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Association Of Insurance And Provider Type With Patients' Perceived Cost And Ease Of Access To Healthcare Services Among Medicare Beneficiaries Diagnosed With Diabetes

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ASSOCIATION OF INSURANCE AND PROVIDER TYPE WITH PATIENTS' PERCEIVED COST AND EASE OF ACCESS TO HEALTHCARE SERVICES AMONG MEDICARE BENEFICIARIES DIAGNOSED WITH DIABETES

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DEDICATION

This dissertation is dedicated to each person who has been diagnosed with diabetes and will receive or has already received health care services as a Medicare beneficiary. Your lived experiences are sometimes understudied so this dissertation is designed to add scientific knowledge to the growing body of evidence used to improve the accessibility, availability, and quality of health care services provided to you, while simultaneously making those health care services affordable. All of which would result in a better quality of life.

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ABSTRACT

Medicare beneficiaries diagnosed with diabetes are likely to have health complications or episodes associated with diabetes, resulting in higher health care utilization and costs. Andersen's Health Care Utilization Behavior Model (HCBM) includes predisposing, enabling, and need factors, but it excludes perception. Ajzen's Theory of Planned Behavior (TPB) shows that perception influences health service use. This study was performed using a real-world model integrating Andersen's HCBM and Ajzen's TPB to determine whether there was an association between insurance type (Medicare Part D versus non-Part D) and perceived ease of access or cost among Medicare beneficiaries with diabetes. The second objective was to determine whether the receipt of care from primary care physicians was associated with greater perceived ease of access or better perceived cost when compared to non-primary care physicians.

This cross-sectional study examined Medicare beneficiaries diagnosed with diabetes using data from the Medicare Current Beneficiary Survey (MCBS) 2013 Access to Care (ATC) Public Use File (PUF). Perceived ease of access and perceived cost were identified as the dependent variables using factor analysis and explored as a sum of survey responses. Insurance type and provider type were the two independent variables. Covariates were age, sex, race, marital status, education, income, metro status, and health compared to past year. Multivariable linear regression models were used for analyzing the relationship between independent and dependent variables. This relationship was

examined in the unadjusted model, and the relationship was further examined in adjusted models which included the covariates or characteristics of Medicare beneficiaries. Study results showed a significant relationship between insurance type and perceived cost. There was a significant association between insurance type and perceived cost, and the significance of this relationship did not change when including characteristics of Medicare beneficiaries with diabetes. The unadjusted effect between insurance type (i.e., Part D vs. non-Part D) and perceived ease of access was significant. The significance of the association between insurance type and perceived ease of access did change when accounting for characteristics of diabetic beneficiaries. The relationship between provider type and perception of cost and the relationship between provider type and perceived ease of access were not significant when running the bivariate and multivariate analyses.

The results from this study showed Medicare beneficiaries diagnosed with diabetes overall do not perceive well the cost of self-administered prescriptions needed for regulation of blood sugar levels. Diabetic beneficiaries have evaluation and management visits with their health care providers, but often feel incapable of getting the antidiabetic drugs (OADs) and/or insulin they need to self-manage diabetes due to perceptions of costs and ease of access afforded by insurance, specifically Part D coverage. Often, these perceptions result in preventable emergency department (ED) visits and hospitalizations as well as more unaffordable health care costs. This becomes important for policymakers, health care providers, and public health professionals to assist this population with getting timely appropriate care by developing policies that improve perception of access and cost.

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CHAPTER 1

INTRODUCTION

Diabetes is a prevalent chronic disease among the United States (US) population. Not only is the disease prevalent, but there are sub-populations in the US experiencing a higher rate of incidence, particularly individuals aged 45-64 (Centers for Disease Control and Prevention [CDC], 2011). These individuals will soon become Medicare beneficiaries along with the millions of seniors and disabled who are already enrolled. Older adults will comprise 20% of the population in the United States by 2030 (Chalé, Unanski, & Liang, 2012). With the impending increase in the older adult population, the United States is unprepared to handle the accompanying social and economic impact of growing rates of age-related diseases such as diabetes (Chalé et al., 2012).

Medicare provides insurance for individuals including seniors aged 65 or older with diabetes, and it has four parts. Medicare Parts A and B together are known as Traditional, Original, or Fee-for-Service (FFS) Medicare. Medicare Part A (Hospital Insurance) covers the outpatient services that Medicare beneficiaries may need. Medicare also provides coverage options for diabetes-related preventive services which are recommended to delay or to avoid diabetes complications (Pu & Chewning, 2013). Medicare Part B (Medical Insurance) covers 2 diabetes screenings each year for persons aged 65 or older (Centers for Medicare & Medicaid Services [CMS], 2016b). Those screenings are at no charge to the patient with Original Medicare and include lab tests for hypertension, dyslipidemia, obesity, and/or glucose (CMS, 2016b). Part B also covers

outpatient diabetes self-management training (DSMT), which includes up to 10 hours of initial DSMT (1 hour of individual training and 9 hours of group training) as well as the possibility of qualifying for up to 2 hours of follow up training each year (CMS, 2016b). DSMT is for certain people who are at risk for complications from diabetes (CMS, 2016b). Finally, Part B covers medical nutrition therapy (MNT) and hemoglobin A1c tests for Medicare beneficiaries who have diabetes (CMS, 2016b). These services require a doctor's order or referral (CMS, 2016b). In contrast, foot exams and eye exams do not require a doctor's order or referral (CMS, 2016b).

Medicare Part C (Medicare Advantage) refers to Medicare-approved private health insurance plans. It consists of both Part A and Part B benefits and may include prescription drug coverage. Medicare Advantage plans can be a coordinated care plan such as a health maintenance organization (HMO) in which enrollees choose a primary care physician who refers them to doctors or specialists, or a self-coordinated plan such as a preferred provider organization (PPO) in which the enrollee coordinates his or her care and sees a doctor or specialist without a referral. Costs of these options vary by the type of plan purchased and the services used. (CMS, 2016b)

The alternative to any of these private plan options is Medicare FFS, which was described earlier. Persons with Medicare FFS can use any doctor or hospital who agrees to accept the Medicare assigned fees for their services. Medicare FFS allows physicians and hospitals to charge specific fees for specific services. There is no incentive in the FFS system to hold down costs, manage care, or provide preventive care or care management services to beneficiaries. Medicare managed care plans in contrast are paid a set amount per person insured, per year, and are motivated to hold down costs so that, on average,

they do not lose money. Medicare managed care plans provide preventive care and disease management services to their beneficiaries, to keep them healthier and reduce their expenditures. (Mobley, Root, Anselin, Lozano-Gracia, & Koschinsky, 2006)

Medicare Part D (Medicare prescription drug coverage), which requires enrollees to have Part A and/or B and live in a service area of Medicare Part D, has special provisions for Medicare beneficiaries who have diabetes. Medicare Part D covers anti-diabetic drugs (CMS, 2016b). Medicare Part D also covers specific insulins (e.g., injectable insulin, inhaled insulin, etc.) and the supplies needed for administering the insulins (CMS, 2016b).

In 2017, more than 42 million Medicare beneficiaries were enrolled in Medicare Part D plans, including employer-only group plans. Of this total, 6 in 10 (60%) were enrolled in stand-alone prescription drug plans (PDPs) and 4 in 10 (40%) were enrolled in Medicare Advantage drug plans. Around 2 million other beneficiaries in 2017 had drug coverage through employer-sponsored retiree plans. Several million beneficiaries were estimated to have other sources of drug coverage, including employer plans for active workers, Federal Employee and Retiree Health Benefits (FEHBP), TRICARE (military health care services), and Veterans Affairs (VA). (Kaiser Family Foundation, 2017)

Multiple studies have been conducted to explore the role of insurance or other factors in Medicare beneficiaries with diabetes getting or receiving care. Researchers have examined the relationship between health outcomes and individual characteristics such as having insurance (Casagrande & Cowie, 2012; Akinyemiju, Sakhuja, & Vin-Raviv, 2016; Polonsky & Henry, 2016; Semilla, Chen, & Dall, 2015; Li et al., 2013), having insurance coverage for timely and appropriate care (Xu, Abraham, Marmor,

Knutson, & Virnig, 2016; Hu, Shi, Rane, Zhu, & Chen, 2014; Hellander, 2015; Cheung, Wiler, Lowe, & Ginde, 2012), and having a usual source of care (Callahan & Cooper, 2006; Rust et al., 2008). Researchers also have studied the relationship between health outcomes and health system factors such as physician availability (Gindi, Kirzinger, & Cohen, 2013) and provider type (Everett et al., 2013; Raji, M.Y., Chen, Raji, M., & Kuo, 2016; Sloan, Feinglos, & Grossman, 2010).

There are also studies examining the relationship between provider perception and patient behavior. For example, researchers have examined provider perception of patient barriers (Crosson et al., 2010) or his or her own barriers when implementing evidence-based guidelines (Appiah et al., 2013); or differences among provider types in terms of patients' health service use (Lyons, Helgeson, Witchel, Becker, & Korytkowski, 2015; Chin, Zhang, & Merrell, 2000; Rosenblatt et al., 2001). However, few studies have examined the relationship between patient perception and enabling factors such as insurance or financial resources (Nam, Chesla, Stotts, Kroon, & Janson, 2011; Moore et al., 2013; Cohen & Villarroel, 2015; Ward, 2017), or health system factors such as primary care provider type (Everett et al., 2013; Raji et al., 2016) or physician type providing care to patients with diabetes (Sloan et al., 2010).

Also, how diabetic beneficiaries perceive their ease or difficulty of performing a specific behavior has been studied within the context of medication adherence (Rich, Brandes, Mullan, & Hagger, 2015; Wu, Corley, Lennie, & Moser, 2012; Fai, Anderson, & Ferreros, 2017; Zomahoun et al., 2016; Lewis, Askie, Randleman, & Shelton-Dunston, 2010), physical activity (Blue, 2007; Ferreira & Pereira, 2017; Hardeman, Kinmonth, Michie, & Sutton, 2009, 2011; Plotnikoff, Lippke, Courneya, Birkett, & Sigal, 2010), and

diet (Blue, 2007; Gellert et al., 2015; Watanabe, Berry, Willows, & Bell, 2015). Perception is an individual's belief about the presence of factors which may facilitate or impede performance of a behavior (Ajzen, 2006). Perceived behavioral control expounds on perception by considering an individual's belief about factors that he or she cannot control (Akbar et al., 2015). For our study, perceived behavioral control is reflected in satisfaction levels when accessing or paying for health care services as diabetic beneficiaries have no control over coverages within insurance plans or services provided during doctors' visits. According to Jacelon (2007), perceived behavioral control is instrumental for effective disease self-management and important for well-being in older adults. Therefore, this study focused on Medicare beneficiaries diagnosed with diabetes, examining the relationship between Medicare insurance type (i.e., Part D vs. non-Part D) and perceived cost or ease of access as well as the relationship between provider type (primary care physician vs. non-primary care physician) and perceived cost or ease of access.

1.1 BACKGROUND OF STUDY

Diabetes is the seventh leading cause of death in the United States (CDC, 2011). It is also a major cause of heart disease, stroke, kidney failure, non-traumatic lower-limb amputations, and new cases of blindness (CDC, 2011). Diabetes increases the risk of heart attack by 1.8 times, and it increases the all-cause mortality rate 1.8 times (ODPHP, 2016).

In addition to these negative health outcomes, the number of adults living worldwide with diabetes has almost quadrupled since 1980, from 108 million to 422 million adults in 2014; therefore, the World Health Organization sponsored the World

Health Day in 2016 and issued a call for action on diabetes (World Health Organization [WHO], 2016). The estimated number of new cases of diabetes by age group in the U.S. in 2010 shows that people aged 45-64 had 1.1 million new cases, while the 64+ age group had 390,000 and the 20-44 age group had 465,000 (CDC, 2011). In 2012, diabetes caused 1.5 million deaths, and high blood glucose caused another 2.2 million deaths (WHO, 2016). The Centers for Medicare & Medicaid Services (CMS) conducted a trend analysis in which the proportion of Medicare population being treated for diabetes increased by almost 6 percent during the 2003-2012 period, and based on this trend, Medicare could be serving 14.6 million diabetics by 2034 (Better Medicare Alliance, 2015; Huang, Basu, O'Grady, & Capretta, 2009). These facts reveal that not only is the population aging, but also getting sicker and dying prematurely.

The costs associated with diabetes are increasing. For example, the 2007 costs were estimated to total $174 billion which included both direct ($116 billion) and indirect ($58 billion) costs (American Diabetes Association [ADA], 2008). However, the total estimated cost in 2012 was $245 billion, including $176 billion in direct medical costs and $69 billion in reduced productivity (ADA, 2013; Office of Disease Prevention and Health Promotion, 2016). As of 2017, the American Diabetes Association estimated the costs for diabetes-related health care had risen to $327 billion, including $237 billion in direct medical costs and $90 billion in reduced productivity (ADA, 2018). The change in costs from 2007 to 2012 reflect a 41% increase while the change in costs from 2012 to 2017 reflect a 26% increase, giving us a reason for a call to action. Indirect costs include disability, loss of work, and premature mortality while direct costs include medical expenditures such as hospital inpatient care, prescription medications for diabetes

treatment, and physician office visits (Ortman, Velkoff, & Hogan, 2014; ADA, 2013; Seuring, Archangelidi, & Suhrcke, 2015).

Diabetes-related health outcomes depend on a diverse set of factors that lie at multiple levels—individual, interpersonal/social, community, environment, etc. Using the 2013 Medicare Current Beneficiary Survey (MCBS) Access to Care (ATC) data, the proposed study focused on the individual level factors found within the health system. Diabetes is a largely self-managed disease (Snoek et al., 2002). Therefore, the Medicare beneficiary with diabetes must adhere to treatments and/or engage in self-management or self-care behavior to experience better health outcomes. Delamater (2006) found that patients adhere well when the treatment regimen makes sense to them, when they believe the benefits exceed the costs, and when they feel that they have the ability to succeed at the regimen. Ultimately, perceived benefits or perceived barriers impact clinical outcomes (Day, 2000). Since the utilization of appropriate health services is often used as a proxy for health outcomes, the health service use behavior for this study was defined as medication adherence.

There are factors that influence the decision to use health services (Rust et al., 2008) or self-manage (Nam et al., 2011). These include perception of cost and perception of access. Individuals' perception of the health system may be influenced by resources they possess or can access (e.g., finances, insurance, providers available, services available at location, insurance coverage provisions, etc.). Furthermore, Snoek (2002) reiterates the impact of perceived barriers by stating that financial barriers and difficulty with access to health care influence peoples' self-care behaviors.

Medicare beneficiaries have lived experiences of being able to pay for and access health care. Therefore, they are best equipped to share their perception of how costly or easily accessible health care services are, based on either the Medicare insurance coverage they have or the health care provider they use. Thus, we will investigate two relationships: the relationship between insurance type and perceived cost and perceived ease of access and the relationship between provider type and perceived cost and perceived ease of access.

1.2 IMPORTANCE OF STUDY

Medicare beneficiaries are a population of interest because they experience high rates of chronic conditions, comorbidities, and mortality as well as high health care costs—all of which are increasing as they age (CDC, 2011; Virnig, Shippee, O'Donnell, Zeglin, & Parashuram, 2014; Escalada, Liao, Pan, Wang, & Bala, 2016; Hyland et al., 2016). Medicare beneficiaries have health insurance, making this population ideal for study. Though they have insurance, Medicare beneficiaries don't always get timely, appropriate care, resulting in poor health status or outcomes as well as high health care costs (Polonsky, Peters, & Hessler, 2016; Beatty & Dhont, 2001; Ng et al., 2010; Fonseca, Chou, Chung, & Gerrits, 2017; Lipska et al., 2014). Facilitating the provision of timely, appropriate care for diabetic beneficiaries will prevent costly emergency department visits and hospitalizations for conditions that are preventable.

Not getting timely, appropriate care may be attributed in part to Medicare beneficiaries' thoughts or perceptions about cost or access to care. According to the Theory of Planned Behavior (TPB), these perceptions can influence health behavior, which is often measured by health service use when applying Andersen's Health Care

Utilization Behavior Model (HCBM) (Ajzen, 2002; Madden, Ellen, & Ajzen, 1992; Glanz, Rimer, & Viswanath, 2008; Pu et al., 2013; Andersen, 1995). Therefore, we integrated both models to form a conceptual framework for this proposed study.

Andersen's HCBM proposes that health behaviors are influenced by individual characteristics (Gucciardi, DeMelo, Offenheim, & Stewart, 2008). It is important to identify factors on the individual level that can influence perceptions regarding cost and ease of access. Identifying the factors will help policymakers, health care providers, and public health professionals work to develop policies, guidelines, or interventions, respectively to address the increasing costs and untimely access of diabetes-related care among Medicare beneficiaries.

In addition, patient care is evolving as the health care system considers and adapts to many factors that influence how health care organizations organize, finance, and deliver health care services. In the past, patient care had been primarily researched from the perspective of either the health care system or provider. However, health initiatives and agencies such as Healthy People 2020 Leading Health Indicators (LHI) and Patient-Centered Outcomes Research Institute (PCORI) have been agents of a paradigm shift as they emphasize the importance of population health and patient-centered care, respectively. This paradigm shift may be attributed to the realization that the population is aging; chronic diseases and health care costs are steadily rising; and a concerted effort involving patient participation in the health care process is required for the health care system's or provider's impact on health outcomes to be evident to all stakeholders involved in the delivery of health care services. As such, there are many studies on health care access, cost, and quality for Medicare beneficiaries with chronic conditions such as

cancer, depression, hypertension, and diabetes. However, few studies have examined the perception of health care access, cost, and quality among Medicare beneficiaries.

1.3 RESEARCH QUESTIONS

Researchers have found that there are differences in health outcomes among patients with diabetes or other chronic conditions when comparing public and private insurance (Cohen et al., 2015; Patel, Caldwell, Song, & Wheeler, 2014; Dall et al., 2016; Master, Munker, Shi, Z., Mills, & Shi, R., 2016; Akinyemiju et al., 2016; Rice et al., 2014; Xu et al., 2016; Gindi et al., 2013). Within public insurance, however, there are two sources, Medicaid and Medicare. Medicare is a source which has 4 different parts in which each part has different provisions. Is there an association between Medicare insurance type, specifically having Part D versus not having Part D, and perceived cost or perceived ease of access? Furthermore, studies reveal that having a regular source of care or primary care physician lead to better health outcomes (Chang, Stukel, Flood, & Goodman, 2011; Rust et al., 2008). Does this hold true for Medicare beneficiaries with diabetes? Is there an association between provider type (i.e., receiving care from a primary care physician versus other physicians) and perceived cost or perceived ease of access?

1.4 STUDY OBJECTIVES

Given all Medicare beneficiaries with diabetes have health insurance coverage and financial access to health care providers, they are an ideal population for studying perceived cost and ease of access to care. Therefore, the concepts identified in the conceptual model will be used to address two objectives. The first objective is to determine whether there is an association between insurance type and perceived cost or

between insurance type and perceived ease of access among Medicare beneficiaries diagnosed with diabetes. The second objective is to determine whether receipt of care from primary care physicians is associated with better perceived cost or greater perceived ease of access among Medicare beneficiaries with diabetes when compared to non-primary care physicians.

CHAPTER 2

LITERATURE REVIEW

2.1 CONCEPTUAL FRAMEWORK

This literature review was conducted using a conceptual framework and identifying research that was relevant to the conceptual framework and hypotheses. Several conceptual models were considered, and two were chosen to create a theoretical framework that will guide our study: Andersen's Health Care Utilization Behavioral Model (HCBM) and Ajzen's Theory of Planned Behavior (TPB). Both conceptual models have been used in studies related to diabetes. Andersen's HCBM has been used in studies assessing key concepts consisting of environmental characteristics (health system and external environment), population characteristics (predisposing, enabling, and need), health behavior (personal practices and health service use), and outcomes (Babitsch, Gohl, & von Lengerke, 2012; Choi et al., 2011; Peyrot & Rubin, 2007; Egede & Osborn, 2010). This model suggests that health behaviors are influenced by individual characteristics that can be divided into the following categories: predisposing, enabling, and need factors. The predisposing factors are existing conditions which include psychosocial factors such as attitudes and beliefs, a very important concept discussed in this study (Gucciardi et al., 2008; Babitsch et al., 2012; Cubanski & Neuman, 2010). The enabling factors include personal, family, and community resources that can either facilitate or impede the use of services (Gucciardi et al., 2008; Babitsch et al., 2012; Cubanski, 2010). Need factors refer to conditions perceived by individuals or evaluated

by health care providers as requiring medical treatment or the use of health services (Gucciardi et al., 2008; Babitsch et al., 2012; Cubanski, 2010).

Just as patients and providers view health care needs differently, researchers conceptualize perception differently, resulting in various models capturing multiple facets of perception. For example, the Health Belief Model relates socio-psychologic theory of decision making to individual health-related behaviors and includes four dimensions (perceived susceptibility, perceived severity, perceived benefits, and perceived costs) (Harrison, Mullen, Green, 1992; Joseph, Burke, Tuason, Barker, & Pasick, 2009). This model demonstrates that individuals adopt and practice positive health behaviors if they perceive a negative health outcome to be severe, perceive themselves to be susceptible to it, perceive the benefits to behaviors that reduce the likelihood of that outcome to be high, and perceive the barriers to adopting those behaviors to be low (Carpenter, Fisher, & Greene, 2010). The Theory of Reasoned Action (TRA) includes attitudes, beliefs, and subjective norms as concepts influencing health behavior, when there is volitional control.

Ajzen and colleagues believed behavioral performance was determined jointly by motivation (intention) and ability (behavioral control), so Ajzen and colleagues added perceived behavioral control as a precursor to behavioral intentions by extending the Theory of Reasoned Action (TRA) model to form the Theory of Planned Behavior (TPB) (Jung, Shin, Kim, Hermann, & Bice, 2017; Glanz et al., 2008; Madden et al., 1992). The TPB model presents ability by accounting for factors outside individual control that may affect intentions and behaviors, and one factor includes a person's beliefs regarding possessing the requisite resources and opportunities for performing a specific behavior

(Glanz et al., 2008; Madden et al., 1992). Therefore, the TPB model includes the following constructs: attitude toward the behavior (outcome expectations and value of outcome expectations); subjective norms (beliefs of others and desire to comply with others); and perceived behavioral control (over opportunities, resources, and skills needed to perform a behavior) (Ajzen, 2002; Munro, Lewin, Swart, & Volmink, 2007). Several quantitative studies assessing the relationship between these TPB constructs and behaviors such as diet (Blue, 2007; Gellert et al., 2015; Watanabe et al, 2015), physical activity (Blue, 2007; Ferreira et al., 2017; Hardeman et al., 2009, 2011; Plotnikoff et al., 2010), and medication adherence (Rich et al., 2015; Wu et al., 2012; Fai et al., 2017; Zomahoun et al., 2016; Lewis et al., 2010) have been conducted.

The TPB model should not be used alone because there are contextual factors such as the physical, social, or economic environment that may facilitate or hinder health service use behavior. Also, access models need to reflect real world processes for creation of better health policies (Ricketts & Goldsmith, 2005). The conceptual framework for our study integrates the thought process of decision making with contextual factors found to be associated with health service use (Figure 2.1).

We are using the integrated conceptual framework based on Andersen's and Ajzen's models because of our theory. Our theory suggests that Medicare beneficiaries diagnosed with diabetes develop thoughts or perceptions of their ability to access the health care system with ease and at a feasible cost, and these perceptions are linked to the type of Medicare insurance used and type of provider seen. Following Andersen's model, the conceptual framework will include the characteristics of the Medicare beneficiaries who were diagnosed with diabetes. The predisposing factors include age, sex, race,

education, and marital status. The enabling factors include income, metro status, and Medicare insurance type which has Parts A, B, C, and D, but only having Part D versus not having Part D will be compared since many Medicare beneficiaries with diabetes require prescribed medications or insulin at some point during their experience with the health care system. The need factor is based on the diagnosis of diabetes, perceived health need, and recommended health care for beneficiaries with diabetes. The recommended health care includes medicines, insulin, and/or blood work.

Integrating Ajzen's TPB model with Andersen's HCBM, the thoughts or perceptions of Medicare beneficiaries with diabetes are captured in the construct of perceived behavioral control. Since Medicare beneficiaries have very little or no volitional control over the coverages included in Medicare insurance and primary care physician access, then perceived behavioral control is worth examining for its relationship with insurance and provider type. Furthermore, TPB constructs including behavioral control have been found to be significantly correlated with and/or predictive of intentions in several studies (Muzaffar, Chapman-Novakofski, Castelli, & Scherer, 2014; Zomahoun et al., 2016; Akbar et al., 2015). Also, researchers found that prediction models containing attitudes, subjective norms, and perceived behavioral control explained 33% or more of the variance to behavioral intention and 9% to adherence (Fai et al., 2017; Plotnikoff et al., 2010).

The concepts identified in the conceptual model will be used to address two objectives. The first objective is to determine whether there is an association between insurance type and perceived ease of access or cost among Medicare beneficiaries with diabetes. The second objective is to determine whether receipt of care from primary care

physicians is associated with greater perceived ease of access or better perceived cost among Medicare beneficiaries with diabetes when compared to non-primary care physicians.

2.2 LITERATURE REVIEW

When searching for relevant literature, keywords such as diabetes, Medicare beneficiaries, insurance, Medicare Parts A and B, Medicare Part D, primary care, primary care physician, specialist, cost, access, perceived access, and perceived costs were used to create several phrases that resulted in studies of interest. Those studies were then examined for relevance to the topic, using an outline of subtopics that would be covered. The subtopics of the literature review focusing on Medicare beneficiaries diagnosed with diabetes or other chronic diseases included the following: the prevalence and impact of diabetes; health care needs; predisposing characteristics of the population; enabling factors of health service use; economic/clinical consequences of health service use; factors that may deter beneficiaries from getting the appropriate care; and whether insurance and provider type have already been found to be associated with perceived cost or ease of access.

2.2.1 PREVALENCE & IMPACT OF DIABETES AMONG MEDICARE BENEFICIARIES

The Centers for Disease Control and Prevention estimated that 8.3% of all Americans were diagnosed with diabetes in 2011, and this number will likely continue to rise (Anderson, Powell, Campbell, & Taylor, 2014). As of 2012, nearly 10% of Americans had diabetes (Ferdinand & Nasser, 2015; Dall et al., 2016). From 1980 through 2014, the number of Americans with diagnosed diabetes has increased fourfold

(from 5.5 million to 22.0 million) (CDC, 2015). The increased prevalence of diabetes among Medicare beneficiaries now reflects the increased prevalence among the entire US population as the number of people diagnosed with diabetes, specifically type 1 (T1DM) or type 2 (T2DM) diabetes mellitus, has steadily increased for over four decades (CDC, 2016; Ferdinand et al., 2015) and continues to rise (Chung, Rascati, Lopez, Jokerst, & Garza, 2014). In 2011, about 25 percent of the Medicare fee-for-service population had diabetes, including approximately 14 percent with type 1, 85 percent with type 2 but without the use of insulin, and less than 1 percent with type 2 diabetes and with the use of insulin to manage their condition (Virnig et al., 2014). This observed prevalence increase may be attributed to improved survival and increased prevalence at age 65 (Akushevich et al., 2017; Lopez, Bailey, & Rupnow, 2015).

The increased prevalence has had consequential clinical and cost impacts for Medicare beneficiaries aged 65 and older with diabetes (Escalada et al., 2016; Fonseca et al., 2017) and the Medicare program (Chen et al., 2016). Type 2 diabetes, related comorbidities, and hypoglycemia are burdensome to the Medicare population because they result in significantly higher healthcare utilization and cost (Lopez et al., 2015; Fonseca et al., 2017). For example, Escalada et al. (2016) documented that hypoglycemia was associated with risk of hospitalization, substantially higher per-patient healthcare costs, and higher healthcare utilization costs when comparing the basal insulin or BI-initiation of Medicare Advantage (Medicare Part C) patients who were treated to those who were not treated. Other researchers substantiate Escalada et al.'s (2016) findings by noting that between 2007 and 2011, beneficiaries with type 2 diabetes who used insulin had the highest burden of comorbidity, hospitalization rates, and allowed payment,

followed by those with type 1 diabetes (Virnig et al., 2014), as poor glycemic control is correlated with higher prevalence of neurological complications, renal complications, and peripheral vascular disease (Dall et al., 2016).

Furthermore, diabetes is associated with substantial morbidity and mortality (Chung et al., 2014). For example, diabetes is a risk factor for cognitive changes (Schimming, Luo, Zhang, & Sano, 2016). Another example is that the prevalence of patients with concomitant heart failure (HF) and diabetes continues to increase with the general aging of the population (Dei Cas., 2015). In patients with chronic HF, prevalence of diabetes is 24% compared with 40% in those hospitalized with worsening HF (Dei Cas., 2015). Also, diabetes increases the incidence of foot ulcer admissions by 11-fold, accounting for more than 80% of all amputations and increasing hospital costs more than 10-fold from 2005 to 2010 (Hicks et al., 2016). Therefore, Medicare beneficiaries can be considered a medically complex group of patients with high comorbidity (Hyland et al., 2016).

In addition, people with diabetes are at approximately double the risk of premature death compared with those in the same age groups without the condition (Ferdinand et al., 2015). One reason for the increase in diabetes-related mortality is the increased prevalence (Akushevich et al., 2017). Therefore, we can safely argue that addressing factors that are drivers of the increased prevalence of diabetes among seniors will reduce diabetes-related mortality. Arguments can also be made that addressing factors related to increases in poor health outcomes, increased health care utilization, and higher costs among Medicare beneficiaries with diabetes warrant the attention of

policymakers and may reduce poor health outcomes, health care use, and costs among this group.

2.2.2 HEALTH CARE NEEDS FOR MEDICARE BENEFICIARIES DIAGNOSED WITH DIABETES

Diabetes mellitus, commonly referred to as diabetes, requires continuous medical care and patient self-management to prevent short-term complications and decrease the risk of long-term complications, which can result in substantial increases in the total economic burden of the disease (Menzin et al., 2010). Short-term complications may include hypoglycemic or hyperglycemic episodes, foot ulcers, or hospital admissions. Long-term complications may include nephropathy, neuropathy, amputation, or end-stage renal disease. Therefore, it has become more important to ensure these patients are effectively treated, especially since the number of individuals diagnosed with T2DM is on the rise (Anderson et al., 2014).

Fortunately, most beneficiaries with diabetes visit both primary care and specialty providers, have evaluation and management visits, and receive needed preventive care (Virnig et al., 2014). Also, screening practices in beneficiaries with diabetes improved from 2002 to 2011, with rising rates of foot exams, renal screening, hemoglobin A1c tests, and lipid profile tests (Hyland et al., 2016). Annual hemoglobin A1c testing is recommended for Medicare patients over the age of 65 diagnosed with diabetes (Goodney et al., 2016). Consistent annual hemoglobin A1c testing is associated with fewer adverse cardiovascular outcomes for this study sample (Goodney et al., 2016). Periodic hemoglobin A1c testing also affects hospital admissions, ED visits, or other health outcomes typically measured in studies. For example, Xu et al. (2016) found that

higher rates of receipt of HbA1c, low-density lipoprotein cholesterol, and retinal eye exam tests during the year were inversely related to average inpatient resource use for a national sample of Medicare fee-for-service beneficiaries in 1685 Hospital Service Areas.

As the use of preventive measures such as hemoglobin A1c monitoring has increased, researchers have had conflicting findings about health outcomes. For example, Newhall et al. (2016) did not find an association between preventive care and lower risk of lower extremity amputation though the risk of leg amputation among patients with diabetes has declined over the past decade. In contrast, Lipska et al. (2014) found that hospital admission rates for hypoglycemia exceed those of hyperglycemia for older or black Medicare beneficiaries despite the increased intensity of diabetes management over the past decade. Hyland et al. (2016) also found that diabetes-related emergency department visits increased though screening practices among beneficiaries with diabetes improved from 2002 to 2011.

In addition to preventive care services, providers recommend behavioral changes as a component of diabetes management or treatment; however, more patients are requiring medication therapy to help them reach their therapeutic goals (Anderson et al., 2014). The progressive nature of T2DM requires that most patients eventually start insulin therapy to achieve and maintain glycemic control though they are using single or multiple oral anti-diabetes drug therapies (OADs), suggesting significant improvements in clinical and economic outcomes—fewer hypoglycemic events and hospitalizations as well as lower inpatient costs offsetting increased drug costs (Levin, Zhou, Gill, & Wei, 2015). Stuart et al. (2011) substantiate that claim because they found that increased drug costs were offset by fewer dollars spent among Medicare beneficiaries with diabetes who

have higher adherence with renin-angiotensin-aldosterone system inhibitors (RAAS-Is) and statins. At the margin, Medicare savings exceed the cost of the drugs (Stuart et al., 2011).

Researchers assert that proactive management with early insulin initiation and intensification should be considered in people with T2DM in inadequate glycemic control (Asche, Bode, Busk, & Nair, 2012). Studies further suggest that there are beneficial effects of early insulin initiation in older adults with T2DM who do not have adequate glycemic control, without increasing the risk of hypoglycemia or greater total direct healthcare costs (Bhattacharya, Zhou, Wei, Ajmera, & Sambamoorthi, 2015). In newly diagnosed type 2 diabetes patients with antidiabetic therapy, higher antidiabetic medication adherence was significantly associated with lower hospital inpatient utilization before and after adjusting for patient characteristics (Sun & Lian, 2016). Proper glycemic control and attainment of other nonglycemic management targets (e.g., blood pressure, lipids, and/or body weight) are essential to the prevention of long-term complications of diabetes and to the reduction of overall disease management costs (Stolar, Hoogwerf, Gorshow, Boyle, & Wales, 2008).

2.2.3 PREDISPOSING CHARACTERISTICS OF MEDICARE BENEFICIARIES DIAGNOSED WITH DIABETES

In an attempt to meet the health care needs of individuals with diabetes, many studies have examined the relationship between health outcomes and individual characteristics. Medicare beneficiaries, because of age, have a higher prevalence of type 2 diabetes, a disease which is diagnosed in adults while type 1 diabetes is often diagnosed in childhood. Hyland et al. (2016) found that the average age of Medicare beneficiaries

with diabetes was 76.5 years, 56% were women, and 83% were white. Ravel et al. (2015) also used a sample of Medicare beneficiaries with T2DM aged ≥ 65 years, and they found that of 202,496 elderly Medicare beneficiaries, 52% were female, 76% were white, the mean age was 75.8 years, and 13.2% had all-cause 30-day readmissions. Strawbridge, Lloyd, Meadow, Riley, and Howell (2015) found that the adjusted odds of any utilization were lower among men compared to women, older individuals compared with younger, non-whites compared with whites, people dually eligible for Medicare and Medicaid compared with nondual eligibles, and patients with comorbidities compared with individuals without those conditions, confirming He's (2011) finding that younger patients were associated with more effective preventive care services, and patients with diabetes when compared to people without diabetes were older and more likely to be non-white and covered by Medicare insurance.

More studies support the findings of previously mentioned researchers. For example, Lopez et al. (2015) used a sample of 1,913,477 Medicare beneficiaries of which 367,602 (19.2%) had T2DM. T2DM prevalence increased with age (Lopez et al., 2015). Even when using a sample of Medicare beneficiaries of the same age but with inadequately controlled T2DM, Ajmera et al. (2015) found that the management of type 2 diabetes mellitus (T2DM) is complicated by population heterogeneity and elderly-specific complexities, while Polonsky et al. (2016) found that older adults with type 1 diabetes or insulin-using type 2 diabetes are at high risk for severe hypoglycemic episodes.

Lopez et al. (2015) also found that T2DM was higher in blacks (26.4%) and Hispanics (25.5%) than in whites (18.0%). Ferdinand et al. (2015) substantiate Lopez et

al.'s (2015) claim by showing that while the prevalence of diabetes has risen across all racial/ethnic groups over the past 30 years, rates are higher in minority populations (Ferdinand et al., 2015). These higher rates often translate into poor health status or outcomes. For example, diagnosed hypertension and diabetic retinopathy were more common in blacks and Hispanics, and lipid metabolism disorders and atrial fibrillation were less common compared with whites (Lopez et al., 2015). In addition, hypoglycemia requiring health care services was more common in blacks (4.7%) and Hispanics (3.6%) compared with whites (2.9%) (Lopez et al., 2015).

2.2.4 ENABLING FACTORS OF MEDICARE BENEFICIARIES DIAGNOSED WITH DIABETES

Researchers have also investigated the relationship between outcomes and factors which enable patients to get care. Chung et al. (2014) noticed changes in diabetes-related hospitalizations and diabetes-related ED visits when patients used a clinical pharmacist. For an adult population aged 18-89 with a T1DM or T2DM diagnosis identified from electronic medical records at outpatient clinics in central Texas during the period of July 1, 2007 through July 1, 2011, the intervention group which used a clinical pharmacist had a decrease of 1 hospitalization (-1 visit per 220 patients, mean = -0.005, SD=0.278) compared to an increase of 8 hospitalizations for the control group, being a statistically significant difference (Chung et al., 2014). The intervention group had an increase of 4 ED visits (4 visits per 220 patients, mean = -0.018, SD=0.641) compared to the increase of 16 ED visits for the control group, being a difference that was not statistically significant (Chung et al., 2014). The favorable results from using a clinical pharmacist shows that medication adherence is important in managing diabetes. Polonsky et al.

(2016) state that poor medication adherence in T2DM is associated with inadequate glycemic control; increased morbidity and mortality; and increased costs of outpatient care, emergency room visits, hospitalization, and managing complications of diabetes.

Among patients diagnosed with either type 1 or type 2 diabetes and assigned to a primary care provider (PCP) in a clinic that was affiliated with a managed care organization (MCO), Menzin et al. (2010) found that higher mean A1c levels were associated with significantly higher estimated hospitalization costs among those with at least 1 hospitalization and with higher rates of diabetes-related hospital utilization per 100 patient-years. On the other hand, McBean and Yu (2007) found that while women with diabetes were less likely to have a mammogram, colorectal cancer screening, and bone density testing, they had had significantly higher rates of bone density testing when seen by endocrinologists than women seen by primary care physicians. Furthermore, Medicare beneficiaries with type 2 diabetes using insulin had the lowest rates of receipt of preventive care (Virnig et al., 2014). Therefore, physicians treating Medicare beneficiaries including elderly women with diabetes need to make sure patients are receiving recommended preventive services (McBean et al., 2007). A more recent study by Chung et al. (2015) also shows that the annual use of preventive visits for Medicare fee-for-service beneficiaries rose from 1.4 percent before the implementation of the Affordable Care Act (ACA) to 27.5 percent afterward, but the annual preventive visit use rates among this population remained 10-20 percentage points lower than the rates for people with private or Medicare HMO coverage. Results like these were expected for people with diabetes under the ACA which was designed to improve healthcare coverage and access (Burge & Schade, 2014).

2.3 COST AND HEALTH SERVICE USE RESULTING FROM DIABETES: ECONOMIC AND CLINICAL OUTCOMES

Since Medicare beneficiaries with diabetes experience a ripple effect among economic/clinical outcomes, health service utilization among them is high, frequent, and costly. Thus, many researchers have examined outcomes such as glycemic levels, diabetes-related hospitalizations or ED visits, hospital costs, diabetic foot ulcers, or amputations. For example, patients with poor glycemic control averaged $4,860 higher average annual health care expenditures, ranging from $6,680 for commercially insured patients to $4,360 for Medicaid and $3,430 for Medicare patients (Dall et al., 2016). For the healthcare system, the costs for hypoglycemic episodes can be high at baseline and during follow-up. Fonseca et al. (2017) proves this with results from a sample of patients who had hypoglycemia compared with those who did not have hypoglycemia. For the hypoglycemic group, the mean cost per episode was $986; hypoglycemia-related medical expenses accounted for 12.6% ($4563/$36,272) of total healthcare expenditure; and hypoglycemia-related hospitalizations accounted for 19.7% ($2602/$13,191) of total hospitalization expenditure (Fonseca et al., 2017).

In addition, Hicks et al. (2014) used a Nationwide Inpatient Sample (2005-2010) of 336,641 patients who were admitted to the hospital with a primary diagnosis of diabetic foot ulceration (mean age 62.9± 0.1 years, 59% male, 61% white race). The annual cumulative cost for inpatient treatment of diabetic foot ulcers increased significantly from 2005 to 2010 ($578,364,261 vs $790,017,704; $p< .001$) (Hicks et al., 2014). More patients were hospitalized (128.6 vs 152.8 per 100,000 hospitalizations; $p< .001$), and the mean adjusted cost per patient hospitalization increased significantly over

time ($11,483 vs $13,258; p< .001) (Hicks et al., 2014). Rice at al. (2014) support these findings when using a random sample of Medicare beneficiaries aged 65+ years (Standard Analytical Files, January 2007-December 2010), showing that diabetic foot ulcers (DFUs) impose substantial burden on public (aged 65+) and private (aged 18+) payers with a cost ranging $9-13 billion in addition to the costs associated with diabetes itself.

Furthermore, Driver, Fabbi, Lavery, and Gibbons (2010) did a comparison between diabetic patients without foot ulcers and those with foot ulcers. Compared with diabetic patients without foot ulcers, the cost of care for patients with a foot ulcer is 5.4 times higher in the year after the first ulcer episode and 2.8 times higher in the second year (Driver et al., 2010). Patients with diabetic foot ulcers require more frequent emergency department visits, are more commonly admitted to the hospital, and require longer length of stays (Driver et al., 2010).

Using the National Emergency Department Sample (NEDS) discharge records of ED cases among persons ≥18 years with any-listed diagnosis of diabetic foot ulcers (DFUs), Skrepnek, Mills, and Armstrong (2015) identified 1,019,861 cases of diabetic foot complications presented to EDs in the US from 2006-2010, comprising 1.9% of the 54.2 million total diabetes cases. The mean patient age was 62.5 years and 59.4% were men. The national cost was $1.9 billion per year in the ED and $8.78 billion per year (US$ 2014) including inpatient charges among the 81.2% of cases that were admitted (Skrepnek et al., 2015). Clinical outcomes included mortality in 2.0%, sepsis in 9.6% of cases and amputation in 10.5% (major-minor amputation ratio of 0.46) (Skrepnek et al., 2015).

2.4 HIGH COSTS MAY DETER MEDICARE BENEFICIARIES DIAGNOSED WITH DIABETES FROM GETTING CARE

Implemented in 2006, Medicare Part D provided coverage for prescription drugs to all 43 million Medicare beneficiaries (Li et al., 2013). Part D enrollees who previously lacked coverage or had Medigap coverage were particularly advantaged by Part D, as evidenced by significantly increased prescription use, lower out-of-pocket spending, and lower non-adherence (Safran et al., 2010). Introduction of Part D coverage was also associated with a substantial reduction in the financial burden of Medicare beneficiaries with diabetes and their families (Li et al., 2013). Li et al. (2013) found that there was a 28% ($530) decrease in individual annual out-of-pocket expenditure (OOPE) for prescription drugs, a 23% ($560) reduction in individual OOPE for all health care, a 23% ($863) reduction in family OOPE for all health care, and a 24% reduction in the percentage of families with high financial burden in 2006. By 2008, the percentage of Medicare beneficiaries with diabetes living in high financial burden families was 37% lower than it would have been had Part D not been in place (Li et al., 2013).

Once Medicare beneficiaries reach the donut hole or coverage gap, the ability to purchase prescribed medications is compromised. Zhang, Baik, and Lave (2013) determined that relative to the comparison group which had full coverage in the gap, beneficiaries without drug coverage in the gap reduced the number of prescriptions filled per month by 16.0% (95% confidence interval [CI], 15.5%-16.5%); those with generic drug coverage in the gap reduced it by 10.8% (95% CI, 10.3%-11.4%). These results confirm Polinski, Kilabuk, Schneeweiss, Brennan, and Shrank's (2010) findings of patients entering the coverage gap being associated with a 9% to 16% decrease in drug

use. Nair et al. (2011) corroborates the direction of the shift in brand-name (decrease) and generic medication (increase) for Medicare beneficiaries who were in a managed care plan (Part C) and experienced a gap. Furthermore, patients <65 years and those with diabetes were more likely to reach the gap sooner as compared to older beneficiaries (aged 65 to 74) and those without diabetes (Nair et al., 2011). For Medicare beneficiaries who reached the coverage gap while in a managed care plan, there was a 60.7 percent increase in out-of-pocket expenditures (Nair et al., 2011) and up to an 89% increase in costs (Polinski, Kilabuk, Schneeweiss, Brennan, & Shrank, 2010).

2.5 PERCEIVED COSTS MAY INTERFERE WITH GETTING APPROPRIATE CARE

Patients' costs when using insurance coverage do matter. However, more studies focus on actual costs and health outcomes. For example, Doucette et al. (2013) examined factors that were important for Medicare beneficiaries when deciding to get a comprehensive medical review (CMR) and found that "knowing the out-of-pocket cost" was in the list of most important when deciding to get a CMR. Xie, Agiro, Bowman, and DeVries (2017) also found that there was a statistically significant association between out of pocket cost for testing strips and continued blood glucose self-monitoring for diabetic patients using insulin. Studies that do examine patients' perceived cost use financial barriers, delay in receiving care, or unmet health care need due to cost to identify the relationship with health outcomes. Polonsky et al. (2016) identified poor medication adherence as being linked to perceived patient burden regarding obtaining and taking medications (e.g., treatment complexity, out-of-pocket costs, and hypoglycemia).

2.5.1 PERCEIVED COST AFFECTED BY INSURANCE

In an attempt to improve health outcomes, researchers have explored the relationship between outcomes and enabling factors such as having insurance (Casagrande et al., 2012; Akinyemiju et al., 2016; Polonsky et al., 2016; Semilla et al., 2015; Li et al., 2013); having insurance coverage for timely, appropriate care (Xu et al., 2016; Hu et al., 2014; Hellander, 2015; Cheung et al., 2012); or having a usual source of care (Callahan et al., 2006; Rust et al., 2008). However, patients' perception of their insurance is reflected implicitly in delayed receipt of care due to cost or financial barriers. Few studies consider patients' perception of cost explicitly. Furthermore, when perceived cost is discussed within context of insurance, studies make comparisons such as public and private insurance as well as Medicare Advantage and Traditional Medicare.

A study conducted on residents in Rhode Island showed that one-third of respondents delayed receiving care due to financial barriers (Moore et al., 2013). This decision resulted in a worsening condition or hospital visit for nearly half of those respondents (Moore et al., 2013). In 2015, the percentage of adults aged 18-64 who delayed or did not obtain needed medical care due to cost in the past 12 months was highest among those diagnosed with 2 or more of 10 selected chronic conditions (Ward, 2017). According to Lee and Khan (2016), there are reports that cancer survivors are delaying or avoiding necessary care due to costs. Their study found that cost-related medication non-adherence (CRN) was highest for the uninsured group and the lowest for Medicare beneficiaries, but sex differences persist for all insurance types, including Medicare; female cancer survivors were 27% more likely than male to report CRN (Lee et al., 2016). In addition to CRN, there is cost-related complementary and alternative

medicine (CAM) use which result from perceived cost issues. An estimated 12.3 million adults (5.4% of the population) used alternative therapies to save money in 2011 (Wang, Kennedy, & Wu, 2015). Cohen et al. (2015) discovered that among adults aged 65 and over, those covered by both Medicare and Medicaid were more likely to have not taken their medication as prescribed to save money.

2.5.2 PERCEIVED COST AFFECTED BY PROVDER TYPE

Many studies have examined the relationship between outcomes and health system factors such as physician availability (Gindi et al., 2013) and provider type (Everett et al., 2013; Raji et al., 2016; Sloan et al., 2010). However, those studies explored the concept of provider type within context of the primary care setting or in comparison of primary care physicians and specialists. Furthermore, actual cost instead of perceived cost is often studied, making the proposed study important for determining if there are different study results when using perceived cost compared to previous research using actual cost. There were no studies found exploring the relationship between perceived cost and provider type for Medicare beneficiaries diagnosed with diabetes.

2.6 DIFFICULT ACCESS MAY DETER MEDICARE BENEFICIARIES DIAGNOSED WITH DIABETES FROM GETTING APPROPRIATE CARE

Medicare beneficiaries diagnosed with diabetes must seek and obtain health care services regularly for maintenance of health, continuation of appropriate medication therapy, treatment options, and management strategies. Improved access to medication through Medicare Part D helps patients improve medication adherence as well as blood pressure, cholesterol, and blood glucose levels, which can then prevent or delay the onset of disease and the incidence of adverse health events, thus reducing mortality (Semilla et

al., 2015). Reductions in mortality have occurred because of fewer deaths associated with medication-sensitive conditions such as diabetes, congestive heart failure, stroke, and myocardial infarction (Semilla et al., 2015). In addition to reductions of mortality, Yashkin, Picone, and Sloan (2015) found reductions in congestive heart failure and/or acute myocardial infarction, stroke, and amputation, while rates of end-stage renal disease increased. Improvements in the management of precursor conditions in addition to regular contact with health professionals and utilization of recommended healthcare services were the primary causes of the change, not population composition (Yashkin et al., 2015).

Using a national representative sample from the 2007 National Ambulatory Medical Care Survey data, He (2011) found several predictors of diabetes preventive care services, including the availability of primary care physicians and on-site laboratory tests, are associated with more effective preventive care services. Furthermore, preventive care services were less likely if physician compensation relied on productivity, suggesting primary care physicians and practice features determine the use of preventive services for diabetic patients (He, 2011). Holmboe, Wang, Tate, and Meehan (2006) reiterate the influence of primary care physicians and practice features on use of recommended health services. Their study, which uses Medicare Part A and Part B claims data, shows that diabetic Medicare fee-for-service patients cared for by physicians with greater numbers of diabetic Medicare patients in their practice are more likely to receive important diabetes processes of care—hemoglobin A1c measurements, lipid profiles, and retinal eye examinations (Holmboe et al., 2006). Therefore, the type (i.e., primary care) of

physician and the volume of Medicare beneficiaries in a physician practice panel are important in the receipt of diabetes processes of care.

Among all adults with diabetes in the 2009 National Health Interview Survey, 90% had some form of health insurance coverage, including 85% of people 18-64 years of age and 100% of people ≥65 years of age (Casagrande et al., 2012). Insurance affects mortality as evident by the payer status having a statistically significant relationship with overall survival from acute myelogenous leukemia (AML) (Master et al., 2016), while treatment choice and outcomes are influenced by coverage differences, availability of networked physicians, or cost-sharing polices (Akinyemiju et al., 2016). For example, Strawbridge et al. (2015) found that there were disparities in access to diabetes self-management training (DSMT) by availability of DSMT providers; as the availability of DSMT providers increased and varied by Census region, the odds of utilization among Medicare beneficiaries increased. Limited availability of DSMT providers helps explain why utilization among Medicare beneficiaries with newly diagnosed diabetes is low though Medicare has been reimbursing for outpatient DSMT since 2000 (Strawbridge et al., 2015).

People with health care needs sometimes report adverse experiences with physician availability. Gindi et al. (2013) found that people under age 65 who had public coverage only were more likely than those with private insurance to have problems finding a general doctor, had been told a doctor would not accept them as new patients, and had been told a doctor did not accept their health care coverage. For adults aged 65 and over with Medicare only, they were as likely as those with both Medicare and private insurance to have these experiences with physician availability (Gindi et al., 2013).

In addition, there is research showing the benefit of insurance expansion on people with diabetes (Burge et al., 2014), and findings suggest that insurance coverage, particularly those with private insurance or with Medicare and Medicaid coverage, were more likely to receive quality diabetes care (Hu et al., 2014). Despite the expansion of insurance coverage for millions of Americans because of the ACA, there are still barriers to access. Much of the coverage, per Hellander (2015), have high cost-sharing requirements and restrict physician choice to narrow networks of provider, while also including more privatization and a rise of specialty drug tiers that limit access to medically necessary medications.

Insurance coverage affects utilization (Xu, Patel, Vahratian, & Ransom, 2006). Near elderly women (aged 55-64) who have coverage for a specific service (e.g., physician visit, hospital stay, dental visit, and use of prescription medication) are significantly more likely to use that service; for example, they have many more physician visits after the first one when compared to women without coverage (Xu et al., 2006). They also have a greater likelihood of medication adherence and frequency of hospitalization when there is extensive or complete coverage for such services (Xu et al., 2006).

2.6.1 PERCEIVED EASE OF ACCESS AFFECTED BY INSURANCE

Though timely access to primary care is measured as unable to get through on telephone, unable to obtain appointment soon enough, long wait in the physician's office, limited clinic hours, and lack of transportation for Medicaid beneficiaries, many of these factors are relevant for Medicare beneficiaries too (Cheung et al., 2012). For example, Rust et al. (2008) found that adults aged 18 and older reported “couldn't get through on

phone," "couldn't get appointment soon enough," "waiting too long in doctor's office," "not open when you could go," and "no transportation" as barriers to timely access to primary care or a usual source of care. Many Americans report having a usual source of care, but they also perceive barriers to receiving timely access to primary care, leading patients to use the ED as an alternative while diminishing the benefits of having a usual source of care (Rust et al., 2008). Using the same data source, the National Health Interview Survey, Capp, Rooks, Wiler, Zane, and Ginde, (2014) found that many adults reported self-perceived access issues which also lead them to their most recent ED visit. Seeking ED care was attributed to patients perceiving an immediate need for evaluation, and ironically similar among adults with private insurance, those with Medicaid, and adults with Medicare (Capp et al., 2014).

The inverse of timely access to care is sometimes referred to as a delay in care. Ng et al. (2010) found that midlife women aged 45-64 with diabetes were more likely than men to report delays in care. Medicare beneficiaries who were older, however, had many of the sex differences eliminated (Ng et al., 2010). Ng et al. (2010) also found that health insurance coverage differences were significantly associated with delays in care. Even though the study population had not been diagnosed with diabetes, Schneider, Rosenthal, Gatsonis, Zheng, and Epstein (2008) used the Medicare Current Beneficiary Survey to conclude that the type of Medicare insurance (Medicare managed care vs. fee-for-service) was associated with differences in the prevalence of interval-appropriate colorectal cancer (CRC) screening, with lower prevalence among fee-for-service beneficiaries who lacked supplemental insurance. Therefore, exploring the impact of Medicare insurance type on access is validated. An older but relevant study by Beatty et

al. (2001) also shows that further and timely research should be done to address the relationship between insurance and perceived access. Beatty et al. (2001) found that beneficiaries with disabilities in HMOs perceive better access to primary care services, and greater affordability of health services than those with traditional Medicare coverage. However, beneficiaries in poor health or with the most severe disabilities were most likely to perceive access and cost difficulties, regardless of coverage type (Beatty et al., 2001).

2.6.2 PERCEIVED EASE OF ACCESS AFFECTED BY PROVIDER TYPE

In search of literature related to primary care physicians or specialists and access to care, studies were found showing which physician type has better outcomes within the context of patients receiving recommended tests (Rosenblatt et al., 2001; Chin et al., 2000) or which physician type has better referral access (Lyons et al., 2015; Diamantidis et al., 2011). Endocrinologists reported better access to diabetes educators and dieticians than PCPs ($p<.01$) (Lyons et al., 2015). Compared with patients of family practitioners, patients of endocrinologists had higher utilization of ophthalmologic screening, lipid testing, and glycosylated hemoglobin measurement (Chin et al., 2000). Patients who saw an endocrinologist at least once during the year were more likely to have received the recommended tests when compared to the generalists who provide most diabetic care in all settings (Rosenblatt et al., 2001). Sloan et al. (2010) suggest that specialists, such as podiatrists and lower extremity clinician (LEC) specialists, are needed for individuals in the case of DM-lower extremity complications.

There was also research discussing differences among primary care providers such as primary care teams, nurse practitioners, or others. Everett et al. (2013) used high

number of emergency department visits as an indicator of limited access to primary care and costly use of services; they also used the number of hospitalizations as an indicator of the quality and the cost of primary care. Within this context, patients with supplemental physician assistants (PAs) or nurse practitioners (NPs) who did not treat highly complex patients and did not deliver chronic care experienced a 0.7 times lower rate of ED visits compared to patients receiving physician-only care, suggesting that patients had limited access to physician-only care (Everett et al., 2013). Patients with supplemental PAs or NPs who both treated highly complex patients and delivered chronic care experienced higher hospitalization rates, suggesting that primary care became costly to patients. In addition, Raji et al. (2016) found that elderly patients had less comorbidity before switching from receiving all primary care from NPs to receiving some or all primary care from physicians in 2008-2010.

2.7 SUMMARY OF LITERATURE

Though most research that exists is related to the relationship between access to care or cost and insurance or provider type, there are research gaps that need to be addressed. For one, there are more studies on providers' perceptions of either barriers to delivery of care (Diamantidis et al., 2011) or patients' barriers to receipt of care than patients' perception of cost or ease of access. Medicare beneficiaries with diabetes may perceive barriers differently than providers since they have firsthand experience with health care costs and access.

Secondly, research covers the perception of access or health status, but the perception concept is either sparse or conveyed using a proxy. For example, Doucette et al. (2013) evaluated Medicare Part D beneficiaries' decision to receive pharmacist-

provided comprehensive medical reviews and assessed perceived importance using survey questions including the factors: knowing the out-of-pocket cost, usual pharmacy, receiving medication list, physician's support, and pharmacists discuss changes with physicians. Rust et al. (2008) used survey questions to assess perception of timely access to care: couldn't get through on phone, couldn't get appointment soon enough, waiting too long in doctor's office, not open when you could go, and no transportation.

Perceived ease of access is typically discussed within the context of comparing insurance types such as Medicare, Medicaid, or private insurance instead of comparing Medicare insurance parts such as Parts A and B versus Part C. Furthermore, the literature on perceived access and provider type discusses either providers' perceptions or the differences among primary care team members which may include the primary care physician, nurse practitioner, advanced nurse practitioner, or physician assistant. Few studies focus on the differences between primary care physicians and specialists as these differences relate to the Medicare beneficiaries diagnosed with diabetes.

On the other hand, there is a lot of literature concerning Medicare costs and diabetes-related outcomes. However, the costs are usually discussed in terms of burden on the health care system. The literature which does exist about the burden of costs on Medicare beneficiaries examines insurance coverages using the availability and costs of needed services, not their perception of availability and costs of needed services. Addressing perception of cost will help decrease delays in receipt of care, and addressing perception of ease of access will facilitate use of the appropriate health care provider. We need further study of factors impacting the perception of Medicare beneficiaries with diabetes because a delayed receipt of timely appropriate care leads to a worsening health

condition, increased health care utilization, and costly care. Since the delay in receipt of care is caused in part by financial barriers resulting from absent, inadequate, or irrelevant insurance coverage as well as the limited income of this subpopulation, the Medicare program coverages and costs (e.g., co-pay, deductible, coinsurance, etc.) should be revisited by policymakers.

After identifying the research gaps, we developed four hypotheses.

H_1: There is a significant association between insurance coverage type and perception of cost among Medicare beneficiaries with diabetes. Specifically, beneficiaries without Part D coverage will be more likely to perceive cost-related barriers to care than will beneficiaries with such coverage.

H_2: There is a significant association between insurance coverage type and perceived ease of access among Medicare beneficiaries with diabetes. Beneficiaries without Part D coverage will be more likely to perceive difficulty accessing care than will beneficiaries with such coverage.

H_3: There is a significant association between provider type and perception of cost among Medicare beneficiaries with diabetes. PCPs are associated with better perception of cost among Medicare beneficiaries with diabetes when compared to non-PCPs.

H_4: There is a significant association between provider type and perceived ease of access among Medicare beneficiaries with diabetes. PCPs are associated with greater perceived ease of access among Medicare beneficiaries with diabetes when compared to non-PCPs.

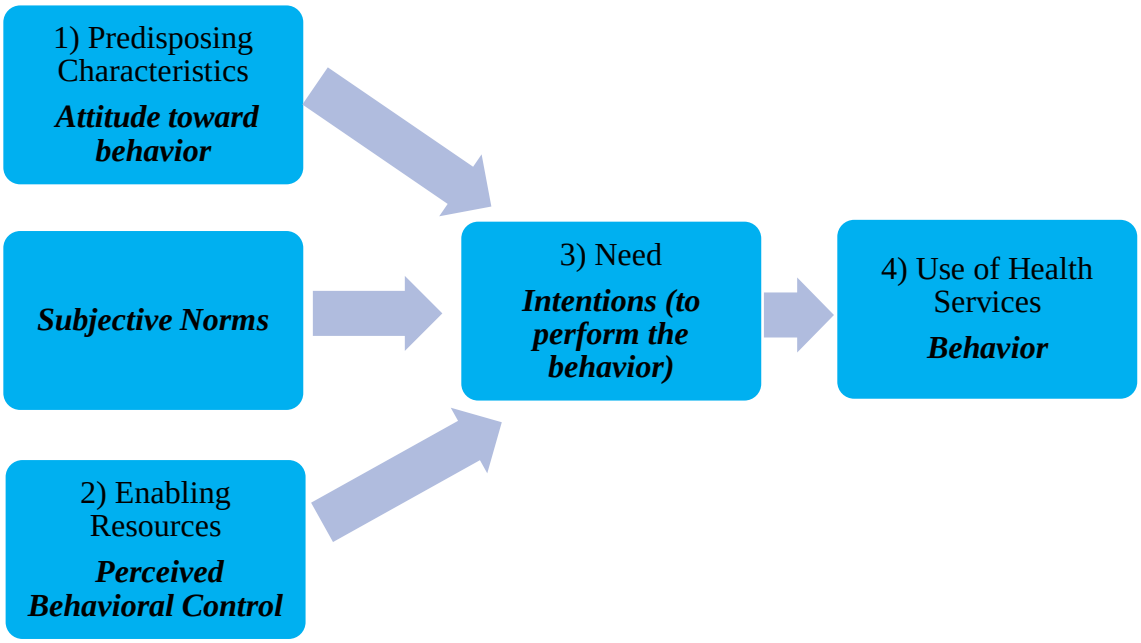

Figure 2.1 Conceptual Model
Note. Andersen's HCBM constructs are numbered and Ajzen's TPB constructs are in italicized bold font.

CHAPTER 3

METHODS

Prior research shows that there is an association between insurance and access, and research shows there is an association between insurance and cost. However, literature on the perception of access or cost, specifically for Medicare beneficiaries who have self-reported a diabetes diagnosis, is sparse. All Medicare beneficiaries have insurance and access to health care, but the different Parts of Medicare are rarely examined for their effect. Therefore, the research question related to insurance type and perceived cost or ease of access is:

RQ1: Is there an association between Medicare insurance type, specifically having Part D versus not having Part D, and perceived cost or ease of access?

Also, existing research shows that having a usual source of care or a primary care physician is a measure of access to health care. For Medicare beneficiaries diagnosed with diabetes, however, the literature examines the relationship between access or cost and different kinds of primary care providers more often than differences between primary care physicians and specialists. Therefore, the research question related to provider type and perceived cost or access is:

RQ2: Is there an association between provider type (i.e., receiving care from a primary care physician versus other physicians) and perceived cost or perceived ease of access?

3.1 DATA AND STUDY DESIGN

The 2013 Medicare Current Beneficiary Survey is a continuous, in-person, longitudinal survey of a nationally representative sample of the Medicare population in the US, District of Columbia, and Puerto Rico, conducted by the Office of Enterprise Data and Analytics (OEDA) of the Centers for Medicare & Medicaid Services (CMS) through a contract with NORC at the University of Chicago. MCBS obtained its sample from beneficiaries who resided in a community or facility setting, but the MCBS 2013 Access to Care (ATC) Public Use File (PUF) included only those beneficiaries interviewed in the community (n=13,924), excluding all beneficiaries who were in a facility (n=950). The 2013 Access to Care File consists of a random cross-section of all beneficiaries who were continuously enrolled in one or both parts of the Medicare program from January 1, 2013 up to and including their interview during the 2013 fall round (September - December). These beneficiaries include those in four separate MCBS longitudinal panels identified by the year in which the panel was selected (i.e., the 2010, 2011, 2012, and 2013 panels) and were drawn using a complex selection algorithm. "Always enrolled population" consists of newly enrolled beneficiaries (i.e., beneficiaries who were enrolled during the period February 2012 through January 2013) as well as previously enrolled beneficiaries (i.e., beneficiaries who were enrolled on or before January 2012). (CMS, 2016a)

The present research was a cross-sectional study that used data from MCBS questions and was approved by the University of South Carolina Institutional Review Board. The Medicare Current Beneficiary Survey (MCBS) 2013 Access to Care (ATC) Public Use File (PUF) collected data on 13,924 respondents, representing the non-

institutionalized Medicare population which totaled approximately 52.3 million in the year 2013 according to the Centers for Medicare & Medicaid Services (CMS, 2016a). Our primary analysis was restricted to those community dwelling Medicare beneficiaries who had self-reported diagnosis of diabetes (n=3,979). This sample was examined and found to have 1,388 observations with missing data for the variables of interest. These observations were omitted from the data analysis, resulting in a smaller study sample (n=2,591).

3.2 DEPENDENT VARIABLES

Initial Development

The study sample's perceived ease of access and perceived cost were latent variables identified by an exploratory factor analysis (Figure 3.1), using relevant measured variables found in the 2013 MCBS ATC data. Table 3.1 lists the questions used to measure satisfaction with care, access, and cost. These questions were categorized under 3 patient satisfaction dimensions (availability, accessibility, and affordability) in Table 3.1 and 2 factors (perceived ease of access and perceived cost) in subsequent tables (Tables 3.2, 3.3, and 3.4). Every selected survey question except for two (i.e., ever trouble getting needed health care and delay in care last year due to cost) had the following Likert-scaled ratings: "1-very satisfied, 2-satisfied, 3-dissatisfied, or 4-very dissatisfied". The Likert-scaled ratings continued with "5-no experience, -7-refused, and -8-don't know," which were counted as missing values.

Finally, the factor loadings were used to confirm the dependent variables, perceived ease of access and perceived cost, which were calculated as a summed score of

the survey responses. Table 3.2 shows that the two questions on the yes/no scale did not load on either factor.

The initial exploratory factor analysis which included 10 variables resulted in 3 factors being retained (Table 3.2). One factor included only the variables that have "yes/no" responses: ever trouble getting needed care and ever delayed care due to cost. A second exploratory factor analysis was run purposely excluding the question "ever trouble getting needed care" since the question was ambiguous as it may be related to either access or cost. After re-running the factor analysis without that question, two factors were retained. Factor 1 and Factor 2 were consistent with the concepts of perceived ease of access and perceived cost, respectively. Factor 1 includes finding a pharmacy accepting prescription (0.45) health care available on nights/weekends (0.60), ease/convenience getting to doctor from home (0.60), health care needs met at same location (0.70), and available specialists (0.74) (Table 3.3). Factor 2 includes prescription plan/drugs covered (0.63), out of pocket costs for medical services (0.64), and amount paid for prescription drugs (0.80) (Table 3.3).

Examining the study sample while excluding observations with missing data, it became evident that the Likert item regarding availability of care on nights/weekends (ACC_MCAVAIL) had to be dropped from the factor analysis (Table 3.4). The number of Medicare beneficiaries with the response of "no experience" was too high (n=1,461). Table 3.4 displays results of the third factor analysis, which shows the remaining Likert items still had the same factor loading. Factor 1 (perceived ease of access) includes finding a pharmacy accepting prescription (0.49), ease/convenience getting to doctor from home (0.55), health care needs met at same location (0.69), and available specialists

(0.76). Factor 2 (perceived cost) includes prescription plan/drugs covered (0.60), out of pocket costs for medical services (0.63), and amount paid for prescription drugs (0.82).

Final Specification of Independent Variables

The dependent variables in both research questions are latent variables: perceived ease of access and perceived cost. Using theories and previous research as a guide in addition to the factor analysis, Likert items loading on factors were categorized by perceived ease of access and perceived cost. Next, the summed score across combined Likert items for each latent variable was calculated. The 3-level survey response was then created with the following cutoff scores for access: 1-4 for very satisfied, 5-8 for satisfied, and 9-16 for dissatisfied. The cutoff scores for cost were 1-3 for very satisfied, 4-6 for satisfied, 7-12 for dissatisfied. The dissatisfied level had a larger range of values because there were very few responses for either dissatisfied or very dissatisfied.

These are the MCBS 2013 ATC PUF questions used for perceived ease of access and are based on the Likert scale (Table 3.5):

1. Ease and convenience of getting from home to the doctor (i.e., from point A to point B)
2. Health care needs at the same location
3. Available care by specialists
4. Find a pharmacy accepting prescription drug plan

These are the MCBS 2013 ATC PUF questions used for assessing perceived cost, and they also used the Likert scale (Table 3.6):

1. Rx plan list/drugs covered – Prescription drug plan's formulary or the list of drugs covered by the plan.

2. OOP costs paid for med services – Out-of-pocket costs paid for health care.
3. Amt paid for Rx drugs – The amount you have to pay for prescribed medicines.

3.3 INDEPENDENT VARIABLES

3.3.1 PART D COVERAGE

The independent variables are insurance type (Medicare Part D and non-Medicare Part D) and provider type (primary care physicians and non-primary care physicians). For determining insurance type, MCBS provides the following questions with the frequency of self-reported or administratively reported responses:

1. Type of Medicare Coverage (self-report)

   Part A or Part B – 95

   Part A and Part B – 2496
2. Fee for Service Flag for the Year (administrative report)

   No FFS – 899

   Part Year FFS – 68

   Full Year FFS – 1624
3. Enrolled in a Part D Plan (self-report)

   Yes – 532

   No – 2059
4. Part D Plan for the Year (administrative report)

   Yes – 2076

   No – 515

Like self-reported data for Parts A/B and Parts A or B, self-reported data for Part D were different from the administrative data for Part D. The Likert item "Rx plan list/drugs covered" involved both Part D enrollees and enrollees of other prescription plans as evident from the question: "By prescription drug plan, we mean any health insurance plan that provides drug coverage." However, respondents for the self-reported questions of "Type of Medicare Coverage" and "Enrolled in a Part D Plan" may have not considered those other prescription drug plans as Part D coverage when interviewed. Also, other prescription drug related MCBS questions with yes/no responses validate our use of administratively reported data for Part D coverage since the following self-reported questions have comparable response frequencies when summed: private plan covers prescription drugs, public insurance covers medicines prescribed by a doctor, Medicare Advantage plan covers drugs, and ever received services (i.e., health care or health services or prescribed medicines) at a Military Treatment Facility or MTF (CMS, 2016a). This reveals that the administratively reported Part D question counts privately purchased prescription plans as equivalent to Part D.

3.3.2 PROVIDER SEEN

For categorizing the providers seen by beneficiaries, the doctor's specialty was identified when beneficiaries were asked to recall the most recent time that they saw a doctor in which a home or hospital visit was not involved (CMS, 2016a). We considered adults who reported seeing a primary care physician as receiving care from a PCP (n=1441) (Table 3.7). Adults who reported seeing physicians who were specialists (n=1150) were noted as receiving care from a non-PCP. The survey responses for non-

PCP are obstetrics/gynecology, ophthalmology, orthopedics, psychiatry, cardiology, dermatology, urology, surgery, and other (Table 3.7).

3.4 COVARIATES

The patient characteristics or covariates were race (Non-Hispanic white, Non-Hispanic black, Hispanic, and Other), sex (male/female), age (<65, 65-75, and ≥75), education (less than high school; high school or vocational, technical, business, etc.; more than high school), and income (<$25,000 and ≥$25,000). Other sociodemographic characteristics that were of interest included metro status (metro area and non-metro area), marital status (married; widowed; divorced/separated; never married), and health status (self-reported health compared to previous year "Compared to one year ago, how would you rate your health in general now?"). According to Andersen's HCBM, the covariates may be categorized as predisposing characteristics (age, sex, race, education, and marital status), enabling characteristics (income and metro status), and perceived health need (health comparison status used as proxy).

Income was imputed for some beneficiaries. Therefore, interpretation of income results may not be valid. Within context, the MCBS question states "income may have been imputed" and has the following results: 1-Imputed (n=1142, 42%) and 2-Not imputed (n=1449, 58%). Imputation refers to how many survey respondents had missing income data which was substituted. Income would then not be valid since survey design does not allow for us to have the actual income amount for slightly less than half of the study sample.

The covariates were selected from among characteristics and needs listed in Andersen's model of health services use (Table 3.8) and based on available, relevant

MCBS questions. Ng et al. (2010) validate the use of the selected covariates and statistical analyses because they too examined associations of sex and insurance status with self-reported delays in medical care, dental care, prescription medication, and illness/injury care, using bivariate and multivariate analyses adjusted for race/ethnicity, education, income, and perceived health status.

Other researchers explored relationships between variables that were relevant to our study but not feasible. For example, Cubanski (2010) used the problem of "Delayed getting or did not get health care services because of cost concerns" which is comparable to the MCBS question of "Last year ever delay in medical care due to cost, because you were worried about cost." That MCBS question was not included in the data analysis because it did not load well in the factor analysis. Also, MCBS has the question of "Availability of care on nights/weekends" which is comparable to Cheung et al.'s (2012) identified problems, specifically "You couldn't get an appointment soon enough" and "The (clinic/physician's) office wasn't open when you could get there." This MCBS question was also not included in the data analysis because there were too few responses for very satisfied, satisfied, dissatisfied, and very dissatisfied. Providing further evidence, Callahan et al. (2006) used the following to assess access to health care: delayed or unmet health needs owing to cost, no contact with a health professional in the prior year, and no usual source of care. Despite the literature on employment status, usual source of care, geographic location by region, and chronic conditions or comorbidities, these variables were not included (Table 3.8) in the analyses because of survey and research question designs.

3.5 STATISTICAL METHODS

Using SAS version 9.4, survey procedures for univariate, bivariate, and multivariate analyses were used to account for the complex survey design of the MCBS 2013 ATC PUF. The univariate analyses included the frequency and percent of each independent variable and the means of dependent variables. The bivariate analyses tested the relationship between each independent variable and the latent dependent variables. The multivariate analyses used multivariable linear regression with least square means. In the multivariate analyses, the outcome variables of perceived ease of access and perceived cost were calculated based on the least square means computed from the Likert scaled values developed from using sums and cutoff points.

Study sample was examined and described by demographics, socioeconomic status, geographic characteristics, and health status. The initial analysis was descriptive, including frequencies, percentages, and means. In assessing the association between insurance type (Part D vs. non-Part D) and perceived ease of access and cost, a bivariate analysis was performed using chi-square test of independence between insurance type and each variable. Multivariable linear regression models were analyzed using least square means while adjusting for demographics, socioeconomic status, health status, and geographic characteristics (Cheung et al., 2012; Hicks et al., 2014; Skrepnek et al., 2015; Capp et al., 2014). We controlled for the demographics of age group, sex, and race (Cifaldi, Renaud, Ganguli, & Halpern, 2016; Rust et al., 2008). The multivariable linear regression models with least square means were also used to assess the relationship between provider type (PCP vs. non-PCP) and perceived ease of access and cost.

The linear regression equation in general form is:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \varepsilon_i$$

The multivariate analysis using multivariable linear regression with least square means determined whether and how insurance and provider type were associated with perceived cost and ease of access. The equations for the research questions are as follow:

RQ1: Is there an association between Medicare insurance type, specifically Part D versus non-Part D, and perceived cost or ease of access?

Perceived Cost = β_0 + β_1Insurance type + β_2Age + β_3Sex + β_4Race + β_5Marital status + β_6Education + β_7Income + β_8Metro status + β_9Perceived health comparison + ε_i

Perceived Ease of Access = β_0 + β_1Insurance type + β_2Age + β_3Sex + β_4Race + β_5Marital status + β_6Education + β_7Income + β_8Metro status + β_9Perceived health comparison + ε_i

RQ2: Is there an association between provider type (i.e., receiving care from a primary care physician versus other physicians) and perceived cost or perceived ease of access?

Perceived Cost = β_0 + β_1Provider type + β_2Age + β_3Sex + β_4Race + β_5Marital status + β_6Education + β_7Income + β_8Metro status + β_9Perceived health comparison + ε_i

Perceived Ease of Access = β_0 + β_1Provider type + β_2Age + β_3Sex + β_4Race + β_5Marital status + β_6Education + β_7Income + β_8Metro status + β_9Perceived health comparison + ε_i

Results from the statistical analyses will be reported at the 0.05 level of significance. The discussion will also explain the importance of statistically significant differences found.

Table 3.1 Dimensions for Measured Variables, MCBS 2013 ATC PUF

Dimensions	Description	Response Scale
Availability	Availability of care on nights/weekends	Likert scale
	Available care by specialists	Likert scale
	Ever trouble getting needed health care	Yes/No
Accessibility	Ease and convenience of getting from home to the doctor (i.e., from point A to point B)	Likert scale
	Health care needs at the same location	Likert scale
	Rx plan list/drugs covered	Likert scale
	Find a pharmacy accepting prescription drug plan	Likert scale
Affordability	Ever delay in care last year due to cost	Yes/No
	Out of pocket costs for medical services	Likert scale
	Amount paid for prescription drugs	Likert scale

Table 3.2 Factor Analysis Results with 10 Variables, MCBS 2013 ATC PUF

Variables	Factor 1	Factor 2	Factor 3
Health care available on nights/weekends	0.60	0.18	0.14
Ease/convenience getting to doctor from home	0.60	0.16	0.17
Health care needs met at same location	0.70	0.17	0.14
Available care by specialists	0.74	0.17	0.12
Finding a pharmacy accepting prescription	0.50	0.38	-0.10
Prescription plan/drugs covered	0.33	0.61	0.12
Out of pocket costs for medical services	0.20	0.60	0.26
Amount paid for prescription drugs	0.14	0.81	0.06
Ever delay in care due to cost	0.04	0.15	0.58
Ever trouble getting needed healthcare	0.16	0.03	0.50

Table 3.3 Factor Analysis Results with 9 Variables, MCBS 2013 ATC PUF

Variables	Factor 1	Factor 2
Health care available on nights/weekends	0.60	0.21
Ease/convenience getting to doctor from home	0.60	0.19
Health care needs met at same location	0.70	0.21
Available care by specialists	0.74	0.20
Finding a pharmacy accepting prescription	0.45	0.36
Prescription plan/drugs covered	0.30	0.63
Out of pocket costs for medical services	0.21	0.64
Amount paid for prescription drugs	0.12	0.80
Ever delay in care due to cost	0.11	0.23

Table 3.4 Factor Analysis Results with 8 Variables, MCBS 2013 ATC PUF

Variables	Factor 1	Factor 2
Ease/convenience getting to doctor from home	0.55	0.19
Health care needs met at same location	0.69	0.20
Available care by specialists	0.76	0.19
Finding a pharmacy accepting prescription	0.49	0.32
Prescription plan/drugs covered	0.33	0.60
Out of pocket costs for medical services	0.22	0.63
Amount paid for prescription drugs	0.13	0.82
Ever delay in care due to cost	0.11	0.23

Table 3.5 Frequency and Distribution of Responses: Perceived Ease of Access, unweighted observations, MCBS 2013 ATC PUF

Description	1 Very Satisfied	2 Satisfied	3 Dissatisfied	4 Very Dissatisfied
Ease and convenience of getting from home to the doctor (i.e., from point A to point B)	938	1519	111	23
Health care needs met at the same location	789	1579	200	23
Available care by specialists	837	1621	112	21
Find a pharmacy accepting prescription drug plan	1113	1450	20	8

Table 3.6 Frequency and Distribution of Responses: Perceived Cost, unweighted observations, MCBS 2013 ATC PUF

Description	1 Very Satisfied	2 Satisfied	3 Dissatisfied	4 Very Dissatisfied
Rx plan list/drugs covered	633	1699	220	39
OOP costs paid for med services	703	1424	366	98
Amt paid for Rx (prescribed) drug	638	1467	368	118

Table 3.7 Provider Specialty, MCBS 2013 ATC PUF

Provider Specialty	Frequency (n=2591)
Primary Care	1441
Obstetrics/Gynecology	20
Ophthalmology	155

Table 3.7 Continued

Provider Specialty	Frequency (n=2591)
Orthopedics	91
Psychiatry	39
Cardiology	192
Dermatology	49
Urology	70
Surgery	35
Other	499

Table 3.8 Factors in Andersen's Model of Health Services Use

Predisposing Characteristics	Enabling Characteristics	Perceived Health Needs
A. Race/Ethnicity B. Sex C. Age group D. Marital status E. Education	A. Employment status* B. Household income C. Insurance status D. Usual source of care* E. Geographic location (NE, Midwest, South, or West)* F. Residence (urban vs rural)	A. Self-reported health status B. Chronic conditions*

Note. Characteristics or needs with an asterisk (*) were not included in the analysis.

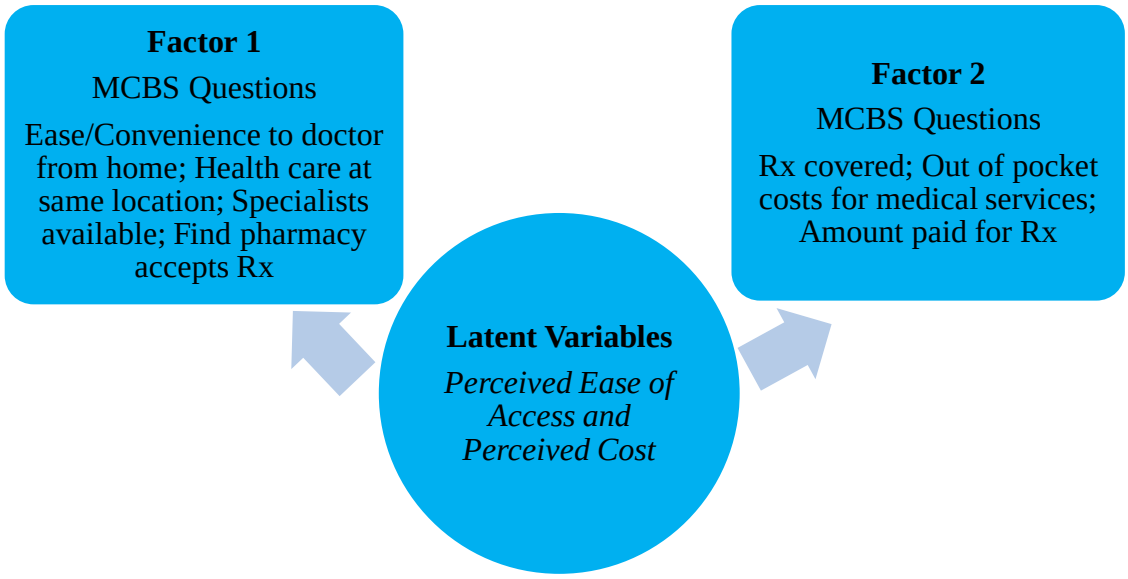

Figure 3.1 Theoretical model for Factor Analysis Model
Note. Variables of interest are italicized.

CHAPTER 4

RESULTS

4.1 CHARACTERISTICS OF MEDICARE BENEFICIARIES WITH DIABETES

Of the 13,924 Medicare beneficiaries who completed the 2013 MCBS ATC survey questions, 3,979 reported being diagnosed with diabetes (Table 4.1). This sample was examined and found to have 1,388 observations with missing data for the variables of interest. These observations were omitted from the data analysis resulting in a sample size of 2,591.

Table 4.1 shows the characteristics of all Medicare beneficiaries diagnosed with diabetes (n=3979) by those who were included in the sample used for data analysis (n=2591) versus those who were not (n=1388). For age, race, education, Medicare status, metro status, and health compared to past year, there were no significant differences between diabetic Medicare beneficiaries who were included in the study sample and those who were not. For the hypothesized independent variables, the study sample when compared with the excluded group contained a much higher proportion of beneficiaries with Part D coverage (78% versus 63.2%; $p<0.0001$) and a lower proportion of beneficiaries who received care from a PCP (56.2% versus 59.9%; $p=0.0510$). The study sample contained a slightly higher proportion of women respondents than the excluded group (51.6% versus 47.4%; $p=0.0204$) as well as a higher proportion of married beneficiaries than the excluded group (55.3% versus 48.8%; $p=0.0062$). Though income was imputed for most respondents, the study sample had a higher proportion of

respondents with at least $25,000 in annual income than the excluded group (51.3% vs. 46.5%; p=0.0297).

Table 4.1 shows the descriptive analysis of all Medicare beneficiaries with diabetes by inclusion status. Most beneficiaries within the study sample had Part D (78%), received health care from primary care physicians (56.2%), and were aged 65 or older (79.7%). Medicare status and age captured similar information as the proportion of aged under Medicare status is the same as the proportion of beneficiaries aged 65 and older, and the proportion of disabled under Medicare status was the same as the proportion of beneficiaries less than 65 years of age. To avoid data redundancy, Medicare status was omitted from further analysis. Most Medicare beneficiaries with diabetes were female (51.6%), Non-Hispanic white (67.3%), educated at the high school level or above (76.5%), and receiving at least $25,000 in annual income (51.3%). They were also married (55.3%), resided in a metro area (77.9%), and believed their health was about the same (53.2%) when compared to their health within the past year.

Table 4.2 compares included and excluded study respondents regarding satisfaction with access to care and cost. On the outcome measures, the study sample did not differ significantly from Medicare beneficiaries who were excluded. It also shows satisfaction with access to care and cost first as ordinal variables (access and cost) and secondly as continuous variables (perceived ease of access and perceived cost). Perceived ease of access measures included ease/convenience of getting to doctor from home, health care needs met at the same location, available care by specialists, and finding a pharmacy accepting the prescription. Overall, Medicare beneficiaries diagnosed with diabetes were very satisfied (15.6%) or satisfied (73.5%) with their access to health care,

with a mean of 6.79 ± 0.04 (SE) for perceived ease of access [6.71-6.87, 95% CI; Table 4.3]. Beneficiaries also were principally very satisfied (12%) or satisfied (60%) with their cost of care, with a mean of 5.83 ± 0.04 (SE) for perceived cost [5.75-5.91, 95% CI]. Perceived cost included prescription plan/drugs covered, out of pocket costs for medical services, and amount paid for prescription drugs.

4.2 RESEARCH QUESTION 1: ASSOCIATION BETWEEN MEDICARE INSURANCE TYPE AND PERCEIVED COST AND EASE OF ACCESS

Since there were cutoff points used for the summed Likert scaled items, we must remember the values for very satisfied, satisfied, and dissatisfied for the dependent variables. MCBS responses for Likert items are in order from least to greatest, with 1 representing very satisfied and 4 representing very dissatisfied. When combined Likert items for perceived ease of access have a sum between 1 and 8, beneficiaries are satisfied with access to health care services. When the summed score of perceived ease of access exceeds 8 and gets closer to 16, then beneficiaries are not satisfied with access to care. A similar logic applies to perceived cost which combines only 3 Likert items. When perceived cost is between 1 and 6, then beneficiaries are primarily satisfied with their health care costs. When the summed score exceeds 6 and gets closer to 12, beneficiaries are not satisfied with costs.

When presenting results of the summed scores, perceived ease of access and perceived cost will be discussed using language from the MCBS questions. For example, perceived ease of access among diabetic beneficiaries is discussed in terms of their satisfaction with accessing health care services. Also, perceived cost among diabetic beneficiaries is discussed in terms of their satisfaction with costs of health care services.

Table 4.3 highlights results of the first research question, determining if there is an association between Medicare insurance type, specifically having Part D versus not having Part D, and perceived cost or perceived ease of access. Unexpectedly, there were proportionately more Medicare beneficiaries with Part D who were dissatisfied with cost than those without Part D (29.2% versus 23.4%; p=0.0004). The proportion of beneficiaries with Part D coverage who were satisfied with access was less than among beneficiaries without Part D coverage (88.6% versus 90.8%; p=0.1875).

There were significant differences between Medicare beneficiaries who had Part D coverage versus those who had no Part D for predisposing characteristics, enabling characteristics, and perceived health need. Table 4.3 shows the beneficiaries aged 65 and older who had Part D coverage were proportionately lower than those who did not have Part D coverage (77.8% versus 86.3%; p=0.0111). Beneficiaries who were male, Non-Hispanic white, educated beyond high school, or married had proportionately lower Part D coverage when compared to those who did not have Part D (45.8% versus 57.3%; p<0.0001 & 66.2% versus 71.3%; p=0.0481 & 36.2% versus 59.3%; p<0.0001 & 51.0% versus 70.3%; p<0.0001). For the enabling characteristics of income and metro status, beneficiaries with an annual income of at least $25,000 or who resided in a metro area were more likely to have no Part D coverage when compared to those who did have Part D (77% versus 44%; p<0.0001 & 80% versus 77.2%; p=0.1734). Paradoxically, the proportion of diabetic beneficiaries reporting worse health compared to the past year was proportionately higher for those with Part D than those without (28.9% versus 22.8%; p=0.0164). Diabetic beneficiaries reporting comparable or better health than the past year

were proportionately higher for those without Part D than those with Part D coverage (77.2% versus 71.1%; p=0.0164).

4.2.1 INSURANCE TYPE AND PERCEIVED COST

Hypothesis 1 explores whether there was a significant association between insurance type and perceived cost. Table 4.3 shows a bivariate analysis revealing there was a significant association between insurance type and perceived cost (p=0.0004). The percentage of respondents who were satisfied with cost while having Part D coverage (70.8%) was less than those who were satisfied while having no Part D coverage (76.6%). Ironically, Medicare beneficiaries with Part D were proportionately more dissatisfied with cost than those without Part D (29.2% versus 23.4%; p=0.0004). To help explain this counterintuitive disproportion, we must note that when the term Medicare Part D is used, Part D refers to any prescription drug coverage. The following self-reported MCBS questions prove this: public insurance covers prescriptions; private plan covers prescription drugs; Medicare Advantage plan covers drugs; and receive health care, health services, or prescribed medicines at a Military Treatment Facility (MTF).

Findings from previous studies also help explain why Part D enrollees were proportionately more dissatisfied than those without Part D. Medicare beneficiaries in Part D had higher cost sharing amounts than those with employer coverage, but higher cost sharing was not significantly linked to lower prescription use (Goedken, Urmie, Farris, & Doucette, 2010). Saleh, Weller, and Hannan (2007) found that the average total drug expenditures among Medicare FFS enrollees who had non-HMO related prescription insurance were higher ($182.51) than that of Medicare FFS enrollees with no prescription insurance. Generic use for Part D beneficiaries was higher than that for

beneficiaries with employer coverage but the same as that for beneficiaries without drug coverage (Goedken et al., 2010).

Table 4.4 displays the least square means of perceived cost by beneficiary characteristics. Perceived cost varied by Part D status which had a mean of 5.94 ($p<0.0001$) while the referent level of Non-Part D had a mean of 5.44. Mean perceived cost also varied with age, race, and health comparison. For age, beneficiaries under age 65 were the referent level with a mean of 6.19 while beneficiaries aged 65-74 had a mean of 5.73 ($p=0.0005$), and those aged 75 and older had a mean of 5.76 ($p=0.0007$). This tells us that older beneficiaries were more satisfied than those under the age of 65. Non-Hispanic black beneficiaries had a mean of 6.03 ($p=0.0217$) as the referent level of Non-Hispanic whites had a mean of 5.78, so Non-Hispanic blacks were less satisfied with perceived cost than Non-Hispanic whites. For health compared to past year, all levels were significant with a mean of 6.40 for the referent level of much worse: somewhat worse (5.96, $p=0.0239$), about the same (5.77, $p=0.0005$), somewhat better (5.86, $p=0.0144$), and much better (5.36, $p<0.0001$). As responses for perceived health reflect better health, mean perceived cost decreases, which means that healthier beneficiaries were more satisfied with perceived cost.

Table 4.5 reports results from the multivariate analysis which used multivariable linear regression to examine the estimated regression coefficients, standard errors, and p-values for determining how insurance type was associated with perceived cost. For further examination of research question 1, the unadjusted and adjusted models show that the impact of insurance type on perceived cost had a 0.504 value for the estimated regression coefficient ($p<0.0001$), while the adjusted models 2 and 3 had estimated

regression coefficients of 0.514 (p<0.0001) and 0.515 (p<0.0001), respectively. Thus, the relationship between insurance type and perceived cost varied very little as beneficiary characteristics were added to the model. Since a coefficient that is positive and/or high in value reflects dissatisfaction, then beneficiaries with Part D coverage were experiencing lower satisfaction with cost than those without Part D coverage.

Table 4.5 also shows that Model 2 was adjusted for age, sex, race, education, and income. Model 3 was adjusted for marital status, metro status, and health compared to past year. As variables were added to the unadjusted model, the estimated regression coefficient or mean of insurance type increased to a higher value when transitioning from Model 1 to Model 2. From Model 2 to Model 3, the estimated regression coefficients remained similar at 0.514 and 0.515, respectively. Insurance type, age, and health comparison across all levels were found to be significant predictors for perceived cost in each model. When compared to the referent group of beneficiaries under age 65, beneficiaries aged 65-74 had effect sizes of -0.43 (p=0.0011) in Model 2 and -0.41 (p=0.0036) in Model 3. Beneficiaries who were aged 75 or older had the same effect size of -0.41 for both models with p-values of 0.0012 (Model 2) and 0.0032 (Model 3). All effect sizes for age demonstrate that older beneficiaries were more satisfied with cost of health care services than the young referent group for negative values for effect sizes reflect greater satisfaction. Race had a 0.26 regression coefficient (p=0.0208) in Model 3, which also showed significant effects for health compared to past year: much better (-0.94, p=0.0001), somewhat better (-0.48, p=0.0306), about the same (-0.52, p=0.0048), and somewhat worse (-0.39, p=0.0462). All variables that were significant in the bivariate analysis were also significant in the multivariate analysis, even when adjusting for

covariates. The multivariable linear regression results showing that insurance type is significant in all models validate results from the bivariate analysis.

4.2.2 INSURANCE TYPE AND PERCEIVED EASE OF ACCESS

Hypothesis 2 tested whether there was a significant association between insurance type and perceived ease of access. When the continuous dependent variable was used instead of the 3-level dependent variable, the full range of responses allowed for a significant relationship to appear between perceived ease of access and insurance type as well as factors including age, race, education, income, metro status, and health compared to past year. Table 4.6 shows that Part D enrollees had a higher mean perceived ease of access score than non-Part D enrollees (6.85 versus 6.57, $p=0.0091$).

Older beneficiaries (65-74, 6.63, $p<0.0001$; $\geq$75, 6.77, $p=0.0009$) had lower mean values compared to <65 referent level, thereby experiencing greater satisfaction with perceived ease of access. All races except Non-Hispanic whites (referent level with mean 6.62) had a higher mean perceived ease of access, so Non-Hispanic blacks (7.22, $p<0.0001$), Hispanics (7.14, $p<0.0001$), and Others (7.07, $p=0.108$) experienced less satisfaction accessing health care. Beneficiaries with a high school education (6.75, $p=0.0001$) or more (6.63, $p<0.0001$) had lower means than those with less than a high school education (referent level with mean 7.13), which translates into greater perceived ease of access for highly educated beneficiaries. Beneficiaries who had annual income exceeding $24,999 (6.58, $p<0.0001$) also experienced greater perceived ease of access. In contrast, beneficiaries experienced lesser satisfaction with ease of access when they lived in a rural area (7.03, $p=0.0006$) or had perceived their health as somewhat worse (7.20,

p=0.1312), about the same (6.69, p=0.0003), somewhat better (6.53, p<0.0001), or much better (6.10, p<0.0001).

Table 4.7 reports the multivariate analysis which used multivariable linear regression to examine estimated regression coefficients, standard errors, and p-values for determining how insurance type impacts perceived ease of access. The unadjusted model for the impact of insurance type on perceived ease of access had a 0.279 value for the estimated regression coefficient (p=0.0091). For the unadjusted model, we can say that diabetic beneficiaries who had Part D experienced a 0.279 increase in their mean perceived ease of access score when compared to those who did not have Part D. This increase suggests that Part D enrollees were less satisfied with their access to health care than non-Part D enrollees.

Table 4.7 shows the estimated regression coefficients of 0.144 (p=0.1841) for Model 2 and 0.133 (p=0.2203) for Model 3. The satisfaction level of diabetic beneficiaries with Part D began to mirror the satisfaction level of those without Part D as the mean perceived ease of access not only decreased in value, but also became insignificantly different. The sudden change in the effect of insurance status on perceived ease of access reveals that personal characteristics, not insurance type, were associated with satisfaction with access. Of the eight personal characteristics listed by insurance type in Table 4.3, seven were significant and showed that a higher proportion of beneficiaries with Part D coverage were either younger than age 65, female, minority, poorly educated (less than high school), not in relationship (divorced/separated or never married), poor (income less than $25,000), or in bad health (somewhat worse or much worse health compared to past year). Model 2 adjusted for age, sex, race, education, and

income. Model 3 adjusted for marital status, metro status, and health compared to past year. As variables were added to the unadjusted model, the estimated regression coefficient or mean of insurance type decreased in value when transitioning from model to model in sequential order. The estimated regression coefficients remained similar within the range of 0.133 to 0.144. Age, education, metro status, and/or health comparison were the control variables that were significant predictors for perceived ease of access for respective models. For hypothesis 2 which explored whether there was a significant relationship between insurance type and perceived ease of access, the multivariable linear regression results suggest that insurance type is not associated with perceived ease of access when adjusting for personal characteristics.

4.3 RESEARCH QUESTION 2: ASSOCIATION OF PROVIDER TYPE WITH PERCEIVED COST AND EASE OF ACCESS

Table 4.8 presents descriptive characteristics of the study sample, by provider type. There were significant differences between Medicare beneficiaries who received care from PCPs versus those who received care from non-PCPs. Medicare beneficiaries with diabetes who were female and earned less than $25,000 received care proportionately more frequently from primary care physicians than other physicians (54% versus 48.6%; p=0.0384 & 51.8% versus 44.7%; p=0.0110). Survey respondents who were Non-Hispanic white, possessed a high school education or higher, or had a health comparison rating of worse received care from PCPs at a lower proportion compared to those who received care from non-PCPs (64.1% versus 71.4%; p=0.0039 & 73.4% versus 80.4%; p=0.0008 & 24.8% versus 31%; p=0.0095).

4.3.1 PROVIDER TYPE AND PERCEIVED COST

Hypothesis 3 explores whether Medicare beneficiaries with diabetes receiving care from PCPs when compared with non-PCPs had better perception of cost. As noted earlier, Table 4.4 displays the least square means of perceived cost by patient characteristics. Mean values for perceived cost did not differ significantly by provider type (PCP 5.82, non-PCP 5.86, p=0.6134). Table 4.7 also noted earlier the details of significant predictors of perceived cost, which included all levels of age and health compared to past year while race was significant at one level.

Table 4.9 presents results from the analysis evaluating unadjusted and adjusted estimates via multivariable linear regression. The unadjusted model (Model 1) shows a -0.042 value for the estimated regression coefficient (p=0.613) for the impact of provider type on perceived cost, while the adjusted models 2 and 3 have estimated regression coefficients of -0.063 (p=0.451) and -0.050 (p=0.083), respectively. Model 2 adjusted for age, sex, race, education, and income. Model 3 adjusted for marital status, metro status, and health compared to past year in addition to the variables listed for Model 2. Perceived cost did not vary by type of provider seen, even after controlling for personal characteristics. Sex, education, income, marital status, and metro status were the covariates not significantly associated with perceived cost.

Results from the multivariable linear regression show that provider type was not significant in either model, thereby allowing insufficient evidence to support our hypothesis that Medicare beneficiaries with diabetes have better perception of cost when receiving care from primary care physicians versus non-primary care physicians. These results agree with results of the bivariate analysis.

4.3.2 PROVIDER TYPE AND PERCEIVED EASE OF ACCESS

Hypothesis 4 explored whether patients who had their most recent visit with PCPs had greater perceived ease of access when compared with non-PCPs. The bivariate analysis results in Table 4.6 shows the least square means for the relationship between provider type and perceived ease of access. Mean perceived ease of access did not differ significantly by provider type (PCP 6.77, non-PCP 6.83, p=0.5012). Other non-significant predictors of perceived ease of access were sex, with male as the referent level and mean of 6.80 (female 6.78, p=0.7968), and marital status with never married as the referent level and mean of 6.86 (married, 6.70, p=0.3922; widowed, 6.87, p=0.9579; divorced/separated, 6.98, 0.5913).

Table 4.6 also shows that there were significant predictors of perceived ease of access. Mean values across all levels of age differed significantly (65-74, 6.63, p<0.0001; ≥75, 6.77, p=0.0009) with age group <65 as the referent level with a 7.20 mean value for perceived ease of access. Mean values for perceived ease or access for race also differed significantly across all levels (Non-Hispanic black, 7.22, p<0.0001; Hispanic, 7.14, p<0.0001; Other, 7.07, p=0.0108) with Non-Hispanic white as the referent level with a mean of 6.62. With the exception of Non-Hispanic whites, all races experienced less satisfaction with access by provider type. Medicare beneficiaries with diabetes had mean perceived ease of access scores that were significantly different across education levels: high school (6.75, p=0.0001) and beyond high school (6.63, p<0.0001), with less than high school as the referent level with mean 7.13. Beneficiaries who were educated at or above high school had greater satisfaction with access to PCPs. Table 4.8 shows the study sample with mean perceived ease of access differed significantly for income (≥$25,000,

6.58, p<0.0001 with <$25,000 as referent level with mean 7.02) and metro status (metro, 6.72, p=0.0006, with non-metro as referent level with mean 7.03). Health compared to past year did not differ significantly across all levels (much better, 6.10, p<0.0001; somewhat better, 6.53, p<0.0001; about the same, 6.69, p-value 0.0003; and somewhat worse, 7.20, p=0.1312, with much worse as the referent level with mean 7.58). As health compared to past year was rated good or better, the mean perceived ease of access values decreased, meaning the diabetic beneficiaries became less dissatisfied with their access to needed health care. In summary, beneficiaries who reported they had greater satisfaction with access to care when receiving care from a PCP versus non-PCP were older, more educated, receiving higher income, and experiencing better health compared to the past year. Those who were less satisfied with access to care were minorities and/or resided in rural areas.

Table 4.10 illustrates results of the multivariable linear regression used for assessing the relationship between provider type and perceived ease of access. Model 1 shows that the estimated regression coefficient for primary care provider was -0.057 (p=0.501). As variables were added in Models 2 and 3, the estimated regression coefficients were -0.115 (p=0.178) and -0.087 (p=0.302), respectively. This suggests that lower mean values for satisfaction were due to control variables. Race, education, and metro status were significant at all levels in each model they were present. For example, the estimated regression coefficient for Non-Hispanic black, Hispanic, and Other ranged from 0.31 to 0.60 in models 2 and 3, revealing that Non-Hispanic blacks were more dissatisfied with access to care than Non-whites. Education among diabetic beneficiaries at the high school level had -0.24 (p=0.0215) and -0.20 (p=0.0475) coefficients for

models 2 and 3, respectively. Education beyond high school had estimated effects of -0.33 (p=0.0031) and -0.27 (p=0.0192) for models 2 and 3, respectively. Metro status also had a comparable estimate of -0.36 (p<0.0001). The small yet significant increases in estimates show that adjusting for more personal characteristics was associated with perceived ease of access though provider type was not.

Table 4.10 also has covariates which are significant at a few levels instead of all levels. Age was not significant for age group ≥75 with an estimate of -0.25 (p=0.0806) in model 3, while model 1 has an estimate of -0.32. Again, the estimate increases in value as more personal characteristics were added. Other age groups had coefficients ranging from -0.30 to -0.41, with an increase in mean perceived ease of access as more variables were added to the model. Health compared to past year was another variable which was not significant at all levels. Beneficiaries who indicated that their health compared to the past year was somewhat worse experienced a -0.35 change in their satisfaction with access to care. Other diabetic beneficiaries who reported that their health compared to the past year was about the same (-0.79, p=0.0017), somewhat better (-0.99, p=0.0003), or much better (-1.40, p<0.0001) showed decreasing means (or increasing satisfaction levels) as they reported health was better. Healthier beneficiaries were more satisfied with access to care.

Table 4.10 reports Model 1 showing the unadjusted relationship between perceived ease of access and provider type. Model 2 shows coefficients when adjusting for age, sex, race, education, and income. Model 3 added marital status, metro status, and health compared to past year. In the end, the multivariate analyses confirmed results of the bivariate analysis by showing that there was no significant association between

provider type and perceived ease of access among Medicare beneficiaries with diabetes. Therefore, there is not sufficient evidence for hypothesis 4 claiming that Medicare beneficiaries with diabetes experience greater perceived ease of access when receiving care from PCPs versus non-PCPs.

Table 4.1 Medicare Beneficiaries Diagnosed with Diabetes (n=3979), by study inclusion status, 2013 Medicare Current Beneficiary Survey

	Included (n=2591)		**Excluded** (n=1388)		**P-value**
	%	**SE%**	**%**	**SE%**	
Hypothesized Independent Variables					
Insurance Type					<0.0001
Part D	78.0	1.09	63.2	1.41	
Non-Part D	22.0	1.09	36.8	1.41	
Provider Type					0.0510
PCP	56.2	1.13	59.9	1.69	
Non-PCP	43.8	1.13	40.1	1.69	
Predisposing Characteristics					
Age					
<65	20.3	1.12	18.1	1.28	0.3447
65-74	45.3	1.12	47.6	1.75	
≥75	34.4	0.96	34.3	1.29	
Sex					0.0204
Male	48.4	1.20	52.6	1.46	
Female	51.6	1.20	47.4	1.46	
Race					0.3733
Non-Hispanic White	67.3	1.20	65.4	1.42	
Non-Hispanic Black	13.1	0.67	12.4	0.92	
Hispanic	11.8	0.92	13.1	1.19	
Other	7.8	0.82	9.1	0.89	
Education					0.8774
Less than High school	23.5	1.06	23.6	1.22	
High school, vocational, technical, business, etc.	35.2	1.10	34.2	1.55	
More than High school	41.3	1.10	42.2	1.73	
Marital Status					0.0062
Married	55.3	1.16	48.8	1.57	
Widowed	21.4	0.77	23.2	1.36	
Divorced/Separated	16.2	0.61	19.5	1.15	
Never married	7.2	0.72	8.5	0.99	
Medicare Status					0.1496
Aged	79.7	1.12	82.3	1.34	
Disabled	20.3	1.12	17.7	1.34	
Enabling Characteristics					
Income					0.0297
<$25,000	48.7	1.03	53.5	1.85	
≥$25,000	51.3	1.03	46.5	1.85	
Metro Status					0.6842
Metro area	77.9	0.78	78.4	1.16	
Non-metro area	22.1	0.78	21.6	1.16	
Perceived Health Need					
Health Compared to Past Year					
Much better					0.2337
Somewhat better	6.6	0.61	6.6	0.69	

About the same	12.7	0.77	10.9	1.04	
Somewhat worse	53.2	1.12	56.0	1.37	
Much worse	21.8	1.11	22.2	1.05	
	5.8	0.56	4.4	0.57	

Table 4.2 Satisfaction with access to care and costs of care, Medicare Beneficiaries with Diabetes (n=2591), Medicare Current Beneficiary Survey 2013

	Included (n=2591)		**Excluded (n=1388)**		**P-value**
	%	**SE%**	**%**	**SE%**	
Ordinal Dependent Variables					
Access					
Very Satisfied	15.6	0.93	15.9	2.34	0.0779
Satisfied	73.5	1.09	68.3	3.07	
Dissatisfied	10.9	0.89	15.8	2.36	
Cost					
Very Satisfied	12.0	0.82	11.4	1.26	0.2224
Satisfied	60.0	1.10	63.9	2.00	
Dissatisfied	28.0	1.01	24.7	1.89	
Continuous Latent Dependent Variables			**Mean(SE)**		**95% CI**
Perceived Ease of Access			6.79(0.04)		6.71-6.87
Ease/convenience getting to doctor from home					
Health care needs met at same location					
Available care by specialists					
Finding a pharmacy accepting prescription					
Perceived Cost			5.83(0.04)		5.75-5.91
Prescription plan/drugs covered					
Out of pocket costs for medical services					
Amount paid for prescription drugs					

Table 4.3 Beneficiary characteristics by Insurance Type, Medicare Beneficiaries with Diabetes (n=2591), Medicare Current Beneficiary Survey 2013

Unweighted Observations (n=2591)	**Part D**		**Non-Part D**		**P-value**
	%	**SE%**	**%**	**SE%**	
Hypothesized Dependent Variables					
Perceived Ease of Access					0.1875
Very Satisfied	14.9	0.98	18.1	1.82	
Satisfied	73.7	1.31	72.7	2.07	
Dissatisfied	11.4	0.98	9.20	1.66	
Perceived Cost					0.0004
Very Satisfied	10.4	0.78	18.0	2.24	
Satisfied	60.4	1.14	58.6	2.87	
Dissatisfied	29.2	1.01	23.4	2.63	
Predisposing Characteristics					
Age					0.0111
<65	22.2	1.26	13.7	2.59	

65-74	43.8	1.30	50.4	2.79	
≥75	34.0	1.07	35.9	2.50	
Sex					<0.0001
Male	45.8	1.28	57.3	2.50	
Female	54.2	1.28	42.7	2.50	
Race					0.0481
Non-Hispanic White	66.2	1.28	71.3	2.64	
Non-Hispanic Black	13.0	0.71	13.4	1.63	
Hispanic	13.2	1.05	6.9	1.94	
Other	7.6	0.80	8.3	1.98	
Education					<0.0001
Less than High school	26.3	1.18	13.8	1.84	
High school, vocational, technical, business, etc.	37.5	1.21	26.9	2.41	
More than High school	36.2	1.16	59.3	2.56	
Marital Status					<0.0001
Married	51.0	1.28	70.3	2.26	
Widowed	21.5	0.92	21.1	2.18	
Divorced/Separated	18.8	0.79	6.8	1.27	
Never married	8.7	0.86	1.8	0.69	
Enabling Characteristics					
Income					<0.0001
<$25,000	56.0	1.18	23.0	2.17	
≥$25,000	44.0	1.18	77.0	2.17	
Metro Status					0.1734
Metro area	77.2	0.92	80.0	1.70	
Non-metro area	22.8	0.92	20.0	1.70	
Perceived Health Need					
Health Compared to Past Year					0.0164
Much better	6.2	0.61	7.9	1.47	
Somewhat better	13.1	0.86	11.1	1.58	
About the same	51.8	1.22	58.2	2.56	
Somewhat worse	22.4	1.16	19.8	2.00	
Much worse	6.5	0.70	3.0	0.97	

Table 4.4 Factors associated with Perceived Cost among Medicare Beneficiaries with Diabetes, MCBS 2013 ATC PUF

	LSMEANS (SE)	**Reg Coeff Est**	**SE**	**P-value**
Hypothesized Independent Variable				
Provider Type				
PCP	5.82(0.05)	-0.042	0.083	0.6134
Non-PCP (reference)	5.86(0.06)			
Insurance Type				
Part D	5.94(0.05)	0.504	0.107	<0.0001
Non-Part D (ref)	5.44(0.10)			
Predisposing Characteristics				
Age				

<65 (reference)	6.19(0.11)			
65-74	5.73(0.06)	-0.452	0.130	0.0005
≥75	5.76(0.05)	-0.429	0.126	0.0007
Sex				
Male (reference)	5.84(0.06)			
Female	5.82(0.05)	-0.021	0.083	0.8047
Race				
Non-Hispanic White (reference)	5.78(0.05)			
Non-Hispanic Black	6.03(0.10)	0.252	0.110	0.0217
Hispanic	5.84(0.14)	0.066	0.147	0.6527
Other	6.01(0.17)	0.231	0.175	0.1873
Education				
Less than High school (reference)	5.95(0.07)			
High school, vocational, technical, business, etc.	5.81(0.07)	-0.139	0.099	0.1576
More than High school	5.79(0.07)	-0.155	0.100	0.1185
Marital Status				
Married	5.84(0.06)	-0.022	0.191	0.9094
Widowed	5.76(0.07)	-0.103	0.195	0.5958
Divorced/Separated	5.88(0.09)	0.011	0.204	0.9565
Never married (reference)	5.87(0.18)			
Enabling Characteristics				
Income				
<$25,000 (reference)	5.89(0.06)			
≥$25,000	5.78(0.06)	-0.107	0.082	0.1935
Metro Status				
Metro area	5.81(0.05)	-0.086	0.092	0.3488
Non-metro area (reference)	5.90(0.08)			
Perceived Health Need				
Health Compared to Past Year				
Much better	5.36(0.16)	-1.045	0.237	<0.0001
Somewhat better	5.86(0.14)	-0.540	0.220	0.0144
About the same	5.77(0.05)	-0.633	0.181	0.0005
Somewhat worse	5.96(0.09)	-0.444	0.196	0.0239
Much worse (reference)	6.40(0.17)			

Table 4.5 Relationship between Insurance Type and Perceived Cost among Medicare Beneficiaries Diagnosed with Diabetes, unadjusted and adjusted estimates, Medicare Current Beneficiary Survey 2013

	Model 1		**Model 2**		**Model 3**	
	Est Reg Coeff (SE)	P-value	Est Reg Coeff (SE)	P-value	Est Reg Coeff (SE)	P-value
Part D Non-Part D (ref)	0.504(0.107)	<0.0001	0.514(0.108)	<0.0001	0.515(0.110)	<0.0001
Age <65 (ref) 65-74 ≥75			 -0.43(0.133) -0.41(0.127)	 0.0011 0.0012	 -0.41(0.140) -0.41(0.138)	 0.0036 0.0032
Sex Male (ref) Female			 -0.04(0.084)	 0.6704	 -0.03(0.087)	 0.7726
Race Non-Hispanic White (ref) Non-Hispanic Black Hispanic Other			 0.21(0.113) -0.03(0.154) 0.23(0.176)	 0.0659 0.8352 0.1905	 0.26(0.114) -0.03(0.153) 0.26(0.171)	 0.0208 0.8254 0.1263
Education Less than High school (ref) High school, vocational, technical, business, etc. More than High school			 -0.14(0.107) -0.11(0.107)	 0.1784 0.2972	 -0.13(0.107) -0.08(0.109)	 0.2407 0.4486
Income <$25,000 (ref) ≥$25,000			 0.15(0.093)	 0.1114	 0.11(0.101)	 0.2831
Marital Status Married Widowed Divorced/Separated Never married (ref)					 0.31(0.202) 0.26(0.202) 0.16(0.205)	 0.1264 0.1916 0.4301

Metro Status Metro area Non-metro area (ref)					-0.07(0.090)	0.4493
Health Compared to Past Year Much better Somewhat better About the same Somewhat worse Much worse (ref)					 -0.94(0.241) -0.48(0.221) -0.52(0.185) -0.39(0.198)	 0.0001 0.0306 0.0048 0.0462

Table 4.6 Factors associated with Perceived Ease of Access among Medicare Beneficiaries with Diabetes, MCBS 2013 ATC PUF

	LSMEANS (SE)	Reg Coeff Est	SE	P-value
Hypothesized Independent Variable				
Provider Type				
PCP	6.77(0.06)	-0.057	0.085	0.5012
Non-PCP (reference)	6.83(0.06)			
Insurance Type				
Part D	6.85(0.05)	0.279	0.107	0.0091
Non-Part D (ref)	6.57(0.10)			
Predisposing Characteristics				
Age				
<65 (reference)	7.20(0.12)			
65-74	6.63(0.06)	-0.574	0.135	<0.0001
≥75	6.77(0.05)	-0.430	0.130	0.0009
Sex				
Male (reference)	6.80(0.06)			
Female	6.78(0.06)	-0.022	0.084	0.7968
Race				
Non-Hispanic White (reference)	6.62(0.05)			
Non-Hispanic Black	7.22(0.09)	0.607	0.102	<0.0001
Hispanic	7.14(0.13)	0.527	0.135	<0.0001
Other	7.07(0.17)	0.458	0.180	0.0108
Education				
Less than High school (reference)	7.13(0.07)			
High school, vocational, technical, business, etc.	6.75(0.07)	-0.378	0.099	0.0001
More than High school	6.63(0.07)	-0.499	0.100	<0.0001
Marital Status				
Married	6.70(0.06)	-0.167	0.195	0.3922
Widowed	6.87(0.07)	0.011	0.200	0.9579
Divorced/Separated	6.98(0.11)	0.115	0.215	0.5913
Never married (reference)	6.86(0.19)			
Enabling Characteristics				
Income				
<$25,000 (reference)	7.02(0.06)			
≥$25,000	6.58(0.06)	-0.444	0.083	<0.0001
Metro Status				
Metro area	6.72(0.05)	-0.310	0.091	0.0006
Non-metro area (reference)	7.03(0.08)			
Perceived Health Need				
Health Compared to Past Year				
Much better	6.10(0.15)	-1.486	0.284	<0.0001
Somewhat better	6.53(0.12)	-1.054	0.268	<0.0001
About the same	6.69(0.05)	-0.892	0.245	0.0003
Somewhat worse	7.20(0.09)	-0.386	0.256	0.1312
Much worse (reference)	7.58(0.24)			

Table 4.7 Relationship between Insurance Type and Perceived Ease of Access among Medicare Beneficiaries Diagnosed with Diabetes, unadjusted and adjusted estimates, Medicare Current Beneficiary Survey 2013

	Model 1		**Model 2**		**Model 3**	
	Est Reg Coeff (SE)	P-value	Est Reg Coeff (SE)	P-value	Est Reg Coeff (SE)	P-value
Part D Non-Part D (ref)	0.279(0.107)	0.0091	0.144(0.109)	0.1841	0.133(0.110)	0.2203
Age <65 (ref) 65-74 ≥75			 -0.41(0.142) -0.31(0.136)	 0.0039 0.0235	 -0.30(0.141) -0.25(0.140)	 0.0322 0.0803
Sex Male (ref) Female			 -0.10(0.084)	 0.2287	 -0.14(0.084)	 0.0967
Race Non-Hispanic White (ref) Non-Hispanic Black Hispanic Other			 0.48(0.108) 0.31(0.148) 0.37(0.183)	 <0.0001 0.0333 0.0409	 0.60(0.110) 0.40(0.146) 0.45(0.174)	 <0.0001 0.0067 0.0092
Education Less than High school (ref) High school, vocational, technical, business, etc. More than High school			 -0.24(0.105) -0.31(0.111)	 0.0257 0.0056	 -0.20(0.103) -0.24(0.113)	 0.0556 0.0310
Income <$25,000 (ref) ≥$25,000			 -0.16(0.101)	 0.1149	 -0.11(0.105)	 0.3108
Marital Status Married Widowed Divorced/Separated Never married (ref)					 0.19(0.211) 0.33(0.217) 0.23(0.220)	 0.3740 0.1328 0.3028

Metro Status Metro area Non-metro area (ref)					-0.36(0.089)	<0.0001
Health Compared to Past Year Much better Somewhat better About the same Somewhat worse Much worse (ref)					-1.39(0.285) -0.99(0.272) -0.78(0.250) -0.33(0.261)	<0.0001 0.0003 0.0018 0.2034

Table 4.8 Beneficiary Characteristics by Provider Type, Medicare Beneficiaries with Diabetes (n=2591), Medicare Current Beneficiary Survey 2013

Unweighted Observations (n=2591)	**Primary Care Physician (PCP)**		**Non-Primary Care Physician (Non-PCP)**		**P-value**
	%	**SE%**	**%**	**SE%**	
Hypothesized Dependent Variables					
Perceived Ease of Access					0.3967
Very Satisfied	15.1	1.16	16.2	1.31	
Satisfied	74.7	1.24	72.0	1.74	
Dissatisfied	10.2	1.07	11.8	1.32	
Perceived Cost					0.8051
Very Satisfied	11.8	1.07	12.3	1.14	
Satisfied	60.7	1.53	59.1	1.77	
Dissatisfied	27.5	1.39	28.6	1.68	
Predisposing Characteristics					
Age					0.3260
<65	20.2	1.53	20.5	1.78	
65-74	47.0	1.70	43.1	1.93	
≥75	32.8	1.35	36.4	1.71	
Sex					0.0384
Male	46.0	1.70	51.4	1.86	
Female	54.0	1.70	48.6	1.86	
Race					0.0039
Non-Hispanic White	64.1	1.65	71.4	1.83	
Non-Hispanic Black	14.8	1.10	10.9	1.12	
Hispanic	11.7	1.23	12.1	1.37	
Other	9.4	1.19	5.6	0.90	
Education					0.0008
Less than High school	26.6	1.54	19.6	1.23	
High school, vocational, technical, business, etc.	34.5	1.46	36.0	1.65	
More than High school	38.9	1.53	44.4	1.59	
Marital Status					0.2021
Married	53.0	1.69	58.1	1.98	
Widowed	22.3	1.12	20.2	1.33	
Divorced/Separated	17.4	0.95	14.7	1.13	
Never married	7.3	0.92	7.0	1.00	
Enabling Characteristics					
Income					0.0110
<$25,000	51.8	1.57	44.7	1.89	
≥$25,000	48.2	1.57	55.3	1.89	
Metro Status					0.2645
Metro area	77.0	1.19	79.0	1.20	
Non-metro area	23.0	1.19	21.0	1.20	
Perceived Health Need					
Health Compared to Past Year					0.0095
Much better	7.5	0.85	5.3	0.77	
Somewhat better	12.5	1.21	13.0	1.05	
About the same	55.2	1.44	50.7	1.65	

Somewhat worse	18.7	1.41	25.7	1.57	
Much worse	6.1	0.82	5.3	1.00	

Table 4.9 Relationship between Provider Type and Perceived Cost among Medicare Beneficiaries Diagnosed with Diabetes, unadjusted and adjusted estimates, Medicare Current Beneficiary Survey 2013

	Model 1		**Model 2**		**Model 3**	
	Est Reg Coeff (SE)	P-value	Est Reg Coeff (SE)	P-value	Est Reg Coeff (SE)	P-value
PCP Non-PCP (ref)	-0.042(0.083)	0.613	-0.063(0.084)	0.451	-0.050(0.083)	0.550
Age <65 (ref) 65-74 ≥75			 -0.44(0.132) -0.43(0.126)	 0.0008 0.0005	 -0.40(0.139) -0.40(0.136)	 0.0040 0.0033
Sex Male (ref) Female			 -0.01(0.084)	 0.8618	 -0.002(0.087)	 0.9811
Race Non-Hispanic White (ref) Non-Hispanic Black Hispanic Other			 0.179(0.112) -0.03(0.153) 0.21(0.173)	 0.1099 0.8351 0.2144	 0.23(0.114) -0.03(0.152) 0.25(0.169)	 0.0438 0.8235 0.1460
Education Less than High school (ref) High school, vocational, technical, business, etc. More than High school			 -0.14(0.106) -0.17(0.109)	 0.1711 0.1176	 -0.13(0.106) -0.15(0.110)	 0.2234 0.1863
Income <$25,000 (ref) ≥$25,000			 0.05(0.092)	 0.6159	 0.02(0.099)	 0.8578
Marital Status Married Widowed Divorced/Separated Never married (ref)					 0.24(0.200) 0.17(0.199) 0.14(0.204)	 0.2373 0.3894 0.4968

Metro Status Metro area Non-metro area (ref)					-0.08(0.091)	0.4018
Health Compared to Past Year Much better Somewhat better About the same Somewhat worse Much worse (ref)					 -0.98(0.243) -0.50(0.224) -0.56(0.189) -0.43(0.202)	 <0.0001 0.0274 0.0032 0.0339

Table 4.10 Relationship between Provider Type and Perceived Ease of Access among Medicare Beneficiaries Diagnosed with Diabetes, unadjusted and adjusted estimates, Medicare Current Beneficiary Survey 2013

	Model 1		**Model 2**		**Model 3**	
	Est Reg Coeff (SE)	P-value	Est Reg Coeff (SE)	P-value	Est Reg Coeff (SE)	P-value
PCP Non-PCP (ref)	-0.057(0.085)	0.501	-0.115(0.085)	0.178	-0.087(0.084)	0.302
Age <65 (ref) 65-74 ≥75			 -0.41(0.142) -0.32(0.136)	 0.0041 0.0207	 -0.30(0.141) -0.25(0.140)	 0.0350 0.0806
Sex Male (ref) Female			 -0.09(0.084)	 0.2778	 -0.13(0.084)	 0.1196
Race Non-Hispanic White (ref) Non-Hispanic Black Hispanic Other			 0.48(0.108) 0.31(0.148) 0.38(0.185)	 <0.0001 0.0348 0.0383	 0.60(0.110) 0.40(0.146) 0.46(0.176)	 <0.0001 0.0069 0.0090
Education Less than High school (ref)						

High school, vocational, technical, business, etc.			-0.24(0.105)	0.0215	-0.20(0.103)	0.0475
More than High school			-0.33(0.113)	0.0031	-0.27(0.114)	0.0192
Income						
<$25,000 (ref)						
≥$25,000			-0.19(0.096)	0.0465	-0.13(0.101)	0.1887
Marital Status						
Married					0.17(0.211)	0.4229
Widowed					0.30(0.216)	0.1602
Divorced/Separated					0.22(0.220)	0.3117
Never married (ref)						
Metro Status						
Metro area					-0.36(0.089)	<0.0001
Non-metro area (ref)						
Health Compared to Past Year						
Much better					-1.40(0.29)	<0.0001
Somewhat better					-0.99(0.27)	0.0003
About the same					-0.79(0.25)	0.0017
Somewhat worse					-0.35(0.26)	0.1847
Much worse (ref)						

CHAPTER 5

DISCUSSION

5.1 BACKGROUND

Focusing on perceived cost using Part D versus non-Part D is a distinction from previous studies which focused on actual costs using Medicare, Medicaid, private insurance, and/or the uninsured or Medicare FFS vs. Medicare Advantage. Exploring the relationship between provider type (PCP vs. non-PCP) and perceived cost among Medicare beneficiaries with diabetes was also unique as no studies were found examining this specific relationship. Most studies examined actual cost in terms of provider type, which was then within the context of a primary care physician vs. specialist comparison (Everett et al., 2013; Raji et al., 2016; Sloan et al., 2010). Though a lot of literature discusses primary care physicians and health care access, the studies examine which physician type has better outcomes within the context of patients receiving recommended tests (Rosenblatt et al., 2001; Chin et al., 2000) or which physician type has better referral access (Lyons et al., 2015; Diamantidis et al., 2011).

5.2 SUMMARY OF FINDINGS

Our analysis used both univariate and bivariate analyses to assess whether there was a relationship between first, insurance type and perceived ease of access or cost and second, between provider type and perceived ease of access or cost. The study results showing a significant relationship (Tables 4.4 and 4.5) between insurance type and perceived cost confirm findings from other studies concluding that poor medication

adherence or delayed receipt of care is linked to patient perceived cost burden or financial barriers (Polonsky et al., 2016; Moore et al., 2013). The significance of the association between insurance type and perceived cost did not change as predisposing, enabling, and need variables were added to the unadjusted model.

However, the significance of the association between insurance type and perceived ease of access did change as those predisposing, enabling, and need variables were added to the unadjusted model. The unadjusted model between insurance type (i.e., Part D vs. non-Part D) and perceived ease of access confirmed study findings of Ng et al. (2010) who determined that health insurance coverage differences were significantly associated with delays in care. Beatty et al. (2001) determined Medicare beneficiaries with disabilities in HMOs perceive better access to primary care services than those with traditional Medicare coverage.

For assessing the relationship between provider type and perception of cost and ease of access, the bivariate analyses were performed using the chi-square test of independence and least square means. Both analyses revealed that there was no significant relationship between provider type and perceived cost or between provider type and perceived ease of access.

5.3 CONCLUSIONS

Though no significant relationship exists between provider type and perceived cost and ease of access, we know this population is going to the doctor for evaluation and management visits. Once at these visits, diabetic beneficiaries receive instructions that often involve getting a prescription, and this is where perception of cost and ease of access become evident. Filling the prescription is not only determined by actual cost

relative to beneficiaries' financial resources, but also perceived cost relative to out of pocket expenses which are calculated after using financial resources such as insurance and personal income.

Diabetic beneficiaries need and want health care services, but often feel incapable of getting what they need to self-manage diabetes due to perceptions of costs and ease of access afforded by insurance, specifically Part D coverage. Since we found that perceived cost is so important to diabetic beneficiaries as it relates to insurance type, we can infer that they require frequent use of medicines costing them more money than they can afford over time. Zhang et al. (2013) and Polinski et al. (2010) prove this cost burden in their findings that beneficiaries quickly reach the drug coverage gap and then decrease the use of brand-named prescriptions, resorting to generic medications or no medications. Cohen et al (2015) found that Medicare beneficiaries aged 65 and over had not taken prescriptions to save money.

In conclusion, insurance type matters for Medicare beneficiaries diagnosed with diabetes but provider type does not in terms of their level of satisfaction with either having Part D coverage or receiving care from primary care physicians. This suggests that financial barriers are influential on beneficiaries' satisfaction with health care experiences, while seeing a specific type of provider has no significant influence on their satisfaction with those same experiences. Age, race, and health compared to past year were significant predictors of perception (of both cost and ease of access) in all models, while education was only a significant predictor when perceived ease of access was an outcome in models. The consistency of these explanatory variables across models suggests that personal characteristics warrant further research of their relationship to

beneficiaries' thoughts, beliefs, perceived behavioral control, and ultimately health service use of needed diabetes-related care.

5.4 STUDY LIMITATIONS

Our study has several limitations. Factors that may impact the results of the study or how the results are interpreted include the population from which the sample was drawn. The data source MCBS consists of a population of community-dwelling Medicare beneficiaries. Therefore, study results may not be generalizable. Also, perception changes, and the data are cross-sectional reflecting perception at one moment in time. Therefore, the study results don't capture the dynamic nature of people's perceptions which change based on attitude, knowledge, health outcomes, and the provider-patient interaction experience.

The dynamic nature of perception allows for recall bias during self-reporting. Administrative data for identifying respondents with Part D was used because self-reported responses for Part D coverage had an unusually low number. This low number may be attributed to beneficiaries excluding other sources that MCBS considered as prescription drug coverage such as Medicare Advantage, private insurance plans, or other public plans. Though beneficiaries did not consider such plans as being covered with Part D, there were MCBS Likert items within the hypothesized latent dependent variables (perceived ease of access and perceived cost) suggesting any prescription drug plan was considered as having Part D coverage. Therefore, we must be aware that Part D does include private, public, or Medicare Advantage prescription plans as we interpret results. Another reason for the differences in self-reporting and administrative reporting may be

the wording of the question since the MCBS question asks specifically "Enrolled in a Part D Plan" which a beneficiary may interpret as meaning enrolled only Medicare Part D.

In addition to the administrative report of Part D being inclusive of other sources of prescription coverage, the insurance coverage costs within Part D change. Therefore, we may have beneficiaries who have responded when in either the initial coverage limit period or during the coverage gap, a period in which beneficiaries are required to pay more for prescriptions. This would influence perception of cost, if the study sample consisted of beneficiaries in different coverage periods. In 2013, beneficiaries had an initial coverage limit of $2,970 and their coverage gap ended when they had spent $4,750 (Hoadley, Summer, Hargrave, & Cubanski, 2013). In 2018, beneficiaries are required to pay a higher percentage of their drug costs once they have spent $3,750 for the year, thereby entering the coverage gap which ends once beneficiaries will have spent $5,000. The fluctuating or increasing cost sharing amounts may cause diabetic beneficiaries to forgo or delay obtaining and taking medications. Joyce, Zissimopoulos, & Goldman (2013) found that the coverage gap does disrupt the use of prescription drugs among seniors with diabetes, with modest declines in usage concentrated among higher cost, brand-name medications.

Regarding provider type, the MCBS question asked only about the most recent visit to a doctor and this visit excluded home or hospital visits. When diabetic beneficiaries responded to this question, they may have had selective memory and only considered the most pleasant recent visit. This would cause more beneficiaries to respond with having had a satisfactory visit, thereby skewing the results of the study. If beneficiaries did accurately remember their most recent visit, then the most recent visit

could have been atypical of their usual experience, thereby skewing the results of the study in either direction.

When making inferences from findings, we must consider the components of the latent dependent variables. Perceived ease of access consisted of only one Likert item related to prescriptions while the other 3 Likert items were related to doctor visits. Therefore, perceived ease of access may have more systematic bias when examining provider type than when examining insurance type (i.e., Part D vs. non-Part D). Perceived cost consisted primarily of prescription-related Likert items, with two Likert items directly involving prescription drugs and the other Likert item involving medical services. This would lead to results more favorable towards insurance type than provider type.

In addition to considering the Likert items within each latent dependent variable, we must account for the loss of information as perceived ease of access and perceived cost were transformed from ordinal to continuous and back to ordinal. The MCBS data were ordinal but had to be transformed to continuous for use in a multivariable linear regression. When in the continuous form, the chi-square analyses tests could not be performed. During the transformation from continuous back to ordinal, data manipulation occurred resulting in only 3 ordinal levels instead of 4. Though the ordinal variables appeared to have been normally distributed, the statistical results due to fewer ordinal levels may show bias estimates of Medicare beneficiaries being satisfied with perceived cost or ease of access.

Covariates also contribute to study limitations. Medicare status was not used in either one of the regression models as intended because it was collinear with the variable

age. However, the sample does account for Medicare status by including both the aged (n=2116) and disabled (n=475) respondents. These disabled respondents were under age 65 and used as the referent level. Using only the aged respondents may have had different results, which may impact our hypothesized variables because the sample size would be smaller. The variable income consisted of two levels, <$25,000 and ≥$25,000, of which 42% of diabetic beneficiaries had their income imputed. Further study would require examining not only accurate income levels, but also more than two income levels to determine if and how policies related to increasing financial resources would impact perceived cost. Finally, the sample of beneficiaries were grouped together according to a diabetes diagnosis which included all types of diabetes. Further study may reveal differences among types of diabetes within the Medicare population as related to having Part D or receiving care from a PCP.

The primary strength of our study is addressing the research gaps with a real-world model integrating Andersen's Healthcare Utilization Behavioral Model and Ajzen's Theory of Planned Behavior Model to conceptualize the relationship of perceived behavioral control with insurance or provider type. Research typically focus on health care utilization regarding predisposing, enabling, and need variables or thought patterns captured in beliefs, norms, and perception. Integrating the two models leads to further research examining the "upstream" factors that may contribute to diabetic beneficiaries being satisfied or dissatisfied with receiving timely appropriate health care. Those upstream factors may include social or economic policies that have trickle-down effects on enabling characteristics such as available transportation in urban versus rural

areas or financial resources such as income and insurance used to pay for needed health care services.

5.5 IMPLICATIONS

Findings in this study will help policymakers, health care providers, and public health professionals develop policies that facilitate greater perceived ease of access and better perceived cost among Medicare beneficiaries diagnosed with diabetes. This study will also complement existing research on provider's or health care system's perspectives of patient health or patient health care. It is needed as a complement because diabetes is largely managed by patients who are most knowledgeable of their reasons for receiving or not receiving timely appropriate health care. Studies focused on beneficiaries' perceptions will enhance stakeholders' ability to design new policies or re-design existing policies with the goal of being more comprehensive and patient-centered, enabling diabetic beneficiaries to be active participants on their health care team managing their care with increased volition.

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