy relates to less chronic disease knowledge, and more use of emergency department services which differs from the findings in this study (Gazmararian et al., 2003; Williams et al., 1998).

The studies discussed above are based on adults, therefore the differences in these finding may be attributable to the unique characteristics of the emerging adult population, which are associated with the experiences and changes that occur during the emerging adulthood development period. Additionally, increased knowledge of asthma symptoms may relate to an increased alertness of asthma symptoms, which may cause fear and increased use of health care services, in an effort to address asthma related concerns and fears. This may be particularly true for emerging adults during the transition from pediatric to adult health care. This health care transition and developmental stage requires emerging adults to take more responsibility for their

health care, asthma management, identification of symptoms, and treatment of symptoms. Therefore, the combined experience of taking full responsibility of their asthma and entering into emerging adulthood may increase emerging adults awareness, fears, and concerns related to their asthma management and treatment,. This could also increase emerging adults use of health care services to address their asthma related fears and concerns, and to take responsibility for their asthma management, medication adherence, and treatment.

Enabling Factors

Research Question 2

What is the impact of enabling factors (e.g., insurance status) on health care utilization during the emerging adulthood developmental period from 18 to 24 years of age, in which individuals' transition from pediatric to adult health care?

Findings

Although, multivariate analysis could not be conducted due to the low cell counts and small sample size in this study, the bivariate results showed a significant association between current health insurance or coverage status and health care utilization. Previous findings showed that having health insurance increased the likelihood of health care utilization among asthmatic patients (Babitsch, 2012). Additionally, previous findings showed that previous use of health care services, within the past year, was associated with current use of emergency department services (Hasegawa et al., 2014). Babitsch (2012) also states that individuals with a regular source of health care used health care services more often. Similarly, a study examining risks for hospitalization among asthmatic patients found that despite having access to health care, health insurance coverage, regular asthma care, and a primary medical provider for asthma, asthmatic patients continued to use emergency and urgent care health care services (Eisner, 2000).

However, another study that examined predictors for asthma-related health care utilization and quality of life among asthmatic inner-city patients found that having a regular asthma care provider reduced the risk of emergency department visits and hospitalizations (Wisnivesky, Leventhal, & Halm, 2005). This shows that the influence of routine, recent, and frequent interactions with a primary care provider on health care utilization might vary based on the demographic characteristics of the population being examined.

Although, no relationship between health insurance status and health care utilization among emerging adults was found at the multivariate level. At the bivariate level, health insurance status and health care utilization were significantly associated among the sample of emerging adults included in this study. The findings at the bivariate level, which show a significant relationship between health insurance status and health care utilization, may be due to the particular experiences, events, and changes in responsibilities that occur during the emerging adulthood developmental stage. Emerging adults take responsibility for their health and use of heath care services during their transition from pediatric to adult health care services, Therefore, emerging adults determine for themselves how often they use their health insurance and health care services, when to schedule doctor appointments, and they must personally manage their asthma and maintain asthma medication use. However, this can be influenced by their knowledge of their insurance plan and the services covered, knowledge of the health care services they have access to through their insurance plan, and their asthma-related knowledge to ensure asthma management and medication adherence.

Furthermore, the CDC (2013a) states that asthmatic Americans are more likely to have health insurance than the general population; therefore it would be expected that asthmatics would have increased health care utilization. Therefore, the association between health insurance

or coverage status and health care utilization at the bivariate level in this study, may also be due to the expansion of private health insurance coverage to the age of 26 years old through the Affordable Care Act (ACA). The ACA increased the length of time that emerging adults have health insurance coverage under their parents' insurance plans, which contributed to the increase in the number of privately insured emerging adults between the ages of 19-25 years old (CDC, 2013c; U.S. Department of Health & Human Services, 2013). Therefore, if many emerging adults already have health insurance coverage due to the ACA expansion, having health insurance may not strongly influence emerging adults' decision to use health care service to manage and treat their asthma. Other factors, including contextual-level factors such as interpersonal relationship, community, and societal factors, may be more influential on asthmatic emerging adults' health service utilization, asthma management, and asthma medication adherence.

Need Factors

Research Question 3

What is the impact of need factors (e.g., self-identified work related asthma symptoms and professional work related asthma symptoms) on health care utilization during the emerging adulthood developmental period from 18 to 24 years of age, in which individuals' transition from pediatric to adult health care?

Findings

In this study evaluated need and perceived need factors were represented by the following variables: last occurrence of asthma symptoms, last asthma medication use, asthma-related activity limitations in past 30 days, asthma symptoms in past 30 days, and the occurrence of an asthma attack or episode in past year. Only perceived need factor variables were associated

with health care utilization at the bivariate level, and only these factors were include in the multivariate analyses. The multivariate analyses indicated that perceived need factors were not significantly associated with health care utilization. In contrast, a previous study that found that evaluated health status and perceived health status were associated with an increase in health care utilization (Babitsch, 2012). This also differs from previous studies which found that evaluated health status, and patients' perception of their health status and symptoms influenced health care use (Babitsch, 2012; Lawson et al., 2014).

Previous studies also found that medication adherence related to health care utilization, although the influence of medication adherence varied among the studies. Medication adherence refers to proper use of asthma medications based on the time, dosage, frequency, and duration recommend by a medical provider (CDC, 2013b). One study found that use of inhaled corticosteroid asthma medications was an indicator of severe asthma and was associated with frequent use of emergency departments (Hasegawa et al., 2014). In contrast, another study found that higher levels of medication adherence were associated with lower rates of hospitalization (Sokol, McGuigan, Verbrugge, & Epstein, 2005).

In addition, a study also found that the use of health care services within the past year was related to increased use of emergency department services for asthma symptoms (Hasegawa et al., 2014). Lastly, a study that examined risk factors for hospitalization among asthma adults also found that increased asthma severity, represented by recent hospitalization for asthma-related symptoms and system corticosteroid medication use, was associated with increased risk of hospitalization for asthma (Eisner, 2000).

These studies suggest that the relationship between medication adherence and health care utilization varies among asthmatic populations. Therefore, knowledge of how often emerging

adults were prescribed to take their asthma medications, in addition to information about the last time they took their medication may provide more useful insight about health care utilization among this population.

Additionally, these findings might relate to the emerging adults asthma management and general asthma knowledge. If emerging adults do not know how to properly manage their asthma or have less general asthma knowledge, this will impact their ability to identify asthma symptoms, triggers, properly use their medication, adhere to their medication, and manage their asthma. The inability to identify asthma symptoms and triggers, properly use and adhere to asthma medications, and manage their asthma can alter emerging adults' perception of their health, and their ability to determine the appropriate times to seek medical attention or health care services. As a result, emerging adults' perceived need for health care services has the potential to increase if they do not know how to manage their asthma or properly use their asthma medications, and if they have less general asthma knowledge.

Strengths and Limitations

Strengths

This study examined health care utilization among asthmatic emerging adults, which is a population that has not been extensively studied in research. Conducting this study provides the opportunity to gain more information about the factors related to health care utilization among this population. Additionally, the use of a national asthma survey data set provided the opportunity to obtain information from people in various locations throughout the United States, which makes these findings generalizable to the asthmatic emerging adult population in the United States. The quantitative cell-phone and landline survey also allowed for a broad range of asthma-related topics to be covered and addressed among a large sample of emerging adults. The

use of cell-phone and landline surveys also allows results to be produced quickly, for problems to be addressed immediately, and more interviewer control. Telephone surveys also have moderate costs because they are less expensive than face-to-face surveys, but more expensive than mail surveys and internet surveys. The quantitative cell-phone and landline survey also allowed respondents to participate in the study from their homes (landline) or a convenient location (cell-phone) and responses are recorded by an interviewer. This assisted in reducing respondent burden and fatigue because travel to an interview location was not required, and participants were not required to personally complete a survey form.

Limitations

Although the use of a national survey data set allowed for more generalizability of the results, it also limited the questions available for use in this study. This also limited the ability to ask specific questions or add additionally questions, which could provide more information about health care utilization patterns among emerging adults. In addition, the nature of the quantitative survey limited the ability to gain an in-depth understanding of the factors that influence the health care utilization behaviors of emerging adults. Qualitative analysis would allow for the opportunity to gain an in-depth understanding of the health care utilization from the participants' perspectives using one-on-one interviews or focus groups. However, one-on-one interviews may be preferred in order to gain more information from each individual.

The Overall Health Utilization Index, which was used to make the health care utilization dichotomous outcome variable, also represents a limitation of this study. The index includes the following variables that represent both positive and negative forms of health care utilization: the number of routine check-ups in past year, the number of urgent visits in past year, the occurrence of emergency room visits in past year, and the occurrence of hospital visits in past year. The

number of routine check-ups variable represents positive health care utilization, and the remaining variables represent negative health care utilization. The positive and negative variables were combined to create the index and dichotomous outcome variable in this study. However, it would be ideal to have two separate outcome variables, one for positive health care utilization and one for negative health care utilization. The small sample size of this study, and the low frequencies for the variables limited the ability to create both positive and negative health care utilization variables in this study.

Another limitation of this study is that multivariate analyses were not conducted for the enabling factors variables due to the low cell counts and presumed similarities with the health care utilization outcome variable. Lastly, Arnett (2000) defines the exact range for emerging adulthood as 18 to 25 years old; however, the age range for emerging adults in this study is from 18 to 24 years old which represents a limitation of this study. The exclusion of 25 year old participants is due to the use of the 18 to 24 age range category to select cases in SPSS and define the sample used in this study.

Implications

In order to promote asthma management and medication adherence among emerging adults, it is important to understand the health care utilization practices and behaviors among this population. The transition from pediatric to adult-centered health care during emerging adulthood presents many risks to emerging adults' health, and ability to manage their asthma and adhere to their asthma medication regimens. Emerging adulthood can involve changes to individuals' environment, living arrangements, heath insurance status, personal income and financial status, employment status, and access to health care services.

Although previous studies have mainly focused on asthmatic children or the adult population in general, this study specifically focused on the factors that influence health care utilization among emerging adults, a sub-group of the adult population. The results of this study differ from the findings in previous literature between predisposing, enabling, and need factors and health care utilization. The public health implications of this study include the following:

1) The findings in this study show that the factors that influence health care utilization among asthmatic emerging adults differ from those previous found among asthmatic children and adults, which suggest differences in health care utilization at each developmental stage.

2) Studies should consider reporting differences in health care utilization and factors that influence health care utilization among asthmatics at each developmental stage.

3) The factors that influence health care utilization among asthmatic emerging adults should be examined separately from those of the overall adult population.

4) The emerging adulthood developmental period involves unique experiences and changes, which can influence asthmatic emerging adults health care utilization practices and behaviors.

Recommendations for Future Research

The results of this study demonstrate the importance of using contextual level factors, in addition to individual level factors to understand individuals' behaviors. Andersen's expanded and modified Health Services Utilization Model, which includes both individual and contextual level factors, should be used to better understand the factors that impact health care utilization among emerging adults in future research. Although this study focused on individual level factors using Andersen's Health Service Utilization Model, examining the impact of contextual

level factors may provide more information about asthmatic emerging adults health care utilization behaviors, which can assist in ensuring asthma management and medication adherence among this population.

In future research, it would be useful to conduct qualitative interviews in addition to obtaining quantitative data. The use of qualitative interviews alone or in mixed-methods research would allow for a deeper understanding of the factors that influence health care utilization among emerging adults. Additionally, future studies should use a larger sample of asthmatic emerging adults in order to conduct more analyses, and to allow for the creation of two separate health care utilization outcome variables: one for positive heath care utilization and one for negative health care utilization. Future research should also consider separating evaluated need factors and perceived need factors among a larger sample size when conducting bivariate and multivariate analyses to understand the influence of each factor on emerging adults' health care utilization. Twenty-five year old emerging adults should also be included in analyses in the future to understand the health care utilization practices and behaviors of emerging adults. Future research should also further examine the relationship between demographic factors, such as race and ethnicity and health insurance and coverage status, and health care utilization among emerging adults.

Future research should also incorporate questions which examine emerging adults knowledge of their insurance plan and the services covered, knowledge of the health care services they have access to through their insurance plan, ability to use their health care services, access to health care services covered by their insurance plans, and the role of their asthma-related knowledge in ensuring asthma management and medication adherence. Lastly, future research should further examine the positive relationship between general asthma knowledge and

health care utilization, specifically to examine if increased asthma knowledge is solely due to increased use of health care services or if this is due to other factors that promote asthma knowledge and use of health care services.

Conclusions

This study shows that only predisposing factors, specifically general asthma knowledge, is related to health care utilization among asthmatic emerging adults. Enabling factors and need factors were not associated with health care utilization among asthmatic emerging adults in this study. The findings from this study differ from those in previous studies, many of which did not solely focus on emerging adults. This suggests that the factors related to health care utilization among asthmatic individuals vary based on demographic factors, such as age and developmental stage. Therefore, in order to better understand asthma management and medication adherence, it is important to examine factors that influence health care utilization among specific asthmatic populations.

References

AAFA. (2005a). Allergic asthma. Retrieved from

      http://www.aafa.org/display.cfm?id=8&sub=16

AAFA. (2005b). Non-allergic asthma. Retrieved from

http://www.aafa.org/display.cfm?id=8&sub=17

AAFA. (2005c). What is asthma. Retrieved from

      https://www.aafa.org/display.cfm?id=8&cont=5

American College of Allergy. Asthma & Immunology. (2014). Who has asthma and why.

      Retrieved from http://acaai.org/asthma/who-has-asthma

American Psychological Association. (2016). Practice guidelines for LGB clients. Retrieved

      from http://www.apa.org/pi/lgbt/resources/guidelines.aspx

American Lung Association. (2014). Asthma & children fact sheet. Retrieved from

      http://www.lung.org/lung-health-and-diseases/lung-disease-lookup/asthma/learn-about

      asthma/asthma-children-facts-sheet.html

American Lung Association. (2012). Trends in asthma morbidity and mortality. Retrieved from

      http://www.lung.org/assets/documents/research/asthma-trend-report.pdf

Andersen, R.M. (2008). National health surveys and the Behavioral Model of Health Services

      Use. *Medical Care*, *46*(7), 647-653.

Andersen, R.M. (1995). Revisiting the Behavioral Model and access to medical care: Does it

      matter? *Journal of Health and Social Behavior*, *36*(1), 1-10.

Arnett, J.J. (2000). Emerging adulthood: A theory of development from the late teens through the

      early twenties. *American Psychologist, 55*(5), 469-480.

Arnett, J. J. (2007). Emerging Adulthood: What Is It, and What Is It Good For? *Child*

   Development Perspectives, 1(2), 68-73. doi: 10.1111/j.1750-8606.2007.00016.

Asthma and Allergy Foundation of America. (2015). Asthma facts and figures. Retrieved from

   https://www.aafa.org/display.cfm?sub=42&id=8

Babitsch, B., Gohl, D., & von Lengerke, T. (2012). Re-visiting Andersen's Behavioral Model of

   Health Services Use: A systematic review of studies from 1998-2011. *GMS Psycho*

   Social Medicine, 9(Doc. 11), 1-15.

Blackwell DL, Lucas JW, Clarke TC. (2014). Summary health statistics for U.S. adults: National

   Health Interview Survey, 2012. National Center for Health Statistics. *Vital Health Stat*

   10(260).

Blum, R. W., Garell, D., Hodgman, C. H., Jorissen, T. W., Okinow, N. A., Orr, D. P., & Slap, G.

   B. (1993). Transition from child-centered to adult health-care systems for adolescents

   with chronic conditions: a position paper of the Society for Adolescent Medicine. *Journal*

   of Adolescent Health, 14(7), 570-576.

Boulet, L.-P., Bélanger, M., & Lajoie, P. (1996). Characteristics of subjects with a high

   frequency of emergency visits for asthma. *The American Journal of Emergency*

   Medicine, 14(7), 623-628. doi: http://dx.doi.org/10.1016/S0735-6757(96)90075-3

Bruzzese J-M, Idalski Carcone A, Lam P, Ellis DA, Naar-King S. (2014). Adherence to asthma

   medication regimens in urban African American adolescents: Application of self-

   determination theory. *Health Psychology,33*(5), 461-464.

CDC. (2009). Management and treatment. Retrieved from

   http://www.cdc.gov/asthma/management.html

CDC. (2012). Trends in asthma prevalence, health care use, and mortality in the United States,

   2001-2010. Retrieved from http://www.cdc.gov/nchs/data/databriefs/db94.htm

CDC. (2013a). Insurance coverage and barriers to care for people with asthma. Retrieved from

   http://www.cdc.gov/asthma/asthma_stats/insurance_coverage.htm

CDC. (2013b). Medication adherence. Retrieved from

   http://www.cdc.gov/primarycare/materials/medication/

CDC. (2013c). Trends in insurance coverage and source of private coverage among young adults

   aged 19–25: United States, 2008–2012. Retrieved from

   http://www.cdc.gov/nchs/data/databriefs/db137.htm

CDC. (2014a). 2013 BRFSS Codebook. Retrieved from

   http://www.cdc.gov/brfss/annual_data/2013/pdf/codebook13_llcp.pdf

CDC. (2014b). 2013 BRFSS Overview. Retrieved from

   http://www.cdc.gov/brfss/annual_data/2013/pdf/overview_2013.pdf

CDC. (2014c). 2013 Survey data and documentation. Retrieved from

   http://www.cdc.gov/brfss/annual_data/annual_2013.html

CDC. (2014d). About the Behavioral Risk Factor Surveillance System (BRFSS). Retrieved from

   http://www.cdc.gov/brfss/about/about_brfss.htm

CDC. (2014e). About BRFSS. Retrieved from

   http://www.cdc.gov/brfss/about/index.htm

CDC. (2015a). 2013: Behavioral Risk Factor Surveillance System Questionnaire. Retrieved from

   http://www.cdc.gov/brfss/questionnaires/pdf-ques/2013%20BRFSS_English.pdf

CDC. (2015b). 2013 BRFSS "LANDLINE" and "LANDLINE & CELLPHONE COMBINED"

   Asthma Call-back Survey (ACBS). Retrieved from

http://www.cdc.gov/brfss/annual_data/2013/pdf/codebook13_llcp.pdf

CDC. (2015c). BRFSS/ACBS Survey: Adult Questionnaire-2013. Retrived from

http://www.cdc.gov/brfss/acbs/2013/pdf/asthma_adult_2013_questionnaire.pdf

CDC. (2015d). BRFSS Asthma Call-back Survey. Retrieved from

http://www.cdc.gov/brfss/acbs/

CDC. (2015e). BRFSS questionnaires. Retrieved from

http://www.cdc.gov/brfss/questionnaires/

CDC. (2015f). Most recent asthma data. Retrieved from

http://www.cdc.gov/asthma/most_recent_data.htm

CDC. (2015g). The BRFSS Data User Guide. Retrieved from

http://www.cdc.gov/brfss/data_documentation/pdf/userguidejune2013.pdf

CDC. (2016a). Data, statistics, and surveillance: Asthma surveillance data. Retrieved from

http://www.cdc.gov/asthma/asthmadata.htm

CDC. (2016b). Learn how to control asthma. Retrieved from

http://www.cdc.gov/asthma/faqs.htm

Dozier, A., Aligne, C. A., & Schlabach, M. B. (2006). What is asthma control? Discrepancies

between parents' perceptions and official definitions. *J Sch Health, 76*(6), 215-218. doi:

10.1111/j.1746-1561.2006.00099.x

Eisner, M. D., Katz, P. P., Yelin, E. H., Shiboski, S. C., & Blanc, P. D. (2000). Risk factors for

hospitalization among adults with asthma: the influence of sociodemographic factors and

asthma severity. *Respiratory research, 2*(1), 53.

Fiscella, K., Franks, P., Doescher, M. P., & Saver, B. G. (2002). Disparities in Health Care by Race, Ethnicity, and Language among the Insured: Findings from a National Sample. *Medical care, 40*(1), 52-59.

Gazmararian, J. A., Williams, M. V., Peel, J., & Baker, D. W. (2003). Health literacy and knowledge of chronic disease. *Patient education and counseling, 51*(3), 267-275. doi: http://dx.doi.org/10.1016/S0738-3991(02)00239-2

George M, Birck K, Hufford DJ, Jemmott LS, Weaver TE. (2006). Beliefs about asthma and complementary and alternative medicine in low-income inner-city african-american adults. *Journal of General Internal Medicine, 21*(12), 1317-1324.

Guilbert, T. W., Garris, C., Jhingran, P., Bonafede, M., Tomaszewski, K. J., Bonus, T., . . . Schatz, M. (2011). Asthma that is not well-controlled is associated with increased healthcare utilization and decreased quality of life. *J Asthma, 48*(2), 126-132. doi: 10.3109/02770903.2010.535879

Hasegawa, K., Sullivan, A. F., Tovar Hirashima, E., Gaeta, T. J., Fee, C., Turner, S. J., . . . Multicenter Airway Research Collaboration, I. (2014). A multicenter observational study of US adults with acute asthma: who are the frequent users of the emergency department? *J Allergy Clin Immunol Pract, 2*(6), 733-740. doi: 10.1016/j.jaip.2014.06.012

Houtrow, A. J., & Newacheck, P. W. (2008). Understanding transition issues: Asthma as an example. *The Journal of Pediatrics*, 152(4), 453-455.

La Roche MJ, Konis-Mitchell D, Gualdron L. (2006). A culturally competent astma management intervention: a randomized controlled pilot study. *Annals of Allergy, Asthma & Immunology, 96*, 80-85.

Lawson, C. C., Carroll, K., Gonzalez, R., Priolo, C., Apter, A. J., & Rhodes, K. V. (2014). "No other choice": reasons for emergency department utilization among urban adults with acute asthma. *Acad Emerg Med, 21*(1), 1-8. doi: 10.1111/acem.12285

Lurslurchachai L, Krauskopf K, Roy A, Halm EA, Leventhal H, Wisnivesky JP. (2014). Metered dose inhaler technique among inner-city asthmatics and its association with asthma medication adherence. *The Clinical Respiratory Journal, 8*(4), 397-403.

Mancuso, C. A., & Rincon, M. (2006). Impact of Health Literacy on Longitudinal Asthma Outcomes. *Journal of General Internal Medicine, 21*(8), 813-817. doi: 10.1111/j.1525-1497.2006.00528.x

Menckeberg TT, Bouvy ML, Bracke M, et al. (2008). Beliefs about medicines predict refill adherence to inhaled corticosteroids. *Journal of Psychosomatic Research, 64*(1):47-54.

Molimard, M., & Le Gros, V. (2008). Impact of patient-related factors on asthma control. *J Asthma, 45*(2), 109-113. doi: 10.1080/02770900701815727

Mulye, T. P., Park, M. J., Nelson, C. D., Adams, S. H., Irwin, C. E., & Brindis, C. D. (2009). Trends in adolescent and young adult health in the United States. *Journal of Adolescent Health*, *45*(1), 8-24.

Naar-King S, Lam P, Ellis D, Bruzzese J-M, Secord E. (2013). Asthma Medication Device Skills in High-Risk African American Adolescents. *Journal of Asthma, 50*(6):579-582.

National Cancer Institute: Cancer Health Disparities. Health disparities defined. Retrieved from http://crchd.cancer.gov/disparities/defined.html

NIH. (2012). Reducing asthma disparities. Retrieved from http://www.nhlbi.nih.gov/health-pro/resources/lung/naci/discover/disparities.htm

NIH. (2014a). What are the signs and symptoms of asthma? Retrieved from

http://www.nhlbi.nih.gov/health/health-topics/topics/asthma/signs

NIH. (2014b). What is asthma? Retrieved from

http://www.nhlbi.nih.gov/health/health-topics/topics/asthma

Peters, D., Chen, C., Markson, L. E., Allen-Ramey, F. C., & Vollmer, W. M. (2006). Using an

asthma control questionnaire and administrative data to predict health-care utilization.

Chest, 129(4), 918-924. doi: 10.1378/chest.129.4.918

Reider-Demer, M., Zielinski, T., Carvajal, S., Anulao, K., & Van Roeyen, L. (2008). When is a

pediatric patient no longer a pediatric patient?. *Journal of Pediatric Health Care*, 22(4),

267-269.

Rosen, D. S., Blum, R. W., Britto, M., Sawyer, S. M., & Siegel, D. M. (2003). Transition to adult

health care for adolescents and young adults with chronic conditions: position paper of

the Society for Adolescent Medicine. Journal of Adolescent Health, 33(4), 309-311.

Scal, P., Davern, M., Ireland, M., & Park, K. (2008). Transition to adulthood: delays and unmet

needs among adolescents and young adults with asthma. *The Journal of Pediatrics*

152(4), 471-475.

Smith, K., Warholak, T., Armstrong, E., Leib, M., Rehfeld, R., & Malone, D. (2009). Evaluation

of risk factors and health outcomes among persons with asthma. *J Asthma, 46*(3), 234-

237. doi: 10.1080/02770900802627294

Snipes, C. (2013). Asthma in Adolescence. In Handbook of Adolescent Health Psychology

(pp. 641-656). Springer New York.

Sokol, M. C., McGuigan, K. A., Verbrugge, R. R., & Epstein, R. S. (2005). Impact of medication

adherence on hospitalization risk and healthcare cost. *Medical care, 43*(6), 521-530.

Speck AL, Nelson B, Jefferson SO, Baptist AP. (2014).Young, African American adults with

      asthma: what matters to them? *Annals of Allergy, Asthma & Immunology, 112*(1), 35-39.

The Asthma Center. (2016). Types of asthma. Retrieved from

      http://www.theasthmacenter.org/index.php/disease_information/asthma/what_is_as

      thma/types_of_asthma/www.theasthmacenter.org

Tinkelman, D. G., McClure, D. L., Lehr, T. L., & Schwartz, A. L. (2002). Relationships Between

      Self-Reported Asthma Utilization and Patient Characteristics. *Journal of Asthma, 39*(8),

      729-736. doi: 10.1081/jas-120015796

U.S. Census Bureau. (2012). Income, poverty, and health insurance coverage: 2010-Tables &

      figures. https://www.census.gov/hhes/www/hlthins/data/incpovhlth/2010/tables.html

U.S. Department of Health & Human Services. (2015). Affordable Care Act. Retrieved from

      http://www.hhs.gov/opa/affordable-care-act/

U.S. Department of Health & Human Services. (2013). Young adult coverage. Retrieved from

      http://www.hhs.gov/healthcare/about-the-law/young-adult-coverage/index.html#

Williams, M. V., Baker, D. W., Honig, E. G., Lee, T. M., & Nowlan, A. (1998). Inadequate

      literacy is a barrier to asthma knowledge and self-care. *Chest Journal, 114*(4), 1008-

      1015.

Wisnivesky, J. P., Leventhal, H., & Halm, E. A. (2005). Predictors of asthma-related health care

      utilization and quality of life among inner-city patients with asthma. *Journal of Allergy*

      and Clinical Immunology, 116(3), 636-642. doi:

      http://dx.doi.org/10.1016/j.jaci.2005.05.031

Appendix A: IRB Determination Letter

.

EMORY UNIVERSITY

October 30, 2015

DeAndra Morris
Rollins School of Public Health
Emory University
Atlanta, GA 30322

RE: Determination: No IRB Review Required
Title: *Health care utilization behavior of asthmatic young adults*
PI: DeAndra Morris

Dear DeAndra:

Thank you for requesting a determination from our office about the above-referenced project. Based on our review of the materials you provided, we have determined that it does not require IRB review because it does not meet the definitions of "research" with human subjects or "clinical investigation" as set forth in Emory policies and procedures and federal rules, if applicable. Instead, this is a secondary data analysis study. The CDC 2013 Behavioral Risk Factor Surveillance System (BRFSS) and the 2013 BRFSS Asthma Call-back Survey (ACBS) data, questionnaires, code book, and other related information and materials will be analyzed. The data contains no identifying information, therefore human subjects are not included in the research.

Please note that this determination does not mean that you cannot publish the results. If you have questions about this issue, please contact me.

This determination could be affected by substantive changes in the study design, subject populations, or identifiability of data. If the project changes in any substantive way, please contact our office for clarification.

Thank you for consulting the IRB.

Sincerely,

Carolyn Sims, MPA
Research Protocol Analyst