IMPACT OF NURSE PRACTITIONER PRACTICE REGULATION ON ACCESS TO HEALTHCARE SERVICES

A DISSERTATION IN Nursing

Presented to the Faculty of the University of Missouri-Kansas City in partial fulfillment of the requirements for the degree DOCTOR OF PHILOSOPHY

by SUMMER CROSS

B.S.N., Murray State University, 2000
M.S.N., Murray State University, 2007

Kansas City, Missouri
2014
IMPACT OF NURSE PRACTITIONER PRACTICE REGULATION ON
ACCESS TO HEALTHCARE SERVICES

Summer Cross, Candidate for Doctor of Philosophy Degree
University of Missouri – Kansas City, 2014

ABSTRACT

Nurse practitioner (NP) practice regulations vary from state to state across the United States. Despite strong evidence supporting the quality of care and satisfaction with care provided by NPs, restrictive regulations continue to limit the practice of NPs in many states. Given current and growing physician shortages, particularly in the area of primary care, NPs are in a role to fill critical gaps in the current healthcare delivery system.

The following dissertation examines the impact of state NP practice regulations on access to care. The specific aim of this study is to examine the relation between different levels of state NP practice regulation and access to care in the Medicare population. The design of the study is a secondary data analysis of the Medicare Current Beneficiary Survey, Access to Care 2011 dataset. Data for this dataset were collected during the fall 2011 interview session, and represent a cross-sectional sample. An observational method is used to examine the impact of state nurse practitioner practice regulations (restricted, reduced, and full nurse practitioner practice) on the following dependent variables which measure access
to healthcare services: appointment waiting times (continuous variable measured in number of days to get appointment, and number of minutes spent waiting at an appointment to see a provider), difficulty accessing care (categorical variable), and usual source of care categorical variable).

Ron Andersen’s Theoretical Framework for Measuring Access to Medical Care is used as a guiding framework to theoretically define and operationalize the dependent variable of access to healthcare services. SAS survey procedures were used to apply Taylor series weights to all statistical analyses in order to make data and results representative of the “always enrolled” Medicare beneficiary population (N = 15,027, weighted sample = 45,205,096). Descriptive statistics are given to describe the population of interest. Covariates used in the regression analysis were: urbanicity, nursing home stay, Medicaid HMO coverage, and private insurance coverage.

Results of the regression analysis for appointment waiting time (time to get an appointment) were least favorable for participants in Full NP practice groups. No significant effect was seen in the time spent waiting at an appointment to see a provider. Difficulty encountered accessing care was statistically significant, with participants in Full NP practice states experiencing increased difficulty getting from home to the provider office. Additionally, participants in Restricted and Reduced NP practice states were more likely to report having trouble accessing care due to cost than participants in Full NP practice states. No significant effect was seen in logistic regression analysis for usual source of care. A higher percentage of participants in Full NP practice states seek care at HMOs for their site of care.
Several limitations exist, including lack of control over primary data collection and high percentages of missing data for some items on the survey. Future research is needed to examine access to care in response to NP practice in other populations (private insurance, uninsured, and HMO groups), and compare access to care before and after NP practice regulation health policy change. NP involvement in health policy change is critical during this time of rapid reform.
The faculty listed below, appointed by the Dean of the School of the School of Nursing and Health Studies, have examined a dissertation titled “Impact of Nurse Practitioner Practice Regulation on Access to Healthcare Services,” presented by Summer Cross, candidate for the Doctor of Philosophy degree, and hereby certify that in their opinion it is worthy of acceptance.

Supervisory Committee

Patricia Kelly, Ph.D., Committee Chair
UMKC School of Nursing & Health Studies

Thad Wilson, Ph.D.
University of Iowa College of Nursing

An-Lin Cheng, Ph.D.
UMKC School of Nursing & Health Studies

Mary M. Gerkovich, Ph.D.
UMKC School of Medicine

Elizabeth Holcomb, Ph.D.
Frontier Nursing University
CONTENTS

ABSTRACT .......................................................................................................................... iii

LIST OF ILLUSTRATIONS ............................................................................................... viii

LIST OF TABLES ................................................................................................................... ix

ACKNOWLEDGEMENTS ...................................................................................................... x

Chapter

1. INTRODUCTION .............................................................................................................. 1

Problem ................................................................................................................................. 1

Specific Aims and Research Questions ............................................................................. 2

Significance and Innovation ................................................................................................. 3

Evolution of the Study .......................................................................................................... 7

Assumptions of the Research ............................................................................................. 9

Definitions ............................................................................................................................ 10

2. LITERATURE REVIEW .................................................................................................... 13

History of Nurse Practitioner Practice ............................................................................. 13

State Practice Environments ............................................................................................. 15

Missouri ............................................................................................................................... 18

Kentucky ............................................................................................................................ 19

Iowa .................................................................................................................................... 20

Nurse Practitioner Research .............................................................................................. 23

Health Outcomes ................................................................................................................ 23

Patient Satisfaction ............................................................................................................. 25
Role Acceptance and Understanding .............................................26
Reimbursement..............................................................................27
Access to Care..............................................................................28
Historical Context........................................................................28
Measurement ............................................................................30

3. METHODS ..................................................................................34
   Research Design........................................................................34
   Rationale ..................................................................................34
   The Database............................................................................35
   Sampling Methods and Procedures...........................................35
   Instrument/Measurements.........................................................37
   Analysis....................................................................................38
   Validity and Reliability...............................................................41
   Limitations..............................................................................42
   Human Subjects Protections .....................................................42

4. RESULTS .......................................................................................44
   Descriptive Statistics................................................................44
   Appointment Waiting Times......................................................50
   Difficulty Accessing Care........................................................50
   Usual Source of Care...............................................................51
   Regression..............................................................................52
   Appointment Waiting Times......................................................53
   Difficulty Accessing Care........................................................54
Usual Source of Care ..................................................................................55

5. DISCUSSION ..........................................................................................56

Difficulties Accessing Care ........................................................................57
Appointment Waiting Times ..........................................................................57
Usual Source of Care ..................................................................................58
Conclusion ..................................................................................................58
Limitations ..................................................................................................59
Recommendations for Future Research .......................................................60
Implications for Practice ............................................................................61

Appendix

A. IRB DOCUMENTATION EMAIL .............................................................62
B. DATA USER AGREEMENT EMAIL ..........................................................63

REFERENCES .............................................................................................64
VITA .............................................................................................................73
# LIST OF ILLUSTRATIONS

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Theoretical framework for Measuring Access to Medical Care</td>
<td>5</td>
</tr>
<tr>
<td>2.</td>
<td>Andersen’s Emerging Model of Access to Care</td>
<td>6</td>
</tr>
<tr>
<td>3.</td>
<td>AANP (2013b) State Regulatory Map</td>
<td>22</td>
</tr>
</tbody>
</table>
LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Examples of Differences in State Practice Environments:</td>
<td>17</td>
</tr>
<tr>
<td>Missouri, Kentucky, Iowa</td>
<td></td>
</tr>
<tr>
<td>2. Sample Description</td>
<td>40</td>
</tr>
<tr>
<td>3. Components of Access to Care</td>
<td>40</td>
</tr>
<tr>
<td>4. Sample Race Frequency Table</td>
<td>45</td>
</tr>
<tr>
<td>5. Sample Gender Frequency Table</td>
<td>45</td>
</tr>
<tr>
<td>6. General Health Ranking Frequency Table</td>
<td>46</td>
</tr>
<tr>
<td>7. Healthcare Facility Frequency Table (=PLACEKIND2 variable)</td>
<td>48</td>
</tr>
<tr>
<td>8. Urbanicity (=URBAN variable) Frequency Table Comparing State NP</td>
<td>49</td>
</tr>
<tr>
<td>Practice Laws Groups (=H_RESST2 variable)</td>
<td></td>
</tr>
<tr>
<td>9. Odds Ratio Table for Difficulty Accessing Care Logistic Regression</td>
<td>54</td>
</tr>
</tbody>
</table>
ACKNOWLEDGMENTS

I would like to take this time to personally thank all of those individuals who have supported and encouraged me during my doctoral studies. Continued prayers, words of encouragement, emails, letters, cards, phone calls, and hugs have given me the strength to persist and successfully complete this phase of the journey. I am truly humbled.

To my husband, Rob, and my son, Luke, thank you for your patience over the past four years. Our little family is the single most important thing on this earth to me, and I know I could not have completed this work without you. Much love today, and always. I would also like to thank my mother, Jan Roberson Stogner, for setting an example of the importance of education for women, and the love and support throughout this process. Your help in caring for my son and words of encouragement will not be forgotten. I also cannot forget the love of my father, Dana H. Roberson, who died three years ago. I know he would be proud of the woman I have become.

In addition to my family, I would like to thank my friends and loved ones who have cheered me on each step of the way. My co-workers at Murray State University, who I am honored to call friends, were also an integral part of the success I have achieved. In addition, two very special ladies whom I met our first Summer Research Institute in Kansas City, Janalee Isaacson and Karen LaMartina, must also be mentioned here. I feel like we have become quite close despite our geographical distances, and I am truly grateful for your support (and help in Stats II).

Last, but certainly not least, I would like to thank the chair of my committee and Ph.D. advisor, Dr. Patricia Kelly, and the other members of my dissertation committee: Dr. An-Lin Cheng, Dr. Thad Wilson, Dr. Mary M. Gerkovich, and Dr. Elizabeth Holcomb. After
countless hours of reading drafts and providing crucial feedback which ensured my success, I
cannot thank you enough. Your expertise in each of your varied fields, and your support of
my research was a critical piece to the study, and allowed for me to achieve my goals and
progress toward graduation. Thank you, repeatedly.
Funding for this dissertation research has been received

by the

Kentucky Nurses’ Foundation

and an

American Association of Nurse Practitioners Foundation Scholarship
CHAPTER 1
INTRODUCTION

Problem

The passage of the Patient Protection and Affordable Care Act of 2010 was a critical step in healthcare reform aimed at increasing access to health care services for underserved Americans. However, much controversy exists on the feasibility of its implementation into the current system with the growing shortage of primary care physicians. The population of the United States in 2009 was 307,006,550, with 785,326 actively practicing physicians (Association of American Medical Colleges, 2011). At present, 70% of the physician workforce practices in specialty practices, leaving primary care physicians in high demand, overworked, and underpaid compared to specialized colleagues. With the approaching healthcare coverage of 32 million Americans who had been previously uninsured, policymakers will be instrumental in finding ways to absorb this group into an already crowded system (Goodson, 2010). Professional medical societies and organizations have proposed changes in the form of increased funding for medical education, incentives for primary care physicians practicing in rural and underserved areas, and research examining the impact of recruiting graduates from foreign medical schools into primary care in the United States (while recognizing the negative impact this latter practice has on the countries where the physicians were trained) (Starfield & Fryer, 2007). However, even more research and health policy change is needed in order to make a significant impact on health outcomes at the individual, community, and population levels.
One such proposed solution to address the growing shortage of primary care and general physicians is nurse practitioners (NPs). NPs are advanced practice nurses who are part of the healthcare delivery team and practice in a variety of practice settings. NPs are nationally certified and licensed by the state to diagnose and treat acute and chronic medical problems (APRN Consensus Work Group & National Council of State Boards of Nursing APRN Advisory Committee, 2008). Currently, there are an estimated 189,000 NPs practicing in the United States (American Association of Nurse Practitioners, 2014). Although NPs might seem like an obvious fix to the shortage, many barriers to NP practice still exist. Research examining the effects of barriers posed by state regulations to NP practice is needed to evaluate the full role NPs play in the current healthcare delivery system. A great degree of differences exist in NP practice regulation throughout the United States. This dissertation will explore outcomes of NP care based on state practice regulations. As the various elements of the Patient Protection and Affordable Care Act are rolled out, an increased number of Americans will have access to health insurance. And as the general physician shortage continues to grow, NPs are in a prime position to influence health outcomes and policy change.

Specific Aims and Research Questions

The specific aim of this study is to examine the relation between different levels of state nurse practitioner practice regulation and access to care in the Medicare population. The following research question will guide the study:

What are the differences in access to healthcare services in the Medicare population between:

1. States with full NP practice and states with reduced NP practice?
2. States with full NP practice and states with restricted NP practice?

3. States with reduced NP practice and states with restricted NP practice?

Based on preliminary work and review of the literature, the research hypothesis for this study is as follows:

Null Hypothesis: Access to healthcare services is equivalent in states with restricted, reduced, and full NP practice.

Alternative Hypothesis: Access to healthcare services is greater in states with full NP practice compared to states with restricted or reduced NP practice.

**Significance and Innovation**

The past four decades of NP research have influenced health policy change in many states experiencing provider shortages. A meta-analysis of outcomes of NPs in primary care affirmed that NPs provide quality care equal to that of physicians with comparable health outcomes (Laurant, et al., 2005). Recent studies have shown that the addition of NPs in practices increases patient access to care (Mesidor, Gidugu, Rogers, Kash-Macdonald, & Boardman, 2011; Perry, Thurston, Killey, & Miller, 2005). The effects of state NP practice regulation on access have yet to be studied.

The American Association of Nurse Practitioners (American Association of Nurse Practitioners, 2013b) categorizes NP state practice laws into three categories: full, reduced, and restricted. *Full practice* is defined as licensure that allows diagnosis, ordering/interpretation of diagnostic tests, treatment, and prescribing privileges regulated by the board of nursing without physician oversight. *Reduced practice* limits NP practice in at least one area and requires a collaborative agreement with a physician. *Restricted practice*
limits NP practice in one or more areas and requires direct physician supervision. Currently 17 states and Washington, DC have full practice, 21 states have reduced practice, and 12 states have restricted practice (American Association of Nurse Practitioners, 2013b). It is important to note that these numbers reflect the recent change in Nevada state regulations which will take effect July 2014 that moved NP practice from reduced to full practice status.

With the aging of the Baby Boomer generation, the Medicare population is expected to double from 2010 to 2030 to 79 million beneficiaries (Umans, 2009). Over 155,000 NPs practice in the United States and 71% provide care to Medicare beneficiaries (American Association of Nurse Practitioners, 2012). NPs practicing in states with full practice regulations provide a greater percentage of primary care services to Medicare beneficiaries than those in states with restrictive regulations. Over time the number of NPs practicing in states with full practice regulations has increased (Kuo, Loresto, Rounds, & Goodwin, 2013), which has a direct impact on access to care. NPs are in a leading role to improve access to care for this growing population.

Andersen’s Theoretical Framework for Measuring Access to Medical Care (Aday & Andersen, 1974) will serve as a guiding model to measure access in this dissertation. Access is defined in terms of process indicators (provider type, satisfaction with system, appointment waiting times, geographic location of facility, hours of operation) and outcome indicators (utilization of services and satisfaction with care). Figure 1 shows the original framework developed by Aday and Andersen (1974, p. 212). Andersen’s theoretical work in health services research has been used in various studies examining access (Kirby, 2008; Lee & Choi, 2009; McCarrier, Zimmerman, Ralston, & Martin, 2011).
Additional work to the model led Andersen to make changes that incorporated health status outcomes in a feedback loop that influences use of health services and access to care. This emerging model is depicted in Figure 2 (Andersen, 1995).
The Medicare Current Beneficiary Survey (MCBS) Access to Care 2011 dataset includes items related to appointment waiting times, usual source of care, and difficulties encountered (Centers for Medicare & Medicaid Services, 2011).

A study of Medicare beneficiaries confirmed a positive association between increased numbers of primary care physicians in a state and quality of care, but NPs were not included (Baicker & Chandra, 2004). This dissertation will examine access to care within the context of varying levels of NP practice in an effort to link the impact of full NP practice to access gains. A study specifically addressing access to healthcare for Medicare beneficiaries receiving care by NPs in states with differing levels of practice regulation may affirm the call for a lift of state regulations that reduce and/or restrict the practice of NPs.
Evolution of the Study

Nurse practitioner practice has been an area of interest of mine since choosing nursing as a profession. After graduating with my Master of Science in Nursing in 2007 from Murray State University, I quickly learned of the barriers nurse practitioners face in their daily practice. NPs in Kentucky are required to have a collaborative agreement with a physician in order to prescribe medications. At the time of my graduation the Kentucky Board of Medical Licensure had published guidelines for physicians collaborating with NPs that stated a physician should only engage in a collaborative agreement with a maximum of two NPs. These guidelines, while not an official part of the Kentucky Revised Statutes, were seen by many physicians as regulatory requirements imposed by their governing board. Therefore, jobs were limited for NPs and establishing independent practice was challenging. Even today, NPs in private practice often pay physicians to sign the collaborative agreement in order to practice independently. Although the collaborative agreement is required for prescribing, there are no requirements regarding communication or physician oversight in the clinical setting.

After accepting a teaching position at Murray State University in the fall of 2009, I began exploring future doctoral work and possible research topics. My passion for NP practice and the barriers NPs face in providing care for their patients was an area in which I felt I could make a difference, but I did not realize how at the time. Never did I think I would be actively engaged in health policy research that has the potential to shape the future of NP practice. Various beginning assignments, including the research trajectory assignment in Quantitative Methods, the concept analysis and nursing theory assignments in Theory I and II, and the interview assignment in Qualitative Methods contributed to my background
knowledge on the topic, and allowed me to draw some conclusions based on a review of current literature. NP research rarely uses a theoretical or conceptual framework (Nicoteri & Andrews, 2003). My concept analysis explored the concept of collaborative practice and linked this to autonomy in NP practice. However, it was not until my collaterals, more specifically Health Services Research and Health Outcomes Seminar, that I gained a clearer picture of the gap in the literature that would have an impact on the future of NP practice.

The Health Outcomes Seminar was an introduction to health outcomes research and access was a recurrent theme that allowed for the introduction of Dr. Ron Andersen’s theory measuring access, which is widely used in health outcomes research. The Introduction to Health Services Research course explored current health policy issues and health reform opportunities. In this class I was introduced to the work of Baicker and Chandra (2004), which looked at the impact of the number of general practice physicians and the amount spent on health care and health outcomes in the Medicare population. If a correlation could be drawn at the state level between the number of general practice physicians and health outcomes, then the need for comparison with NPs could also be used to measure health outcomes. Drs. Baicker and Chandra used the Medicare Current Beneficiary Survey to examine the link between states with more general practice doctors and spending and health outcomes. Reading about the research that these economics professors conducted to broadly examine the effect of providers on outcomes at the state level introduced me to the importance of secondary analysis as a means for health policy research and change.

Completion of the Health Policy Leadership course through George Mason University and attendance at the Washington Health Policy Institute allowed me to see firsthand the ways in which research can be used to influence health policy. Interactions with
policymakers in Washington D.C. alerted me to the importance of research that clearly delineates the need for policy change. My last collateral course focused on Secondary Analysis of Data through Walden University, and provided an opportunity to analyze an existing database and follow through the process of secondary data analysis, exploring the benefits and drawbacks of the methodology. Support from the American Association of Nurse Practitioners in the form of a doctoral NP scholarship served to strengthen the impact of my dissertation study. In June 2013 a grant proposal was submitted to the Kentucky Nurses Foundation to support dissertation research exploring the impact of NP state regulations on access to care, and the grant was received August 19, 2013. Even in completing the written portion of the comprehensive exam and communicating with the researcher, Dr. Eileen Sullivan-Marx, I continued to learn of the impact of NP research and the need for further research and health policy change.

Assumptions of the Research

Assumptions that guide the research study include:

1. NP practice is well established and integrated into the American healthcare system.

2. NP practice and reimbursement will continue to be regulated at the state level for the immediate future.

3. States have imposed variable practice regulations on NP practice.

4. NPs provide healthcare services to Medicare beneficiaries.

5. Policy research can have an impact on health policy and health outcomes.
Definitions

The following conceptual definitions have been developed to help guide the research and provide clarity throughout each phase of the process.

_Nurse practitioners_: advanced practice registered nurses (APRNs) who are certified by a national certifying organization (i.e. American Nurses Credentialing Center, American Academy of Nurse Practitioners Certifying Program) as a nurse practitioner and are licensed to practice in one or more states by the state board of nursing of that state. According to the APRN Consensus Model (APRN Consensus Work Group & National Council of State Boards of Nursing APRN Advisory Committee, 2008), which has been adopted by 48 professional nursing organizations including the American Nurses Association, National Council of State Boards of Nursing, and the National Organization of Nurse Practitioner Faculties, the certified nurse practitioner (CNP) provides care in a variety of practice settings to a variety of clients and populations. The APRN Consensus Work Group & National Council of State Boards of Nursing Advisory Committee (2008) give the following description of the role of CNPs in the American healthcare system:

Care along the wellness-illness continuum is a dynamic process in which direct primary and acute care is provided across settings. CNPs are members of the health delivery system, practicing autonomously in areas as diverse as family practice, pediatrics, internal medicine, geriatrics, and women’s health care. CNPs are prepared to diagnose and treat patients with undifferentiated symptoms as well as those with established diagnoses. Both primary and acute care CNPs provide initial, ongoing, and comprehensive care, includes taking comprehensive histories, providing physical examinations and other health assessment and screening activities, and diagnosing, treating, and managing patients with acute and chronic illnesses and diseases. This includes ordering, performing, supervising, and interpreting laboratory and imaging studies; prescribing medication and durable medical equipment; and making appropriate referrals for patients and families. Clinical CNP care includes health promotion, disease prevention, health education, and counseling as well as the diagnosis and management of acute and chronic diseases. Certified nurse practitioners
are prepared to practice as primary care CNPs and acute care CNPs, which have separate national consensus-based competencies and separate certification processes. (p. 9)

*Access:* the ability of an individual to obtain healthcare services when needed. Access is based on the following sub-constructs: usual source of care, appointment waiting times, and difficulties encountered.

*Nurse practitioner practice regulation:* state laws that guide the safe practice of nursing in an effort to protect public welfare. According to the National Council of State Boards of Nursing (NCSBN), the nurse practice act for a state regulates titles and licenses of nurses, as well as the requirements for licensure and disciplinary actions (2013). According to the American Association of Nurse Practitioners (2013b), state practice acts and laws can be subdivided into the following three distinct practice environments:

1. **Restricted practice:** State practice and licensure laws restrict the ability of a nurse practitioner to engage in at least one element of NP practice. States require supervision, delegation or team-management by an outside health discipline in order for the NP to provide patient care.

2. **Reduced practice:** State practice and licensure laws reduce the ability of nurse practitioners to engage in at least one element of NP practice. States require a regulated collaborative agreement with an outside health discipline in order for the NP to provide patient care.

3. **Full practice:** State practice and licensure laws provide for nurse practitioners to evaluate patients, diagnose, order and interpret diagnostic tests, initiate and manage treatments—including prescribe medications—under the exclusive
licensure authority of the state board of nursing. This is the model recommended by the Institute of Medicine and National Council of State Boards of Nursing.
CHAPTER 2
LITERATURE REVIEW

This review of literature represents areas important to nurse practitioner practice and research. First, the history of NP practice in the United States is examined in order to gain a better understanding of the current state of the knowledge. Building on this history, state practice environments are explored based on the impact of regulation, with special attention to three states (Missouri, Kentucky, and Iowa), which serve as exemplars due to their differing levels of state practice regulation. Next, a review of current NP research is provided based on health outcomes, patient satisfaction, role acceptance and understanding, and reimbursement issues in NP practice. Last, the historical context of access to care in the United States is reviewed, and the measurement of access as a concept in research is defined.

History of Nurse Practitioner Practice

Nurse practitioners emerged as a new discipline in healthcare in response to a shortage in primary care physicians and the passage of Medicare and Medicaid legislation in the 1960s (Mezey, McGivern, Sullivan-Marx, & Greenberg, 2003). The first nurse practitioner education program was developed collaboratively by Dr. Loretta Ford, RN, and Dr. Henry Silver, MD, in 1965 at the University of Colorado (Hawkins, 2005). In an interview with CNN columnist Elizabeth Landau, Dr. Ford described the resistance met in the first nurse practitioner programs by the medical and nursing communities. “There was great concern, I think, that the kind of direction that we were taking was much more medical than nursing,” Ford said. “It's not easy when you have to buck some of the old prejudices and
some of the demands of faculty that's set in its ways, so to speak” (Landau, 2011). At the same time, Dr. Ford recognized the push from professional organizations for nurses to become more specialized and expand their practice and independence. The concerns from the early days continue today as nurse practitioners still encounter opposition around expanded scope of practice.

Nurse practitioner training was initially associated with medical school training implemented by non-university training programs or considered continuing education; however, further development of the role of nurse practitioners in the healthcare system lead to master’s level programs throughout the country (Dunn, 1997). Boston College began one of the earliest master’s programs for NPs in 1967 followed by many other major nursing universities adopting the advanced practice curriculum (American Association of Nurse Practitioners, 2013a). Over 200 NP programs were in full operation by 1980, and the American Academy of Nurse Practitioners (today known as the American Association of Nurse Practitioners) was first established in 1985 to influence health policy and support NP research. By 1999, according to a workforce study conducted by the American Academy of Nurse Practitioners, there were 60,000 NPs practicing in the United States. In 2010, it was estimated that 135,000 NPs were practicing in the United States.

The current shift in advanced practice education recommends a doctoral degree for entry to practice. In 2003 the Institute of Medicine issued a report that healthcare education was deficient in providing education that promotes healthcare providers who deliver safe and quality healthcare, and called for educators to evaluate their process of accreditation, certification, and licensure to meet the growing needs of the workforce and the community of interest (Institute of Medicine, 2003). The work of the APRN Consensus Work Group and
the National Council of State Boards of Nursing APRN Advisory Committee (2008) resulted in the Consensus Model for APRN Regulation. This model, which has been endorsed by 48 professional nursing organizations, serves as a national regulatory model for licensure, accreditation, certification, and education of advanced practice registered nurses (APRNs). Implementation of the model as a regulatory standard for APRN practice allows NPs to practice to the full extent of their education and scope of practice, and be a change agent in health policy reform (Stanley, Werner, & Apple, 2009). Past arguments within the healthcare community stemmed from variations in NP education and licensure across the nation, and a lack of clarity in the NP role both within the healthcare community and among the general public. The Consensus Model for APRN Regulation seeks to offer role transparency for all advanced practice nurses and provide a standardized process for licensure, certification, accreditation, and education to prevent any question regarding the preparation of NPs and their ability to provide care and positively influence outcomes. The clinical doctoral degree supported by the APRN Consensus Model for APRN Regulation is the Doctor of Nursing Practice (DNP). There are over 330 accredited Master of Science in nursing programs in the United States (Dracup, 2014). Currently there are 217 active DNP programs in the United States, with another 97 programs in the process of seeking accreditation (American Association of Colleges of Nursing, 2013). DNP programs are now offered in 40 states and the District of Columbia.

State Practice Environments

Despite a substantial body of research to support independent NP practice, a wide-ranging degree of state regulations exist throughout the United States. An exploratory study
examining state practice acts and scope of practice regulation (Lugo, O’Grady, Hodnicki, & Hanson, 2010) found that states with the least restrictive state regulations are governed solely by the state board of nursing of that state, whereas states with additional oversight from medical and pharmacy boards had more practice restrictions. Practice restrictions in different states include the following: collaboration required for NP practice; prescriptive authority only with physician collaboration; prescriptive authority but not for narcotics; frequent chart audits; required presence of a physician on-site to practice; oversight by Board of Nursing and Board of Medicine or other state legislative body; required written practice protocols; and limitations on ability to diagnose/order tests/refer. The following sections will compare three states with differing levels of NP state practice regulations: Missouri, Kentucky, and Iowa. These states have a restricted, a reduced, and a full practice environment respectively, as characterized by the American Association of Nurse Practitioners (2013b). The following table (Table 1) was created to summarize the differences in state regulatory practice environments between Missouri, Kentucky, and Iowa.
Table 1

Examples of Differences in State Practice Environments: Missouri, Kentucky, Iowa

<table>
<thead>
<tr>
<th>State</th>
<th>NP Practice Regulation</th>
<th>AANP Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missouri</td>
<td>Missouri Board of Nursing and Board of Medicine</td>
<td>Required for NP practice: Month of on-site joint practice, chart review every 14 days of 10% of NP patient charts or 20% if controlled substances prescribed, physician visit with patient within 2 weeks if chronic conditions, &lt;30-50 mile radius between NP and physician practice location, physician collaboration limited to &lt;3 full-time NPs</td>
</tr>
<tr>
<td>Kentucky</td>
<td>Kentucky Board of Nursing</td>
<td>Required for NPs to prescribe medications: No specifications given for physician oversight of care or prescribing practices</td>
</tr>
<tr>
<td>Iowa</td>
<td>Iowa Board of Nursing</td>
<td>No collaborative practice requirements for NPs</td>
</tr>
</tbody>
</table>
Missouri

The current estimated population of Missouri is 6,021,988 (United States Census Bureau, 2013). When examining the Medicare population, which is composed primarily of individuals age 65 and older, Missouri has an estimated 14.7% of residents in this age bracket. According to the U.S. Census Bureau, 15.8% of the population of Missouri fell below the federal poverty level in 2011, slightly lower than 15.9% of the total United States population (Bishaw, 2012). According to the American Association of Nurse Practitioners (2013b), NPs in the state of Missouri are practicing in a restricted environment, meaning that state regulations limit a minimum of one aspect of NP practice and force the requirement of supervision of the NP in order to practice. NPs practice in Missouri is governed by the Missouri Board of Nursing, with prescriptive authority governed jointly by the Board of Nursing and the Board of Healing Arts. The Missouri Board of Nursing outlines specific regulations pertaining to collaborative practice arrangements between NPs and physicians, which include: one month of collaborative practice in the presence of a physician; 30 to 50 mile radius after the initial practice month between the NP and physician practice; consultation between the patient and physician within two weeks of seeing the NP if treatment includes chronic conditions thus doubling the treatment burden for patients with chronic conditions; requirement for physicians to review 10% of the NP’s charts every 14 days or 20% if controlled substances were prescribed; and limitations which only allow physicians to collaborate with three or fewer full-time NPs (Missouri Division of Professional Regulation, n.d.; Missouri Secretary of State Jason Kander, 2011). A recent report by the Robert Wood Johnson Foundation (2012) highlighted the limitations that resulted from the state regulations of Missouri NPs in providing emergency and primary care.
in the aftermath of the Joplin, Missouri tornado. On May 22, 2011, a severe tornado hit Joplin, MO, killing an estimated 157 people; this tornado has been ranked the 7th most fatal tornado in history (National Oceanic and Atmospheric Administration, 2012). Immediately following the tornado, medical workers were called to help in the aftermath. However, the restrictions on practice radius between the collaborating physician and NP prohibited many able and willing NPs to contribute to the emergency response (Joiner, 2012). Another aspect of this level of restriction in Missouri is that it puts a burden on healthcare in rural areas of the state. NPs are willing to provide care in rural areas, but there are not the necessary physicians to provide supervision in many cases.

**Kentucky**

The current estimated population of Kentucky is 4,380,415 (United States Bureau of Statistics, 2013). The primary Medicare age group, age 65 and older, accounts for 14% of the state’s population. The U.S. Census Bureau reported 19.1% of Kentuckians below the federal poverty level in 2011 (Bishaw, 2012). Kentucky is identified as a state with reduced practice regulations (American Association of Nurse Practitioners, 2013b), which means a reduction in the ability of NPs in the state to provide at least one aspect of care and the requirement of collaborative agreement with a physician or other healthcare provider. The main difference in physician oversight between Missouri and Kentucky is that NPs in Missouri require direct supervision with the physician practicing at the same time within the practice setting, while NPs in Kentucky are only required to obtain a collaborative agreement with a physician and are not requirement to have direct supervision or practice within the same practice setting. NP practice in Kentucky is governed solely by the Kentucky Board of Nursing. NPs in
Kentucky are allowed to practice independently of physicians in relation to diagnosis and treatment; however, NPs are required to obtain a collaborative practice agreement in order to prescribe nonscheduled legend drugs and controlled substances that are limited by 201 KAR 20:057, Section 9 (Kentucky Legislature, 2013). Despite a consistent record of safe prescribing practices (Mercer, 2011), collaborative practice agreements for prescriptive authority are still required. The Kentucky Coalition of Nurse Practitioners and Nurse Midwives and the Kentucky Nurses Association have made considerable efforts to influence health policy change regarding NP regulation. They have not yet been successful and continue to battle the Kentucky Medical Association and other political powers in gaining independence.

**Iowa**

The current estimated population of Iowa is 3,074,186 (United States Bureau of Statistics, 2013). The elderly population, age 65 and older, comprise 15.3% of the state’s overall population. This is significant when examining access to healthcare services at the state level because Iowa has a larger percentage of its population who are Medicare-eligible than both Missouri and Kentucky, as well as a higher percentage than that found for the overall United States population. In addition, 12.8% of people in Iowa fell below the federal poverty level in 2012 (Bishaw, 2012), which is considerably lower than both Missouri and Kentucky. Iowa is a state characterized as *full* practice environment (American Association of Nurse Practitioners, 2013b), which allows for diagnosis and treatment of patients, including prescribing, without collaborative practice arrangements with physicians; Iowa NPs are solely governed by the board of nursing. Limitations on prescribing, diagnosis,
treatment, and ordering or interpretation of diagnostic tests are not a barrier to practice for Iowa NPs (Iowa Board of Nursing, 2009). This type of regulatory model has been promoted as an ideal practice environment for NPs by the Institute of Medicine and the National Council of State Boards of Licensure. A summary of the regulations for these three states is shown in Table 1.

The American Association of Nurse Practitioners (AANP) has developed a map depicting the 50 states and Washington D.C. and their current NP practice regulation classification (2013b). This map represents newly enacted state regulations for Nevada, which moved the state from a reduced to full practice environment. For the purposes of this study, Nevada will remain coded as reduced practice because data were collected in 2011 when the regulatory environment was reduced. Figure 3 is the current AANP State Regulatory Map.
2013 Nurse Practitioner State Practice Environment

- **Full Practice**: State practice and licensure laws provide for nurse practitioners to evaluate patients, diagnose, order and interpret diagnostic tests, initiate and manage treatments—including prescribe medications—under the exclusive licensure authority of the state board of nursing. This is the model recommended by the Institute of Medicine and National Council of State Boards of Nursing.

- **Reduced Practice**: State practice and licensure law reduce the ability of nurse practitioners to engage in at least one element of NP practice. State requires a regulated collaborative agreement with an outside health discipline in order for the NP to provide patient care.

- **Restricted Practice**: State practice and licensure law restrict the ability of a nurse practitioner to engage in at least one element of NP practice. State requires supervision, delegation or team-management by an outside health discipline in order for the NP to provide patient care.

Figure 3. AANP (2013b) State Regulatory Map
Based on state practice regulations for 2011, 12 states had restricted practice, 22 states had reduced practice, and 16 states and Washington, D.C. had full practice environments.

**Nurse Practitioner Research**

**Health Outcomes**

A variety of practice issues have been addressed in NP research with a heavy emphasis on patient outcomes. The first study addressing outcomes of NP care was a randomized trial conducted in Canada comparing care received by 4,325 patients who saw either family physicians or nurse practitioners (Sackett et al., 1974; Spitzer et al., 1974). Pre- and post-trial measurements of functional capacity, and social and emotional function revealed no significant difference in the two groups; mortality rates were similar as well. Patient satisfaction with care and quality of care was high among both groups. The cost effectiveness of NP care in Canada could not be measured at the time due to limited reimbursement of NP services. The findings of this study were published in the *Annals of Internal Medicine* and the *New England Journal of Medicine*, which allowed for dissemination of findings among the medical community. Another early study in Canada compared health outcomes of care provided by NPs and physicians (Ramsay, McKenzie, & Fish, 1982), and was successful in promoting NPs as safe and effective care providers. The study was a non-randomized trial with 40 participants engaged in a NP-led hypertension management program compared to care provided by physicians for hypertension. Results of the study showed greater success in lowering hypertension over time in the NP group, as well as a greater patient participation in treatment.
The first study examining outcomes associated with NP care in the United States was a randomized trial comparing outcomes of 1,316 participants receiving care by NPs and physicians in a primary care setting (Mundinger et al., 2000). No significant differences were observed in the following health outcomes measures: health status, patient satisfaction after initial provider visit, health services utilization, and physiologic measurements for asthma and diabetes. The study was published in the *Journal of the American Medical Association* and was significant in quantifying the ability of NPs to provide care and produce outcomes equivalent to that of physicians. A two-year follow up phase to the original randomized trial, which measured outcomes in 406 participants from the original sample, revealed the same findings for health status, physiologic measures, patient satisfaction, and health services utilization among the groups of participants receiving care from NPs and physicians (Lenz, Mundinger, Kane, Hopskin, & Lin, 2004).

A meta-analysis of the outcomes of nurse practitioner care in the primary care system affirmed that nurse practitioners provide quality care that is equal to that provided by physicians with equivalent health outcomes (Laurant, et al., 2005). A systematic review by Newhouse et al. (2011) examined the impact of advanced practice nurses on a variety of outcome variables, including self-reported perceived health, functional status, and various outcomes indicators (glucose control, lipid control, blood pressure). A high level of evidence was found to support equal outcomes between NPs and physicians for each of these measures based on findings from 49 studies comparing outcomes between NPs and physicians including studies conducted only in the United States and reported during 1990 and 2008. In fact, high evidence was found to support better outcomes by NPs for the lipid control measure (Newhouse et al., 2011). Mortality rates were equivalent in comparison among the
provider groups as well. A follow up study by the research team (Stanik-Hutton et al., 2013) concentrated solely on outcomes specific to NP practice from studies reported from 1990-2009. Findings from this systematic review supported the need for future research that compares independent and group/team NP practice settings, and examines the effectiveness of different models of care delivery.

**Patient Satisfaction**

Several studies have demonstrated a high measure of patient satisfaction with care provided by nurse practitioners in comparison with care provided by physicians (Dierick-van Daele, Metsemakers, Derckx, Spreeuwenberg, & Vrijhoef, 2009; Guzik, Mendel, Fitzpatrick, & McNulty, 2009; Jennings, Lee, Chao, & Keating, 2009; Laurant, Hermens, Braspinning, Akkermans, Sibbald, & Grol, 2008; Pinkerton & Bush, 2000; Thrasher & Purc-Stephenson, 2008). A cross-sectional study of 100 African Americans in an urban academic medical center revealed a high degree of patient satisfaction and trust in NP care provided in a primary care setting despite an overall mistrust in the general healthcare system (Benkert, Hollie, Nordstrom, Wickson, & Bins-Emerick, 2009). A secondary analysis of 1,601,828 veterans surveyed revealed greater increases in satisfaction with care in the Veteran’s Health Administration system when the number of NPs was increased as compared to the number of physicians or physicians’ assistants (Budzi, Lurie, Singh, & Hooker, 2010). A recent survey of 131 families of nursing home residents verified that 98% of families were satisfied with NP care in end-of-life care situations (Liu, Guarino, & Lopez, 2012). The Newhouse et al. (2011) systematic review also compared 39 studies of patient satisfaction and found a high level of evidence to support equal satisfaction with care received by NPs and physicians.
Evidence supports the widespread patient satisfaction with care not only in primary care but in all healthcare settings, and across generations and races.

**Role Acceptance and Understanding**

The past four decades of nurse practitioner research have influenced healthcare policy change in many states experiencing healthcare provider shortages. Efforts to explore the relationship between physicians and nurse practitioners have supported the acceptance of nurse practitioners as independent healthcare providers. A recent survey of 505 physicians and 467 NPs compared work and practice characteristics between the disciplines, as well as perspectives of expansion of the NP role in primary care (Donelan, DesRoches, Dittus, & Buerhaus, 2013). The majority of participants supported increasing the number of NPs in order to expand access to care, and agreed that NPs should be able to practice within the full range of licensure and education. However, a quarter of NP respondents reported factors that limited independent practice, including restrictions imposed by states, hospital policy restrictions, and limitations experienced in work settings. Recent research examining consumer preferences of care and acceptance of advanced roles for NPs supported the evolving role of NPs and greater acceptance of this role to enhance access to care (Dill, Pankow, Erickson, & Shipman, 2013).

NPs are often excluded from many research studies examining issues important to practice and outcomes. An example of a recent study that failed to include NPs examined the effects of expanding coverage versus increasing provider reimbursement (White, 2012). The study, a retrospective analysis of the National Health Interview Survey, examined the impact of expansion of the states Children’s Health Insurance Program (CHIP) and physician fees on
access to care. Findings at the state level supported an increase in physician fees to increase access, but expansion of the CHIP program did not result in an increase in physician utilization. NPs were not included in this study, although NPs certainly provide primary care services and have the potential to have an impact on access to care in this underserved population.

Despite positive outcomes in research and practice, the general public still finds the role of the NP in practice confusing. A recent survey examining satisfaction with care in a rural urgent care center revealed that Americans still lack a general understanding of the role of NPs (Ryan & Rahman, 2012). Various elements of NP practice, including scope of practice regulations and payment policies, have been recommended as key areas in need of additional research and policy change in order to strengthen the primary care system and combat workforce shortages (Poghosyan, Lucero, Rauch, & Berkowitz, 2012).

**Reimbursement**

Reimbursement for care provided is another aspect of practice that has been addressed in research. NP research has also been successful in addressing reimbursement related issues, showing that NPs are more readily reimbursed for care in federal healthcare programs than in private pre-paid and HMO insurance programs (Anderson & Hampton, 1999). These findings support NP research in the Medicare population, a federally funded program. Sullivan-Marx and Maislin (2000) explored the use of NP data in determining Relative Work Values in the CMS Resource Based Relative Value Scale (RBRVS), which determines reimbursement of services for providers of healthcare. Although a pilot study, findings suggested that NPs and family physicians make practice decisions and provide
services that are comparable and result in equal relative work values. Findings from this study were instrumental in the initial utilization of NP data in the RBRVS update process and inclusion of NPs on committees addressing provider reimbursement.

A recent telephone survey of 258 Health Maintenance Organizations, which represented 98 major Managed Care Organizations (MCOs) in the United States, revealed that one fourth of MCOs still fail to credential NPs, which prohibits direct reimbursement for care provided (Hansen-Turton, Ware, Bond, Duria, & Cunningham, 2013). The ability to reimburse for services is fundamental to full NP practice. A recent health policy brief issued by the National Institute of Health Care Reform discusses not only the influence of health insurer and payer restrictions on NP reimbursement, but also recognizes the role that state scope of practice laws have on private and public payer sources in legally limiting payer policies (Yee, Boukus, Cross, & Samuel, 2013). For example, some states require a degree of physician oversight which prohibits NPs from being credentialed as primary care providers, thus limiting their ability to bill for and be reimbursed for services provided by some payer sources.

Access to Care

Historical Context

Before examining how access is currently measured and what findings are influencing public policy, it is first necessary to take a look at the history behind the concept. When did the idea of access to care first appear in the literature? How has it evolved over time?

In a historical review of the public health movement toward universal access to healthcare in the United States, early discussions around access to care occurred in the early
1910s in response to the passage of the national health insurance system in Great Britain (Derickson, 2002). The mid-1930s saw strides in improving access by initiating federal pensions and federal and state unemployment insurance during the New Deal era. The American Public Health Association paved the way for universal access to care in the healthcare arena, but the conservative ideals of the American Medical Association created enough counter-influence to negate any true steps toward national healthcare coverage for all citizens. The passage of Medicare legislation in the 1960s occurred in response to an impending physician shortage and certainly access to care was at the heart of such public policy. Yet, the first mention of access found in the literature is in response to the fourteenth amendment of the United States Constitution. In a legal review of the governments’ enactment of the Equal Protection Clause of the 14th Amendment, Mariner (1986) suggests that in order to fully protect the rights of individuals, avoid discrimination and ensure equal distribution of benefits, the United States and policymakers must re-evaluate how health care is provided and address issues of access through health reform that benefits all Americans.

One such effort to expand health care services was the State Children’s Health Insurance Program (SCHIP) passed by Congress in 1997 (Teitelbaum & Wilensky, 2013). This program was designed to provide medical coverage to children from low-income families that were not eligible for state Medicaid programs. SCHIP was temporarily extended in 2007 and then further expanded in 2009. The Affordable Care Act incorporates the various elements of Medicaid and the SCHIP program in its fiscal structure and provides for financial support of these programs through 2015.

The Institute of Medicine published a consensus report, *The Future of Nursing: Leading Change, Advancing Health* (2010), which was a call for nurses to fulfill the
expanded roles required to meet the needs of the American people during a period of critical reform in the United States. Nurse practitioners are in a prime role to fill unmet needs and practice to the full extent of their education, certification, and licensure. A recent workforce study concludes that nurse practitioners account for 17% of the current primary care workforce (Dower & O’Neil, 2011), which only serves to further support advocacy for nurse practitioners as independent providers. In order to look more in depth at how nurse practitioners can make an impact on access issues, it is crucial to examine how access is measured and review key studies that relate to access that can be reproduced to include nurse practitioners as part of the healthcare workforce.

**Measurement**

Access to care is defined as “the ability to obtain needed health services” (Teitelbaum & Wilensky, 2013, p. 49), and is influenced by numerous factors that can serve as facilitators or create barriers. In a concept analysis addressing personal access to health care, Norris and Aiken (2006) propose a theoretical definition of access that encompasses availability, eligibility, amenability, and compatibility as defining attributes that are required for the presence of personal health care access. Previous research and supportive theory have identified three common indicators of access to healthcare services: usual source of care, unmet health care needs, and forgoing or delaying care.

A secondary data analysis of the 2000 Medical Expenditure Panel Survey examined access to care by measuring two commonly identified subconstructs of access: usual source of care and satisfaction with access to care while examining community-level poverty (Kirby, 2008). Access was also measured using the variable of usual source of care in a
secondary data analysis of the 2005 California Health Interview Survey with special interest paid to non-U.S. citizens (Lee & Choi, 2009). An analysis of the Canada/U.S. Survey of Health measured the second indicator of access, unmet healthcare needs, in comparing access between the two countries (Lasser, Himmelstein, & Woolhandler, 2006). McCarrier et al. (2011) also examined the impact of state minimum wage data on unmet medical needs using a longitudinal secondary analysis of data from the Behavioral Risk Factor Surveillance System. A secondary analysis of the Community Tracking Study evaluated the effect of community non-insurance rates on access to care measured by the indicator of foregoing or delaying care (Sabik, 2012). It is crucial to note that all of these studies employed a secondary data analysis method and used the theoretical work of Ron Andersen’s access to healthcare services (Aday & Andersen, 1974).

Fortney, Burgess, Bosworth, Booth, and Kaboli (2011) suggest an evolving definition due to new electronic health innovations. They recommended including factors reflecting geographic, temporal, financial, cultural, and digital measures to better incorporate the changing atmosphere in the way healthcare is delivered. Suggestions for operationally measuring these factors include questions that relate to distance from patient residence to provider, language pairing between patient and provider, appointment wait times, and access to health records. Common themes seen in access-related literature include access to mental health services (Mesidor et al., 2011), access issues for American citizens compared with access for immigrants and other non-citizen residents (Lee & Choi, 2009), lack of insurance and the impact on access to health care services (Sabik, 2012), and poverty and access to care (Kirby, 2008; McCarrier et al., 2011). All of these categories represent areas where health
disparities play an integral role in redefining access and the limitations and barriers many subpopulations face.

Research examining access at the state level has been conducted by foundations involved in health policy reform, and this research lends itself well to comparative analysis. In an ongoing data collection effort, the Commonwealth Fund has developed a *Scorecard* system for measuring various health systems elements, including access to care, and then assigns a rank to the state on those health systems elements, as well as an overall state health system ranking (Schoen et al., 2013). States with lower rankings were found to have better access and health systems as opposed to states with higher rankings. Findings from data collected in 2010-2011 for the three example states are:

1. Missouri: overall health systems ranking of 44 (out of 51), state access and affordability ranking of 30.
2. Kentucky: overall health systems ranking of 45, state access and affordability ranking of 36.
3. Iowa: overall health systems rating of 9, state access and affordability ranking of 13.

A recent qualitative study looked at the institution of a nurse practitioner in a mental health care setting and the positive impact this adjustment had on access to mental health and primary care services (Mesidor et al., 2011). A similar qualitative study in the UK examined access in response to the addition of nurse practitioners in primary care settings, and concluded that various elements of access, such as appointment waiting times, were improved as a result of the addition of a nurse practitioner to a practice (Perry et al., 2005).
A retrospective analysis of 10.6 million patient encounters in the Veteran’s Health Administration revealed that NPs and physician assistants were responsible for the care provided in 30% of primary care patient visits (Morgan, Abbott, McNeil, & Fisher, 2012). Yet, the overall effects of nurse practitioner practice on access to primary care have yet to be studied at the aggregate level in the United States. In order to examine nurse practitioner practice at the state level, it is essential to explore state regulation of NPs.
CHAPTER 3

METHODS

Research Design

The design of this study is a secondary data analysis of an existing database, the Medicare Current Beneficiary Survey (MCBS). The MCBS sample was selected by using a stratified, multistage area probability sample design. Data were collected at one point in time; therefore, the study research questions will be answered using a cross-sectional data source. Strengths of using secondary data analysis to address research questions include shorter time frame for data collection, large sample sizes, and cost efficiency (Aponte, 2010; Hofferth, 2005). Large datasets allow the researcher to derive generalizable answers to “high impact” questions (Smith et al., 2011, p. 921). Secondary data analysis has been promoted as an approach to evaluate the impact of health policy (Evans, Grella, Murphy, & Hser, 2010). Jacobson Vann and Gitterman (2008) evaluated the impact of changes in North Carolina State Children’s Health Insurance Program and Medicaid programs on access to healthcare services using a secondary data analysis method. Challenges to using secondary data analysis to answer research questions include lack of control over data collection, including variable and population selection, and the exploratory nature of secondary analysis which limits the ability to substantiate causation when examining variables (Smith et al., 2011).

Rationale

The goal of the project is to examine access to healthcare for Medicare recipients in states with different levels of NP practice regulation. NPs have the unique opportunity to influence access to care under supportive state regulatory circumstances. The objective of the
study is to demonstrate the relationship between full practice and increased access to care at the state level in the Medicare population. Efforts to make health policy change to promote the expanded role of NPs must be based on research that demonstrates that increased scope of practice results in increased access to care and improved health outcomes.

The Database

The dataset used for this project is the Medicare Current Beneficiary Survey (MCBS) MCBS Access to Care dataset 2011, a nationwide survey that provides a cross-sectional set of data collected during the fall 2011 interview session. The MCBS is a continual survey that includes a sample of the Medicare population representative of the national Medicare beneficiary population. The Office of Strategic Planning of the Centers for Medicare & Medicaid Services (CMS) conducted the survey. Inclusion criteria for the 2011 MCBS were: Medicare beneficiaries who became eligible for Medicare prior to January 1, 2011, continued to be eligible throughout the 2011 calendar year, and were still enrolled during the fall 2011 interview session (Centers for Medicare & Medicaid Services, 2012). The analysis dataset does not represent the 5,300,000 Medicare beneficiaries who were initially enrolled after the start of 2011 or those who died in 2011 (Centers for Medicare & Medicaid Services, 2012).

Sampling Methods and Procedures

The sample size of the parent study was 15,027, which included all 50 states (Cable, 2012). Participants in the MCBS were sampled from the Medicare enrollment file to be representative of the Medicare population as a whole, and by the following age groups: under 45, 45-64, 65-69, 70-74, 75-79, 80-84, and 85 and above. Due to interest in special health care needs, the oldest old (85 and over) and the disabled (64 and under) were oversampled to
permit more detailed analysis of these subpopulations. The sample was selected using a stratified, multistage area probability sample design. The first stage in the sampling process was to select 107 primary sampling units (PSUs). The PSUs were selected to be nationally representative and consist of either counties or groups of counties containing both metropolitan and non-metropolitan areas. Once the PSUs were selected, ZIP code clusters were selected within the PSUs and beneficiaries within those ZIP codes were selected by systematic random sampling to participate in the survey (M. Emerick with Centers for Medicare & Medicaid Services, personal communication, October 7, 2013).

Two types of interviews were used to obtain data: home-based interviews performed by trained personnel and institutional interviews conducted by knowledgeable staff (Evans et al., 2010). The MCBS Access to Care dataset includes data from 14,120 community interviews and 907 institutional interviews (Centers for Medicare & Medicaid Services, 2012). Recent research using the MCBS Access to Care data include a secondary analysis affirming the link between usual source of care (a sub-construct of access) and decreased depression in the Medicare population (Chunyu, Dick, Fiscella, Conwell, & Friedman, 2011).

Findings from data collected by the Henry J. Kaiser Family Foundation, a non-profit organization involved in health policy research, show the following Medicare enrollee numbers and numbers of NPs practicing in states with restricted, reduced, and full practice in 2011, the year data were collected for the MCBS (Kaiser Family Foundation, 2013):

1. Restricted: 22,235,958 Medicare beneficiaries; 80,485 NPs (12 states, average of 6,707 NPs per state; 1 NP/276 Medicare beneficiaries)
2. Reduced: 20,502,038 Medicare beneficiaries; 75,772 NPs (22 states, average of 3,444 NPs per state/270 Medicare beneficiaries)
3. Full: 5,937,042 Medicare beneficiaries; 23,976 NPs (18 states and the District of Columbia, average of 1,262 NPs per state; 1 NP/248 Medicare beneficiaries).

**Instrument/Measurements**

The study is a secondary data analysis of the MCBS Access to Care 2011 dataset using an observational design comparing states with different levels of practice regulation: restricted practice, reduced practice, and full practice. The independent variable is NP practice laws, and is coded as: restricted practice (1), reduced practice (2) and full practice (3). The dependent variable is access to healthcare services, which is measured by three constructs present in the dataset: appointment waiting times (length of time to get an appointment and length of time waiting to see the provider at the appointment), difficulty accessing care (dichotomous yes/no), reasons associated with difficulty accessing care (multiple categories), usual source of care (dichotomous yes/no), and place for usual source of care (multiple categories). Appointment waiting times are measured at the ratio level, while difficulty accessing care and usual source of care are recorded at the categorical level. The three constructs are represented in the MCBS 2011 Access to Care Survey with the following questions taken from the questionnaire (Centers for Medicare & Medicaid Services, 2011):

1. **Appointment Waiting Time (to get an appointment):** How long did you have to wait for the appointment? (continuous variable: # of days)

2. **Appointment Waiting Time (at the appointment, to see the provider):** How long did you have to wait during your most recent visit before you saw a doctor or some other medical person? (continuous variable: # of minutes)
3. **Difficulties Encountered Accessing Care:** Have you had trouble getting needed healthcare? (dichotomous variable: yes/no) What kind of difficulty did you have? (categorical variable: plan would not authorize service, wait for appointment too long, provider’s location not convenient, doctor/plan would not give referral to see the provider, did not like or not confident in provider, provider’s office hours not convenient).

4. **Usual Source of Care:** Is there a particular medical person or a clinic you usually go to when you are sick or for advice about your health? (dichotomous variable: yes/no) Additional information regarding usual place for care is available (categorical variable with the following item responses): Doctor’s office or group practice, medical clinic, MCO/HMO, neighborhood/family health center, freestanding surgical center, rural health clinic, company clinic, other clinic, walk-in urgent center, doctor comes to house, hospital emergency room, hospital outpatient department/clinic, VA facility, mental health center, other.

**Analysis**

Data analysis was conducted using SAS/STAT® Software. Survey procedures were used for all statistical analyses which applied the Taylor series weights in order to make the sample representative of the “always enrolled” Medicare population. Descriptive statistics were used to analyze demographic data. Upon review of the items on the MCBS Access to Care 2011 survey, many variables were coded as categorical variables (i.e., usual source of care, difficulty accessing care). The main statistical test to use with categorical variables is the nonparametric statistic chi-square. In addition, logistic regression was performed with
dichotomous outcome variables (difficulty accessing care and usual source of care). The variables of appointment wait time, which was broken down into number of days it takes to get an appointment with a provider (D_OAPPT2) and the amount of time spent waiting to see the provider at the appointment (D_OPTIME2), were measured at the ratio level and regression analyses were performed. An alpha level of 0.05 was used to evaluate the statistical significance of findings. Urbanicity, quantified by frequency data of Medicare beneficiaries in urban and rural areas, was used as a covariate when measuring the effect of state practice regulations on access to care. Additional covariates used during regression analyses were nursing home stay, Medicaid HMO coverage, and private insurance coverage. All of these covariates were measured at the nominal level, and were dichotomous variables.

Special attention was paid to non-response when analyzing secondary data.

The MCBS Access to Care dataset used a cross-sectional weight for all survey respondents in order to adjust for non-response and post-stratification to control for age, sex, race, region, Metropolitan area, and age of eligibility for Medicare (Centers for Medicare & Medicaid Services, 2012). The Taylor Series weights, which are commonly used in large survey datasets, allow researchers to apply a commonly used and accepted weighting system to make the data from a non-random sample more generalizable to the population of interest (Chen & Gorrell, 2008). The Taylor Series weights were included as a variable in the dataset and were used when analyzing the data using SAS/STAT ® Software PROC survey analyses. Specifically, PROC survey logistic was used when analyzing dichotomous outcome variables. The following were projected tables for analyses.
Table 2
Sample Description

<table>
<thead>
<tr>
<th></th>
<th>Restricted Practice States (1)</th>
<th>Reduced Practice States (2)</th>
<th>Full Practice States (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total N</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (mean, SD, range)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Race/Ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urbanicity: (frequency) urban/rural</td>
<td>Urban</td>
<td>Rural</td>
<td>Urban</td>
</tr>
</tbody>
</table>

Table 3
Components of Access to Care

<table>
<thead>
<tr>
<th></th>
<th>Waiting Times</th>
<th>Difficulties Accessing Care</th>
<th>Usual Source of Care</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>To Get Appointment (mean, SD)</td>
<td>To See Provider During Appointment (mean, SD)</td>
<td>Yes/No</td>
</tr>
</tbody>
</table>

Restricted Practice States (1)
Reduced Practice States (2)
Full Practice States (3)
Validity and Reliability

Validity refers to the ability of an instrument to measure what is intended to be measured and reliability is the ability of the measure to produce consistent results (Polit & Beck, 2004). Certain threats to external validity in the primary data collection must be considered in the study. First, participants who died during the data collection period were not included in the sample, which could lead to a non-representative sample. Medicare beneficiaries who were in poor health may not have enrolled in the survey, which would also have an impact on the representativeness of this sample. Measurement artifacts, including linguistic and cultural bias, could have had an effect on the participant’s ability to fully and accurately answer questions related to access to care. Potential threats to the construct validity of the independent variable, state practice regulation, or the dependent variable, access to care, must be considered when conducting policy research. For example, for the item of place for usual source of care, are all places that a Medicare beneficiary might go for care actually included to make the measurement reflective of what is actually intended to measure?

Psychometric analyses were conducted examining the various aspects of the MCBS related to the respondent’s evaluation of their understanding of Medicare. Results comparing data from 1995-1999 revealed that only two of the four knowledge indices being measured showed reliability over time (Bonito et al., 2000). One particular question related to Medicare understandability was eliminated due to weak construct validity, and it was suggested that another construct was being measured with this variable. In addition, a question asking about the availability of mammograms under Medicare was eliminated as it only pertained to female applicants. The MCBS Access to Care 2011 datasets collected self-reported race and
ethnicity, which have been found to be more reliable than CMS administrative data (Centers for Medicare & Medicaid Services, 2012).

**Limitations**

Limitations of the study include lack of control over the primary data collection. The completeness of data was not fully understood until the data were accessed. Cases were deleted due to missing data, which decreases the sample size available for an item and affects the power of the study (Langkamp, Lehman, & Lemeshow, 2010). Efforts were used to minimize bias in the data by employing established data manipulation techniques. The weighting methods used in the MCBS Access to Care 2011 dataset were described in the “Sampling Methods and Procedures” section of this chapter.

**Human Subjects Protections**

Institutional Review Boards (IRBs) have the obligation to ensure that research involves minimal risks to participants, risks are balanced with potential benefits, informed consent is obtained and properly documented, participants are selected fairly, data are handled safely and ethically, and participants’ privacy and confidentiality are protected (Steneck, 2007). Documentation of IRB approval or communication is an important step in the responsible conduct of research. Some research may be considered exempt from IRB approval, such as research that involves review of records which cannot be traced back to participants and participation does not increase risk of criminal or civil liability (Office for Human Research Protections, 1993). This research study involves previously collected data which have been de-identified and cannot be traced back to the original participants. In the process of applying for funding with the Kentucky Nurses’ Foundation, the UMKC Social
Sciences IRB was contacted in order to follow ethical standards and maintain good communication with the IRB regarding future dissertation research. Initially the UMKC Social Sciences IRB was contacted for exemption from review; however, direction was given to complete the “Not Human Research Determination Form” electronically, and it was determined that the proposed research would not fall under the jurisdiction of the IRB for review (see the Appendix A for the electronic feedback with UMKC SSIRB). The next step in the research process was to complete the Data User Agreement with CMS along with a project description to the Research Data Assistance Center (ResDAC). Appendix B includes the Data User Agreement that was approved by the CMS ResDAC, as well as the Research Summary provided to CMS and the MCBS Request Letter. The request was approved by CMS November 1, 2013. A copy of the approval email is also included in Appendix B.
CHAPTER 4
RESULTS

The dataset was received in November 2013 and a trip was made to Kansas City December 9-11, 2013 to work on accessing the data, selecting variables of interest, recoding the data, and meeting with committee members. A new dataset was created with the recoded variables of interest in SAS 9.2 and SAS Enterprise. First, descriptive statistics of the sample were computed. The Taylor series weights were then applied to make the data representative of the “always enrolled” Medicare population as described in Chapter 3. The original sample ($N = 15,027$) was broadened using the Taylor series weights to allow for 45,205,096 weighted cases, which represented the Medicare “always enrolled” population. Additional descriptive statistics were performed with the weights. The next step in the analysis was to perform regression analysis with survey procedures in SAS PROC Surveryreg and PROC Surverylogistic using the independent variable NP practice laws, and the dependent variable access to healthcare services. Additional variables that were controlled for included nursing home stay, urbanicity, Medicaid HMO coverage, and private insurance coverage. The following sections will discuss the results of the descriptive statistics, regression, and logistic regression.

Descriptive Statistics

The mean age of the weighted sample was 71.65 years, which is representative of the sum 45,205,096 Medicare beneficiaries ($SE = 0.12$). The youngest participant was 21 and the oldest was 107, resulting in a range of 86 years. When calculating the frequencies of the race
variable for the sample, the weights were again applied and the breakdown of race is displayed in Table 4. The frequency for gender is illustrated in Table 5.

Table 4

*Sample Race Frequency Table*

<table>
<thead>
<tr>
<th>Race</th>
<th>Frequency</th>
<th>Weighted Frequency</th>
<th>Percent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unknown</td>
<td>27</td>
<td>102,505</td>
<td>0.23%</td>
</tr>
<tr>
<td>White</td>
<td>12,449</td>
<td>37,901,989</td>
<td>83.84%</td>
</tr>
<tr>
<td>Black</td>
<td>1,688</td>
<td>4,581,787</td>
<td>10.14%</td>
</tr>
<tr>
<td>Other</td>
<td>173</td>
<td>639,047</td>
<td>1.41%</td>
</tr>
<tr>
<td>Asian</td>
<td>186</td>
<td>710,117</td>
<td>1.57%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>426</td>
<td>1,064,959</td>
<td>2.36%</td>
</tr>
<tr>
<td>North American Native</td>
<td>78</td>
<td>204,692</td>
<td>0.45%</td>
</tr>
</tbody>
</table>

Table 5

*Sample Gender Frequency Table*

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Weighted Frequency</th>
<th>Percent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>6,772</td>
<td>20,262,662</td>
<td>44.82%</td>
</tr>
<tr>
<td>Female</td>
<td>8,255</td>
<td>24,943,435</td>
<td>55.18%</td>
</tr>
</tbody>
</table>
Participants were asked to rate their general health at the time of the interview, with 1 = Excellent, 2 = Very Good, 3 = Good, 4 = Fair, 5 = Poor. From the total sample, 3.17% rated their general health “Excellent”, 10.72% “Very Good”, 28.56% “Good”, 36.86% “Fair”, and 20.69% “Poor”. Table 6 illustrates the breakdown of these rankings between states with Restricted, Reduced, and Full NP Practice.

Table 6

*General Health Ranking Frequency Table*

<table>
<thead>
<tr>
<th>Health Ranking Category</th>
<th>Frequency</th>
<th>Weighted Frequency</th>
<th>Percent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restricted Practice States (1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 “Excellent”</td>
<td>15</td>
<td>28,408</td>
<td>3.60%</td>
</tr>
<tr>
<td>2 “Very Good”</td>
<td>52</td>
<td>92,535</td>
<td>11.73%</td>
</tr>
<tr>
<td>3 “Good”</td>
<td>118</td>
<td>224,648</td>
<td>28.48%</td>
</tr>
<tr>
<td>4 “Fair”</td>
<td>131</td>
<td>253,941</td>
<td>32.19%</td>
</tr>
<tr>
<td>5 “Poor”</td>
<td>90</td>
<td>189,398</td>
<td>24.01%</td>
</tr>
<tr>
<td>Reduced Practice States (2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 “Excellent”</td>
<td>11</td>
<td>15,682</td>
<td>1.98%</td>
</tr>
<tr>
<td>2 “Very Good”</td>
<td>47</td>
<td>76,015</td>
<td>9.45%</td>
</tr>
<tr>
<td>3 “Good”</td>
<td>114</td>
<td>229,529</td>
<td>28.91%</td>
</tr>
<tr>
<td>4 “Fair”</td>
<td>158</td>
<td>333,109</td>
<td>41.96%</td>
</tr>
<tr>
<td>5 “Poor”</td>
<td>64</td>
<td>140,551</td>
<td>17.70%</td>
</tr>
<tr>
<td>Full Practice States (3)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 “Excellent”</td>
<td>4</td>
<td>8,445</td>
<td>5.14%</td>
</tr>
<tr>
<td>2 “Very Good”</td>
<td>10</td>
<td>20,950</td>
<td>12.76%</td>
</tr>
<tr>
<td>3 “Good”</td>
<td>23</td>
<td>41,438</td>
<td>25.24%</td>
</tr>
<tr>
<td>4 “Fair”</td>
<td>27</td>
<td>61,018</td>
<td>37.17%</td>
</tr>
<tr>
<td>5 “Poor”</td>
<td>18</td>
<td>32,299</td>
<td>19.68%</td>
</tr>
</tbody>
</table>

*Frequency missing = 14,139*
Survey procedures were used to perform a chi square test of independence and see if there was a difference in overall health of participants in states with Restricted, Reduced, and Full NP practice, and results were not significant ($\chi^2 (8) = 12.24, p = .14$).

Additional frequency statistics were calculated for the sample examining the place participants usually go when seeking care, illustrated in Table 7. The site of care is also an important factor when measuring access to healthcare services. Results of the comparison between different levels of NP Practice laws for the place participants usually go when seeking care is presented under the Usual Source of Care section below.
Table 7

*Healthcare Facility Frequency Table (=PLACEKND2 variable)*

<table>
<thead>
<tr>
<th>Healthcare Facility Type</th>
<th>Frequency</th>
<th>Weighted Frequency</th>
<th>Percent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Doctor’s office or group practice</td>
<td>10,361</td>
<td>32,097,891</td>
<td>77.06%</td>
</tr>
<tr>
<td>2 = Doctor’s clinic</td>
<td>1,695</td>
<td>4,988,843</td>
<td>11.98%</td>
</tr>
<tr>
<td>3 = HMO</td>
<td>404</td>
<td>1,299,399</td>
<td>3.12%</td>
</tr>
<tr>
<td>4 = Neighborhood or family health center</td>
<td>97</td>
<td>306,690</td>
<td>0.74%</td>
</tr>
<tr>
<td>5 = Freestanding surgery center</td>
<td>0</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>6 = Rural health clinic</td>
<td>131</td>
<td>362,713</td>
<td>0.87%</td>
</tr>
<tr>
<td>7 = Company clinic</td>
<td>3</td>
<td>14,482</td>
<td>0.03%</td>
</tr>
<tr>
<td>8 = Other clinic</td>
<td>23</td>
<td>66,803</td>
<td>0.16%</td>
</tr>
<tr>
<td>9 = Walk-in urgent care center</td>
<td>39</td>
<td>135,159</td>
<td>0.32%</td>
</tr>
<tr>
<td>10 = At home</td>
<td>87</td>
<td>232,653</td>
<td>0.56%</td>
</tr>
<tr>
<td>11 = Hospital emergency room</td>
<td>17</td>
<td>46,410</td>
<td>0.11%</td>
</tr>
<tr>
<td>12 = Hospital outpatient department</td>
<td>276</td>
<td>848,445</td>
<td>2.04%</td>
</tr>
<tr>
<td>13 = Veteran’s administration facility</td>
<td>358</td>
<td>1,195,822</td>
<td>2.87%</td>
</tr>
<tr>
<td>14 = Mental health facility</td>
<td>1</td>
<td>4,963</td>
<td>0.01%</td>
</tr>
<tr>
<td>15 = Other</td>
<td>14</td>
<td>50,293</td>
<td>0.12%</td>
</tr>
</tbody>
</table>

*Missing data = 1521 cases*
Last, a chi-square test of independence was conducted comparing urbanicity, which
was calculated during primary data collection procedures from the participant’s zip code and
then re-coded into a dichotomous variable (metropolitan versus non-metropolitan area), in
order to determine if differences existed in Medicare beneficiaries in states with different NP
practice laws. A significant interaction was found ($\chi^2 (2) = 79.95, p < .01$). Table 8 represents
the frequency distribution for this outcome. Urbanicity was used in subsequent regression
analyses as a covariate since a significant difference was seen in the urbanicity frequency
between the three categories of State NP practice law groups.

Table 8

*Urbanicity (= URBAN variable) Frequency Table Comparing State NP Practice
Laws Groups (= H_RESST2 variable)*

<table>
<thead>
<tr>
<th>Urbanicity Category</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restricted Practice States (1)</td>
<td></td>
</tr>
<tr>
<td>1 = Yes</td>
<td>70.53%</td>
</tr>
<tr>
<td>0 = No</td>
<td>29.47%</td>
</tr>
<tr>
<td>Reduced Practice States (2)</td>
<td></td>
</tr>
<tr>
<td>1 = Yes</td>
<td>77.34%</td>
</tr>
<tr>
<td>0 = No</td>
<td>22.66%</td>
</tr>
<tr>
<td>Full Practice States (3)</td>
<td></td>
</tr>
<tr>
<td>1 = Yes</td>
<td>72.67%</td>
</tr>
<tr>
<td>0 = No</td>
<td>27.33%</td>
</tr>
</tbody>
</table>

*Missing data = 262 cases*
**Appointment Waiting Times**

The first two constructs of access, waiting time to get an appointment and the time it took to see the provider in the office while waiting at the appointment, were analyzed using an analysis of variance. The appointment time variable, which measured the number of days it took to get an appointment, showed a statistical difference between the three state NP practice groups, $F(2, 1198) = 3.21, p = .04$. It took an average of 9.37 days for participants in the Restricted NP practice law group to get an appointment with a provider ($N = 526, SD = 15.48$), and an average of 9.10 days for the Reduced NP practice law group ($N=539, SD=15.41$), and 12.94 days for the Full NP practice law group ($N=133, SD=19.94$).

The waiting time variable, which represents the amount of time a participant spent waiting to see the provider at the time of appointment, also showed a statistically significant difference between the three groups, $F(2, 4988) = 8.22, p<.01$. The mean time spent waiting to see the provider in the office for participants in the Restricted NP practice states was 22.30 minutes ($N=2280, SD = 43.67$), as compared to 17.89 minutes in Reduced NP practice states ($N=2266, SD = 37.38$), and 17.18 minutes in Full NP practice states ($N=442, SD=23.83$).

**Difficulty Accessing Care**

The relationship between participants in Restricted, Reduced, and Full NP practice states and ease of getting from home to the medical provider office (Very Satisfied, Satisfied, Dissatisfied, and Very Dissatisfied) was examined with survey procedures using a chi square test of independence. The relation between State NP Practice groups and ease of getting from home to the medical provider office was not significant, $\chi^2 (6) = 7.46, p = .28$. 
A chi-square test of independence using survey procedures to examine the relation between state NP practice law groups and the main reason a participant did not seek care (a categorical variable with multiple responses), and yielded significant results, $\chi^2 (14, N = 1180) = 26.14, p = .03)$. It should be noted that there were a great deal of missing cases for this particular variable, which reflects that many participants either did not understand the question, or saw a provider when care was needed. In the category “cost too much,” 23.47% of participants in Restricted NP Practice states reported not seeing a provider due to cost, 15.57% in Reduced NP Practice states, and 11.73% in Full NP Practice states. In the category “trouble finding a provider,” 8.03% in Restricted, 6.65% in Reduced, and 11.02% in the Full NP Practice states reported not seeing a provider due to trouble finding a provider. The dichotomous variable used to measure whether a person had difficulty accessing care was measured using logistic regression (see Regression section).

**Usual Source of Care**

The final construct of access to care, usual source of care, was first evaluated using survey procedures and the chi-square test of independence. Results showed that there was no statistical difference for Medicare beneficiaries in Restricted, Reduced, and Full NP practice states in terms of having a usual source of care, ($\chi^2 = 1.90, df = 2, p > 0.39$). Frequency of participants reporting a usual source of care was 87.02% with 12.98% reporting no usual source of care (11,996 missing cases were noted for this item). In order to examine this question further, logistic regression was used with survey procedures to see if differences were seen when adding additional predictors into the model and results from the regression analysis are presented in the subsequent section.
A chi-square test of independence was conducted comparing the frequency of participants’ choices for their place of healthcare (healthcare facility) and state NP practice laws. A significant relationship was found ($\chi^2(26) = 417.06, p < .01$). Participants in Full NP Practice law states visited doctor’s offices and group practices (63.86%) less often than participants in Restricted (79.32%) and Reduced States (76.71%). In contrast, participants in Full NP Practice law states sought care at HMO facilities more frequently (8.79%) than participants in Restricted (3.72%) and Reduced (0.94%) states.

**Regression**

Regression was used to predict whether Medicare beneficiaries in states with restricted, reduced, and full NP practice laws experienced different appointment waiting times. The two outcome variables used in the regression analysis were appointment waiting times, measured in the number of days it took to get an appointment with a provider, and time spent waiting at the appointment to see the provider, measured in number of minutes. Logistic regression was used to predict whether Medicare beneficiaries in states with restricted, reduced, and full NP practice laws differ on a variety of dichotomous access variables. Logistic regression was used to compare the independent variable of state NP practice law groups with the outcome variables related to difficulty accessing care and usual source of care. Covariates used when performing the regression analyses were urbanicity, nursing home stay, Medicaid HMO coverage, and private insurance coverage.
Appointment Waiting Times

Regression analysis was performed to examine if state NP practice had an effect on the amount of time it took to get an appointment with a provider. Additional predictor variables included in the model were urbanicity, nursing home stay, Medicaid HMO coverage, and private insurance coverage. The number of observations used from the sample was 142, which accounted for 371,166 weighted cases using survey procedures. State NP Practice showed a significant effect in predicting the amount of time it took to get an appointment, $R^2 = .02$, $F(2, 371,166) = 15.11, p < .01$. All predictor variables, except for Medicaid HMO coverage ($p = .34$), had a significant effect on the dependent variable of time to get an appointment ($p < .01$). In summary, Medicare participants from Restricted NP Practice states had lower waiting times with 2.82 times shorter waiting time in days than participants from Full NP Practice states ($\beta = -2.82, t = -5.47, SE = .51, p < .01$). In addition, participants in Reduced NP Practice states also had lower waiting times with 1.86 times shorter waiting times in days than participants in Full NP Practice states ($\beta = -1.86, t = -2.31, SE = .81, p = .02$).

For the dependent variable of time spent waiting at appointment to see provider, a regression analysis was performed. There is no significant effect of state NP practice law groups on the time spent waiting to see a provider using survey procedures, $R^2 = .01$, $F(2, 2,013,410) = 0.15, p = .86$. The number of observations used from the sample was 759, which resulted in 2,013,410 weighted cases for this analysis. Therefore, State NP Regulation did not significantly predict amount of time spent waiting to see a provider at an appointment.
Difficulty Accessing Care

When examining the dependent variable of trouble getting needed healthcare services, a significant effect was seen when comparing participants in states with Restricted, Reduced, and Full NP practice laws, $\chi^2 (2, N = 5,568,495) = 16.12, \ p < .01$. Additional predictor variables in the model include urbanicity, nursing home stay, Medicaid HMO coverage, or private insurance coverage. These covariates did not have a significant effect on the outcome ($p > .05$). A participant had a 67% less likely chance of having trouble accessing healthcare if they lived in a Reduced NP Practice State than participants in Full Practice States. Model fit statistics for the regression analysis were significant (global null hypothesis test, $\beta = 0$).

Table 9

Odds Ratio Table for Difficulty Accessing Care Logistic Regression

<table>
<thead>
<tr>
<th>Effect</th>
<th>Point Estimate</th>
<th>95% Confidence Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lower</td>
</tr>
<tr>
<td>Restricted vs. Full</td>
<td>0.646</td>
<td>0.346</td>
</tr>
<tr>
<td>Reduced vs. Full</td>
<td>0.330</td>
<td>0.173</td>
</tr>
<tr>
<td>Urbanicity</td>
<td>0.684</td>
<td>0.454</td>
</tr>
<tr>
<td>Nursing Home Stay</td>
<td>0.604</td>
<td>0.218</td>
</tr>
<tr>
<td>Medicaid HMO Coverage</td>
<td>1.376</td>
<td>0.890</td>
</tr>
<tr>
<td>Private Insurance Coverage</td>
<td>1.576</td>
<td>0.576</td>
</tr>
</tbody>
</table>
Usual Source of Care

Logistic regression was also performed to examine if state NP practice regulation affected the odds of whether or not a participant reported having a usual source of care. Urbanicity, nursing home stay, Medicaid HMO coverage, private insurance coverage were included as covariates when performing the regression analysis. No significant difference was seen between the different levels of state NP regulation groups and usual source of care, \( \chi^2 (2, N = 1,496,251) = 1.17, p > .56 \). In order to examine if participants in non-metropolitan areas reported a difference in having a usual source of care, a chi-square test of independence was performed. In this particular sample of Medicare beneficiaries, a difference was not seen in participants having a usual source of care whether they lived in a metropolitan area or not, \( \chi^2 (1, N=3,053) = 1.13, p = .23 \).
CHAPTER 5
DISCUSSION

This study measured access to healthcare services based on Andersen’s Framework for the Measurement of Access to Medical Care (Aday & Andersen, 1974). The effects of health policy, which are operationalized by categorizing states into one of three levels of state NP practice regulation (restricted, reduced, full) as identified by the AANP (2013b), were examined with a variety of predictors of access. Andersen portrays utilization of health services in the framework as vital predictor of access to medical care, which is measured in the 2011 MCBS with the usual source of care variable, and characteristics of the healthcare delivery system as measured in the 2011 MCBS by the place for care variable.

Characteristics of the population at risk are also important predictors identified in Andersen’s framework, measured in the 2011 MCBS by the general health ranking as perceived by the Medicare beneficiary participant variable. Last, the consumer satisfaction predictor outlined in Andersen’s framework is represented in the 2011 MCBS in a number of variables related to why patients did or did not seek or delay seeking care.

Examining the impact of NP state regulation on access to healthcare services in the Medicare population through secondary data analysis of the MCBS Access to Care 2011 dataset resulted in some interesting findings that are supportive of expanded NP practice. Although the constructs of usual source of care and waiting time at the appointment to see the provider showed no statistical differences between states with different levels of NP practice laws, the amount of time it took to get an appointment and difficulty accessing care based on cost were significantly different between state NP practice law groups.
Difficulties Accessing Care

Health policy analysis has identified NPs as a cost-effective alternative to traditional physician care when barriers to practice are removed (Naylor & Kurtzman, 2010). This study supports findings that Medicare beneficiaries reported less trouble accessing care due to cost in states with Full NP practice; however, more research is needed to identify a correlation between cost-effectiveness and Full NP practice in this population. Fewer participants in Full NP Practice states reported delaying care because of cost. Although direct costs were not measured in this particular study, participant perception was that cost was a hindrance more often to seeking needed care in states where NPs practice under the supervision of a physician (Restricted) or with mandated collaboration with a physician due to state NP regulations (Reduced).

Appointment Waiting Times

Findings from the regression analysis examining the time it took to get an appointment with a provider were actually more favorable for Medicare beneficiaries in Restricted and Reduced NP practice states, than Full NP practice states. A variety of contributing factors may have played a role in this particular outcome, including the density of providers in population as discussed in Chapter 3. Future research would benefit from creating a predictor variable that represented the density of NPs in the population, as well as the overall density of primary care providers in the population. A significant effect was not seen in the regression analysis which examined the amount of time a participant spent waiting at an appointment to see a provider.
Usual Source of Care

In a secondary analysis of data collected in the Wisconsin Longitudinal Study, analyses were conducted to identify the population who uses NPs as their usual source of care (Everett, Schumacher, Wright, & Smith, 2009). Findings from the study (n=6803) showed that participants who were uninsured or had public insurance besides Medicare, and women and younger participants had higher odds of identifying NPs as a usual source of care. These findings support the results of this study examining the effects of NP practice regulation on usual source of care as a construct of access to healthcare services. If younger populations are utilizing the services of NPs as a usual source of care, and persons who are uninsured or on public assistance coverage are accessing care through NPs, findings from the Medicare population might not pose a completely accurate look at the benefits of NPs in improving access for this population.

Conclusion

It was originally hypothesized that Medicare beneficiaries living in states with Full NP Practice laws would have better access to care, which is measured by difficulties encountered when accessing care, appointment waiting times, and usual source of care. Although not all of these variables yielded statistically significant results, some important findings emerged. First, fewer Medicare beneficiaries who did not seek needed healthcare services due to cost were reported in Full NP Practice states than Restricted and Reduced NP Practice states. These findings suggest that Medicare beneficiaries in Restricted and Reduced NP Practice states experience difficulty accessing care due to cost more often than beneficiaries in Full NP Practice states. Current evidence supports NPs as cost-effective
providers of healthcare services (Chenoweth, Martin, Pankowski, & Raymond, 2008; Mehrotra et al., 2009; Roblin, Howard, Becker, Adams, & Roberts, 2004), and further research is needed to examine if NP state practice regulation has a direct impact on this variable. Second, Medicare beneficiaries in Full NP Practice states identified doctor’s offices and group practices as their choice for healthcare less often than beneficiaries in Restricted or Reduced NP Practice states, but identified HMOs as their choice for healthcare more often than beneficiaries in Restricted and Reduced NP Practice states. Trends show more and more HMOs credentialing nurse practitioners over time (Zimlich, 2012). Therefore, additional research on the number of NPs in HMOs in the Restricted, Reduced, and Full NP Practice states is needed to better understand usual source of care sites and preferences. Given these findings, several limitations exist to this study and recommendations for future research are presented in the following sections.

Limitations

Limitations of this study include lack of control over the primary data collection. There were a great deal of missing data in this particular dataset for several variables of interest when measuring access. For example, for the main variable of usual source of care, only 3,031 participants answered this question, accounting for only 20.17% of the sample. Another limitation of this study was the lack of a variable that specifically addresses NPs as providers of care. Inclusion of NPs in this database will only add to the completeness of the assessment of access in the Medicare population. The vocabulary used in the MCBS when referring to provider or when discussing usual source of care is doctor, and should be modified to include nurse practitioners and other providers such as physician assistants. It is
suggested to remove “doctor” and replace it with a more general term such as “provider”, and for nurse-managed clinics and retail clinics to be included in the item measuring the place where beneficiaries go to receive care in order to best reflect current healthcare delivery models for usual source of care.

**Recommendations for Future Research**

The first recommendation for future research is a pre-post study using a quasi-experimental design to observe the impact of health policy change in a state where NP practice laws have been changed and full NP practice has allowed for autonomous practice. This observational health policy research method is frequently used when evaluating the effect of policy change in a population on health outcomes (Ross & Gross, 2009). Recent changes in health policy related to NP practice at the state level include state regulatory changes for Nevada (2013b), and the recent signing of new regulation for NPs in Kentucky that eliminates the need for a collaborating physician when prescribing non-controlled substances after four years of professional practice (Richardson & Sebastian, 2014). Access variables can be measured prior to the change, as well as after the change to determine if health policy change has an effect on access to healthcare services. Additional research should specifically examine NPs as a usual source of care, and the effect of NP care on access. Access to care based on NP state practice laws should also be studied in other populations (Medicaid, HMOs, MCOs, uninsured). Findings from this study will be presented to the research team involved in primary data collection for the MCBS through Medicare in order to advocate for NP inclusion as a distinctive category for the measurement of usual source of care.
Implications for Practice

As leaders of health policy change in a time of rapid and significant healthcare reform in the United States, NPs can use health policy research that supports the benefits of full NP practice in order to advocate for patients and influence change. NPs provide quality, cost-effective care across a variety of populations, and should be included in data collection, ongoing research, and health policy committees at the state and national levels. NPs play a role in reducing Medicare beneficiaries from delaying care due to cost, thus only enhancing the cost-effective value of NP practice. Research has confirmed that NPs provide quality care and that recipients of that care are satisfied. NPs must act as change agents and advocates not only for the profession, but also for the betterment of patient outcomes. Involvement in research examining access and other health outcomes measurements are important steps NPs can take in order to lead the way in health policy reform.
Appendix A: IRB Documentation Email

Study SS13-08 - NHSR: Impact of the Professional Regulation of Nurse Practitioners on Access to Healthcare Services

barreth@umkc.edu

To: Kelly, Patricia J.
Cc: Karruth, Rebekah; Christoff, Kayna K.; Coss, Summer R. (UMKC-Student)

April 11, 2013

Patricia J. Kelly, Ph.D.
UMKC School of Nursing
2464 Charlotte
Kansas City, MO

RE: SSIRB Protocol #: SS13-08 - NHSR: Impact of the Professional Regulation of Nurse Practitioners on Access to Healthcare Services

Dear Dr. Kelly,

Thank you for contacting the SSIRB about your proposed project. The SSIRB's subject matter jurisdiction is limited to human subjects research as defined in the Federal Policy for the Protection of Human Subjects - 45 CFR 46.102(d). "Research" is defined by these regulations as "a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge." The regulations define a "Human Subject" as "a living individual about whom an investigator (whether professional or student) conducting research obtains: data through intervention or interaction with the individual, or identifiable private information."

Based upon your description of your project it does not meet the criteria to be considered human subjects research and therefore the SSIRB has no authority to review it.

Please contact the administrative office of the SSIRB (email: umkcssirb@umkc.edu; phone: 816-235-5927) if you have questions.

Thank you,

SSIRB Administrative Office
Appendix B: Data User Agreement Email

Email:

To: Email

Subject: Data User Agreement

From: Email

Date: 12/13/2011

Dear [Name],

This is to inform you that CMS has approved your request to obtain CMS (MCIS) data for your research project entitled, "Impact of Nurse Practitioner Practice Regulation on Access to Healthcare Services." You need to submit your payment (8000) via the website [www.pay.gov](http://www.pay.gov). This website will provide directions to complete your transaction. You will need to access the CMS Data Payment for [https://www.pay.gov/forms/form/instance.html?AgencyFormID=25651662](https://www.pay.gov/forms/form/instance.html?AgencyFormID=25651662) to submit your payment for this request. At the end of the payment transaction, you will receive an Agency Tracking ID number. You need to provide this Agency Tracking ID number along with the control number 20131017_3194 and DUAS 25752 directly to Judith.Swierczek@CMS.HHS.gov.

This information is required to confirm your payment. If you have any questions concerning payment, please contact Judith.Swierczek@CMS.HHS.gov.

Attached is a copy of the html DUAS from our DUAS tracking system, a scanned copy of the completed DUAS will be sent in a separate email.

Please review the Centers for Medicare & Medicaid Services (CMS) DUAS Requirements which outlines your responsibilities in terms of safeguarding the confidentiality of CMS data. This DUAS approval is based on the understanding that personnel within your organization and any subcontracting organization's personnel will comply with all requirements of this DUAS. It is your responsibility to convey a copy of this DUAS and CMS DUAS Requirements to any such individuals and organizations. Note that this approval only applies to the request for the study tabulated in the DUAS. Any additional purpose will have to be reviewed and approved in writing by CMS.

New MCIS Access to Care Files 2011

Judy—please inform Joanne when the payment is confirmed. Thanks.

Joanne—Shipping information can be found in DAOSS.

Thank you,

Vivian Rogers

Division of Privacy Operations & Compliance | Privacy Policy Compliance Group | Office of E-Health Standards & Services | Centers for Medicare & Medicaid Services | 7500 Security Boulevard, Mailstop: N1:24.09, Office Location: N1:24.07, Baltimore, MD 21244-1870 Phone: (410) 786-8142 | Fax: (410) 786-5638 | E-mail: vivian.rogers@cms.hhs.gov Website: [http://www.cms.gov/privacy](http://www.cms.gov/privacy)
REFERENCES


66


VITA

Summer Cross was born on July 14, 1977, in Murray, KY. She was educated in the local public schools and graduated from Murray High School in 1996. She received her Bachelor of Science degree in Nursing (BSN) from Murray State University in 2000. Upon graduation she began working at the local community hospital on a medical/surgical/orthopedic floor as a Registered Nurse. In 2002, Mrs. Cross accepted the position of Executive Director of the local free medical, pharmacy, and dental clinic. She served in this role for five years.

In the fall of 2006, she continued her education by pursuing a Master of Science degree in Nursing (MSN) from Murray State University. Mrs. Cross graduated with her MSN in 2007. After graduation she accepted a position as a nurse practitioner in a gastroenterology practice in Paducah, KY. In the fall of 2009, Mrs. Cross accepted a teaching position in the School of Nursing at Murray State University where she continues to work today. She has taught a variety of courses at the BSN, MSN, and DNP levels. Her passion for nursing is shared with her students in both lecture and clinical rotations.

In 2010, she began the pursuit of her Ph.D. in Nursing at the University of Missouri-Kansas City, School of Nursing and Health Studies. Her passion and expertise is in the role of the nurse practitioner in health policy research. Mrs. Cross is an advocate for full nurse practitioner practice in promoting improved health outcomes and increasing access to healthcare services. Upon completion of degree requirements in the fall of 2014, Mrs. Cross will be promoted to assistant professor and be placed on tenure track at Murray State University. She continues to volunteer at the local free clinic and serves on the board of
directors for this charitable organization, and intends to be actively involved in health policy change at the state and national levels.