2016

Examining The Relationship Among Patient-Centered Communication, Patient Engagement, And Patient's Perception Of Quality Of Care In The General U.S. Adult Population

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Recommended Citation

Wang, J.(2016). *Examining The Relationship Among Patient-Centered Communication, Patient Engagement, And Patient's Perception Of Quality Of Care In The General U.S. Adult Population.* (Doctoral dissertation). Retrieved from https://scholarcommons.sc.edu/etd/3869

EXAMINING THE RELATIONSHIP AMONG PATIENT-CENTERED COMMUNICATION, PATIENT ENGAGEMENT, AND PATIENT'S PERCEPTION OF QUALITY OF CARE IN THE GENERAL U.S. ADULT POPULATION

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Submitted in Partial Fulfillment of the Requirements

For the Degree of Doctor of Philosophy in

Health Services Policy and Management

The Norman J. Arnold School of Public Health

University of South Carolina

2016

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ACKNOWLEDGEMENTS

I would like to express my deep gratitude to several individuals who inspired and supported me during my doctoral studies.

I am thankful to my committee chair, Dr. Rajendra Singh, for his support, encouragement, and guidance throughout the dissertation process. I would also like to express my appreciation to my committee members, Drs. Janice C. Probst, Elizabeth A. Regan, and Kevin J. Bennett for always being available to share their expertise. I am inspired by their passion to improve healthcare delivery. Their valuable comments and suggestions during different stages of the dissertation helped greatly to improve this document. I feel fortunate to have had such a supporting dissertation committee.

Finally, I am thankful to my wonderful family. I would like to especially thank my mother, Sunja Lee, who encouraged and supported me during my studies in the United States. I also express gratitude to my children, Yejin and Chanheum Park, for their understanding, patience, and support during my study abroad. Yejin and Chanheum thank you from the bottom of my heart; I love you so much.

ABSTRACT

Introduction: Patient-centered care is a major focus of healthcare organizations, policy makers, and researchers. Patient-centered communication by the provider and patient engagement are important components of patient-centered care. Despite increasing attention to these topics, we do not fully understand *how* patient-centered communication and patient engagement relate to perceived quality of care as reported by patients. This study takes some initial steps in exploring these relationships. The study also identifies patient-related factors such as sociodemographic, health-related, and health system factors that are associated with patient-centered communication, patient engagement, and perceived quality of care.

Method: This study used survey data from the 2013 Health Information National Trends Survey (HINTS), conducted from September to December 2013. The study population included non-institutionalized adults over 18 years of age who responded to all questions related to patient-centered communication, patient engagement, and perceived quality of care. A structured equation modeling analysis and a multivariate linear regression analysis were performed to analyze the weighted data.

Results: This study found that patient-centered communication was positively associated with patient engagement ($\beta = 0.29$, $p < .001$) which was, in turn, positively associated with perceived quality of care ($\beta = 0.06$, $p < .01$). Further, patient-centered communication was directly associated with perceived quality of care ($\beta = 0.71$, $p < .001$). Further, indirect relationship was found between patient-centered communication and perceived quality of care, with patient engagement mediating the relationship ($\beta = 0.01$, $p= 0.012$). In addition, compared to those aged 18-34 years old, individuals over 65 years were more likely to report having better patient-centered communication ($\beta = 1.56$, $p < .001$), better patient engagement ($\beta = 1.46$, $p < .000$), and better perceived quality of care ($\beta = 1.46$, $p = .002$). Compared to Non-Hispanic white respondents, Asian respondents reported having worse patient-centered communication ($\beta = - 2.30$, $p < .001$), worse patient engagement ($\beta = - 1.09$, $p < .05$), and worse quality of care ($\beta = - 0.45$, $p < .001$). Further, those who had a regular provider reported better patient-centered communication ($\beta =0.93$, $p < .01$) and better perceived quality of care ($\beta = 0.22$, $p < .001$) compared to their counterparts.

Conclusions: Patient engagement played an important role in the relationship between patient-centered communication and perceived quality of care. Moreover, the patient-related factors such as age, race/ethnicity, and having a regular provider were significant factors in patient-centered communication, patient engagement, and perceived quality of care. These findings can provide guidance to healthcare organizations on designing effective interventions towards patient-centered care.

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CHAPTER 1: INTRODUCTION

This chapter provides an introduction to patient-centered communication, patient engagement, and patient's perception of quality of care in healthcare delivery in the United States. It identifies the research objectives of this dissertation, summarizes the research method, and provides a brief summary of results.

In its 2001 report, *Crossing the Quality Chasm: A New Health System for the 21st Century*, the Committee on Quality of Health Care in America, Institute of Medicine, provided a strategic direction for redesigning the healthcare delivery system in the United States (IOM, 2001). In an effort to improve the quality of care, the IOM Report emphasized the need for fundamental reform to ensure that all Americans can receive healthcare that is safe, effective, patient-centered, timely, efficient, and equitable. Since the release of this groundbreaking report, there has been increased focus on patient-centered care, i.e., providing care that is respectful of and responsive to individual patient preferences, needs, and values and ensuring that patient values guide all clinical decisions (IOM, 2001). As a result, patients' perspectives in evaluating the quality of their care have received increasing attention by health care researchers and policy makers (Abrams, Nuzum, Mika, & Lawlor, 2011; R. M. Epstein & Street, 2011; Porter, 2010; Robinson, Callister, Berry, & Dearing, 2008).

The Patient Protection and Affordable Care Act (aka Affordable Care Act) of 2010 sought to increase access to high quality and affordable health care for all Americans. The law required the U.S. Department of Health and Human Services (HHS) in 2011 to establish the National Quality Strategy for Improvement in Health Care (NQS). The NQS included patient engagement and effective patient-provider communication as major priorities to improve quality of care in the U.S. (2011). Patient-centered communication and patient engagement are fundamental tools to enhance patient-centered care (Jennings, Heiner, Loan, Hemman, & Swanson, 2005; Robinson et al., 2008; Wanzer, Booth-Butterfield, & Gruber, 2004; Wensing, Jung, Mainz, Olesen, & Grol, 1998). Patient-centered care can lead to improved communication, encourage patient engagement, and result in improved quality of care (Beck, Daughtridge, & Sloane, 2002; Robinson et al., 2008). Under the Affordable Care Act, these shared aims and priorities of the NQS play an important role in improving the nation's health.

Patient's Perception of Quality of Care

Patient's perception of quality of care is a reflection of how the patient defines quality (Sofaer & Firminger, 2005). In fact, patients' perspectives have become increasingly important indicators to measure quality of care under a patient-centered health care environment. Attree (2001) described elements of 'good' quality of care from a patient's perspective in terms of nature of care provided (for example, how well the provider focused on the patient) and nature of provider-patient relationship (for example, whether the provider spent enough time with the patient). These attributes of patient's perception of quality of care play a critical role in guiding and monitoring quality improvement initiatives aimed at improving overall health care delivery (Browne, Roseman, Shaller, & Edgman-Levitan, 2010; Friedberg, SteelFisher, Karp, & Schneider, 2011; Goldstein, Cleary, Langwell, Zaslavsky, & Heller, 2001). In addition, patient's perception of quality of care is an important indicator of quality of care in public reporting and the current pay-for-performance reimbursement regime (Browne et al., 2010; Kolstad & Chernew, 2009; Price et al., 2014). Several studies have also shown that the perceived quality of care by patients plays an important role in determining the choice of providers and plans (Kolstad & Chernew, 2009; Price et al., 2014; Spranca et al., 2000), preventive services (Mohammed et al., 2016), and patient adherence to treatment advice (Bartlett, 2002; Brown, 2001; Gordon, Smith, & Dhillon, 2007).

An understanding of factors influencing patient's perception of quality of care—such as patient-centered communication and patient engagement—is important because patients are the primary stakeholders in health care. We examine these factors in the current study.

Patient-Centered Communication

An important component of patient-centered care is communication between the provider and the patient that is respectful of and responsive to the patient's needs, beliefs, values, and preferences (Barry & Edgman-Levitan 2012; Wynia & Matiasek, 2006). Following other studies, we refer to such communication as patient-centered communication (R. M. Epstein et al., 2005; R. M. Epstein & Street Jr, 2007).

The US National Cancer Institute's Strategic Plan for Leading the Nation in 2006 called for assessing the delivery of patient-centered communication as an important step towards improving cancer care. Several studies have demonstrated that patient-centered communication improves clinical outcomes in the management of diabetes and hypertension and in building trust between patient and provider (Bredart, Bouleuc, & Dolbeault, 2005). Moreover, improved patient-centered communication contributed to lower diagnostic testing costs (R. M. Epstein et al., 2005). Effective patient-centered communication can enhance patient empowerment and adherence to treatment (Baile & Aaron, 2005; R. M. Epstein & Street Jr, 2007; Flach et al., 2004). In general, more effective communication between physicians and patients contributes to a better provider-patient relationship, which affects patient's perception of quality of care and health outcomes (Rimal, 2001). Understanding patients' perception of provider communication may serve to develop system-level interventions aimed at eliminating communication disparities and improving patients' health outcomes (Calo, Ortiz, Colon, Krasny, & Tortolero-Luna, 2014). However, while the results of patient-centered communication have been documented, the precise mechanisms that lead to these results are not fully understood. There is, therefore, a need to improve our understanding of how patient-centered communication relates to patient engagement and patient's perception of quality of care.

Epstein and Street (2007) presented six core functions of the patient-centered communication: exchanging information, recognizing and responding to emotions, making decisions, enabling patient self-management, fostering healing relationships, and managing uncertainty. Drawing on Epstein and Street's (2007) framework, McCormack and colleagues (2011) proposed a comprehensive patient-centered communication framework. They included a crosscutting function that includes communication interaction quality in a team care model. This cross-cutting function considers spending enough time with the provider during a medical encounter as well as having enough privacy, and communicating about the roles and responsibilities. This dissertation uses McCormack's conceptual model (2011) to examine patient-centered communication.

Patient Engagement

Over the past decade, patient engagement has been widely accepted in health care as an important factor in improving patient's care experiences and enhancing the quality of care. Notably, since the urgent call to improve the health care system by the IOM's Committee in 2001 and the establishment of the National Quality Strategy by the U.S. Department of Health and Human Services in 2011, the focus on engaging patients and motivating them to play a more active role in their health care has substantially increased. Patient engagement refers to "the actions individuals must take to obtain the greatest benefit from the health care services available to them" (Holmes Rovner et al., 2010, p. 2). This definition focuses on individuals' behaviors related to health outcomes rather than on actions of professionals, policies, or institutions, and has been widely used by researchers and policy makers in designing initiatives to promote meaningful, active, and constructive involvements between patients and other stakeholders (Deverka et al., 2012; Devine et al., 2013; Guise et al., 2013; Haywood et al., 2014; Holroyd-Leduc, Lorenzetti, Straus, Sykes, & Quan, 2011).

The Center for Advancing Health (Holmes Rovner et al., 2010) developed *the Engagement Behavior Framework* regarding patients' behaviors during interactions with health care providers. The goals of this framework were to achieve individuals' desired benefits in their care and how to help health behavior research focus on any gaps or priorities for effective engagement behaviors. The framework outlines individuals' behaviors for communication with health care providers, and includes: preparing in advance a list of questions for health care providers before office visits; taking a list of all medications for discussion about their benefits and side effects; reporting on their medical history and health status accurately; and making sure that providers explain clearly any expectations and express any concerns about their care experiences.

Studies have shown that patient engagement is associated with high level of satisfaction with quality of care (Mead & Bower, 2000) and improved patient health and economic outcomes (Laurance et al., 2014). Based on a cross-national study, Osborn and Squires (2012) found that patients who were engaged in their own care reported higher quality and fewer errors. In another study, R. M. Epstein and Street Jr (2007) found that patient activation influences patient-provider communication. However, patient activation—which represents the patient’s capacity to engage in care-related activities (Carman et al., 2013)—is a narrower concept than patient engagement, which includes interventions to increase activation and promote positive patient behavior (James, 2013). Thus, current literature has examined patient engagement and its impact to some extent. However, very little is known about the mechanisms through which patient engagement relates to patient-provider communication (R. M. Epstein & Street Jr, 2007; Street, 2013) and to patient’s perception of quality of care. Therefore, there is a need to further investigate the relationships between patient engagement, patient-centered communication, and patient’s perception of quality of care.

Research Objectives

Many studies have identified that to improve patients’ perception of quality of care, effective patient-provider communication is crucial, regardless of health status (Arora, 2003b; Bickell, Neuman, Fei, Franco, & Joseph, 2012; Bredart et al., 2005;

Kleeberg et al., 2005; Mallinger, Griggs, & Shields, 2005). Further, there is a need for more studies on patient engagement and patient preferences associated with improved quality of care so that health care providers can design effective strategies to improve patients' care experiences and overall quality of care (Barello, Graffigna, Vegni, & Bosio, 2014; Laurance et al., 2014). However, few studies have examined how patient-centered communication is associated with patient engagement and patients' perception of quality of care (R. M. Epstein & Street Jr, 2007).

Therefore, the primary objective of this study was to examine the relationship among patient-centered communication, patient engagement, and perceived quality of care, as reported by patients drawn from the U.S. adult population. The secondary objective was to identify patient-related factors—such as socio-demographic, health-related, and health system factors—associated with patient-centered communication, patient engagement, and patients' perception of quality of care. Accordingly, our two research objectives were as follows:

1 – To examine the relationship among patient-centered communication, patient engagement, and patient's perception of quality of care

2 – To identify patient-related factors associated with patient-centered communication, patient engagement, and patient's perception of quality of care

Research Method

To examine the research questions, we draw on the 2013 Health Information National Trends Survey (HINTS) provided by the National Cancer Institute. The HINTS dataset is a secondary, cross-sectional survey of the nationally representative postal survey of the U.S. non-institutionalized adult (i.e., over 18 years old) population. To analyze the data, we used STATA 14 (StataCorp LP, College Station, TX, USA). Specifically, descriptive statistics, including frequencies, percentages, and patient ratings of patient-centered communication, patient engagement, and patients' perception of quality of care were estimated for each covariate using appropriate weights. Bivariate analysis assessed the relationships among patient-related characteristics, patient-centered communication, patient engagement, and patients' perception of quality of care. The sum of global rating of each patient-centered communication, patients' perception of quality of care and patient engagement was calculated for each covariate. Multivariate analyses were conducted as follows:

- Structural equation modeling (SEM) was performed to determine the relationship among patient-centered communication, patient engagement, and patient's perception of quality of care.
- Multivariate linear regressions were performed to identify the patient-related factors associated with patient-centered communication, patient engagement, and patient's perception of quality of care.

The Institutional Review Board of the University of South Carolina approved this research.

Summary of Results

The research findings suggest that patient-centered communication contributed to a positive and direct relationship with patients' perception of quality of care and patient engagement. Therefore, patient-provider communication behaviors, such as making decisions, enabling patient self-management, fostering health relationships, and spending enough time with providers were significant predictors of improved patient engagement as well as patients' perception of quality of care. Additionally, patient engagement played a mediator role in fostering a positive relationship between patient-centered communication and patients' perception of quality of care. Together, the research findings highlight the importance of patient-centered communication in improving patients' perception of quality of care through active patient engagement.

This study also identified the patient-related factors such as sociodemographic, health-related and health system factor associated with patient-centered communication, patient engagement, and patients' perception of quality of care. The results suggest that patient-related factors such as age, race/ethnicity, and having a regular provider were significantly associated with patient-centered communication, patient engagement, and patients' perception of quality of care. Specifically, among sociodemographic factors, respondents over 65 years old reported better patient-centered communication, patient engagement, and quality of care compared to respondents 18-34 years old. On the other hand, the Asian respondents reported poor patient-centered communication, patient engagement, and patients' perception of quality of care as compared to Non-Hispanic white respondents. This suggests a distinct racial disparity in patient-centered communication, patient engagement, and patients' perception of quality of care. Among health-related factors, patients who rated themselves Very Good or Excellent in terms of health status were significantly associated with improved patient centered communication and patients' perception of quality of care. Among the considered health system factors, having a regular provider was significantly associated with improved patient-centered communication and patients' perception of quality of care. The study also found that patients who had three or more visits to their provider during the previous 12 months were significantly associated with higher level of patient engagement. Overall, these findings emphasize the importance of various patient-related factors in improving health communication, patient engagement, and perceived quality of care.

CHAPTER 2: LITERATURE REVIEW

This chapter summarizes the empirical literature and theoretical frameworks related to this study. Specifically, it discusses the literatures related to patient-centered communication, patient engagement, and patients' perception of quality of care. Next, it presents the research gaps and the related research questions. The chapter concludes by proposing a conceptual model that illustrates the relationship among patient-centered communication, patient engagement and perceived quality of care, and includes patient-related factors that are associated with these three areas of interest.

Patient's Perception of Quality of Care

Driven by the IOM Report and the increasing challenge of improving health care delivery, incorporating patients' perspectives has become increasingly important (R. M. Epstein & Street, 2011; Porter, 2010; Robinson et al., 2008). As a result, health care researchers, administrators, providers, and policy makers have begun to focus on patients' perspectives in evaluating the quality of care (Abrams et al., 2011). Improving patients' perception of quality of care is one of the important ways to achieve patient-centered care. In fact, as Sofaer and Firminger (2005) have noted, how patients perceive the quality of care they receive is a reflection of how they define quality.

Several studies have reported that patients' perception of quality of care is affected by the nature and quality of their experiences with health care providers (Montague, Chen, Xu, Chewning, & Barret, 2013; Pandhi & Saultz, 2006; Williams, 1998). Attree (2001) described elements of good quality of care from a patient’s perspective in terms of the nature of care provided and the provider-patient relationship. Patients rated care as ‘good’ quality when the provider focused on the patient, engaged the patient in care, provided individualized care, and was willing to address the patient’s needs. Moreover, regarding the provider-patient relationship, patients rated ‘good’ quality of care when the provider considered the patient as a person, developed rapport, made efforts towards open communication, was available and accessible for advice and information, and spent enough time with the patient. According to Attree (2001), the most important characteristic of perceived good quality of care by the patient is open and engaging communication with patients, which involves listening and giving patients opportunity to talk and express their concerns.

Conceptual Models Relating to Patient’s Perception of Quality of Care

The conceptual model proposed by (Donabedian, 1966, 1988) is one of the earliest models that discussed quality of care. This model consists of structures, processes, and outcomes as components that influence the quality of care. In this model, structure refers to the attributes of the practice setting in which care occurs, and includes characteristics related to human resources (such as number and qualifications of providers), material resources (such as facilities and equipment), and organizational structure (such as medical staff organization, and reimbursement models). In his influential book, Donabedian (1980) emphasized that the structure is embedded in—and therefore influenced by—the external environment (which includes patients, societal values, politics, expectations, state of scientific discovery, and knowledge about patient care). Processes refer to what is actually done during care delivery; it includes the relationship between care activities and the results of the care activities. Finally, outcomes refer to changes in the patient's health status as well as the degree of patient's satisfaction with care. In this way, Donabedian emphasized patient satisfaction with care as an important component of quality of care.

Some studies have supported the importance of patients' perception of quality of care and patient satisfaction is a frequently used measure of quality of care (Crow et al., 2002; Sixma, Kerssens, Campen, & Peters, 1998). Sofaer and Firminger (2005) suggested, many studies have used patient satisfaction and patient's perception of quality of care interchangeably, which has led to conceptual confusion. In fact, satisfaction can be considered an example of a perception, but it is by no means the only example (Sofaer & Firminger, 2005). Researchers have considered patient satisfaction as "an outcome, either to assess the value of a new intervention or to identify patient characteristics that appear to influence quality assessment" (Sofaer & Firminger, 2005, p. 517). Although patient satisfaction is not the only patient assessment of care, it has been predominantly used by healthcare researchers (Sofaer & Firminger, 2005). The patient satisfaction construct has also been utilized by health plans, hospitals, and other providers to assess the satisfaction of their members or patients with their services. Satisfaction is a relative concept that can be defined as fulfilling expectations, needs, or desires (Sitzia & Wood, 1997), but not necessarily implying superior service (only adequate or acceptable service may satisfy some patients) (Crow et al., 2002). Many researchers have questioned the value of patient satisfaction concept, citing problems with standardization, reliability, and validity of measures (Crow et al., 2002).

Sofaer and Firminger (2005) evaluated patients' perception of quality of care in terms of patient experiences with care delivery during a single or multiple episodes of care. They noted that patients' perception of quality care is determined by the interaction of the patients' expectations and their experiences. Further, as patients apply their standards regarding quality, their perceptions of the quality of care becomes solidified (Sofaer & Firminger, 2005). In a significant departure from existing literature, Sofaer and Firminger (2005) considered being satisfied as only *one* way of characterizing patient's perception of quality and therefore did not include patient satisfaction in their conceptualization. Instead, they examined patient's perceptions of quality of care in terms of patient-centered care, access, communication and information, courtesy and emotional support, technical quality, efficiency of care/organization, and structure and facilities.

Factors Affecting Patient's Perception of Quality of Care

The existing literature has identified a number of patient-related factors that are associated with patient's perception of quality of care, including age, sex, race/ethnicity, health status, and health system factors. For example, older patients are more likely to report higher quality of care compared to younger patients (Danielsen, Garratt, Bjertnæs, & Pettersen, 2007; Vukmir, 2006). Studies have also identified gender as a predictor of patients' perception of quality of care, although there are some mixed findings. For example, some studies found that women reported better quality of care than men (Holter et al., 2014; Hsieh & Kagle, 1991), while other studies found that women reported significantly poorer quality of care than men (Danielsen et al., 2007). Still, another study showed that there is no gender difference regarding patients' perception of quality of care (B Wilde Larsson, Larsson, & Starrin, 1999).

Other studies have shown that racial/ethnic minorities are more likely to report poorer quality of care. For example, African Americans and Asian/Pacific Islanders reported a poorer quality of care compared to the White population (Borders, Lensing, & Xu, 2011; Henderson, Caplan, & Daniel, 2004; Tsai, Whealin, & Pietrzak, 2014). Other studies have shown that education is also associated with patients' perception of quality of care. For example, patients with lower levels of education are more likely to report a higher level of quality of care compared to counterparts (Danielsen et al., 2007; Jenkinson, Coulter, Bruster, Richards, & Chandola, 2002). One study, however, found that there is no relationship between education levels and patients' perception of quality of care (Vukmir, 2006).

Considering the relationship between health status and perceived quality of care, Weingart et al. (2011) found that individuals who are in poor health reported negative perceptions of the quality of care. Other studies have reported that health system factors, such as having a usual source of care and insurance, are significantly associated with patient's rating of quality of care (Finney Rutten et al., 2015; Palmer et al., 2014).

Measuring Patient's Perception of Quality of Care

Researchers have utilized various tools to measure patient's perception of quality of care. For example, Cleary (1991) used a national hospital care survey to examine patients' perception of hospital quality of care. The survey, among the earliest to focus on patient-centered care, evaluates patient education, communication with providers, respect for patients' needs and preferences, provision of emotional and physical comfort, family involvement, and discharge preparation. This tool emphasized that patient's perspective is a significant input to assessing quality of care. Another tool, the Quality from Patient's

Perspective (QPP) questionnaire—which is based on a qualitative assessment of patients' expectations and experiences with their care delivery—has been extensively used to examine patients' perception of quality of care (Bodil Wilde Larsson & Larsson, 2002; Muntlin, Gunningberg, & Carlsson, 2006). The QPP questionnaire has two dimensions: patients' perception of the care received and the subjective importance of the care received (Bodil Wilde Larsson & Larsson, 2002; G. Larsson, Larsson, & Munck, 1998). Similarly, the Picker Institute Questionnaire survey was developed to measure in-patients' perception of quality of care concerning patient-centered care. The survey had the following dimensions: access to care, emotional support, involvement of family and friends, continuity and transition, physical comfort, and coordination of care (Henderson et al., 2004; Jenkinson et al., 2002).

Over the last several years, the Consumer Assessment of Healthcare Providers and Systems (CAHPS)[1] survey, developed by the Agency for Healthcare Research and Quality (AHRQ) in the U.S. Department of Health and Human Services, has become the most widely used standardized survey to assesses patients' perception of quality of care in various health care settings across the nation (Darby, Hays, & Kletke, 2005; Giordano, Elliott, Goldstein, Lehrman, & Spencer, 2009; Goldstein et al., 2001). There are several CAHPS surveys, for example, focusing on health plans, ambulatory settings, and inpatient hospital stays. This survey was developed based on literature reviews and reflected on feedback from patients and other key stakeholders in health care to ensure validity and reliability of the data. The results of the CAHPS survey have been used to

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[1] For more information about CAHPS, see http://www.ahrq.gov/cahps/about-cahps/cahps-program/cahps_brief.html.

guide and monitor quality improvement for patients' care experiences. For example, patients can review and compare health care providers and health plans, and hospitals can integrate the survey results into programs that gain reimbursement or improve quality of care for patients. The most recent CAHPS (2015) Survey covers major areas: communication with health care providers, access to care and information, customer services, coordination of care, and patients' feedback about the importance and perception of quality of care (CMS, 2015).

Patient-Centered Communication

In recent years, patient-centered communication has gained increasing attention as a key element of patient-centered care (R. M. Epstein & Street Jr, 2007; Krupat et al., 2000). Patient-centered communication by providers concerns with focusing on patients' perspectives and putting them into context, identifying and considering patients' values, needs, preferences, and beliefs, and promoting patients' participation in their own care (Wynia & Matiasek, 2006). It plays an important role in decision-making and information collection during a medical encounter (Arora, 2003a; Bredart et al., 2005; Jahng, Martin, Golin, & DiMatteo, 2005; Wynia & Matiasek, 2006). Effective patient-centered communication can create a strong relationship between the patient and provider, and motivate patient involvement in decision-making. It can also enhance patient empowerment and improved adherence, which can eventually lead to improved quality of care (R. M. Epstein & Street Jr, 2007).

Over many decades, a number of researchers have examined the association between physicians' communication behaviors and patient health outcomes. Many studies have shown that patient-centered communication is significantly associated with positive patient behaviors (Ashton et al., 2003; Beach, Keruly, & Moore, 2006; Griffin et al., 2004). Research has also shown that effective patient-provider communication can lead to improved patient adherence to treatment, resulting in decreases in asthma-related morbidity and mortality (Brown, 2001). Arora (2003a) examined patients' perception of uncertainty and personal control in cancer care, and found that patients' perception under these circumstances have a negative influence on health outcomes if the communication with their provider was unsatisfactory. Other studies have found that patient-provider communication is associated with cancer screening behaviors (Ling, 2006; Cairns & Viswanath, 2006; Underhill & Kiviniemi, 2012b).

Several studies have shown that patient-centered communication is a critical feature associated with patient preferences and satisfaction with the care delivered (Duberstein, Meldrum, Fiscella, Shields, & Epstein, 2007; Kleeberg et al., 2005; Mallinger et al., 2005; Rutten, Augustson, & Wanke, 2006). Patients who rated their patient–provider communication as high in primary care settings showed higher levels of quality of care and overall satisfaction with their healthcare (Duberstein et al., 2007; Rutten et al., 2006). Effective patient-provider communication and interactions have been associated with achieving patient satisfaction with care and a high quality of life, regardless of health status (Arora, 2003a; Bredart et al., 2005; Kleeberg et al., 2005; Mallinger et al., 2005).

Effective communication between the doctor and the patient has been shown to reduce malpractice claims as well as patient dissatisfaction (Levinson, Roter, Mullooly, Dull, & Frankel, 1997). Moreover, effective patient-provider communication can result in positive health outcomes (Baile & Aaron, 2005; Bredart et al., 2005; Edgman-Levitan &

Brady, 2013; Janz et al., 2004; Mallinger et al., 2005; Mazor et al., 2013; Ong, Visser, Lammes, & De Haes, 2000). For example, Baile and Aaron (2005) found that cancer patients with effective and empathetic communication had an improved patient quality of life and satisfaction with care. Other researchers have demonstrated that patients whose doctors implement supportive communication activities tend to have greater satisfaction in regards to the quality of care, better management of optimal cancer-related symptom management, and improved health status (Arora, 2003b; Roter & Hall, 2006). Several studies have shown that to accomplish effective patient-provider communication, the patient must perceive that the health care provider is performing a number of complex communication activities, such as listening or explaining information in a way that is helpful and culturally appropriate (Sharkey, Ory, & Browne, 2005; Street Jr, Gordon, Ward, Krupat, & Kravitz, 2005; Thorne, 2006).

Conceptual Models Relating to Patient-Centered Communication

Several studies have developed conceptual models related to patient-centered communication. The conceptual framework suggested by Epstein and Street (2007) has been widely accepted in health communication literature. Although the six core functions in this framework were focused on cancer care, they are also relevant for any patient-provider interaction.

1. Exchanging information – Attending to information needs of the patient by providing opportunity to ask health-related questions, such as cause, diagnosis, treatment, prognosis, and psychosocial aspects of the illness
2. Responding to emotions – Recognizing and responding to patient’s feelings and emotions

3. Making decisions – Involving patients in making health and care-related decisions based on their needs, values and preferences
4. Enabling patient self-management – Helping patients to enhance their ability to solve health-related problems and to take actions to improve their health
5. Fostering healing relationship – Developing patient-provider relationship that is based on mutual understanding, trust, and rapport
6. Managing uncertainty – Helping patients deal with uncertainty about the illness, treatment, and recovery

These functions are interrelated rather than discrete. In a slight modification of the Epstein and Street (2007) framework, de Haes and Bensing (2009) introduced a similar model of patient-centered communication, which included (1) fostering relationships, (2) gathering information, (3) information provision, (4) decision making, (5) enabling disease and treatment-related behavior, and (6) responding to emotions.

More recently, McCormack and colleagues (2011) proposed a patient-centered communication framework, as shown in Figure 2.1. They expanded Epstein and Street's (2007) framework to include a crosscutting function that relates to communication interaction quality in a team care model. The crosscutting function considers spending enough time with the provider during a medical encounter as well as having enough privacy, and communicating about the roles and responsibilities. These functions are interdependent and result in communication methods that have a major impact on health outcomes. This model can be readily applied to different healthcare settings to assess the quality of communication at various levels, ranging from individual encounters to entire healthcare systems (McCormack et al., 2011). In this dissertation, we have used McCormack et al.'s (2011) framework to examine patient-centered communication.

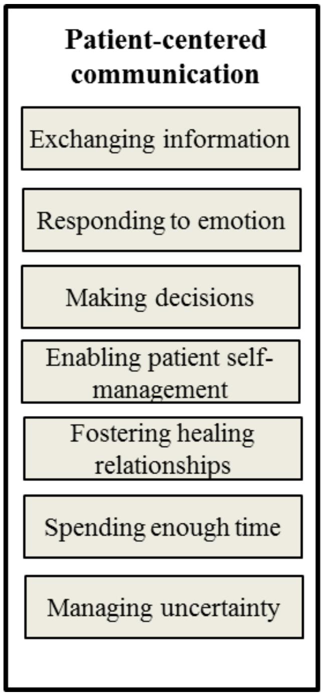

Figure 2.1 Patient-Centered Communication Functions (McCormack et al., 2011)

Factors Affecting Patient-Centered Communication

Several researchers have examined the relationship between patient-related factors and patient-centered communication. For example, studies have shown that age, education, income level and race are associated with patient-provider communication (Ashton et al., 2003; Ok, Marks, & Allegrante, 2008; Siminoff, Graham, & Gordon, 2006). Other studies found that having health insurance and access to care are important predictors of patient-provider communication (Osborn & Squires, 2012; Rutten et al., 2006). Further, Hispanic as well as older patients were more likely to report better perception of communication with their health care providers (DeVoe, Wallace, & Fryer Jr, 2009; DeVoe, Wallace, Pandhi, Solotaroff, & Fryer, 2008). In contrast, Rutten et al.

(2006) found that socio-demographic factors are not associated with patients' perception of communication with health care providers.

Measuring Patient-Centered Communication

There are various methods—such as patient survey, provider report, direct observation, and medical records—to measure provider communication during a medical encounter (Calo et al., 2014). A patient survey is the most commonly used method as it focuses on patients' perception of quality of care and values (Robinson et al., 2008). Patient surveys enable us to explore the effectiveness of communication and the nature of the interrelationship between patients and providers. They can help to define patients' experiences with their health care providers and with the interpersonal characteristics of their health care system (R. M. Epstein et al., 2005).

According to Epstein (2005, 2007), patient-centered communication measures should clarify what is important to patients. The Health Information National Trends Survey (HINTS) is one of the most commonly used tools to examine the patients' perception of patient-provider communication on a national level (Nelson et al., 2004; Rutten et al., 2012). Since 2003, this survey has been used to reflect the public's perceptions, trends and needs in health-related communication. Initially, HINTS included five provider communication behaviors (listening carefully, explaining things in a way the patient can understand, showing respect for what the patient has to say, spending enough time with the patient, and involving the patient in decisions related to his or her care). The 2013 HINTS survey examines seven provider communication behaviors, based on specific questions to the patients related to their medical encounter:

1. giving the chance to ask all the health-related questions you had,

7. paying attention to patient's feelings and emotions,
8. involving the patient in decisions about health care,
9. making sure the patient understood the things needed to do to take care of his or her health,
10. explaining things in a way the patient could understand,
11. spending enough time with the patient, and
12. helping the patient deal with feelings of uncertainty about his or her health or health care.

These survey items are similar to McCormack et al.'s (2011) framework, which we utilize in this dissertation.

A standardized, national survey—the CAHPS Hospital Survey—is widely used to assess patient's perspective during an inpatient stay at a hospital facility. The survey also includes items related to patient-centered communication, such as communication with doctors, communication with nurses, communication about medicines, responsiveness of hospital staff, pain management, discharge information, cleanliness of the hospital environment, quietness of the hospital environment, and transition of care (*HCAHPS Fact Sheet*, 2015). This survey plays an important role in collecting patients' feedback and in informing quality improvement efforts (Mavis et al., 2015).

Patient Engagement

Patient engagement is defined as "actions individuals must take to obtain the greatest benefit from the health care services available to them" (Holmes Rovner et al., 2010, p. 2). This definition focuses on individual behaviors concerning their health care, not the actions of professionals, policies, or institutions. Going beyond the individual level, Coulter (2011, p. 10) defined patient engagement in terms of the ongoing relationship between patients and health care providers as they work together to “promote and support active patient and public involvement in health and healthcare and to strengthen their influence on healthcare decisions, at both the individual and collective levels.” Similarly, other researchers have defined patient engagement as meaningful, active, and constructive involvement of patients and other stakeholders involved in healthcare delivery (Deverka et al., 2012; Devine et al., 2013; Guise et al., 2013; Haywood et al., 2014; Holmes Rovner et al., 2010).

The concept of patient engagement is often used interchangeably, albeit erroneously, with patient activation (Carman et al., 2013). Patient activation is a narrower concept, and it refers to a patient’s knowledge, skills, ability, and willingness to manage his or her own health and care (James, 2013). As such, patient activation represents the patient’s capacity to engage in care-related activities (Carman et al., 2013). In contrast, patient engagement is a broader concept that combines patient activation with interventions designed to increase activation and promote positive patient behavior, such as obtaining preventive care or engaging in a physical activity (James, 2013).

Coulter (2011) characterized patient engagement based on how much information exchange occurs between patient and provider, how much role the patient has in care decisions and in health organization decisions. This line of thinking suggests that patient engagement occurs on a continuum. At the lower end of the continuum, patients remain involved but have limited power or decision-making authority (with most of the decisions being made by the providers and healthcare organizations). In such a scenario, the information flows to patients and then back to the providers and healthcare organizations.

At the higher end of the continuum, patient engagement is characterized by shared power and decision-making responsibility, with patients becoming active partners in determining healthcare goals and making decisions. Information flows to and from the patient throughout the process of engagement.

In 2013, the World Innovation Summit for Health in Doha, Qatar, focused on understanding and advancing a global discussion about engaging patients and their families in their healthcare. The resulting Report of the Patient and Family Engagement Working Group (Edgman-Levitan, Brady, & Howitt, 2013) highlighted several previously unexamined aspects of patient engagement. In particular, the Report noted that patient engagement is multi-dimensional – it can be at a personal level (for example, shared decision-making between a patient and a provider) or it can be at a public level (for example, a health literacy campaign). Further, patient engagement can be targeted at improving provider performance (for example, when the patient and his or her family collaborate with the provider to redesign healthcare services) or it can be targeted at informing patient behavior (for example, through self-management programs for chronic disease). Finally, patient engagement can begin with simple information-sharing, move on to a dialogue, and evolve into a partnership between the patient and provider. Encouraged by the increasing attention, several international researchers have now taken up further examination of this “blockbuster [solution] of the century” (Dentzer, 2013).

The Affordable Care Act recognizes that engaging patients in their own care is a cornerstone of a successful health care system as it can have a transformative effect on care relationships (Hibbard & Greene, 2013; Laurance et al., 2014). Although patient engagement has been paid increasing attention recently, the evidence supporting impacts of patient engagement is still emerging (Haywood et al., 2014). More recently, evidence suggests that patient engagement can be a pathway toward achieving better quality of care, greater cost efficiency, and improved population health (Coulter, Parsons, & Askham, 2008; Johnson et al., 2008; Smith, Saunders, Stuckhardt, & McGinnis, 2013). In commenting on a recent special issue on patient engagement in *Health Affairs*, Dentzer (2013) noted that wherever engagement takes place, evidence shows that patients who are actively involved in their health and health care achieve better health outcomes, and have lower health costs, than those who are not actively engaged. This is also supported by several studies which indicate that patient engagement is associated with high level of satisfaction with quality of care (Mead & Bower, 2000), improved patient-provider communication, and improved patient health and economic outcomes (Laurance et al., 2014). Based on eleven country surveys, Osborn and Squires (2012) found that patients who were engaged in their own care reported higher quality and fewer errors. Coulter and Ellins (2007) systematically reviewed patient engagement strategies in existing literature and evaluated their effectiveness, and found that patient engagement helped to improve health literacy, clinical decision-making, self-care, and patient safety. In a more recent literature review, Coulter (2012) found that patient engagement helped to improve health literacy, shared decision-making, and quality.

Conceptual Models Relating to Patient Engagement

Based on literature reviews and interviews with various levels of stakeholders including consumers and advocacy groups in health care, the Center for Advancing Health (Holmes Rovner et al., 2010) developed the *Engagement Behavior Framework* regarding patients’ behaviors during interactions with health care providers. The goals of this framework indicate how to achieve individuals' desired benefits in their care and how to help health behavior research focus on any gaps or priorities for effective engagement behaviors. The framework outlines patients' behaviors related to their interaction with health care providers, and includes: preparing in advance a list of questions for health care providers before office visits; taking a list of all medications for discussion about their any benefits and side effects; reporting on their medical history and health status accurately; and making sure that providers explain clearly any expectations and express any concerns about their care experiences.

Carman and colleagues (2013) have proposed a multidimensional conceptual framework of patient engagement, in which engagement activities range along a continuum—from consultation to partnership and shared leadership. Further, engagement occurs at different levels—individual health behavior or direct care interactions, organizational design and governance, and in policymaking. Finally, multiple factors affect the willingness and ability of patients to engage. These factors include patient-related factors such as patient beliefs about their role, health literacy, and education; organization-related factors, such as policies, practices, and culture; and society-related factors, such as social norms, regulations, and policy (Carman et al., 2013).

Factors Affecting Patient Engagement

Numerous factors associated with patient engagement include individual, illness-related, health care setting. For example, individual factors such as age, gender, education, race/ethnicity, health status, patient's knowledge, attitudes, self-efficacy, health literacy, and health status have an impact on patient engagement (Arora & McHorney, 2000; Bakken et al., 2000; Carman et al., 2013; Cunningham, 2014). That is, individuals with lower income and the elderly may struggle with their engagement due to low health literacy or limited health resources available. Health insurance and access to care factors are significantly associated with patient engagment levels (Osborn & Squires, 2012; Scholle, Torda, Peikes, Han, & Genevro, 2010). For example, Scholle et al. (2010) found that uninsured and poorer patients had lower levels of patient engagement compared to patients with health insurance and high-income level.

Measuring Patient Engagement

Measuring patient's engagement in their care is critical to understanding patient behaviors and how these behaviors can improve the quality of care and health outcomes in general (Laurance et al., 2014; Mavis et al., 2015). The study by Lorig (1996) developed questions related to patient engagement in a medical encounter in chronic disease care. These survey questions examined patients' behaviors regarding preparing a list of questions for the doctor, asking questions about anything patients do not know and understand, and discussing any issues related to health. This survey focused on specific chronic disease patients rather than general populations-based surveys. The survey did not assess shared decision-making, a key dimension of patient engagement (Carman et al., 2013), thereby limiting its utility.

The Consumer Assessment of Healthcare Providers and Systems (CAHPS) survey is an important tool to assess patients' feedback and quality of care. While the current survey is valuable for understanding patient's perception of provider communication behaviors, it is limited in its assessment patient engagement behaviors related to their care. Although the CAHPS survey does not currently include items regarding patient engagement behaviors, it may be developed further by including such items (Mavis et al., 2015).

Some studies have utilized the Patient Activation Measure (PAM) to assess patient’s capacity to manage their health and healthcare (Hibbard & Greene, 2013; Hibbard & Mahoney, 2010). PAM has been shown to be positively associated with improved self-management behaviors. For example, individuals identified as highly activated according to the measure are more likely to obtain preventive care, such as health screenings and immunizations, and to exhibit other behaviors known to be beneficial to health (Hibbard & Cunningham, 2008). However, the value of this tool in measuring interventions that may signify patient engagement remains questionable (Hibbard, Mahoney, Stock, & Tusler, 2007)

Research Gaps

It is becoming increasingly important to understand the influence of patient-centered communication and patient engagement on the patients’ perceived quality of care (Bergeson & Dean, 2006). In general, patient-centered communication, patient engagement, and perceived quality of care have been studied extensively, but few studies have examined the relationship among them simultaneously. As a result, the relationship among them is not well understood.

Studies have shown that effective patient-centered communication can improve the relationship between patient and provider, motivate patient engagement, and eventually enhance perceived quality of care (R. M. Epstein & Street Jr, 2007; Street, 2013). Previous studies have also examined the relationship between patient-centered communication and perceived quality of care in different health care settings (Arora, 2003a; Bredart et al., 2005; Duberstein et al., 2007; Kleeberg et al., 2005; Mallinger et al., 2005; Rutten et al., 2006). Further, studies have shown that better patient-provider communication is associated with patient's active engagement in their care (DiMatteo et al., 1993; Merkel, 1984). Other studies have concluded that patient engagement is associated with better perception of quality of care (Coulter, 2012; Duberstein et al., 2007; Mead & Bower, 2000; Osborn & Squires, 2012). In fact, in recent years, researchers have called for more studies on how patient-provider communication affects patient engagement and patients' perception of quality of care (R. M. Epstein & Street Jr, 2007; Street, 2013).

Although the role of health system factors—such as access to care, frequency of visit to the clinic, health insurance status, and having a regular provider—is fundamental to healthcare delivery, their relationship with patient-provider communication and patient engagement has not been fully examined. For example, some studies have shown that health insurance and access to care are significantly associated with higher patient engagement level (Osborn & Squires, 2012; Scholle et al., 2010), patient-provider communication (Rutten et al., 2006), and patients' rating of quality of care (McCormack et al. 2011; Finney, 2015). Some researchers have called for examining the relationship between health system factors, patient-centered communication and patient engagement (R. M. Epstein et al., 2005, 2007; Osborn & Squires, 2012). Palmer et al. (2014) examined the association of a sociodemographic factor (racial and ethnic disparities) with patient-provider communication, perceived quality of care and patients' activation among long-term cancer patients. In this way, they sought to link patient-centered communication, patient engagement, and perceived quality of care into a single conceptual model. However, their framework only considered racial/ethnic factors and did not examine health system factors. Further, they considered patient activation—which is a narrower concept representing the patient's capacity to engage in care-related activities (Carman et al., 2013)—rather than patient engagement, which combines patient activation with interventions designed to increase activation and promote positive patient behavior (James, 2013).

Research Questions

To address these research gaps, this dissertation examined the relationship among patient-centered communication, patient engagement and perceived quality of care among US adult population. In addition, we identified patient-related factors—such as socio-demographic, health-related, and health system factors—associated with patient-centered communication, patient engagement, and patients' perception of quality of care. Accordingly, this dissertation examined two research questions:

- RQ1 - What is the relationship among patient-centered communication, patient engagement, and patient's perception of quality of care?
- RQ2 - What patient-related factors are associated with patient-centered communication, patient engagement, and patient's perception of quality of care?

Conceptual Framework

Based on these research questions, we developed a conceptual framework that draws on existing research, including patient-centered communication framework (Epstein & Street, 2007; McCormack et al., 2011), patient engagement behavior framework (The Center for Advancing Health, 2010), and Palmer et al.' (2014) conceptual model. By integrating and modifying these existing models (see Figure 2.2), we examined the relationship between patient-centered communication, patient engagement, and perceived quality of care. In addition, we identified patient-related factors associated with these three areas of interest.

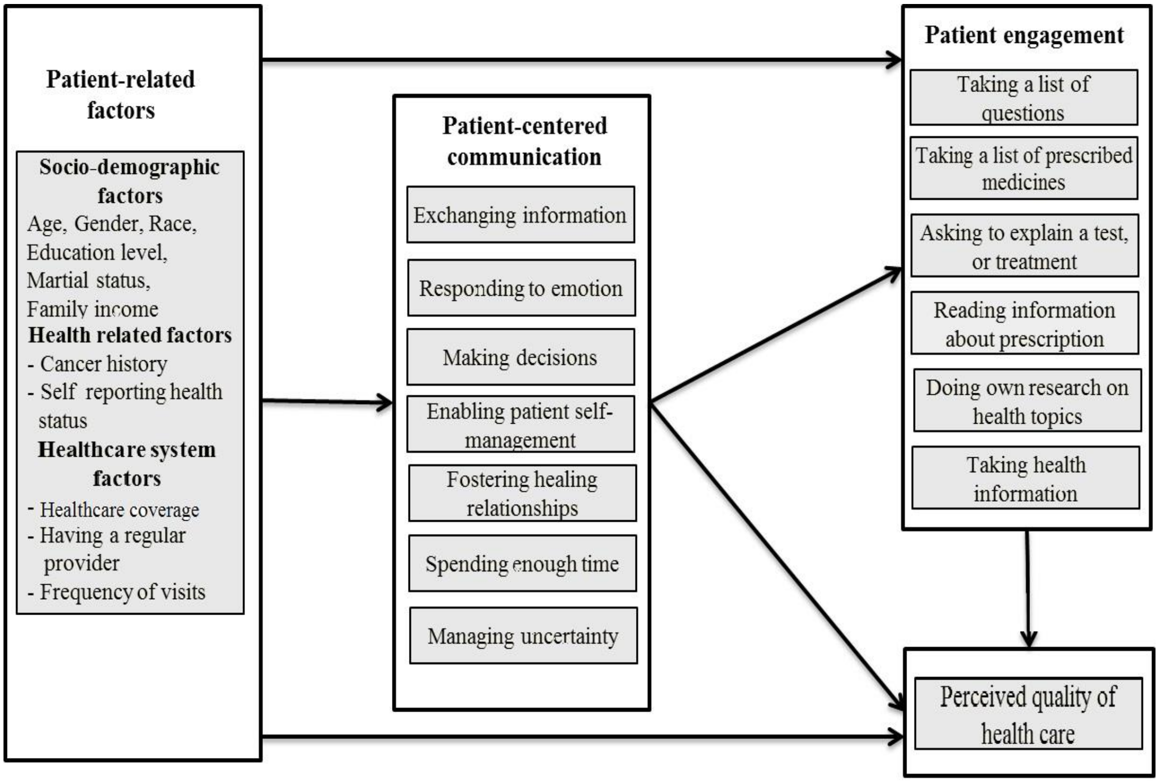

Figure 2.2 Conceptual Framework

CHAPTER 3: METHODOLOGY

This chapter provides detailed information on the data source and the study population. Next, it describes the dependent and independent variables as well as the covariates considered in the study. Finally, it presents data analysis and the analytical models related to the research questions.

Data Source

This study utilized the 2013 Health Information National Trends Survey[2] (hereafter referred to as 2013 HINTS) developed by the Health Communication and Informatics Research Branch in National Cancer Institute (Lau et al., 2012). For the first time since 2003 when the HINTS questionnaire and interview protocol were created, the 2013 HINTS included new items related to patient engagement behaviors. This makes use of 2013 HINTS particularly useful to answer our research questions. The 2013 HINTS data was collected from September through December 2013, and became publicly available on June 2014. The 2013 HINTS dataset was collected in two stages. In the first stage, addresses from the United States Postal Service file of residential addresses were randomly selected. In the second stage, one adult from each selected household was selected using the next birthday method. The total sample for 2013 HINTS dataset was 3,185 respondents and the overall response rate was 35.2 percent (*Health Information*

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[2] http://hints.cancer.gov/docs/Instruments/HINTS_4_Cycle_3_English_Annotated_508c_3_21_2014.pdf

National Trends Survey, 2014). To maximize response rate and representativeness of the sample, the survey included multiple non-response follow-ups.

The HINTS dataset is based on a biennial, cross-sectional survey of a nationally representative sample of U.S. non-institutionalized adults. The HINTS questionnaire and interview protocol used constructs from established health communication theory and behavior change models (Nelson et al., 2004). Survey weights were created to permit analysts to generalize the results to the national population. To create these weights, an adjustment had to made first to reflect the selection probabilities. To compensate for non-response and coverage error, the selection weights were calibrated using the data from the American Community Survey. HINTS non-response correlated with being male, young, a minority, having less education, and being Hispanic and the calibration used age, gender, education, race/ethnicity, and Census region to adjust for this pattern. An analysis conducted on earlier rounds of HINTS in previous years found that non-response also correlated negatively with access to health care and health status. For example, those with less access to health care services and with fewer health problems were less likely to respond to the survey. To compensate for these patterns, insurance status and cancer status were used as additional calibration adjustments in the HINTS dataset. The data for these adjustments come from the National Health Interview Survey.

The HINTS dataset has been used by researchers to monitor changes in the public's perception of knowledge and behaviors associated with health and cancer-related information. Several studies have used this dataset to examine health communication, including patient-provider communication (Cairns & Viswanath, 2006; Finney Rutten et al., 2015; Gill & Cowdery, 2014; Ling, Klein, & Dang, 2006; Nelson et al., 2004; Ok et al., 2008; Rutten et al., 2006; Spooner, Salemi, Salihu, & Zoorob, 2015; Underhill & Kiviniemi, 2012; Ye & Shim 2010). In a recent study, Spooner et al. (2015) used 2011-2013 HINTS data to examine disparities and trends of perceived patient-provider communication, as well as the association between patient-provider communication and sociodemographic and health-related factors.

To our knowledge, no published study has utilized the HINTS dataset to examine patient engagement, and its relationship with patient-provider communication and perceived quality of care.

Selection Strategy for Study Population

In the 2013 HINTS, the questions related to patient-centered communication (which includes the communication that doctors, nurses, or other health professionals have with a patient during a medical encounter) were administered *only* to respondents who had been to a health care provider in the past 12 months. It must be noted that the HINTS data defines providers as doctors, nurses, or other health care professionals (and does not include psychiatrists and other mental health professionals).

Out of the total sample of 3,185 respondents this study, we extracted 2,288 respondents (71.9 % of the total sample) who had visited their health care provider in the past 12 months. We further excluded respondents with missing data (i.e., patients who did not answer all questions relevant to the study). Of the 2,288 respondents, 1,472 answered all patient-provider communication related questions; 1,463 respondents answered all patient engagement related questions; and 1,498 answered perceived quality of care related questions. Overall, 1,432 respondents (45.0 % of the total sample) answered questions related to all three research areas of interest (patient-centered communication, patient engagement, and perceived quality of care). Figure 3.1 shows our selection strategy for the study population.

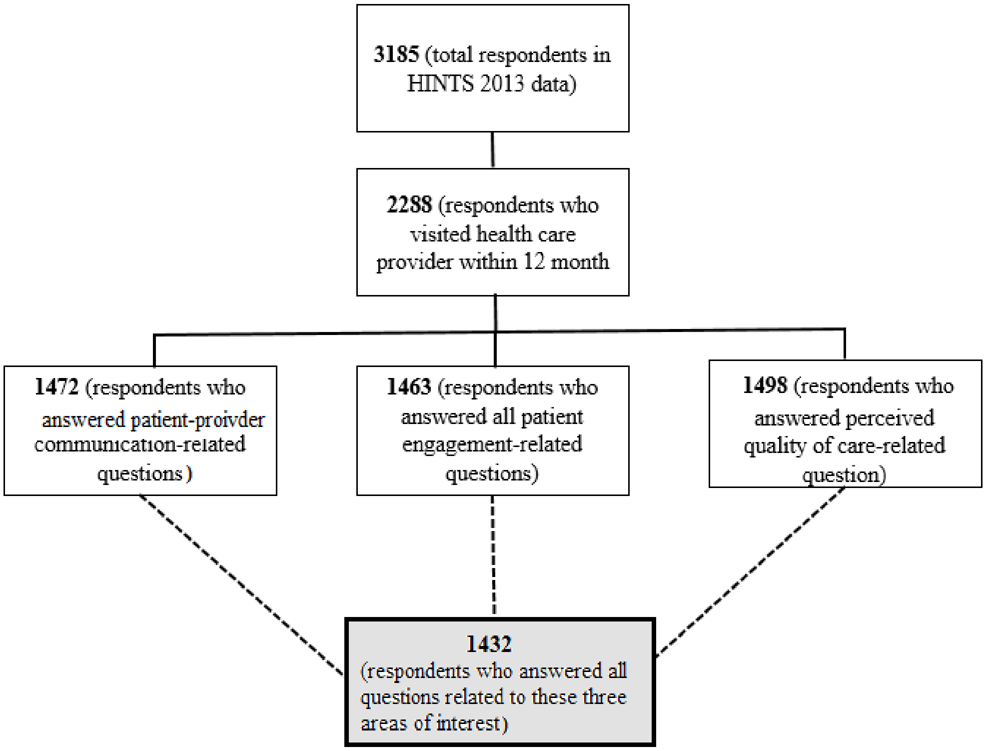

Figure 2.1 Selection Strategy for Study Population

To examine sample representativeness of the subsamples used, we compared two subsamples: the 2,288 respondents (who visited a health care provider within 12 months) and the final study sample of 1,432 respondents (who responded to questions related to patient-centered communication, patient engagement, and perceived quality of care). Table 1 shows the distribution of gender, age, and race for the initial 2,288 respondents and the study sample of 1,432 respondents and the statistical significance of differences between the subsamples using chi-square test.

Our analysis suggests that the study population of 1,432 respondents is slightly younger than the initial 2,288 sample of respondents who visited a health care provider within 12 months. 56.0% of the study population, for example, were aged 49 or less, versus 50.5% of the full HINTS sample (2,288). This difference in subsamples is indicated by the P-value of age (0.005) which is less than significant level at 0.05.

Table 3.1. Comparing subsamples, 2013 HINTS

Characteristic	**Variables**	**2,288 sample** Weighted %	**1,432 sample** Weighted %	**P-value**
Gender	Male	44.9	45.3	0.687
	Female	55.1	54.7	
Age (years)**	18-34	23.9	27.3	0.005
	35-49	26.6	28.7	
	50-64	27.2	25.9	
	65+	22.3	18.1	
Race/ethnicity	Hispanic	14.0	12.3	0.353
	Non-Hispanic white	67.2	69.7	
	Non-Hispanic African American	11.3	10.2	
	Asian	5.5	5.8	
	Other	2.0	2.0	

Note: **Chi-Square Analysis significant $p < 0.05$

Dependent Variable

The proposed model included one dependent variable: perceived quality of care, as reported by patients in the 2013 HINTS dataset. Question C8 of the 2013 HINTS3 asked “Overall, how would you rate the quality of health care you received in the past 12 months?” The responses to this question were measured on a five-point Likert scale ranging from 1 (Excellent) to 5 (Poor). This item had reverse coded items, with higher scores indicating higher rating of quality of care (1= Poor 2= Fair, 3=Good, 4=Very Good, 5= Excellent). The poor and fair responses were combined to create a meaningful

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[3] http://hints.cancer.gov/docs/Instruments/HINTS_4_Cycle_3_English_Annotated_508c_3_21_2014.pdf

estimate because of their very low percentage. Finally, perceived quality of care by the patient was measured on a four-point scale ranging from 1 = ‘Poor/Fair’ to 4 = ‘Excellent’.

Table 3.2. Summary of Dependent Variable

Dependent Variable	Variable Description in HINTS	Variable Name in HINTS	Coding
Perceived Quality of Care	C8. Overall, how would you rate the quality of health care you received in the past 12 months?	QualityCare	1=Poor/Fair 2=Good 3=Very good 4=Excellent

Independent Variables

The study examines two independent variables: patient-centered communication and patient engagement.

Patient-Centered Communication

In 2013 HINTS, the patient is asked seven questions to reflect on their communications with the provider, during a visit in the last 12 months. These questions correspond to the seven functions of patient-centered communication outlined by McCormack et al. (2011), which we mention *in italics* alongside each survey question below. As shown in Figure 2, we use these functions of patient-centered communication in our conceptual model.

The 2013 HINTS asks the following question: During the past 12 months, how often did doctors or other health care providers:

1) Give you the chance to ask all the health-related questions you had? [corresponds with *exchanging information* in McCormack et al.’s (2011) framework]

2) Give the attention you needed to your feelings and emotions? [corresponds with *responding to emotions*]

3) Involve you in decisions about your health care as much as you wanted? [corresponds with *making decisions*]

4) Make sure you understood the things you needed to do to take care of your health? [corresponds with *enabling patient self-management*]

5) Explain things in a way you could understand? [corresponds with *fostering healing relationship*]

6) Spend enough time with you? [corresponds with *length of time with provider*]

7) Help you deal with feelings of uncertainty about your health or health care? [corresponds with *managing uncertainty*]

For easy reference to the actual 2013 HINTS that we used in the study, we have included the actual question numbers from the survey (C6a to C6g) in Table 3.3.

Table 3.3 Independent Variable – Patient-Centered Communication

Independent Variables	Variable Description in HINTS	Variable Name in HINTS	Coding
Patient-Centered Communication	*The following questions are about your communication with all doctors, nurses, or other health professionals you saw during the past 12 months...How often did they do each of the following:*		
	C6a. Give you the chance to ask all the health-related questions you had?	ChanceAskQuestions	1=Never 2=Sometimes 3=Usually 4=Always
	C6b. Give the attention you needed to your feelings and emotions?	FeelingsAddressed	1=Never 2=Sometimes 3=Usually 4=Always
	C6c. Involve you in decisions about your health care as much as you wanted?	InvolvedDecisions	1=Never 2=Sometimes 3=Usually 4=Always
	C6d. Make sure you understood the things you needed to do to take care of your health?	UnderstoodNextStep	1=Never 2=Sometimes 3=Usually 4=Always
	C6e. Explain things in a way you could understand?	ExplainedClearly	1=Never 2=Sometimes 3=Usually 4=Always
	C6f. Spend enough time with you?	SpentEnoughTime	1=Never 2=Sometimes

			3=Usually 4=Always
	C6g. Help you deal with feelings of uncertainty about your health or health care?	HelpUncertainty	1=Never 2=Sometimes 3=Usually 4=Always

As Table 3.3 shows, the responses to the questions were measured on four-point Likert scale ranging from 1 (Always) to 4 (Never). All items included reverse-coded items with higher scores indicating higher rating of the quality of patient-centered communication (1 = Never, 2= Sometimes, 3= usually, and 4= Always). The estimate under “Never,” answering the question “How often did your provider give the chance to ask all the health-related questions you had?” based on small number of responses from the study population, is likely to be unstable. These seven items were summed up to calculate global rating of patient-centered communication; values ranged from 7 to 28. This measure was found to have good internal consistency (Cronbach’s $\alpha = 0.93$).

Patient Engagement

In 2013 HINTS, the patient is asked six questions to reflect on their engagement with the provider, during a visit in the last 12 months. These questions correspond to patient-engagement related behaviors, which we mention *in italics* alongside each survey question below. As shown in Figure 2.2, we use these patient-engagement behaviors in our conceptual model. The 2013 HINTS question is as follows: In general, how often do you do each of the following?

1) Take with you to your doctor visits a list of questions or concerns you want to cover *[Taking a list of questions]*

2) Take a list of all of your prescribed medicines to your doctor visits *[Taking a list of prescribed medicines]*

3) Ask your doctor to explain a test, treatment, or procedure to you in detail *[Asking to explain a test or treatment]*

4) Read information about a new prescription, such as side effects and precautions *[Reading information about prescription]*

5) Do your own research on a health or medical topic after seeing your doctor *[Doing own research on health topics]*

6) Take with you to your doctor visit any kind of health information you have found *[Taking health information]*

As Table 3.4 shows, the responses to the questions were recorded on a four-point Likert scale ranging from 1 (Always) to 4 (Never). Six items included reverse coded items with higher scores indicating higher rating of quality of patient engagement (1= Never, 2= Sometimes, 3= Usually, and 4= Always). This study created global index of patient engagement by summing up all items; values ranged from 6 to 24. This measure was found to have good internal consistency (Cronbach's α = 0.73).

For easy reference to the actual 2013 HINTS that we used in the study, we have included the actual question numbers from the survey (D3a to D3f) in Table 3.4.

Table 3.4 Independent Variable – Patient Engagement

Independent Variable	Variable Description in HINTS	Variable Name in HINTS	Coding
Patient Engagement	*In general, how often do you do each of the following?*		
	D3a. - Take with you to your doctor visits a list of questions or concerns you want to cover	HowOften_ListQuestions	1=Never 2=Sometimes 3=Usually 4=Always
	D3b. Take a list of all of your prescribed medicines to your doctor visits	HowOften_ListMeds	1=Never 2=Sometimes 3=Usually 4=Always
	D3c. Ask your doctor to explain a test, treatment, or procedure to you in detail	HowOften_AskExplain	1=Never 2=Sometimes 3=Usually 4=Always

	D3d. Read information about a new prescription, such as side effects and precautions	HowOften_ReadRxInfo	1=Never 2=Sometimes 3=Usually 4=Always
	D3e. Do your own research on a health or medical topic after seeing your doctor	HowOften_ResearchAfter	1=Never 2=Sometimes 3=Usually 4=Always
	D3f. Take with you to your doctor visit any kind of health information you have found	HowOften_TakeInfo	1=Never 2=Sometimes 3=Usually 4=Always

Covariates

The study also explored the relationships with patient-related factors, such as socio-demographic, health-related, and health system factors.

Patient-related factors

Socio-demographic factors included age (18-34, 35-49, 50-64, and more than 65), race/ethnicity (Hispanic, Non-Hispanic white, Non-Hispanic African American , Asian, and Other), gender (either male or female), educational level (either less than high school, high school graduate, some college, or college graduate or more), marital status (either married or non-married), employment status (either employed or unemployed), and household income (less than < $20,000, vs. $20,000 to < $35,000, vs. $35,000 to < $50,000 vs. $50, 000 to < $ 75,000, $75,000 more).

Health-related factors included cancer history and self-reported health status. A dichotomous (0 = No, 1 = Yes) cancer history question asked the participants to indicate “Have you ever had a cancer?” Self-reported health status question, “In general, would you say your health is?” was measured on a five-point Likert scale ranging from 1 (Excellent) to 5 (Poor). This item included reverse coded items with higher scores indicating higher rating of health status (1= Poor/Fair, 2 = Good, 3 = Very good, and 4 =

Excellent). We combined the Poor and Fair categories to make the result more meaningful, as individual frequency of these categories was very low.

Health system factors include the question of having a regular provider ("Is there a particular doctor, nurse, or other health professional that you see most often?), and the question of having health insurance coverage ("Do you have any of the following health insurance or health coverage plans?"). Each variable is dichotomous (0 = No, 1 = Yes). Furthermore, the question of the frequency of patients' office visits ("In the past 12 months, how many times did you go to a doctor, nurse, or other health professional to get care for yourself?") was added. The responses to this question included 1 = 1 time, 2 = 2 times, 3= 3 times, 4 = 4 times, 5 = 5 or more times, and 6 = 10 or more times. The choice of these categories is appropriate because the frequency of each category is more or less the same. This question excluded visits to an emergency room. Further, respondents who have never visited any health professional in the past 12 months were excluded. Table 3.5 presents a summary of covariates in this study.

Table 3.5 Summary of Covariates

Covariates	Variable Description in HINTS	Variable Name in HINTS	Coding
Socio-demographic factors	Gender	Gender	1=Male 2=Female
	Age	AgeGrpB	1=18-34 2=35-49 3=50-64 4=65+
	Race	RaceEthn	1=Hispanic 2=White 3=African American 4=Asian 5=Others
	Marital Status	Marital	1=Married 2=Non-married
	Education level	EducA	1=less than High school 2=High School graduate 3=Some college 4=College Graduate or More
	Employed Status	OccupationStatus	1=Employed 2=Unemployed

	Combined household Income	HHInc	1=< \$20,000 2=\$20,000 to < \$35,000 3=\$35,000 to < \$50,000 4=\$50,000 to < \$75,000 5=\$75,000 +
Health-related factors	Cancer history (Having ever been diagnosed as having cancer)	EverHadCancer	1= Yes 0= No
	General health status	General	1=Poor/Fair 2=Good 3=Very Good 4=Excellent
Health system factors	Having a regular provider	RegularProvider	1= Yes 0= No
	Frequency of patient's office visits	FreqGoProvider	1=1 time 2=2 times 3=3 times 4=4 times 5=5-9 times 6= 10 or more times
	Having a health coverage plan	HCCoverage	1=Yes 0=No

Data Analysis

Data analyses were conducted using STATA 14 (Stata Corp LP, College Station, TX, USA) to accommodate the sampling design of HINTS. We conducted descriptive analyses, bivariate analysis, and multivariate analysis to examine our research questions. The descriptive, bivariate, and multivariate analyses were adjusted by the final sample weights and 50 replicate weights to estimate standard error using Jackknife method to represent population level. Further, the weights and variances were adjusted using the survey procedures to yield nationally representative results.

Descriptive analysis of study population includes information about socio-demographic factors, health related factors, and health system factors. In each case, we calculated the unweighted sample size, weighted %, and standard error. For each area of research interest in this study—patient-centered communication, patient engagement, and patients' perception of quality of care—we first calculated the weighted % for each item (to adjust for the U.S. adult population) and the standard error associated with the weighted %. Next, we calculated the mean, standard error, maximum and minimum value, and the related Cronbach's α for each item as well as for the overall constructs (i.e., patient-centered communication, patient engagement, and patients' perception of quality of care).

A bivariate analysis was performed to test mean differences between patient-related factors (i.e., socio-demographic factors, health related factors, and health system factors) and each construct separately (i.e., patient-centered communication, patient engagement, and patients' perception of quality of care). We calculated mean, standard error, and p-value to determine the relationship between each socio-demographic factor (such as gender, age, race/ethnicity, marital status, education, employment status, and income) for each construct.

To address the first research question (RQ1), we performed structural equation modeling (SEM). SEM is a powerful multivariate confirmatory analysis that has been used to investigate complex and dynamic relationships within observed and unobserved variables driven by strong theoretical and prior research findings (Gunzler, Chen, Wu, & Zhang, 2013; Markus, 2012). We utilized a comprehensive three-step modeling approach to develop, test, and estimate the model. In the first step, we conducted Exploratory Factor Analysis (EFA) to develop latent variable using the Iterated Principal Axis factoring method to extract factors followed by oblique promax rotations. We retained factors with eigenvalues greater than 1 and estimated their factor loadings. In the second step, Confirmatory Factor Analysis (CFA) was conducted to validate the factor model fit of sample population in the dataset and evaluate the measurement model. In the third step, structural equation modeling was performed to estimate the associations among patients' perception of patient-centered communication, patient engagement, and quality of care simultaneously.

This study used the maximum likelihood for estimation model in the SEM analysis. The goodness of fit of each model was evaluated using chi-square statistics, comparative fit index (CFI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR). Chi square value is a traditional measure of overall model fit but it is sensitive to sample size (Hooper, Coughlan, & Mullen, 2008). CFI is a commonly used fit index as it is less sensitive to sample size (Fan, Thompson, & Wang, 1999; Hooper et al., 2008). RMSEA is one of the most informative fit index to estimate how well a model fits the population covariance matrix (Hooper et al., 2008). SRMR is the square root of the difference between the residuals of the sample covariance matrix and the hypothesized covariance model (Hooper et al., 2008). According to Hooper et al. (2008) and Joreskog and Sorbom (1993), a good fitting model has CFI > 0.95, RMSEA < 0.08, and SRMR < 0.08. Additionally, non-significant chi-square indicates a good model fit.

This study aimed to determine whether patient-centered communication has an impact on perceived quality of care directly or through patient engagement. Accordingly, in this study, both a direct effect and an indirect effect model considered. This study examined two latent variables (patient-centered communication and patient engagement) and one observed variable (perceived quality of care). More specifically, the patient-centered communication latent variable consisted of seven measured indicators, the patient engagement latent variable consisted of six measured indicators, and the perceived quality of care observed variable comprised one measured indicator. The resulting SEM model is shown in Figure 3.2.

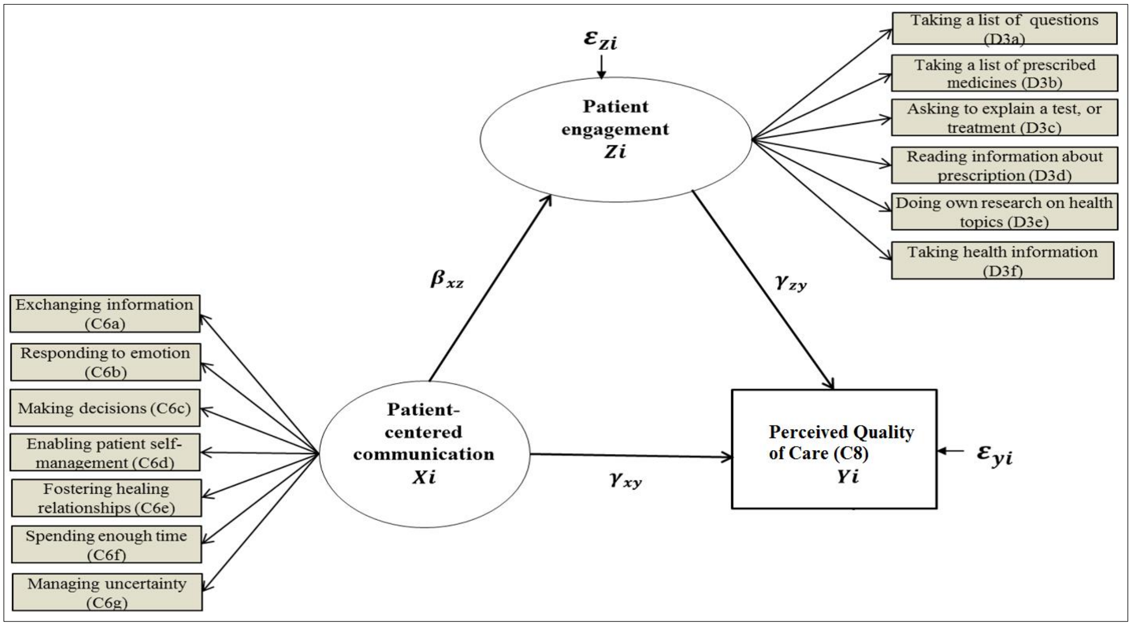

Figure 3.2 Structural Equation Modeling

The analytical model for RQ1 is shown below:

$$Zi = \beta_o + \beta_{xz} Xi + \varepsilon_{zi}$$
$$Yi = \gamma_o + \gamma_{zy}\, Zi + \gamma_{xy} Xi + \varepsilon_{yi}$$

Xi = Patient-centered communication
Yi = Perceived quality of care
Zi = Patient engagement
γ_{xy} = The direct effect
β_{xz} & γ_{zy} = The indirect effect
ε = Error terms

To address the second research question (RQ2), separate linear regressions were used to examine patient-related factors associated with overall patient-centered communication, patient engagement, and perceived quality of care. These three constructs—patient-centered communication, patient engagement, and perceived quality of care—are continuous variables. Scoring higher on each variable indicates that the respondents perceived more positive communication, engagement, and quality of care.

The resulting analytical model for RQ2 is shown below:

$$Y_j = \beta_0 + \beta_1 X_{j1} + \beta_2 X_{j2} + \beta_3 X_{j3} + \varepsilon_j$$

Y = Outcome
X1= Socio-demographic characteristics
X2= Health related factors
X3= Health system factors

CHAPTER 4: RESULTS

This chapter describes the results. First, the descriptive analyses present the characteristics of the study population. Next, the bivariate analyses describe the relationships between patient-related factors and the three areas of interest (patient-centered communication, patient engagement, and perceived quality of care). Next, the multivariate analyses address the first research question by examining the relationship among the three areas of interest using structural equation modeling, and the second research question by examining what patient-related factors are related to the three areas of interest using separate linear regressions.

Descriptive Analysis

Table 4.1 displays the characteristics of the study population (N=1,432). More than half of the respondents were female (54. 7%) and between 35 and 64 years old (54.6 %). Most respondents were married (62.4%) and employed (63.2%). The respondents were 69.8% Non-Hispanic white respondents, 10.2 % Non-Hispanic African American, 12.3% Hispanic and 5.8% Asian. A majority of respondents reported having a college degree or higher (39.1%), 32.8% had some college, and 28.1% had a high school graduate or less. Only a small proportion of respondents (9.6%) reported that they have been diagnosed with a cancer. Furthermore, 12.1% of respondents reported fair or poor health status. Most respondents reported that they had visited a healthcare provider two times or more in the past year for a regular check-up (82.7%). Most respondents reported having health coverage (91.7%) and having a regular health care provider (76.1%).

Table 4.1 Characteristics of the Study Population, 2013 HINTS (N=1,432)

Characteristic		**Unweighted *n***	**Weighted %**	**S.E.**
Patient-related factors				
	Socio-demographic factors			
Gender	Male	548	45.3	0.01
	Female	884	54.7	0.01
Age (years)	18-34	192	27.3	0.02
	35-49	324	28.7	0.02
	50-64	624	25.9	0.01
	65+	399	18.1	0.01
Race/ethnicity	Hispanic	216	12.3	0.01
	Non-Hispanic white	879	69.7	0.02
	Non-Hispanic African American	227	10.2	0.01
	Asian	56	5.8	0.01
	Other	54	2.0	0.00
Marital status	Married	946	62.4	0.02
	Not currently married	781	37.6	0.02
Education	Less than high school	94	6.2	0.01
	High school graduate	291	21.9	0.02
	Some college	430	32.8	0.02
	College graduate or more	617	39.1	0.02
Employment status	Employed	777	63.2	0.01
	Not currently employed	655	36.9	0.01
Income	<$20,000	295	15.8	0.02
	$20,000 to < $35,000	180	11.7	0.01
	$35,000 to < $50,000	208	13.7	0.01
	$50,000 to < $75,000	248	17.9	0.02
	$75,000+	501	41.0	0.02
	Health related factors			
Having cancer	Yes	226	9.6	0.01
	No	1,206	90.5	0.01
Health status	Poor/Fair	232	12.1	0.01
	Good	517	35.8	0.02
	Very Good	533	40.0	0.02
	Excellent	150	12.1	0.01
	Health system factors			
Frequency of visit to provider	1 time	224	17.3	0.02
	2 times	296	23.1	0.02
	3 times	267	17.3	0.01
	4 times	237	15.2	0.02
	5-9 times	268	18.1	0.02
	10 or more times	140	9.0	0.01
Health coverage	Yes	1,362	91.7	0.01
	No	70	8.3	0.01
Having regular provider	Yes	1,128	76.1	0.01
	No	304	23.9	0.01

Patient-Centered Communication

Table 4.2 describes the study population's responses to the seven questions related to patient-centered communication behaviors. Overall, 63.4% of respondents reported that their provider 'Always' gives them the chance to ask health related questions, and 63.0% reported that their provider explains things in a way they can understand. Additionally, 60.4% of the respondents reported that their provider 'Always' makes sure that they understand what they need to do to take care their health and 52.8% reported that their provider involves them in decision about their health care as much as they want. Lastly, 46.5% of respondents reported that their provider 'Always' pays the attention to their feelings and emotions, and 44.2% of respondents reported that their provider 'Always' helps them deal with feeling of uncertainty about their health or health care, as shown in Table 4.2.

Table 4.2 Responses to Patient-Centered Communication (N=1,432)

	Never Weighted % (S.E.)	Sometimes Weighted % (S.E.)	Usually Weighted % (S.E.)	Always Weighted % (S.E.)
How often did your provider do each of the following				
Give the chance to ask all the health-related questions you had?	1.0 (0.00)	8.9 (0.01)	26.7 (0.02)	63.4 (0.02)
Give the attention you needed to your feelings and emotions?	4.0 (0.01)	16.3 (0.01)	33.2 (0.02)	46.5 (0.02)
Involved you in decisions about your health care as much as you wanted?	2.6 (0.01)	12.1 (0.01)	32.6 (0.02)	52.8 (0.02)
Make sure you understood the things you needed to do to take care of your health?	1.3 (0.00)	10.1 (0.01)	28.3 (0.02)	60.4 (0.02)
Explain things in a way you could understand?	1.5 (0.01)	7.7 (0.01)	27.9 (0.02)	63.0 (0.02)
Spend enough time with you?	4.1 (0.01)	14.9 (0.01)	32.0 (0.02)	49.0 (0.02)
Help you deal with feelings of uncertainty about your health or health care?	6.3 (0.01)	16.1 (0.01)	33.3 (0.02)	44.2 (0.02)

Table 4.3 displays respondents' mean scores of patient-centered communication as reported by the study population (overall Mean = 23.52 SE= 0.19; range = 7-28). The

highest mean for patient-centered communication which related to the question about giving the chance to ask all the health-related question was 3.53 (SE =0.03) while the lowest mean for patient-centered communication related to the question about provider's help in dealing with feeling of uncertainty about patient's health or health care was 3.16 (SE = 0.04). Reliability test for overall patient-centered communication using Cronbach's α (0.93) was acceptable.

Table 4.3 Mean Scores for Patient-Centered Communication (N=1,432)

	Mean	S.E.	Min	Max	Cronbach's Alpha
How often did your provider do each of the following					
Give the chance to ask all the health-related questions you had?	3.53	0.03	1.00	4.00	0.93
Give the attention you needed to your feelings and emotions?	3.22	0.04	1.00	4.00	0.92
Involved you in decisions about your health care as much as you wanted?	3.36	0.03	1.00	4.00	0.92
Make sure you understood the things you needed to do to take care of your health?	3.48	0.03	1.00	4.00	0.92
Explain things in a way you could understand?	3.52	0.03	1.00	4.00	0.92
Spend enough time with you?	3.26	0.04	1.00	4.00	0.92
Help you deal with feelings of uncertainty about your health or health care?	3.16	0.04	1.00	4.00	0.93
Patient-Centered Communication	23.52	0.19	7	28	0.93

Note that higher values indicate better rating regarding patient-centered communication.
Abbreviation: SE, standard error

Patient Engagement

Table 4.4 describes the study population's responses to the six questions related patient engagement behaviors. 39.1% respondents reported that they 'Always' read information about a new prescription, such as side effects; 35.9% reported that they ask their doctor to explain a test, treatment, or procedure to them in detail; 30.0% reported that they take a list of all their prescribed medicines; 26.9% reported that they conduct their own research on a health or medical topic after seeing their doctor; and 18.6%

reported that they take with them a list of questions or concerns they want to cover during their visit. Only 8.4% of respondents reported that they 'Always' take with them any kind of health information they have found.

Table 4.4 Responses to Patient Engagement (N=1,432)

	Never Weighted % (S.E.)	Sometimes Weighted % (S.E.)	Usually Weighted % (S.E.)	Always Weighted % (S.E.)
How often do you do each of the following				
Take with you a list of questions or concerns you want to cover?	26.2 (0.02)	33.1 (0.02)	22.1 (0.02)	18.6 (0.02)
Take a list of all your prescribed medicines?	34.6 (0.02)	16.1 (0.02)	19.3 (0.02)	30.0 (0.02)
Ask your doctor to explain a test, treatment, or procedure to you in detail?	6.4 (0.01)	25.8 (0.02)	31.9 (0.02)	35.9 (0.02)
Read information about a new prescription, such as side effects?	12.8 (0.01)	19.2 (0.02)	28.9 (0.02)	39.1 (0.02)
Conduct your own research on a health or medical topic after seeing your doctor?	14.4 (0.02)	31.9 (0.02)	26.8 (0.02)	26.9 (0.02)
Take with you any kind of health information you have found?	40.5 (0.02)	36.3 (0.02)	14.9 (0.02)	8.4 (0.01)

Abbreviation: SE, standard error

Table 4.5 shows that the mean score for patient engagement behaviors was 15.27 (SE = 0.16; range = 6-24). The highest mean for patients' engagement behavior as evidenced by whether the patients asked their doctor to explain a test, treatment, or procedure to them in detail was 2.97 (SE =0.04). At the same time, the lowest mean for patient engagement behavior as evidenced by whether the patients brought any kind of health information they found to the doctor visit was 1.91 (SE= 0.04). Reliability test for overall patient engagement behaviors was examined using Cronbach's α (0.73), which is acceptable.

Table 4.5 Mean Scores for Patient Engagement (N=1,432)

	Mean	S.E.	Min	Max	Cronbach's Alpha
In general, how often did you do each of the following					
Take with you a list of questions or concerns you want to cover?	2.33	0.16	1.00	4.00	0.72
Take a list of all your prescribed medicines?	2.45	0.05	1.00	4.00	0.72

Ask your doctor to explain a test, treatment, or procedure to you in detail?	2.97	0.04	1.00	4.00	0.73
Read information about a new prescription, such as side effects and precautions?	2.94	0.05	1.00	4.00	0.73
Conduct your own research on a health or medical topic after seeing your doctor?	2.66	0.04	1.00	4.00	0.74
Take with you to your doctor visit any kind of health information you have found?	1.91	0.04	1.00	4.00	0.73
Patient Engagement	15.27	0.16	6.00	24.00	0.73

Note that higher values indicate better rating regarding patient engagement.
Abbreviation: SE, standard error

Perceived Quality of Care

As Table 4.6 shows, 35.0% of study population rated 'excellent' quality of care, 41.0%, rated 'very good' quality of care, and 18.3% rated 'good' quality of care in the past 12 months. Only 84 patients, comprising 5.7% respondents, reported 'poor' or 'fair' quality of care.

Table 4.6 Responses to Perceived Quality of Care (N=1,432)

	Poor/Fair Weighted % (S.E.)	Good Weighted % (S.E.)	Very Good Weighted % (S.E.)	Excellent Weighted % (S.E.)
Overall, how would you				
Rate the quality of health care you received in the past 12 months?	5.7 (0.01)	18.3 (0.02)	41.0 (0.02)	35.0 (0.02)

Table 4.7 shows respondents' mean score for perceived quality of care on a scale of 1 to 4. The mean score of quality of care was 3.05 (SE = 0.04) which can be considered as high.

Table 4.7 Mean Scores for Perceived Quality of Care (N=1,432)

	Mean	S.E.	Min	Max
Overall, how would you				
Rate the quality of health care you received in the past 12 months?	3.05	0.04	1.00	4.00
Perceived Quality of Care score	3.05	0.04	1.00	4.00

Bivariate Analysis

Patient-Centered Communication Perceived by Patient-related Factors

Table 4.8 presents the mean of the overall patient-centered communication assessed by socio-demographic, health-related, and health care system factors. Strong positive relationships were found between patient-centered communication and socio-demographic factors, specifically age ($p < .001$) and race ($p < .001$); health-related factors, such as having a cancer ($p < .05$) and self-rating their health status ($p < .001$); and health system factors, such as having a regular provider ($p < .001$). P-value of less than 0.05 was used to determine statistical significance.

Respondents older than 65 years of age had the highest mean value of 24.59 (SE = 0.30) for overall patient-centered communication, while Asian respondents had the lowest mean score of 20.87 (SE =1.45). Notably, health-related factors in this study showed significantly strong relationships with patient-centered communication.

Table 4.8 Mean Patient-Centered Communication by Patient-related Factors (N=1,432)

Patient-Centered Communication		**Estimate**	**S.E.**	**P-value**
Patient-related factors				
Socio-demographic factors				
Gender	Male	23.70	0.27	0.06
	Female	23.37	0.26	
Age (years)	18-34	22.93	0.53	**0.00*****
	35-49	23.16	0.44	
	50-64	23.78	0.23	
	65+	24.59	0.30	
Race/ethnicity	Hispanic	22.87	0.65	**0.00*****
	Non-Hispanic white	23.76	0.21	
	Non-Hispanic African American	24.03	0.53	
	Asian	20.87	1.45	
	Other	24.14	1.03	
Marital status	Married	23.40	0.27	0.55
	Not currently married	23.72	0.25	
Education	Less than high school	23.86	0.77	0.76

	High school graduate	23.42	0.44	
	Some college	23.68	0.42	
	College graduate or more	23.38	0.25	
Employment status	Employed	23.61	0.22	0.55
	Not current employed	23.36	0.32	
Income	<$20,000	23.38	0.56	0.11
	$20,000 to < $35,000	23.88	0.66	
	$35,000 to < $50,000	24.04	0.52	
	$50,000 to < $75,000	23.98	0.46	
	$75,000+	23.09	0.30	
Health related factors				
Having cancer	Yes	24.28	0.56	**0.05***
	No	23.51	0.18	
Health status	Poor/Fair	21.95	0.51	**0.00*****
	Good	23.30	0.29	
	Very Good	23.87	0.29	
	Excellent	24.57	0.59	
Health care system factors				
Frequency of visit to provider	1 time	24.44	0.32	0.30
	2 times	23.08	0.42	
	3 times	23.80	0.37	
	4 times	23.16	0.46	
	5-9 times	23.47	0.64	
	10 or more times	23.02	0.86	
Health coverage	Yes	23.53	0.19	0.11
	No	22.35	0.84	
Having regular provider	Yes	23.72	0.21	**0.00*****
	No	22.87	0.52	

Note: *p < .05, **p < .01, ***p < .001. Abbreviation: SE, standard error

Patient Engagement by Patient-related Factors

The mean of the overall patient engagement score was calculated for each independent variable. The means for the overall patient engagement scores by each independent variable are presented in Table 4.9.

Strong relationships were found between patient engagement behaviors and gender (p < .001), age (p < .001), race (p < .001), education level (p < .05), employment status (p < .001), and income level (p < .001), with the exception of marital status among socio-demographic factors (p = 0.76). Among health related factors related to patient engagement behaviors, having cancer (p < .001) was statistically significant while health status was not statistically significant (p=0.92). Health system factors, such as frequency of office visit for regular checkup (p < .001) and a regular provider factors (p < .001) were statistically significant.

The highest mean value for overall patient engagement was reported by respondents with household income level greater than $35,000 and less than < $50,000 (Mean=16.85, SE=0.48). Further, males reported lower mean value for patient engagement (Mean=14.40, SE=0.27) as compared to females (Mean=15.99, SE=0.17). Notably, older respondents reported higher patient engagement. For example, patients who were 65 years and older reported higher mean value for patient engagement (Mean= 15.93, SE=0.30) as compared to other groups. Patients who were Non-Hispanic white showed higher mean value for patient engagement (Mean= 15.46, SE =0.19) as compared to other groups. Patients who were employed showed lower mean value for patient engagement (Mean=14.78, SE=0.22) as compared to patients who were not employed (Mean=16.11, SE=0.19). Generally, higher education level was associated with higher patient engagement. For example, patients who reported some college education showed higher mean value for patient engagement (Mean=15.57, SE=0.30) as compared to other groups (although those with a college graduate or higher education reported slightly less patient engagement).

Regarding health related factors, respondents who have ever been diagnosed with cancer (Mean=16.57, SE =0.44) reported higher level of patient engagement compared to patients who never had cancer (Mean=15.13, SE = 0.16). Among health care system factors, the frequency of office visits to provider in the previous 12 months was associated with higher level of patient engagement. The more frequent the office visits to a provider were, the higher the level of patient engagement. Patients with one visit reported mean value for overall patient engagement of 13.95 (SE = 0.54), whereas patients with 10 or more visits reported mean value of 16.25 (SE= 0.55). Further, patients having a regular provider (Mean=15.54, SE = 0.18) reported higher level of patient engagement than patients not having a regular provider (Mean=14.39, SE = 0.35).

Table 4.9 Mean Patient Engagement Patient-related Factors (N=1,432)

Patient Engagement		**Mean**	**S.E.**	**P-value**
Patient-related factors				
Socio-demographic factors				
Gender	Male	14.40	0.27	**0.00*****
	Female	15.99	0.17	
Age (years)	18-34	14.44	0.35	**0.00*****
	35-49	15.07	0.32	
	50-64	15.90	0.27	
	65+	15.93	0.30	
Race/ethnicity	Hispanic	14.40	0.49	**0.00****
	Non-Hispanic white	15.46	0.19	
	Non-Hispanic African American	14.98	0.58	
	Asian	14.92	0.69	
	Other	16.45	0.68	
Marital status	Married	15.42	0.21	0.76
	Not currently married	15.02	0.27	
Education	Less than high school	14.46	0.73	**0.02***
	High school graduate	15.00	0.46	
	Some college	15.57	0.30	
	College graduate or more	15.29	0.23	
Employment status	Employed	14.78	0.22	**0.00*****
	Not current employed	16.11	0.19	
Income	<$20,000	15.27	0.40	**0.00****
	$20,000 to < $35,000	15.36	0.34	
	$35,000 to < $50,000	16.85	0.48	
	$50,000 to < $75,000	14.52	0.39	
	$75,000+	15.04	0.27	

Health related factors				
Having cancer	Yes	16.57	0.44	**0.00*** **
	No	15.13	0.16	
Health status	Poor/Fair	15.26	0.38	0.92
	Good	15.35	0.31	
	Very Good	15.34	0.31	
	Excellent	14.79	0.50	
Health care system factors				
Frequency of visit to provider	1 time	13.95	0.54	**0.00*** **
	2 times	14.84	0.26	
	3 times	15.67	0.36	
	4 times	15.52	0.42	
	5-9 times	15.99	0.43	
	10 or more times	16.25	0.55	
Health coverage	Yes	15.27	0.18	0.98
	No	15.25	0.75	
Having regular provider	Yes	15.54	0.18	**0.00*** **
	No	14.39	0.35	

Note: *p < .05, **p < .01, ***p < .001. Abbreviation: SE, standard error

Perceived Quality of Care by Patient-related Factors

Table 4.10 shows the mean scores for the perceived quality of care by selected patient-related factors. We found significant relationships between perceived quality of care and age (p < .001), race/ethnicity (p < .001), marital status (p < .05), education level (p < .001), and house income level (p < .001). However, gender, employment status, and frequency of office visit did not show significant relationship with perceived quality of care.

We also found significant relationships between perceived quality of care and health related factors such as having cancer (p < .001) and health status (p < .001). Similarly, health care system factors, such as having health coverage (p < .001) and a regular provider factors (p < .001), were statically significant as well. Remarkably, the respondents who self-reported excellent in their health status had the highest mean value of perceived quality of care (Mean=3.36, SE = 0.09). Among race/ethnic groups, the Asian respondents reported the lowest perceived quality of care (Mean=2.56, SE = 0.26).

Table 4.10 Mean Perceived Quality of Care by Patient-related Factors, (N=1,432)

Quality of Care		**Estimate**	**S.E.**	**P-value**
Patient-related factors				
Socio-demographic factors				
Gender	Male	3.04	0.06	0.94
	Female	3.06	0.05	
Age (years)	18-34	2.99	0.08	**0.00*** **
	35-49	2.88	0.07	
	50-64	3.16	0.04	
	65+	3.27	0.05	
Race/ethnicity	Hispanic	2.95	0.10	**0.00*** **
	Non-Hispanic white	3.13	0.04	
	Non-Hispanic African American	2.95	0.07	
	Asian	2.56	0.26	
	Other	3.00	0.35	
Marital status	Married	3.08	0.05	**0.03* **
	Not currently married	3.09	0.06	
Education	Less than high school	3.10	0.13	**0.00** **
	High school graduate	3.00	0.08	
	Some college	3.03	0.07	
	College graduate or more	3.09	0.05	
Employment status	Employed	3.04	0.05	0.60
	Not current employed	3.07	0.05	
Income	<$20,000	2.96	0.10	**0.00** **
	$20,000 to < $35,000	3.05	0.13	
	$35,000 to < $50,000	3.11	0.08	
	$50,000 to < $75,000	3.18	0.08	
	$75,000+	3.02	0.05	
Health related factors				
Having cancer	Yes	3.19	0.11	**0.00** **
	No	3.04	0.04	
Health status	Poor/Fair	2.62	0.09	**0.00*** **
	Good	2.96	0.06	
	Very Good	3.18	0.06	
	Excellent	3.36	0.09	
Health care system factors				
Frequency for office visits	1 time	3.15	0.07	0.94
	2 times	2.96	0.07	

	3 times	2.98	0.07	
	4 times	3.16	0.09	
	5-9 times	3.06	0.11	
	10 or more times	3.07	0.16	
Health coverage	Yes	3.06	0.04	**0.00****
	No	2.98	0.15	
Having regular provider	Yes	3.11	0.04	**0.00*****
	No	2.86	0.09	

Note: *p < .05, **p < .01, ***p < .001. Abbreviation: SE, standard error

Structural Equation Modeling

Exploratory Factor Analysis

For reliability analysis, Cronbach's value ranged from 0.66 to 0.93, indicating good internal consistency. Table 4.11 presents the results of exploratory factor analysis (EFA) and reliability analysis. The EFA indicated that all 7 items related to patient-centered communication as well as the 6 items related to patient engagement load nicely. We labeled the latent variable "Patient-Centered Communication" to represent questions 1-7 and the latent variable "Patient Engagement" to represent questions 8-13. The Cronbach's alpha for patient-centered communication and for patient engagement of 0.93 and 0.72, respectively.

Table 4.11 Exploratory Factor Analysis and Reliability Analysis for Patient-Centered Communication and Patient Engagement

	Factor loading	Eigenvalue	Cronbach's Alpha
Patient-Centered Communication			0.93
How often did your provider do each of the following			
1. Give the chance to ask all the health-related questions you had?	0.78	4.93	0.93
2. Give the attention you needed to your feelings and emotions?	0.80		0.92
3. Involved you in decisions about your health care as much as you wanted?	0.83		0.92
4. Make sure you understood the things you needed to do to take care of your health?	0.86		0.92
5. Explain things in a way you could understand?	0.83		0.92
6. Spend enough time with you?	0.85		0.92

7. Help you deal with feelings of uncertainty about your health or health care?	0.78		0.93
Patient Engagement			0.72
In general, how often did you do each of the following			
8. Take with you a list of questions or concerns you want to cover?	0.64	1.73	0.66
9. Take a list of all your prescribed medicines?	0.46		0.71
10. Ask your doctor to explain a test, treatment, or procedure to you in detail?	0.55		0.68
11. Read information about a new prescription, such as side effects?	0.51		0.69
12. Conduct your own research on a health or medical topic after seeing your doctor?	0.55		0.70
13. Take with you to your doctor visit any kind of health information you have found?	0.64		0.67

Confirmatory Factor Analysis (CFA)

Subsequent Confirmatory Factor Analyses for two latent variables—Patient-Centered Communication and Patient Engagement—were performed to ensure the validity of the models derived from exploratory factor analysis (EFA). The model parameters were estimated using maximum likelihood.

1) Confirmatory Factor Analysis for Patient-Centered Communication

Confirmatory Factor Analysis for patient-centered communication was performed to assess the fit of the measurement model based on the results of EFA. Based on the results, the fit of the initial model to the data was not adequate (Chi square = 437.73, N=1,432, df = 14, $P < 0.001$; RMSEA= 0.15; SRMR=0.03; CFI=0.95). To improve the model fit, we examined modification indices for potential paths. Modification index expresses the expected decrease in chi-square statistic with a single degree of freedom for adding a single path. Kline (2011) has shown that the overall fit of a model can be improved by adding paths with a greater value of modification index. Therefore, based on modification index analysis, we added the following paths: exchanging information - managing uncertainty; responding to emotion - fostering healing relationship; enabling patient self-management- fostering healing relationship. The results for the goodness of fit of the modified model is presented Table 4.12. The chi-square statistic shows that it is significant, which indicates that the model fit is still not adequate. However, the chi-square statistic is very sensitive to sample size (Hooper et al., 2008). Therefore, we consider other criteria, such as the values of RMSEA, CFI, and SRMR to determine model fit. RMSEA values of the modified model were approaching 0.08, indicating moderate fit. SRMR ≤ 0.08 and CFI ≥ 0.95 indicated good model fit. Therefore, Goodness of fit in the modified model was adequate to conceptualize the data within our measurement model for Patient-Centered Communication.

Table 4.12 Goodness of Fit Results for Confirmatory Factor Analysis for Patient-Centered Communication

χ^2/df	129.30/11 ***
RMSEA	0.087
CFI	0.985
SRMR	0.016

Note: *p < .05, **p < .01, ***p < .001.
Note: CFI: Comparative Fit Index; (CFI) ≥ 0.95; Root mean square error of approximation (RMSEA) ≤ 0.08, Standardized Root Mean Square Residual (SRMR) ≤ 0.08; and chi-square with no significance at the .05 level indicate a good fitting model.

Strong standardized path coefficients between the latent variable (Patient-Centered Communication) and its corresponding indicator variables suggested sound latent structure. The path coefficients for the patient-centered communication were all statistically significantly at 0.05 level or lower. All path coefficients between latent variable and the observed variables ranged from 0.78 to 0.85 indicating robust latent structure and verifying that each observed variable contributed significantly to the overall latent construct, as shown Table 4.13.

Table 4.13 Standardized Path Coefficients for Patient-Centered Communication

	Estimate	S.E.	P-value	Cronbach's Alpha

Provider Communication Behavior				
In the last 12 months, how often did doctor or other providers…				
Give the chance to ask all the health-related questions you had? (Exchanging information)	0.78	0.01	0.00	0.93
Give the attention you needed to your feelings and emotions? (Responding to emotion)	0.82	0.01	0.00	0.92
Involved you in decisions about your health care as much as you wanted? (Making decisions)	0.83	0.01	0.00	0.92
Make sure you understood the things you needed to do to take care of your health? (Enabling patient self-management)	0.83	0.01	0.00	0.92
Explain things in a way you could understand? (Fostering health relationships)	0.83	0.01	0.00	0.92
Spend enough time with you? (Spending enough time)	0.85	0.01	0.00	0.92
Help you deal with feelings of uncertainty about your health or health care? (Making uncertainty)	0.81	0.01	0.00	0.93

The path diagram with standardized path coefficients illustrates the one factor model, where the latent variable (Patient-Centered Communication)) is manifested by seven observed variables. An oval represents a latent variable and a rectangle represents measured variables. As displayed in Figure 4.1, we found each of the observed variables to be positively associated with the latent variable. Accordingly, exchanging information ($\beta = 0.78$, $p < .001$), responding to emotion ($\beta = .82$, $p< .001$), making decision ($\beta = .83$, $p< .001$), enabling patient self-management ($\beta = .83$, $p< .001$), fostering healing relationship ($\beta = .82$, $p< .001$), spending enough time for patient-provider communication ($\beta = .85$, $p< .001$), and managing uncertainty ($\beta = .81$, $p< .001$) were all positively associated with patient-centered communication.

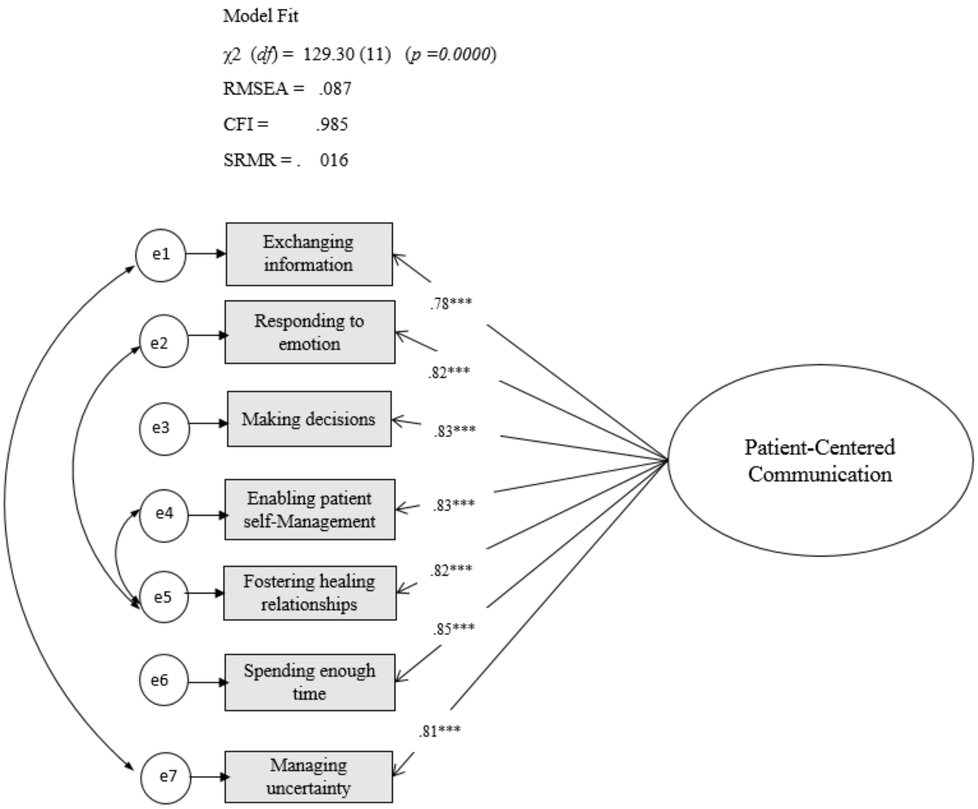
Model Fit
χ2 (df) = 129.30 (11) (p =0.0000)
RMSEA = .087
CFI = .985
SRMR = . 016

Figure 4.1 Confirmatory Factor Analysis for Patient-Centered Communication

2) Confirmatory Factor Analysis for Patient Engagement

Confirmatory Factor Analysis (CFA) for patient engagement was conducted as well. Based on the results, the initial model did not fit the data well (Chi square statistics = 324.90, N=1,432, df = 9, P < 0.001; RMSEA = 0.157; SRMR = 0.065; CFI = 0.812). Considering the conceptual framework (Figure 2.2) and the exploratory factor analysis (Table 4.11), we excluded the item: “How often do you conduct your own research on a health or medical topic after seeing your doctor” from the CFA model. The reason for this exclusion was that patients conducting own research after a visit is a comprehensive behavior inclusive of other patient engagement behaviors. Further, the focus of this study is on patients’ behaviors related to their interaction with health care providers *during* an office visit and not on patient engagement behavior *after* an office visit. Therefore, the remaining five observed behaviors included in the patient engagement latent variable were considered for further CFA analysis. After this adjustment, the goodness of fit estimates of modified model are shown in Table 4.14. The RMSEA value is closer to 0.08, which indicates good model fit. Furthermore, the modified model met the requirement of SRMR ≤ 0.08 and CFI ≥ 0.95. Thus, the modified CFA model indicated good fit.

Table 4.14 Goodness of Fit Results for Confirmatory Factor Analysis for Patient Engagement

χ^2/df	59.05/5***
RMSEA	0.087
CFI	0.953
SRMR	0.030

Note: *p < .05, **p < .01, ***p < .001
Note: CFI: Comparative Fit Index; (CFI) ≥ 0.95; Root mean square error of approximation (RMSEA) ≤ 0.06, Standardized 0.08, Root Mean Square Residual (SRMR) ≤ 0.08; and chi-square with no significance at the .05 level indicate a good fitting model.

The standardized path coefficients between the latent variable (Patient Engagement) and its corresponding indicator variables suggested sound latent structure. The path coefficients for the patient engagement were all statistically significantly at 0.05 level. All path coefficients between the latent variable and the observed variables ranged from 0.45 to 0.70, indicating robust latent structure. Further, each observed variable contributed significantly to the overall the latent construct, as shown in Table 4.15.

Table 4.15 Standardized Path Coefficients for Patient Engagement

	Estimate	**S.E.**	**P-value**	**Cronbach's Alpha**
Patient Engagement Behavior				0.72
In general, how often do you do each of the following				

Take with you to your doctor visits a list of questions or concerns you want to cover	0.70	0.03	0.00	0.66
Take a list of all of your prescribed medicines to your doctor visits	0.56	0.03	0.00	0.71
Ask your doctor to explain a test, treatment, or procedure to you in detail	0.60	0.03	0.00	0.68
Read information about a new prescription, such as side effects and precautions	0.45	0.03	0.00	0.69
Take with you to your doctor visit any kind of health information you have found	0.55	0.03	0.00	0.67

The path diagram with standardized path coefficients illustrates that the latent variable (Patient Engagement) with five observed variables, as shown in Figure 4.2. The observed variables correlated modestly with patient engagement. Specifically, taking to a doctor a list of questions or concerns the patient wants to cover ($\beta = .70$, $p < .001$), taking a list of prescribed medicines to their doctor visits ($\beta = .56$ $p < .001$), asking the doctor to explain a test or treatment ($\beta = .60$, $p < .001$), reading information about a new prescription such as side effects and precautions ($\beta = .45$, $p < .001$), and taking to a doctor visit any kind of health information the patient has found ($\beta = .55$, $p < .001$) are positively associated with patient engagement.

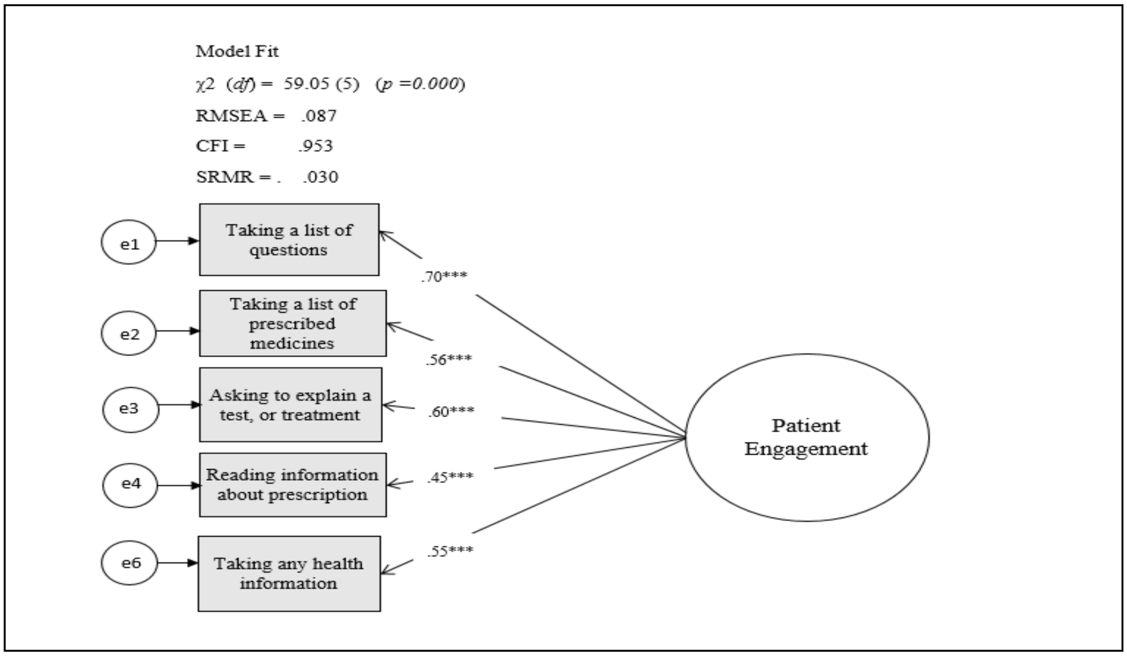

Figure 4.2 Confirmatory Factor Analysis for Patient Engagement

Final Structural Equation Model

Based on the two confirmatory factor analyses, we conducted SEM to estimate path models for the two latent variables (patient-centered communication and patient engagement) and one observed variable (perceived quality of care) in one model. We examined the goodness of fit statistics of the final Structural Equation Model. As Table 4.16 suggests, the initial model fit the data well.

Table 4.16 Goodness of Fit Results for Full Structural Equation Model

χ^2/df	611.987 (63)***
RMSEA	0.078
CFI	0.945
SRMR	0.040

Note: *p < .05, **p < .01, ***p < .001
Note: CFI: Comparative Fit Index; (CFI) ≥ 0.95; Root mean square error of approximation (RMSEA) ≤ 0.06, Standardized 0.08, Root Mean Square Residual (SRMR) ≤ 0.08; and chi-square with no significance at the .05 level indicate a good fitting model.

Next, we examined the factor structure, factor loading, and factor error measurement values for sample population. The standardized path coefficients represent the strength of each relationship. As shown in Table 4.17, higher levels of patient-centered communication led to higher levels of patient engagement and higher level of perceived quality of care by patients. We found that the strongest relationship among the observed variables related to patient-centered communication was with enabling patient self-management (which corresponds to the survey item: Make sure you understood the things you needed to do to take care of your health). We also found that the weakest relationship among the observed variables related to patient-centered communication was with exchanging information (which corresponds to the survey item: Give you the chance to ask all health related questions). Similarly, the strongest relationship among the observed variables related to patient engagement was with taking a list of questions or concerns to doctor visits and the weakest relationship was with reading information about a new prescription.

Overall, the seven considered components related to patient-centered communication had strong path coefficients for the patient-centered communication latent variable (standardized coefficient = 0.77 to 0.86). Further, the five considered components of patient engagement had relatively weak path coefficients for the patient engagement latent variable (standardized coefficient = 0.46 to 0.69). The results also indicate that the paths between patient-centered communication and patient engagement, between patient engagement and perceived quality of care, and between patient-centered communication and perceived quality of care were all statistically significant. However, a low standardized coefficient between patient engagement and perceived quality of care (standardized coefficient = 0.06) indicated weak relationship.

Table 4.17 Standardized Path Coefficients for Full Structural Equation Model

	Estimate	S.E.	P-value
Structure			
Patient-Centered Communication → Patient Engagement	0.28	0.03	0.00
Measurement			
Provider-Centered Communication			
In the last 12 months, how often did doctor or other providers…			
Give the chance to ask all the health-related questions you had?	0.77	0.01	0.00
Give the attention you needed to your feelings and emotions?	0.80	0.01	0.00
Involved you in decisions about your health care as much as you wanted?	0.83	0.01	0.00
Make sure you understood the things you needed to do to take care of your health?	0.86	0.01	0.00
Explain things in a way you could understand?	0.84	0.01	0.00
Spend enough time with you?	0.85	0.01	0.00
Help you deal with feelings of uncertainty about your health or health care?	0.79	0.01	0.00
Patient Engagement Behavior			
In general, how often do you do each of the following…			
Take with you to your doctor visits a list of questions or concerns you want to cover?	0.69	0.02	0.00
Take a list of all of your prescribed medicines to your doctor visits?	0.56	0.02	0.00
Ask your doctor to explain a test, treatment, or procedure to you in detail?	0.62	0.02	0.00
Read information about a new prescription, such as side effects and precautions?	0.46	0.02	0.00
Take with you to your doctor visit any kind of health information you have found?	0.54	0.02	0.00
Patient Engagement → Perceived Quality of Care	0.06	0.02	0.01
Patient-Centered Communication → Perceived Quality of Care	0.71	0.02	0.00

Patient-centered communication was considered an “exogenous” variable that is not determined by any other variable, while patient engagement and perceived quality of care were considered “endogenous” variables influenced by other variables in the structural equation model. Additionally, endogenous variable patient engagement acted as both a cause and an effect variable, as shown Figure 4.3. This study found that patient-centered communication was positively associated with patient engagement (β = 0.29, p < .001) which was, in turn, positively associated with perceived quality of care (β = 0.06, p < .01). Further, patient-centered communication was directly associated with perceived quality of care (β = 0.71, p < .001). In other words, patient engagement mediated the relationship between patient-centered communication and perceived quality of care, as shown in Figure 4.3.

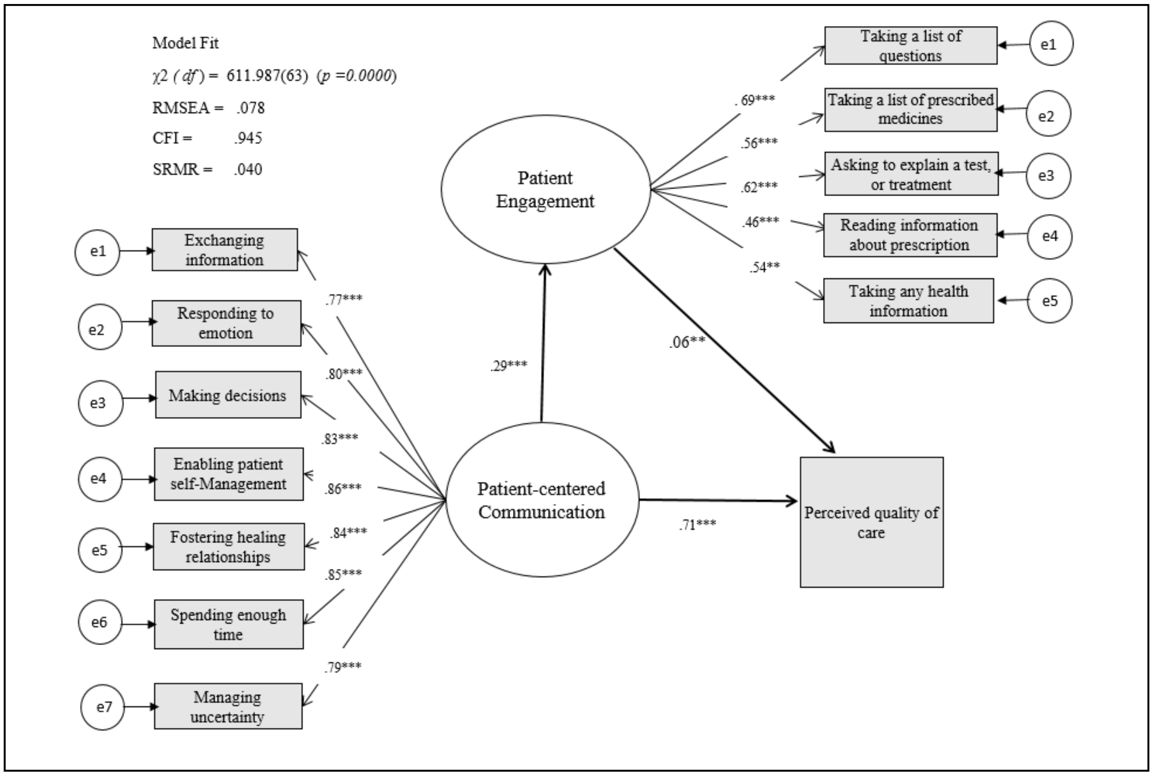

Figure 4.3 Modified Model with Standardized Coefficients

Indirect effects, direct effects, and total effects

To validate the mediation effect, we measured the total effects and indirect effects. Table 4.18 displays the total effects and indirect effects as well as the significance of patient-centered communication and patient engagement on perceived quality of care. Patient engagement is directly associated with patient-centered communication and with perceived quality of care. Further, no indirect relationship exists between patient-centered communication and patient engagement, and between patient engagement and perceived quality of care. In both these cases, the direct effect is the same as the total effect. However, indirect relationship was found between patient-centered communication and perceived quality of care, with patient engagement mediating the relationship (β = 0.01, p= 0.012). The total effect (indirect plus direct) of patient-centered communication on perceived quality of care was significant and positive (β = 0.72, P < 0.001).

Table 4.18 Summary of Standardized Indirect and Total Effects

Path	Indirect effect	Total effect
Patient-Centered Communication → Perceived Quality of Care	0.01*(p=0.012)	0.72***(P < 0.001)
Patient-Centered Communication → Patient Engagement	0	0.28***(P < 0.001)
Patient Engagement-> Perceived Quality of Care	0	0.06***(P = 0.013)

Multivariate Linear Regression Analysis

This study identified patient-related factors associated with overall patient-centered communication, patient engagement, and perceived quality of care among US adults who have visited their health care provider in the last 12 months.

Factors Associated with Patient-Centered Communication

This study examined the association of patient-related factors such as socio-demographic, health related, and health system factors with patient-centered communication. Table 4.19 shows the results of the multivariate linear regression analysis. After controlling for socio-demographic, health related, and health system factors, it was found that individuals over 65 years of age (β = 1.56, p < .001) were more likely to engage in patient-centered communication compared to 18 to 34 years old patients. Compared to Non-Hispanic white respondents, Asian respondents showed a significant negative association with patient-centered communication (β = -2.30, p < .001).

Further, those patients who reported very good (β =1.96, p < .01) or excellent (β =2.74, p < .001) in their health status showed a significantly positive association with the patient-centered communication compared to those who reported a poor health status. Additionally, compared to those who do not have a regular health provider, patients having a regular provider (β =0.93, p < .01) showed a positive association with patient-centered communication when controlling for all variables in the model.

Table 4.19 Factors associated with Patient-Centered Communication (N=1,432)

Patient-Centered Communication		**β**	**S.E.**	**P-value**
Intercept		21.34	1,12	**0.00*****
Socio-Demographic factors				
Gender	Male	0	-	-
	Female	0. 23	0.25	0.36
Age (years)	18-34	0	-	-
	35-49	0.25	0.42	0.56
	50-64	0.74	0.39	0.06
	65+	1.56	0.46	**0.00*****
Race/ethnicity	Hispanic	-0.27	0.34	0.46
	Non-Hispanic white	0.00	-	-
	Non-Hispanic African American	0.06	0.35	0.87
	Asian	-2.30	0.64	**0.00*****
	Other	1.31	0.64	0.04
Marital status	Married	0.30	0.27	0.27
	Not currently married	0.00	-	-
Education	Less than high school	0.00	-	-
	High school graduate	-0.87	0.55	0.12
	Some college	-0.97	0.55	0.08
	College graduate or more	-1.00	0.57	0.08
Employment status	Employed	0.42	0.31	0.18
	Not current employed	0.00	-	-
Income	<$20,000	0.00	-	-
	$20,000 to < $35,000	-0.20	0.45	0.65
	$35,000 to < $50,000	0.27	0.45	0.56
	$50,000 to < $75,000	-0.19	0.46	0.65

	$75,000+	-0.84	0.46	0.07
Health related factors				
Having cancer	Yes	0.21	0.35	0.55
	No	0.00	-	-
Health status	Poor/Fair	0.00	-	-
	Good	1.25	0.38	**0.01****
	Very Good	2.07	0.41	**0.00*****
	Excellent	2.89	0.54	**0.00*****
Health care system factors				
Frequency for office visits	1 time	0.00	-	-
	2 times	0.05	0.40	0.90
	3 times	0.36	0.42	0.39
	4 times	-0.01	0.44	0.98
	5-9 times	-0.41	0.43	0.34
	10 or more times	-0.27	0.52	0.60
Health coverage	Yes	0.28	0.58	0.63
	No	0.00	-	-
Having regular provider	Yes	0.93	0.31	**0.00****
	No	0.00	-	-

Note: *p < .05, **p < .01, ***p < .001.

Factors Associated with Patient Engagement

Table 4.20 shows the association of patient-related factors such as socio-demographic, health related, and health system factors with patient engagement. Compared to male respondents, female respondents (β = 1.16, p < .001.) were positively associated with patient engagement. Compared to 18-34 years old respondents, respondents older than 35 years of age had a significantly positive association with patient engagement when controlling for all variables in the model. Compared to Non-Hispanic white respondents, Asian respondents (β = - 1.09, p < .05) had a significantly negative association with patient engagement. Respondents with higher level of education were also positively associated with patient engagement compared to those with high school education or less. Additionally, compared to those who have never been diagnosed with cancer, patients who have ever been diagnosed with cancer (β = 0.67, p < .05) had a positive relationship with patient engagement. The number of visits to health care providers in the last 12months was also positively associated with patient engagement. Health coverage and a regular provider factors were not significantly associated with patient engagement.

Table 4.20 Factors associated with Patient Engagement (N=1,432)

Patient Engagement		**β**	**S.E.**	**P-value**
Intercept		11,55	0,97	**0.00*** **
Socio-Demographic factors				
Gender	Male	0.00	-	-
	Female	1.16	0.21	**0.00*** **
Age (years)	18-34	0.00	-	-
	35-49	0.94	0.36	**0.01** **
	50-64	1.64	0.34	**0.00*** **
	65+	1.46	0.40	**0.00*** **
Race/ethnicity	Hispanic	0.25	0.31	0.43
	Non-Hispanic white	0.00	-	-
	Non-Hispanic African American	-0.33	0.30	0.271
	Asian	-1.09	0.55	**0.05* **
	Other	1.13	0.55	**0.04* **
Marital status	Married	0.29	0.23	0.22
	Not currently married	0.00	-	-
Education	Less than high school	0.00	-	-
	High school graduate	0.80	0.48	**0.01** **
	Some college	1.26	0.47	**0.01** **
	College graduate or more	1.78	0.50	**0.00*** **
Employment status	Employed	-0.64	0.27	**0.02* **
	Not current employed	0.00	-	-
Income	<$20,000	0.00	-	-
	$20,000 to < $35,000	-0.15	0.39	0.70
	$35,000 to < $50,000	0.77	0.39	**0.05* **
	$50,000 to < $75,000	-0.20	0.39	0.61
	$75,000+	-0.32	0.40	0.42
Health related factors				
Having cancer	Yes	0.67	0.30	**0.03* **
	No	0.00	-	-
Health status	Poor/Fair	0.00	-	-

	Good	0.10	0.34	0.76
	Very Good	0.36	0.35	0.31
	Excellent	0.50	0.46	0.29
Health care system factors				
Frequency for office visits	1 time	0.00	-	-
	2 times	0.59	0.35	0.10
	3 times	1.13	0.36	**0.00****
	4 times	0.83	0.38	**0.03***
	5-9 times	1.33	0.37	**0.00****
	10 or more times	1.13	0.45	**0.01****
Health coverage	Yes	0.02	0.50	0.97
	No	0.00	-	-
Having regular provider	Yes	0.37	0.27	0.12
	No	0.00	-	-

Note: *p < .05, **p < .01, ***p < .001

Factors Associated with Perceived Quality of Care

Table 4.21 shows the association of patient-related factors such as socio-demographic, health-related, and health system factors with perceived quality of care. Compared to male respondents, female respondents (β = 0.03, p < .05) had a positive association with perceived quality of care. Compared to 18-34 years old respondents, those over 50 years of age had a significantly positive association with perceived quality of care after controlling for all variables in the model. Additionally, compared to Non-Hispanic white respondents, Asian respondents (β = - 0.45, p < .001) showed a negative relationship with perceived quality of care. Those patients who reported good/very good/excellent health status had a positive relationship with perceived quality of care, as compared to patients who rated their health as poor. Compared to patients who do not have a regular health provider, those who have regular provider had positive association (β = 0.22, p < .001) with the perceived quality of care when controlling for all variables in the model.

Table 4.21 Factors associated with Perceived Quality of Care (N=1,432)

Quality of Care		**β**	**S.E.**	**P-value**
Intercept		2.31	0,21	**0.00*****
Socio-Demographic factors				
Gender	Male	0.00	-	-
	Female	0.03	0.05	**0.05***
Age (years)	18-34	0.00	-	-
	35-49	0.15	0.08	0.36
	50-64	0.26	0.07	**0.04***
	65+	1.46	0.85	**0.002****
Race/ethnicity	Hispanic	-0.05	0.07	0.44
	Non-Hispanic white	0.00	-	-
	Non-Hispanic African American	-0.05	0.07	**0.04***
	Asian	-0.45	0.12	**0.001***
	Other	0.07	0.12	0.54
Marital status	Married	0.09	0.493	0.08
	Not currently married	0.00	-	-
Education	Less than high school	0.00	-	-
	High school graduate	-0.24	0.10	0.02
	Some college	-0.16	0.10	0.12
	College graduate or more	-0.12	0.10	0.25
Employment status	Employed	-0.01	0.06	0.09
	Not currently employed	0.00	-	-
	<$20,000	0.00	-	-
	$20,000 to < $35,000	-0.10	0.08	0.22
	$35,000 to < $50,000	-0.03	0.08	0.75
	$50,000 to < $75,000	-0.04	0.08	0.59
	$75,000+	-0.11	0.08	0.19
Health related factors				
Having cancer	Yes	0.11	0.06	0.10
	No	0.00	-	-
Health status	Poor/Fair	0.00	-	-
	Good	0.40	0.07	**0.000****
	Very Good	0.64	0.08	**0.000*****
	Excellent	0.88	0.09	**0.000*****
Health care system factors				
Frequency for office visits	1 time	-0.04	-	-
	2 times	-0.01	0.07	0.61
	3 times	0.07	0.07	0.87
	4 times	0.83	0.08	0.38
	5-9 times	0.05	0.08	0.46

	10 or more times	0.15	0.09	0.11
Health coverage	Yes	0.12	0.11	0.26
	No	0.00	-	-
Having regular provider	Yes	0.22	0.06	**0.000*** **
	No	0.00	-	-

Note: *p < .05, **p < .01, ***p < .001.

CHAPTER 5: DISCUSSION

This chapter provides a summary of the findings and how these findings correspond to the previous studies. Next, it discusses how this study contributes to theory and practice. Finally, we discuss the potential limitations of this study and directions for future research.

This dissertation examined the relationship between patient-centered communication, patient engagement, and perceived quality of care based on a nationally representative sample of adult population. The study also identified what patient-related factors are associated with these three areas of interest. Patient-centered communication is significantly associated with patient engagement as well as patients' perception of quality of care. In addition, patient engagement mediates the association between patient-centered communication and patients' perception of quality of care. In other words, patient engagement can facilitate a more positive relationship between patient-centered communication and perceived quality of care.

These findings are consistent with previous studies reporting from specific health care settings. Palmer et al. (2014) demonstrated that patient-provider communication is associated with perceived quality of care and patient engagement among long-term cancer survivors. Flickinger, Saha, Moore, and Beach (2013) have found that patients were more likely to be actively engaged in HIV care when they perceived that their providers always explained clearly so the patients could understand, treated them respectfully, and made efforts to understand them as the whole person. Other studies have also demonstrated that improved patient-physician communication resulted in better perception of quality of care among cancer patients (Baile & Aaron, 2005; Bredart et al., 2005; Mallinger et al., 2005; Mazor et al., 2013; Ong et al., 2000; Sorkin, Ngo-Metzger, & De Alba, 2010). In contrast, Gill and Cowdery (2014) found that patient-centered communication is not associated with perceived quality of care, which is different from our results. Their findings may be explained by the fact that they considered a different study population: 1) they used the 2012 HINTS dataset and 2) they examined the entire population in the dataset. As mentioned in Chapter 3, this disseratation utilized the 2013 HINTS dataset and took a more focused approach by considering only those respondents who visited their healthcare provider in the last 12 months *and* who also answered questions related to all three areas of interest.

Our empirical analyses suggest that patient-related factors, such as age, race/ethnicity, and having a regular provider were significantly associated with patient-centered communication, patient engagement, and patients' perception of quality of care. For example, respondents aged 65 and older reported better patient-centered communication, patient engagement, and perceived quality of care. These findings are consistent with DeVoe et al. (2009), who found that older patients had positive patient-centered communication than younger patients did. However, the other studies that examined the relationship between patient-centered communication and age have reported different results. For example, younger patients were more likely to communicate with their providers regarding their medical decisions compared to older patients (Arora & McHorney, 2000; Siminoff et al., 2006). Danielsen et al. (2007) explained these findings by suggesting that younger patients were more likely to get access to the internet and tended to be more educated and informed about their disease conditions and treatment options.

This study found that racial factors are associated with patient-centered communication, patient engagement, and perceived quality of care at the population level. For example, Asian respondents reported poor patient-centered communication, patient engagement, and patients' perception of quality of care compared to Non-Hispanic white respondents. These findings are consistent with several studies (Calo et al., 2014; Cooper, Powe, & Fund, 2004; Palmer et al., 2014; Siminoff et al., 2006). In particular, Siminoff et al. (2006) found that Asian respondents had poor communication, lower self-efficacy in medical decisions, and lower perception of quality of care compared to Non-Hispanic white respondents in cancer care. Ok et al. (2008) have shown that the Hispanic race/ethnicity was a significant predictor of poor patient-provider communication. However, in contrast to our findings, Rutten et al. (2006) concluded that socio-demographic variables are not associated with perception of patient-provider communication.

Based on our empirical analyses, we found that among health system factors, having a regular provider was a key predictor to improving patient-centered communication, patient engagement, and perceived quality of care. Further, we found that frequency of office visits was only associated with patient engagement. Previous studies have shown that health system factors are associated with patient-provider communication and patient engagement (Schoen, Lyons, Rowland, Davis, & Puleo, 1997; Schoen et al., 2010). Although previous studies have found that having health coverage was associated with patient-provider communication and patient engagement

(Osborn & Squires, 2012; Rutten et al., 2006), our results suggest that having health coverage was not significantly associated with these three areas of interest. This difference may be because most of the respondents (91.7%) in our study population reported having health coverage. As such, having few respondents without health coverage may have limited our analysis.

Contribution to Research and Practice

Researchers have called for more studies on how patient-provider communication affects patient engagement and patients' perception of quality of care (R. M. Epstein & Street Jr, 2007; Street, 2013). In particular, Street (2013) urged researchers to model pathways through which patient-provider communication affects other variables directly or indirectly. This dissertation found that patient-centered communication is significantly associated with patient engagement and perceived quality of care at the population level. In addition, patient engagement mediated the association between patient-centered communication and perceived quality of care. These findings suggest direct as well as indirect effects of patient-centered communication on perceived quality of care. Although the effect of patient engagement on perceived quality of care in this study was weak, patient engagement showed a positive relationship with perceived quality of care consistent with previous studies (Carman et al., 2013; Osborn & Squires, 2012; Scholle et al., 2010). Thus, the findings of this dissertation help us understand the pathways in which patient-centered communication can lead to improved perceived quality of care through patient engagement. An understanding of these relationships can help healthcare organizations, researchers, and policy makers achieve the goal of patient-centered care as set out in the 2001 report, *Crossing the Quality Chasm: A New Health System for the 21st*

Century, by the Institute of Medicine (Corrigan, Kohn, Donaldson, Maguire, & Pike, 2001).

As contribution to practice, this analysis provides evidence for the need to develop effective patient-centered communication and patient engagement behaviors to improve perceived quality of care. In recent years, patients' perception of quality of care has become one of the critical indicators for pay for performance in the current reimbursement environment (Price et al., 2014; Robinson et al., 2008; Rodriguez, Von Glahn, Elliott, Rogers, & Safran, 2009). This dissertation found that effective patient-centered communication behaviors (including spending enough time with patients, making decisions, enabling patient self-management, and fostering healing relationships) were strongly associated with improved patient engagement and perceived quality of care. Further, by promoting patient engagement, patient-provider communication is more likely to improve patient's perception of quality of care. Thus, by better understanding how patient-centered communication and patient engagement influence perceived quality of care, health care administrators can improve patient's care experience. Towards that end, under the Affordable Care Act, the Center for Medicare & Medicaid Services (CMS) has required several public reporting and pay-for-performance programs employing the Consumer Assessments of Healthcare Providers and Systems (CAHPS) survey (Price et al., 2014). For example, the Hospital CAPHS (HCAHPS) survey that evaluates patients' perceptions of their hospital experience including patients' communication with the health care provider and staff plays a critical role in determining performance and payment for hospitals (*HCAHPS Fact Sheet*, 2015). Thus, the emphasis on patient's perception of quality of care will not only improve overall patients' care experience, but also benefit providers financially. Finally, by improving how patients and healthcare providers engage and communicate with each other in the process of care delivery (for example, through electronic health records, personal health records, mobile apps, patient generated data, telehealth, and personalized medicine), healthcare organizations can improve patient care experience.

Study Limitations

This dissertation has some limitations. In the 2013 HINTS dataset, questions regarding patient-centered communication and perceived quality of care are asked only from patients who saw any providers in the past 12 months. Therefore, individuals who never saw providers in the last 12 months were not included. Further, in order to focus our study on patient-centered communication, patient engagement, and patients' perception of quality of care, we only considered respondents who answered questions related to all these three areas of interest. Therefore, the selected sample (n=1,432, 45.0 % of the total sample) may limit the degree to which this study population is representative of the adult U.S. population. It must be noted that the study population that we excluded (i.e., patients who had no access to care within the past 12 months and did not answer questions related to all these three areas of interest), could have negative previous care experiences. If so, the results of this dissertation may be inflated. Moreover, non-respondents in the study may be more likely to have a lower socio-economic status, so the survey may under-represent the true perception of the total US population (Nelson et al., 2004).

Further, cross-sectional design precludes causal inferences among patient-centered communication, perceived quality of care, and patient engagement (Palmer et al., 2014; Cunningham, 2014). Considering that HINTS dataset is cross-sectional, the cause-and-effect relationships between constructs or items in the survey cannot be determined. There is also the possibility of recall, attribution, and social desirability bias due to the utilization of self-reported surveys (McCormack et al., 2011). For instance, questions in this study asked about perception, which required patients to recall past behaviors, such as their interactions with providers in the last 12 months. Therefore, the possibility of recall bias and socially desirable responding has to be acknowledged.

The 2013 HINTS data relied on patients' perspectives, and there is no data to examine providers' perspectives related to patient-centered communication and patient engagement. Some studies have illustrated the relationship between patient-centered communication and patients' participation in medical decisions, indicating that gender differences between patients and providers tend to be associated with health outcomes and self-reported satisfaction (Jahng et al., 2005; Krupat et al., 2000). However, our study could not capture providers' perspectives owing to the limitations of the selected dataset.

Finally, the health care providers in the study included all doctors, nurses, or other health professionals that patients saw during the past twelve months. It is difficult to specify whether the perception of patients' ratings were based on their primary care physicians or specialists, physician's assistants, nurses, or any other healthcare providers (Nelson et al., 2004). Moreover, the study examines one question relating to all care that the patient received during the last 12 months. Thus, it is a global measure of perception of all providers, rather than being directed to a specific health care provider.

Directions for Future Research

This study demonstrated that patient engagement was a mediator of patient-centered communication and perceived quality of care based on cross-sectional data. Future researchers can examine the relationship among patient-centered communication, patient engagement, and patients' perception of quality of care in longitudinal studies. Such longitudinal studies can provide a stronger basis for demonstrating the effects of patient engagement over time and for drawing causal relationship between health communication and perceived quality of care.

Further studies can include providers' perspectives related to patient-provider communication and patient engagement, and possibly compare them with patients' perspectives. In addition, future researchers may further examine racial and ethnic disparities related to patient-centered communication, patient engagement, and perceived quality of care.

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