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INVESTIGATING STRATEGIES TO IMPROVE HEALTH CARE LABOR MARKET, HEALTH OUTCOMES, HEALTH CARE QUALITY, AND TO REDUCE EMERGENCY DEPARTMENT UTILIZATION AND COSTS: A STUDY OF THE EFFECTIVENESS OF FAMILY FRIENDLY POLICIES, PATIENT-CENTERED COMMUNICATION, AND ENHANCED ACCESS TO CARE

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DISSERTATION

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DEDICATION

This is for everyone who believed in me along the way and gave me encouraging words and advice. There is absolutely no way I could have done this without you.

Most of all, this is for my husband Jean-Jacques and our lovely children Elroy and Abrielle.

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Investigating Strategies to Improve Health Care Labor Market, Health Outcomes, Health Care Quality, and to Reduce Emergency Department Utilization and Costs: A Study of the Effectiveness of Family Friendly Policies, Patient-Centered Communication, and Enhanced Access to Care

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ABSTRACT

This dissertation investigates three important issues in the United States health care system: the low utilization of family-friendly policies by health care professionals, the sub-optimal quality of medical services, and the high level of emergency department (ED) expenditures. Chapter 2 uses a unique dataset from a choice experiment survey of employees of a Health Sciences Center to address the first issue by exploring the impact of supervision support on the economic value of family-friendly policies. My results suggest that supervisors' support for the use of family-friendly services significantly increase the economic value of the family-friendly benefits provided. Chapter 3 investigates the effectiveness of patient-centered care models in improving health outcomes, and health care quality. Using six panels (from 2007 to 2013) of the Medical Expenditure Panel Survey, I construct a multidimensional measure of patient-centered communication that integrates items related to cultural competency, coordinated care, shared decision-making, and patient-centeredness. The investigation of the effect of the constructed patient-centered communication measure on health and health care quality reveals that patient-centered

communication significantly increases patients' likelihood to report a better physical health, mental health, as well as health care quality. Finally in Chapter 4, I use a two part correlated random effects generalized gamma model to investigate barriers to access to care and patient-doctor communication and the effectiveness of enhanced access to care and patient-centered communication on ED use and expenditures. My results show that being foreign born, non-English proficient, with mental, social, or physical disability, all significantly decrease the risk of having enhanced access to care and patient-centered communication with medical provider. Also, having an enhanced access to primary care and a patient-centered communication with primary care provider significantly reduces both the likelihood to use ED services and the amount of money spent on ED services. Estimated average reduction in ED expenditures attributed to a better access to primary care and a patient centered-communication varies from $1.180,53 to $1.191,89 per year per individual.

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Chapter 1: Introduction

1.1. Overview

Three of the major challenges within the United States health care system are the low retention rate of health care professionals, the sub-optimal quality of the health care delivery system, and the high level of emergency department (ED) expenditures. This dissertation addresses these issues.

First, Chapter 2 addresses the low retention rate of health care workers by focusing on family-friendly benefits and policies, which are among the most prevalent strategies used to recruit and retain health care workers. Although family-friendly policies and services have been proven to benefit both employees and employers, a low utilization rate of these services have been reported. This chapter aims at understanding the low utilization rate of family-friendly benefits by exploring the role of the supervisor support for the use of benefits and its interaction with the benefits provided.

Second, I address the quality and cost of the health care services by investigating the effectiveness of patient-centered care models. Patient-centered care models are gaining a lot of attention and are now recognized as the gold standard of medical practice. Chapter 3 focuses on the impact of patient-centered communication -- the central component of patient-centered care -- on health outcomes and health care quality, while Chapter 4 examines the impact of patient centered communication and enhanced access to care on ED services utilization and expenditures.

1.2. Chapter Two

According to the Bureau of Labor Statistics (2015), the healthcare labor market is projected to have the fastest employment growth between 2014 and 2024, ranking health professions at the top of all occupations in terms of expected growth in the United States. For example, the shortage of primary care physicians is estimated to reach 20,000 full time equivalents by 2020 (Abayasekara, 2015), while between 300,000 and one million nurse positions will remain unfilled by 2020-2025 (Buerhaus, 2008). The current and future scarcity of qualified health practitioners is driving the implementation of innovative strategies to attract and retain a competent health care workforce. The provision of a family-friendly work environment is increasingly explored by health care recruiters as an alternative to the traditionally used financial incentives. It has been shown that providing a more family-friendly work environment can benefit employers by decreasing employees' absenteeism and turnover rate, improving the organization's productivity and increasing the recruitment potential of the firm (Thorsteinson, 2003). Moreover, **f**amily-friendly policies have been shown to have a positive impact on the physical and psychological well-being of employees and their job satisfaction (Lobo et al., 2012). A detailed knowledge of health professionals' preferences for family friendly benefits is a prerequisite to the implementation of effective recruitment and retention strategies.

The implementation of the 2010 Patient Protection and Affordable Care Act with its expansion of health insurance coverage to millions of U.S. citizens has exacerbated the existing shortage of health care professionals. As a result, the competition of health institutions to meet their need for health professionals is increasingly challenging. Several recruitment and retention strategies have been used to attract highly qualified health

workforce. These strategies include financial incentives such as competitive salaries, student loan repayment, loan for services, tax credits, etc. However, the competition between work and family's responsibilities has placed the provision of family friendly benefits at the top of the list of recruitment initiatives. Despite organizations' efforts to offer competitive sets of family-friendly benefits to their employees, a low utilization of family-friendly benefits has been reported. The primary goal of this dissertation chapter is to assess how a supportive work environment for the use of employees' benefits affects how health care professionals value their family friendly benefits. To achieve this goal, I designed a large-scale survey of employees of a Health Sciences Center (HSC). This study case is particularly suitable to address family-friendly benefits related issues because at the time of the survey, the HSC was engaged in a long term planning effort to improve the work environment of its employees through family-friendly benefits. Some of their goals are to reduce employees' job related stress and turnover rate, increase employees' job satisfaction, and provide emotional and economic assistance to caregivers. To achieve these goals, a special committee was established to assess the HSC employees' needs. This committee commissioned a survey with two main objectives. The first objective is to identify the family-friendly benefits and services that are most valued by the HSC employees and how employees' preferences vary across the different demographic and professional groups. Second, the survey aims at providing estimates of employees' willingness to pay for the provision of the benefits and services desired. Finally, the survey goal is to assess factors affecting the use of family-friendly benefits.

To assess health care professional's preferences for family-friendly policies, I conducted a choice experiment online survey of the HSC employees. The Tailored Design

Method (Dillman, 2007), which is considered best practice to administer surveys, was used to develop the survey instrument. The survey questionnaire was informed by the following activities: interviews with experts, review of literature, focus group discussions, debriefings and pretest of the survey. The sample consists of all the 3,450 benefits eligible employees (faculty and staff) of the six branches of the Health Sciences Center (Vice President HSC Administration, HSC Vice President Research, Health Sciences Library and Informatics Center, School of Medicine, College of Pharmacy, and College of Nursing).

I describe the different steps followed in developing the survey, from the inception to the survey results. More specifically, I discuss the process of selecting the benefits and levels included in the study, survey design, administrative aspect of the survey, and quality of the data collected. I then proceed to investigate of health care workers' preferences for family-friendly policies and the impact of a family supportive work environment on the economic value of these policies. Eight family-friendly policies are under investigation, namely: (1) the provision of additional sick leave, (2) the provision of additional annual leave, (3) the creation of a program that trains supervisors on how to effectively meet their employees' needs regarding leaves and flexible work arrangements, (4) the reduction of admission time to onsite childcare, (5) the extension of operation hours of the onsite childcare, (6) the provision of childcare services to moderately ill children, (7) the provision of adult care services, and (8) the provision of resources and referral services. The random parameter logit technique is applied to main effect and two-way interaction models in order to assess the willingness to pay for each of the proposed policies and assess the impact of the supervisors' training program on the value of sick leave and annual leave.

Findings reveal that among the eight policies under investigation, the provision of a supervisors' training program that advocates the use of leave and flexible work arrangements is the most valued policy. The results also suggest that the value for an additional day of sick leave or annual leave is at least doubled when employees perceive their organization to be family-friendly. Empirical evidence that particular policies which are available only to a sub-category of employees may have an adverse effect on other employees' utility are provided. Finally, I find that although benefits available to employees with adult dependents have been largely overlooked compared to those designed for children caregivers, they yield higher willingness to pay estimates. The results are applied to five potential policy scenarios and estimate that the median health professional is willing to sacrifice up to 2.15% of his monthly income in exchange for improved family-friendly benefits. It is estimated that this amount percentage could increase to 4.52% (a 110% increase) if the new policies are implemented in a family-friendly supportive work environment.

1.3. Chapter Three

Some of the challenges related to the quality of health care delivery in the United States include the inability to deliver continuing and coordinated services, incapacity to administered known best practice treatments to almost half of U.S. patients, and high frequency of medical errors (The National Academy of Engineering and the Institute of Medicine, 2005; Majette, 2009).

A complete restructuration has emerged as an inevitable solution to improve the U.S. health care system while containing health care costs. As a result, several health care models have been proposed. Well known models include concierge medicine (CM), guided

care (GC), managed care (MC), patient-centered medical home (PCMH), comprehensive primary care (CPC), etc. These models are variations of the patient-centered care model and are all defined by a set of key components. For example, the Institute of Medicine model (IMO, 2001) recognizes six attributes of a good health care system: safety, effectiveness, timeliness, patient-centeredness, efficiency, and equity. A definition of medical home endorsed by four physician societies is any practice that incorporates the following activities: enhanced access to care, care continuity, practice based team care, comprehensive care, coordinated care, population management, patient self-management, health information technology, evidence-based care plans, patient-centered care, shared decision-making, cultural competency, quality measurement and improvement, patient feedback, and new payment systems (Berenson et al., 2011). Although other existing models are more or less comprehensive (AAFP, 2008; AHRQ, 2014; CMS, 2014), they are all designed with a common core objective of improving primary care through the provision of a comprehensive, coordinated and personalized care that focuses on preventive services.

Patient-centered care models have been implemented with numerous variations throughout the United States and several studies have been conducted to evaluate their effectiveness. Most of these studies have been inconclusive. The lack of consistency in these results has been attributed to factors such as the variety of health outcomes under investigation (Street Jr., 2013), presence of multiple possible confounders uncontrolled by researchers that may influence research outcomes (King and Hope, 2013; Street et al., 2009), and lack of theory justifying the patient-centered communication measures used (Street Jr, 2013; Street Jr et al., 2009), and relatively small samples used in these studies.

The goal of this chapter is to address these shortcomings and provide new insights on the effectiveness of patient-centered communication in improving general health, mental health, and the quality of health care services. This study uses a large sample of 38,315 individuals obtained by combining six panels (from 2007 to 2013) of the Medical Expenditure Panel Survey (MEPS), a survey of a nationally representative sample of the US population. I construct a multidimensional measure of patient-centered communication that integrates items related to cultural competency, coordinated care, shared decision making, and patient-centeredness. I investigate the effect of the constructed patient-centered communication measure on self-reported general health status, mental health status, and the perceived quality of health care services received. Inverse probability weighting and propensity score matching techniques are applied to pooled and lagged models to account for potential endogeneity and selectivity issues. I find evidence that the likelihood of being physically and mentally healthy and of highly rating the quality of health care received, increases with the quality of patient-centered communication. These positive effects although reduced one year after the clinical encounter, persisted. Health care organizations and policymakers should help health professionals develop strong doctor-patient-centered communication skills.

1.4. Chapter Four

With an annual growth rate of 6.4% between 1996 and 2013, ED expenditures is the fastest growing category of health care expenditures (Dieleman et al., 2016). Rapid growth in ED spending has been attributed to deficiencies in the primary care that motivate patients to rely on ED services for their non-urgent care needs (Xin, 2017). This chapter has two main objectives. First, it aims at understanding the effect of cultural barriers (country of birth, English proficiency), mental, social, and physical disabilities on the likelihood to have enhanced access to primary care and effective patient-centered communication with primary care provider, which are two important features patient-centered medical homes (PCMH). Second, it investigates whether these two PCMH features are associated with lower emergency department use and expenditures. Using six panels (2007-2013) of the Medical Expenditures Panel Survey (MEPS), I put forth a two-part random correlated effects generalized gamma model. This model combines the propensity matching technique and the control function approach to address common modeling challenges in health care data (i.e. selection bias, unobserved heterogeneity, endogeneity, and the non-negative and extremely right-skewed distribution of the ED expenditures with a large mass of observations at zero). My findings suggest that being foreign born, non-English proficient, with mental, social, or physical disability, all significantly increase the risk of not having a primary care with one or both PCMH features. Language barriers are the most detrimental factor affecting access to care and doctor-patient communication with a relative risk ratio of 1.46. The results also suggest that having an enhanced access to primary care and a patient-centered communication with primary care provider significantly reduces both the likelihood to use ED services and the amount

of money spent on ED. Estimated average reduction in ED expenditures attributed to a better access to primary care and a patient centered-communication varies from $1.180,53 to $1.191,89 per year per individual.

Chapter 2: Assessing the Impact of a Family Supportive Work Environment on the Economic Value of Family-Friendly Policies: A Choice Experiment at a Health Sciences Center

2.1. Introduction

The shortage of health care professionals is widely recognized as one of the greatest threat to the health care system. The Global Health Workforce Alliance and the World Health Organization (2013) estimate that the world is currently short of 7.2 million health care workers, and that this estimates will escalate to 12.9 million by 2035. As a result, the competition among health institutions to retain talented health care workers has become increasingly difficult. Among the recruitment and retention strategies used to attract a qualified health care workforce, the provision of family-friendly policies has emerged as one of the most prevalent (Kroezen et al., 2013; Lagarde and Blaauw, 2009). Family-friendly policies include practices such as providing caregiving services to employees' dependents, family leave policies, and flexible work arrangements aimed at reducing conflict between work and non-work demands (Roehling et al., 2001). Despite the broadening of policies and practices to help employees balance their work and life, a critically low utilization of family-friendly benefits has been reported in several studies, raising questions about the effectiveness of these policies. The low utilization of family-friendly policies has become a great concern for Human Resources Services and employers, and is shifting the work-life policies debate from benefits availability to benefits accessibility or usability (McNamara et al. 2012, Wheatley, 2016).

Barriers to the utilization of family-friendly benefits and services include employees' lack of knowledge of benefits provided (Gunn et al., 2014), accessibility of benefits to only a restricted group of workers (McNamara et al., 2012), and fear of discrimination against benefit users (Drago et al., 2006). However, the lack of a family supportive work environment has been cited as the most important factor preventing employees from using the benefits designed to help them (McNamara et al. 2012, Wheatley, 2016).

The primary goal of this study is to provide more insight on how employees' perception of the degree of supportiveness of their organization for work-life balance relates to the economic value that they place on family-friendly policies. There is a growing literature showing that providing resources that help to efficiently manage work and family demands is beneficial to employees (eg., Tower, 2015). The benefits include improved physical and psychological well-being (Jennings et al., 2016), and improved job satisfaction (Mas-Machuca et al., 2016). However, it is unlikely that organizations will engage in family-friendly behaviors without an expected economic gain. Numerous studies have provided evidence that organizations can also profit from implementing family-friendly practices through a decrease in employees' absenteeism and turnover rate[1] (Timms et al., 2015) and improvement in the organization's productivity (Odle-Dusseau, et al. 2012). The amount of evidence showing that reducing employees' work-life conflict is economically advantageous for both employees and employers is overwhelming. However, no study has examined the financial gain derived from the potential increase in the economic value of the policies resulting from a more family-friendly workplace. In many

[1] The cost of turnover in academic medical centers is more than 5% of their annual operating budget. This takes into account recruiting, training and productivity lost expenses (Waldman, Kelly, & Smith, 2004).

occupations, employees are more likely to gain access to work-life benefits and services through informal arrangements than through formal policies (McNamara et al., 2012). Therefore, understanding the impact of a family supportive workplace culture on the value of policies is crucial to the implementation of effective work-life policies.

Using an economic valuation survey of a US Health Sciences Center, this paper answers three specific questions: (1) what are health care professionals' preferences for family-friendly benefits? (2) how much are health care professionals willing to pay for the provision of the family-friendly benefits they value? and (3) how does a family supportive work environment affect the economic values of family-friendly benefits?

This paper makes several contributions to the literature related to health care workforce and economic valuation. First, we use a unique dataset from a choice experiment survey conducted with employees of a US Health Sciences Center to investigate health care professionals' preferences and marginal willingness to pay for potential family-friendly benefits improvements. Because the institution under study was engaged in a long-term planning effort to improve its employees' work-life benefits at the time of the survey, it provides a unique opportunity to address the benefits accessibility crisis currently faced by many health care employers.

Second, this study uses an original approach to investigate the interaction between family-friendly benefits and a family supportive work environment. Several studies have found a positive correlation between family supportive organization culture and benefits utilization (Fiksenbaum, 2014; Greenhaus et al., 2012). However, to the best of our knowledge no valuation study has focused on measuring the economic value that employees place on a family-friendly work environment and its interactions with other

benefits. This paper is the first attempt to quantify the value of organizational support for the use of work-life policies and its economic impact on these policies.

Third, this work differs from previous choice experiment studies on health care workforce in the choice of work-life policies and the population under investigation. Previous studies have focused on intrinsic work characteristics such as career development opportunities, on-call arrangements, rapid promotion, workload, equipment and supplies, and facility size and location and have targeted specific group of workers like nurses, physicians, and medical students. Research has shown that providing benefits to only specific segment of workers promotes organization exclusion and can have adverse repercussions on employees' productivity, job commitment, health, as well as recruitment and retention rates (Ryan and Kossek, 2008). This investigation focuses on practices that have the potential to reduce conflicting family and work demands among faculty and staff in health care academic institutions. More specifically, this study looks into human resources interventions that can improve the workplace family culture by increasing support for the use of family-friendly policies, the improvement of leave policies, and the provision of direct services and referrals to employees with dependents (children and adults). Most of the attributes are new to the work-life policies economic valuation literature, which contribute to the originality of this work. To the best of our knowledge, only one study has exclusively focused on preferences for family-friendly policies (Drago et al., 2001). Using a contingent valuation method, they investigated the willingness to pay for work-life policies in a sample of elementary school teachers. This study differs from that of Drago et al. (2001) by the targeted population, the attributes selected, and the

valuation method used. Furthermore, the primary objective of this paper is to explore the impact of a family supportive work environment on policies value.

Finally, we illustrate our main findings with five policy scenarios that represent possible investment plans that promote a family-friendly organizational culture. This provides guidance to estimate the monthly amount that could be collected from each employee to finance potential benefits improvements.

2.2. The Role of Family Supportive Work Environment: Current Evidence

Thompson et al. (1999) define a work-family culture as "the shared assumptions, beliefs and values regarding the extent to which an organization supports and values the integration of employees work and family lives". The current literature recognizes three hierarchical levels of work-family support in a workplace: organizational support, supervisor support, and co-worker support for use of family-friendly policies. Despite the theoretical distinction between these three constructs, it has been shown that there are very closely related. For example, some studies find a positive correlation between family supportive organization and family supportive supervision (Greenhaus et al., 2012). Other studies find a reciprocal relationship between these two concepts, meaning that organizations that are perceived as family-friendly are more likely to have family supportive managers (Matthews and Toumbeva, 2015). Similarly, given that supervisors are organizations' primary representative of organization, a lack of effort on the part of supervisors to accommodate employees' work and family responsibilities is likely to be perceived as a lack of organizational support for the use of family friendly policies

(Matthews and Toumbeva, 2015). Likewise, it has been suggested that supervisors are more likely to implement work and life policies if they perceive that their subordinates (especially those with no dependents) are supportive of the use of these benefits by their coworkers (Wells, 2007). Because of the close interaction between the three levels of support for family-work balance, in this study a family-friendly work environment refers to all practices within an organization that promote the effective management of employees' work and family responsibilities, regardless of the source of support.

Despite the numerous advantages associated with the use of family-friendly policies, a low utilization of these employee benefits has been reported, even when provided within an organization. The major factor preventing the use of family-friendly benefits is the perceived hostility of the work environment toward employees who use those benefits (McNamara et al., 2012). A survey of 441 faculty of a Hospital Medical Center revealed that the majority of faculty (59%) believed that full-time faculty were perceived as more committed to their job and their instituion than part-time employees (Kahn et al., 2005). Another survey of 4,188 faculty members of 507 colleges and universities showed that faculty avoid using their benefits to prevent negative career repercussions: 19% of men and 33% of women did not request reduced teaching load after a child's birth or some other family event in order to avoid career penalties (Drago et al., 2006). Drago et al. (2006) also found that faculty respond to discrimination against caregivers by either decreasing or hiding their family obligations. The former strategy could have a positive effect on employees' performance in the short term, by enabling them to allocate more time to work. But in the long run, this could results in employees'resentment toward their employers. These strategies include behaviors such as remaining single, delaying childbearing, having

fewer children than wanted, etc. The latter approach is also detrimental and consists of behaviors like not utilizing policies such as a flexible work schedule, tenure clock stoppage, formal leave for family obligations (dependents' important events, birth of a new child), etc. (Bardoel, et al. 2011; Drago et al., 2006). These studies also found that the most important factor determining the extent to which employees with family responsibilities adjust their behaviors to avoid dscrimination against caregivers is the level of efforts to accomodate work and life demands within an organization.

Kossek and Hammer (2008) conducted an inexpensive and short multi-year experiment to investigate the effects of supervisors work-life training on their subordinates' job satisfaction and attitude. After the training, the control group of employees whose supervisors did not receive training was compared with the treatment group of employees with trained supervisors. Employees from the treatment group perceived that their supervisors were more supportive. These employees also had better job attitude, better overall health (blood pressure, heart rates, quality of sleep, etc.), and lower inclination to quit their job.

Based of these studies, it is clear that the success of an organization in creating a family-friendly work environment does not only depends on the set of benefits provided, but also on the provision of an environment that encourages employees to use the benefits designed to meet their needs.

2.3. Methods

2.3.1. Study Case: An Urban Health Sciences Center located in the Urban Southwest of the USA

The Health Sciences Center (HSC) under investigation is engaged in a long term planning effort to improve the work environment of its employees through family-friendly policies. Some of the goals of this project are to (a) reduce employees' job related stress and turnover rate, (b) increase employees' job satisfaction, (c) provide emotional and economic assistance to caregivers. To achieve these goals, a special committee was established to conduct an assessment of the HSC employees' needs. This committee commissioned a survey with two main objectives. The first objective was to identify the family-friendly policies that are most valued by employees. The second objective aimed at providing estimates of employees' willingness to pay for the provision of the benefits and services desired.

2.3.2. Survey Instrument

The data for this study is collected from six branches of the HSC: (1) Vice President HSC Administration, (2) HSC Vice President Research, (3) Health Sciences Library and Informatics Center, (4) School of Medicine, (5) College of Pharmacy, and (6) College of Nursing. A list of 4,517 individuals consisting of the HSC employees (including members of the administration, faculty, staff, etc) was obtained from the University Human Resources Services. Only current employees with a valid email addresses were retain from the list. The final sample consisted of 3450 HSC staff and faculty.[2] The survey was

[2] The exclusion criteria from the original sample of employees included duplicated observations, observations with absent or invalid email, valid email of former employees.

conducted online through Opinio 6.6.1, the university tool for electronic survey. The questionnaire consisted of 37 questions divided in five sections: informed consent form, background information on current policies and proposed changes, needs assessment, choice experiment, and demographic information. It took approximately 25 minutes to complete the survey. The survey data were supplemented with employees' job characteristics and demographic information provided by Human Resources Services.

2.3.3. Study Participants

Of the 3,450 HSC employees, 1392 completed the survey (40% response rate).[3] Basic socio-demographic characteristics of survey respondents are presented in Table 2.1. Although a test for differences in means and proportions shows that survey participants significantly differ from the population of HSC employees, most of the estimates are reasonably close. The mean age and mean annual salary of survey respondents are 47 years and $77,582 respectively. These are respectively about 2 years and $7,000 statistically higher than the mean age and mean salary in the population of the HSC employees. The study includes a statistically higher proportion of women (76%) compared to the female proportion at the HSC (64%). The overrepresentation of women was expected and has been reported in several work-life policies studies (Drago et al., 2001; Sivey, 2012). The proportion of White study participants (59%) also significantly

[3] This response rate estimate is computed using the guidelines provided by the American Association of Public Opinion Research (AAPOR, 2009) and conservatively assumes that all individuals with invalid email address were eligible for the survey. Assuming that all invalid email addresses were not eligible yields a response rate of 46%.

exceeds the proportion of White in the population of HSC employees (53%). Finally, the School of Medicine is underrepresented (76% in the study compared to 83% at the HSC), while the College of Pharmacy (5%), the College of Nursing (6%), and the VP HSC Administration (9%), the VP Research (2%), and the Health Sciences Library and Informatics Center (2%), are slightly overrepresented by less than 1%, 3%, 2%, 1%, 1%, respectively. Among study participants, 35% had at least one child dependent, and 21% had at least one adult dependent. 74% of the respondents were married or lived with a partner.

Table 2.1: Demographic characteristics of the HSC employees

Characteristics	Survey respondents[a] (N = 1392)	HSC employees (N = 3,450[a])
Age	47	44
Female	76 %	64 %
Salary[b]	$77,582	$84,210
White	59%	53 %
Employees with at least one dependent[c]		
Child Dependent	35 %	--
Adult Dependent	21 %	--
Married or living with a partner[c]	74%	--
HSC Branches[d]		
School of Medicine	76 %	83%
College of Pharmacy	5 %	4 %
College of Nursing	6 %	3 %
VP HSC Administration	9 %	7 %
HSC VP Research	2 %	1 %
HSC Library and Informatics Center	2 %	2 %

Notes: [a]The tests of equal means or equal proportions show that the demographic characteristics of survey respondents and HSC employees are statistically different. However, most of the estimates are close. [b]2014 annual salary. [c]Dependents' information and marital status unavailable for survey non respondents. [d]Some numbers may not add to 100% due to rounding

2.3.4. Attributes Development

In the choice experiment section of the survey, each respondent was presented with a series of four hypothetical choices among four benefits packages. Each benefit package consists of a list of attributes. Attributes development was informed by five activities. First, we consulted with the HSC project committee and members of the HSC administration. This interaction with the different stakeholders allowed defining the survey objective, understanding the current level of benefits, and identifying potential work-life policies improvement. Second, we reviewed scholarly papers at the intersection of best human resources practices and discrete choice experiments of health care workers (Scott, 2001; Günther et al., 2010; Sivey et al., 2012; Lagarde et al., 2013; Mandeville et al., 2014; Holte et al. 2015). Third, four focus group discussions were conducted with groups varying in size from five to seven participants. Focus group participants were chosen to represent different employee groups of interest including, staff, faculty, administration, physician residents from the six HSC branches. Fourth, seven individual debriefing interviews were conducted to test the initial online design of the survey and survey wording. Finally, a pretest of the survey on a random sample of 100 employees helped further refine the survey instrument.

2.3.5. Attributes Descriptions

The benefits packages were characterized by eight attributes, as described in Table 2.2. A brief description of attributes is provided below.

Table 2.2: Description of Family Friendly Benefits and Services

Attributes (*Labels*)[a]	Description	Levels[b]
Additional leave (*Sickleave, Annualleave*)[c]	Additional days of sick leave or annual leave per year	**None**, 3 more days of annual leave, 3 more days of sick leave, 5 more days of annual leave, 5 more days of sick leave,3 more days of sick leave and 3 more days of annual leave
Training program (*Training, **No Training***)	Supervisors' training and incentive program to increase the use of leave and flexible work arrangements	**No,** Yes
Wait list at onsite childcare (*Waitlist*)[d]	Average time on waitlist for a child admission at onsite childcare	**24 months,** 12 months, 6 months
Hours of operation of onsite childcare (*Hours24, Hours8, **Hours5:30***)	Onsite childcare hours of operation	**7:30 AM – 5:30 PM,** 7:30 AM – 8:00 PM, 24 hours
Childcare facility for sick children (*Sickchildren, **No***)	Provision of care to children with moderate illnesses (e.g. cold, ear infections, sore throat) in a quiet and safe environment with trained pediatric caregivers, when their parents are at work.	**No,** Yes
Adult care direct services (*Dropoff, Backup, **No adult service***)	*Drop-off center*: onsite center that provides social activities and basic personal care. *Back- up services:* third party nationwide service that provides care to adults in the absence of their regular caregiver.	**None,** Drop-off center, Back-up services
Resources and referrals (*Childref, adultref, bothref, **Noref***)	Case worker who provides caregivers with legal and financial advice, and information on local, state and national services designed to assist with child, elder and family needs	**None,** For adults only, For children only, For both children and adults
Cost (*Cost*)	Universal monthly after tax payroll deduction	**$0,** $5, $10, $20, $30, $40, $50, $75, $100, $125, $150, $200
Generated Terms[e]		**Interaction**
Interaction term between *Training program* and *Sick* (*Training*Sick*)		
Interaction term between *Training program* and *Annual* (*Training *Annual*)		

[a] The attributes names refer to the family friendly policies as used in the experimental design while the labels represent the coded variables used in the model specification. For categorical and dummy variables, the labels in bold are the references. [b] Current level of benefits in bold.[c] We recode "Additional leave*"* into two continuous variables: *Sickleave* and *Annualleave*. Each of these two variables takes the values 0, 3 and 5 days per year. Other continuous variables are *Waitlist* and *cost*. The attributes "*Training program*" and "*Childcare facility for sick children*" are dummy coded while the remaining of the attributes are categorical variables. [d] Admission time to onsite childcare varies and can reach up to 3 years. We use the average time as the status quo, which is approximately two years. [e]*Sick* (resp. *Annual*) is a dummy variable that takes the value 1 if and only if the package includes any additional days of sick leave (resp. annual leave). *Sick* (resp.*Annual*) captures the presence of any additional day of sick leave (resp. annual leave) in a benefits package.

Additional leave: Several studies show that leave policies are among the most valued work-life benefits by employees. For instance, in a study that investigates teachers' preferences for work-life policies, family leave was ranked at the top, and full paid maternity leave the third among the seven work-life policies considered (Drago et al., 2001). More recent investigations of work-life policies at the top ten leading medical schools in the USA ranked family leave policies at the top of work-life policies provided (Bristol et al., 2008; Welch et al.,2011). Moreover, in our study, the provision of additional leave was the single benefit unanimously valued by all focus group participants. This study focuses on improving two types of leave: annual leave and sick leave. The proposed benefit is to increase the amount of annual leave and sick leave for HSC employees. Five levels are used to describe the potential changes: 3 more annual leave days per year, 5 more annual leave days per year, 3 more sick leave days per year, 5 more sick leave days per year, 3 more annual leave and 3 more sick leave days per year. It is important to note that at the HSC, annual leave and sick leave are paid leaves.

Leave and Flexible Work Arrangement Incentive Program (Training program): Detailed information on the goal of the incentive program was provided in the survey questionnaire. Among other things, the program is intended to 1) train supervisors on how to effectively meet their employees' needs regarding leave and flexible work arrangements, while preserving the university mission; 2) give both formal and informal recognition (awards, certificates, etc) to supervisors who demonstrate an extraordinary achievement in providing opportunities for flexible work arrangements and leave, while maintaining an effective unit; and 3) develop strategies to allocate more resources to fund leave and flexible work arrangements, in collaboration with HSC Administration. At the HSC under

investigation, currently available flexible work arrangements include flexible scheduling[4], job-sharing, compressed work weeks, and telecommuting (Division of Human resources, 2011). A wide variety of leave benefits are also available to employees.[5] However, a critically low utilization of leave and flexible work scheduling has been observed. For example, it was reported that no faculty at the School of Medicine of the HSC used they sick leave the year preceding the survey. The goal of the incentive program is to develop strategies that facilitate utilization and accessibility of the existing leave and flexible work schedule.

Childcare assistance: The next three attributes relate to the provision of childcare direct services. Previous studies have focused on the presence of an onsite childcare as a measure of childcare services availability. Currently, there is an onsite childcare center that provides daycare (for children ages 6 weeks to 5 years) and before and after school care (for children ages 5 to 12 years) to the HSC employees. These services are available from 7:00 A.M. to 5:30 P.M. and do not admit children with moderate illnesses, such as cold, sore throat, etc. Three attributes were chosen to capture complementary dimensions of childcare accessibility. First, we use waiting time between application and admission at the

[4] Flexible scheduling includes staggered scheduling, flexible work hours, flexible lunch hours, 80-hour fortnight, and summer hours. Job-sharing consists of dividing a full-time position between at least two employees. Compressed workweeks allow the employee to take time off during a workweek in exchange for extended hours on the day worked.

[5] Currently at the HSC, eligible employees have several types of leave benefits including paid holidays, leave without pay, leave with pay (for marriage, death of a family member, voting, etc.), Family and Medical Leave Act (FMLA), catastrophic leave, and military leave. The current level of sick leave and annual leave at the HSC varies across employees, depending on factors such as the exemption status, the percentage of full time equivalent (FTE) worked, etc. Eligible full time exempt employees accrue annual leave at a rate of 1.75 days per month for a total of 21 days per year. Eligible non-exempt employees accrue annual leave at a biweekly rate up to a maximum of 6.47 hours based on hours worked in the pay period. For eligible part time employees, annual leave accruals are prorated depending on employees' workload. Faculty members are eligible for 10 days internal sick leave. Other eligible exempt full time employees accrue sick leave at a rate of 8 hours each month. Eligible non-exempt employees accrue 3.7 hours biweekly. For eligible part time employees, sick leave accruals are prorated depending on employees' workload.

existing onsite childcare, which is currently approximately 24 months. In addition to the status quo, two levels were used: 12 months and 6 months. The second attribute related to childcare services is the hours of operation of the current childcare center either from 5:30 P.M. to 8:00 P.M. or overnight (24 hours childcare). The final childcare direct service attribute is the creation of a childcare facility for children with moderate illnesses.[6] *Provision of adult care direct services:* Although the importance of providing family-friendly benefits to employees with child dependents has been emphasized in the literature, little has been done to help caregivers with adult dependents as far as work-life policies go. More specifically, we found no study investigating the willingness to pay for adult care direct services. This attribute involves assistance to employees with adult care responsibilities and has three levels. The first level is the status quo, which is no adult care service. The second level is the creation of an onsite (close to work) drop-off adult care center that provides social activities, (games, movies, exercises, arts, etc.) and basic personal care (assistance with bathing, dressing, eating, medication management, etc.) dependent of the individual's needs. The third level is the provision of adult-care back-up services. Under this benefit, HSC contracts with a third party agency that provide back-up in home adult care to adults when their regular care provider is not available. The employee, student, or adult dependent can call for immediate assistance for a qualified caregiver to be dispatched to their home or their adult dependent's home. The negotiated

[6] At the existing onsite childcare center, parents are required to keep their children at home when they are sick. The following description was provided to survey participants: the childcare facility for sick children, will be located at a different site than the onsite childcare center but close to HSC and will provide the following services 1) care to children age newborn through 16 with moderate illnesses (such as intestinal symptoms, ear infections, cold, sore throat, etc.) 2) quiet and safe environment, with beds, cribs, isolation rooms, and a sheltered drop-off point, 3) trained pediatric caregivers; strict infection control; written reports of children's day; and an on-call registered nurse and resident doctor.

rate is reasonable and paid by the employee. This service can be provided throughout the US.

Provision of resources and referrals for employees' dependents: we define four levels for this attribute: no resources and referrals (current level), child care only resources and referrals, adults care only resources and referrals, child care and adult care resources and referrals.

The cost: This is a universal monthly after tax payroll deduction on each employee salary to finance part of the cost of benefits provided. The cost attribute allows measuring the willingness to pay for each of the proposed policies or services improvement. The twelve levels of this attribute are: $0, $5, $10, $20, $30, $40, $50, $75, $100, $125, $150, and $200.

2.3.6. Experimental Design

This study involves 8 attributes consisting of 2 attributes with 2 levels, 3 attributes with 3 levels, 1 attribute with 4 levels, 1 attribute with 6 levels, and 1 attribute with 12 levels giving a full factorial design[7] of $2^2 * 3^3 * 4^1 * 6^1 * 12 * 1 = 31{,}104$ possible choices. To generate the design, we used a modified Fedorov candidate-set-search algorithm using the "%choiceff" macro in SAS (Kuhfeld, 2004). This macro is used to select a random fractional design with a specified size from the full factorial design. Alternatives are swapped in, in an attempt to minimize the D-error. 200 initial random designs were used. The design with the minimum D-error, which minimizes the variance matrix for a

[7] A full-factorial design has the advantage of allowing all main effects, all interactions effects and all higher order interactions to be estimable and uncorrelated. However, it is not practical as it requires respondents to consider all 31,104 possible combinations of attributes levels.

Which Benefits Package and Payroll Deduction do you Prefer?

In order to get a better understanding of which benefits are most important to you, we will present you with four questions. In each question, we are asking you to imagine that you have to choose between four options. The first three options are possible combinations of benefits and payroll deduction and the last option describes your current benefits package. Assume that all the job characteristics under the four options such as job duties, work environment, etc. are the same. The options only differ in terms of the benefits listed and payroll deduction. The payroll deduction is a monthly after tax deduction regardless the benefits utilized. We would like you to choose the option you prefer. When making a choice, think about your current and future needs and pay attention to the level of benefits in each table. There are no right or wrong answers.

Which benefits package and payroll deduction do you prefer? If needed, you can hover on each benefit underlined, for additional information[a]. Check only one.

Additional benefits and services	**Option A: Benefits package and payroll deduction**	**Option B: Benefits package and payroll deduction**	**Option C: Benefits package and payroll deduction**	**Your current benefits package and payroll deduction**
Additional leave	None	5 more days of sick leave	3 more days of sick leave	None
Leave and Flexible Work Arrangements Incentive Program	No	Yes	No	No
Wait list at onsite childcare	6 months	6 months	3 years	24 months
Hours of operation of onsite childcare	7:00 AM -5:30 PM	24 hours	24 hours	7:00 AM-5:30 PM
Childcare facility for sick children	Yes	No	Yes	No
Adult care direct services	Drop-off center	None	Drop – off	None
Resources and referrals	None	Adults only	Children only	None
Universal monthly after tax payroll deduction	$125	$0	$30	$0
I choose				

[a]If a respondent hovered on a underlined benefit, a pop-up window would open presenting detailed description of the current level of benefits and the proposed improvements.

Figure 2.1: Example of preamble and choice task

multinomial logit discrete choice model, is chosen. A fractional design of 192 alternatives split into 12 questionnaire versions was selected. This design specifically allowed for estimation of interactions between *training program* and *additional leave*. Each version of the questionnaire consists of 4 choice sets with 4 alternatives each. The number of choices and alternatives per choice set was selected after having conducted numerous debriefings. Figure 2.1. provides an example of a choice task.

2.4. Econometric Estimation

2.4.1. Random Utility Theory

The theoretical framework is based on the random utility theory which assumes that individuals behave rationally and always seek to maximize their utility when faced with competing alternatives. Denote by U_{njt} the level of utility that employee *n* (n = 1,…,N) derives from choosing benefits package *j* (j = 1,…,J) in the choice task *t* (t = 1,…,T). U_{njt} can be decomposed as the sum of the deterministic indirect utility V_{njt} and an independently distributed (i.i.d) random component ε_{njt} assumed to follow a type 1 extreme value probability distribution:

$$U_{njt} = V_{njt} + \varepsilon_{njt} = \beta_n X_{njt} + \varepsilon_{njt} \quad \ldots\ldots\ldots\ldots (1)$$

the indirect utility V_{njt} is a linear function of benefits package attributes X_{njt}. A Random Parameter Logit (RPL) is used to allow the attributes coefficients β_n to capture unobserved preference heterogeneity[8] for family-friendly policies:

[8] We also ran the multinomial logit, the generalized multinomial model type, type II and full model (Fiebig et al. 2010) to test the presence of scale heterogeneity. We found no evidence of scale heterogeneity. A comparison of each RPL model with their counterpart GMNL model (based on the BIC) showed that explicitly accounting for scale heterogeneity did not improve the model fit. Furthermore, the scale parameter

$$\beta_n = \sigma_n \beta + \eta_n \quad \ldots\ldots\ldots\ldots (2)$$

The person specific scale parameter σ_n measures scale heterogeneity and is set to $\sigma_n = 1$. η_n follows a diagonal multivariate normal distribution MVN (0, Σ) where Σ is the attribute coefficients variance-covariance matrix and measures potential correlation structure across attributes.[9] The vector of parameters of interest is $\Theta = (\beta, \theta)$, where β is the vector of means of attributes utility weights and θ is the vector of standard deviation of β. A positive (resp. negative) attribute coefficient indicates that overall, the corresponding attribute has a positive (resp. negative) impact on employees' utility or wellbeing. The higher the coefficient, the bigger the impact.

Denote by $f(\beta/\Theta)$ the probability density function of the random parameter β_n. The probability that employee *n* picks the benefits package *j* in the choice task *t* is given by:

$$P_{njt} = \int \frac{\exp(\beta X_{njt})}{\sum_{k=1}^{J} \exp(\beta X_{nkt})} f(\beta/\Theta)\, d\beta. \quad \ldots\ldots\ldots\ldots (3)$$

Let $y_{njt} = 1$ if employee n picks benefits package j in the choice task t, and $y_{njt} = 0$ otherwise. For employee n, the probability of a sequence of choices $\{y_{njt}\}_{t = 1,\ldots,T, j = 1,\ldots,J}$ is:

---

in the two-way interaction GMNL model was insignificant. The presence of a substantial scale homogeneity indicates a high degree of certainty or consistency across survey participants' choices. (Silvey et al. 2012).

[9] It may be more realistic to assume that there is a correlation structure across benefits (employees who strongly prefer certain benefits tend to like or dislike some other benefits). Given the large number of attributes included in this study, we assumed that attributes are independent for simplicity. Although it had been shown that explicitly modelling correlation across attributes can result in some model improvement in terms of goodness of fit (Colombo et al., 2007), many studies have shown that MWTP estimates from correlated models are not always statistically different from models that assume independence across attributes (Colombo et al., 2007; Scarpa et al., 2012). Furthermore assuming that the variance-covariance matrix is non-diagonal often yields more MWTP extreme outliers and greater variations in the MWTP distribution (Colombo et al., 2007).

$$S_n = \int \prod_{t=1}^{T} \prod_{j=1}^{J} \left[\frac{\exp(\beta X_{njt})}{\sum_{k=1}^{J} \exp(\beta X_{nkt})} \right]^{y_{njt}} f(\beta/\Theta)\, d\beta. \quad \ldots\ldots\ldots\ldots (4)$$

The vector of parameters Θ is estimated by maximizing the following simulated log-likelihood function:

$$SLL = \sum_{n=1}^{N} \ln \left\{ \frac{1}{D} \sum_{d=1}^{D} \prod_{t=1}^{T} \prod_{j=1}^{J} \left[\frac{\exp((\beta + \eta_n{}^{d}) X_{njt})}{\sum_{k=1}^{J} \exp((\beta + \eta_n{}^{d}) X_{njt})} \right]^{y_{njt}} \right\}, \quad \ldots\ldots\ldots\ldots (5)$$

where $\eta_n{}^{d}$ corresponds to the d[th] draw for respondent *n* from the distribution of η_n.

2.4.2. Model Specification

The attribute *Additional leave* is recoded to generate two continuous attributes *Sickleave* and *Annualleave* (in days per year).[10] Other continuous attributes are *waitlist* (in months) and *cost* (in dollars). The attributes *Training program* and *Childcare facility for sick children* are dummy coded while the remaining attributes are categorical with the status quo level of each benefit being the reference category (See Table 2.2). Two model specifications are used to capture the relationship between the indirect utility and the attributes.

2.4.2.1. Main Effect Model

This model only captures the main effect of attributes on respondents' utility. The indirect utility function can be written as:

[10]The two new attributes *Sickleave* and *Annualleave* take the values 0, 3 and 5 days per year. Recoding these attributes as continuous allow to estimate MWTP for one day of sick leave and MWTP for one day of annual leave separately. This attribute format has a more intuitive interpretation and facilitates policy implementation.

$$V_{njt}^{1} = \beta_0 SQ_{njt} + \beta_1 Sickleave_{njt} + \beta_2 Annualleave_{njt} + \beta_3 Trainingprogram_{njt} + \beta_4 Waitlist_{njt} + \beta_{52} Childcarehours8_{njt} + \beta_{53} Childcarehours24_{njt} + \beta_6 Sickchildcare_{njt} + \beta_{72} Dropoff_{njt} + \beta_{73} Backup_{njt} + \beta_{82} Childreferrals_{njt} + Adultreferrals_{njt} + \beta_{84} Childadultreferrals_{njt} + \beta_9 Cost_{njt}$$

…… (6)

In (*Equation 6*) the constant *SQ* takes the value 1 if the offered alternative is the status quo and 0 otherwise. *SQ* allows capturing the status quo bias which is a systematic and sometimes irrational preference (or dislike if β_0 is negative) for the current level of benefits, regardless of available alternatives.

2.4.2.2. Main Effect Model with Two-way Interactions

The second model specification extends the main effect model by introducing two interaction terms. Using the attribute *Additional leave,* we construct a dummy variable attribute *Sick* that takes the value 1 if there are any additional sick leave days in a given benefits package (3 more sick leave days or 5 more sick leave days) and zero otherwise. Likewise, we construct the dummy variable attribute *Annual* that takes the value 1 if there are any additional annual leave days in a given benefits package (3 more annual leave days or 5 more annual leave days) and zero otherwise. These two variables are then interacted with the attribute *Trainingprogram*. The two interaction terms are used to test if the provision of a supervisors training program that promotes the use of family-friendly benefits affects how people value their leave benefits. The resulting model is:

$$V_{njt}^{2} = V_{njt}^{1} + \beta_{10} Training * Sick_{njt} + \beta_{11} Training * Annual_{njt} \quad \text{…… (7)}$$

2.4.3. Study Hypothesis

Hypothesis 1: *Health professionals value family-friendly benefits.*

While we expect respondents to value any additional day of leave, we hypothesize that they will place a greater weight on annual leave than sick leave ($\beta_1 > 0$, $\beta_2 > 0$, $\beta_1 < \beta_2$). we also expect employees' utility to be positively affected by the creation of an incentive program ($\beta_3 > 0$), any reduction of the average time on the wait list of the onsite childcare ($\beta_4 > 0$), the provision of childcare to moderately ill children ($\beta_6 > 0$), the provision of an adult care drop-off and back-up services ($\beta_{72} > 0$, $\beta_{73} > 0$), any provision of resource and referral services ($\beta_{82} > 0, \beta_{83} > 0$, $\beta_{84} > 0$) . Although we expect the extension of the onsite childcare closing time to 8:00 P.M. to increase respondents' utility ($\beta_{52} > 0$), the effect of a 24-hour childcare service on employees' utility is uncertain. While employees with clinical work may value this attribute, employees with regular working hours may be indifferent or may even negatively value 24-hours childcare services ($\beta_{53} \gtreqless 0$). The payroll reduction attribute is expected to have a negative impact on respondents' utility ($\beta_9 < 0$).

Hypothesis 2: *A more family-supportive work environment increases the value that health professionals place on their sick leave and annual leave.*

According to (*Equation 7*), additional days of leave, if supplemented with the training program will result in an extra change in the utility level of β_{10} for sick leave, and β_{11} for annual leave respectively, keeping other benefits constant. I expect both β_{10} and β_{11} to be positive. This means that employees place a greater value on their leave when their work environment is supportive of the use of the leave benefits.

All models' parameters were estimated in Stata 13.0.

2.5. Estimation Results

Tables 2.3 and 2.4 respectively report the estimated coefficients and the MWTP values (mean and median) for the two models. A MWTP estimate is the marginal rate of substitution between a benefit and the salary and represents the maximum amounts (in terms of payroll deduction) an employee is willing to give up in exchange of one-unit increase in the level of benefits. A negative MWTP is interpreted as the maximum amount an employee is willing to sacrifice to avoid a one-unit increase in the level of benefit. Reported mean and median MWTP are computed from the distribution of individual estimated MWTP values[11]. Model goodness of fit is based on the log likelihood (*LogL).*

Coefficients are consistent across the two model specifications in terms of signs and levels of significance. More specifically, all coefficients are statistically significant in both models (except for the coefficients of *Adultreferrals*). With the exception of the coefficients of *Adultreferrals* and *Childreferrals* that are negative, all coefficients signs are as expected (Table 2.3). Having no change from the current benefits package is the least preferred alternative with the median HSC employee willing to sacrifice about $62 of his monthly income to change their family-friendly benefits package, regardless of the alternative benefits package a provided. The ranking of benefits based on the median monthly MWTP (Table 2.4) is influenced by the presence of interaction terms. However, the two models consistently rank the training program, annual leaves and adults care direct services (drop-off and back-up services) as the four most valued benefits. Also, the

[11] Because of the presence of extreme outliers, we dropped 2 percent of observations from the distribution of individual MWTP before computing final mean and median MWTP for each attribute.

provision of a 24-hour onsite childcare and resources and referrals to either only children

Table 2.3: Models results

	Main effect RPL model		Two-way interaction RPL model	
Attributes	Coeff (SE)	SD (SE)	Coeff (SE)	SD (SE)
SQ	-0.563	3.64	-0.773	3.671
	(0.206)***	(0.243)***	(0.227)***	(0.236)***
Sick Leave	0.208	0.15	0.16	0.181
	(0.028)***	(0.106)	(0.034)***	(0.076)**
Annual Leave	0.407	0.336	0.338	0.385
	(0.034)***	(0.057)***	(0.040)***	(0.062)***
Training program	0.862	1.295	0.463	1.249
	(0.088)***	(0.149)***	(0.147)***	(0.192)***
Childcare waitlist	-0.047	0.069	-0.049	0.074
	(0.005)***	(0.010)***	(0.006)***	(0.011)***
Childcare hours: 24 hours	-0.158	0.769	-0.187	0.883
	(0.078)**	(0.165)***	(0.082)**	(0.179)***
Childcare hours: 7:30-8:00PM	0.232	0.281	0.275	0.069
	(0.073)***	(0.589)	(0.076)***	(1.085)
Childcare facility for sick children	0.226	0.817	0.216	-0.89
	(0.064)***	(0.150)***	(0.067)***	(0.139)***
Children referral services only	-0.239	0.26	-0.246	0.191
	(0.090)***	(0.276)	(0.096)**	(0.33)
Adults referral services only	-0.123	0.729	-0.124	0.634
	-0.094	(0.234)***	(0.099)	(0.387)
Children and adults referrals	0.158	0.722	0.159	0.729
	(0.090)*	(0.221)***	(0.095)*	(0.230)***
Adults drop-off center	0.349	0.584	0.342	0.786
	(0.074)***	(0.172)***	(0.079)***	(0.159)***
Adults back-up services	0.404	0.905	0.449	0.869
	(0.081)***	(0.149)***	(0.086)***	(0.191)***
Cost	-0.026	-0.02	-0.028	-0.022
	(0.002)***	(0.002)***	(0.002)***	(0.002)***
Two-way interaction variables				
Training*Sick			0.219	0.888
			(0.128)*	(0.323)***
Training*Annual			0.513	0.574
			(0.124)***	(0.270)**
N	21676		21676	
LogL	-5604.763		-5591.601	

Notes: All coefficients are assumed to follow an uncorrelated normal distribution. We obtained similar results when assuming that the *Cost* coefficient followed a log-normal distribution, while the remaining coefficients were still assumed to be normally distributed. I used 500 Halton draws. The references for the categorical variables "Childcare Hours", "Resources and referrals", and "Adult direct services" are respectively "7:30 AM to 5:30 PM", "no resources and referrals" and "No adult direct services".Significance levels: * p<0.1; ** p<0.05; *** p<0.01.

or only adults are the three least preferred benefits in the two models. The high significance level (1%) of the standard deviation of almost all coefficients in Table 2.3 indicates the presence of substantial preference heterogeneity in almost all attributes.

Table 2.4: Mean and Median MWTP estimates

Estimated MWTP from the main effect variables [a]	Main effect RPL model		Two-way interaction RPL model	
	Mean (95% CI)	Median (95% CI)	Mean (95% CI)	Median (95% CI)
Change the current package of benefits, regardless of available alternatives	-$39.22 (-46.90 - 31.54)	-$62.04 (-71.78 -52.29)	-$45.97 (-54.35 -37.58)	-$61.35 (-71.90 -50.79)
Provide one additional day of sick leave per year	$8.69 (8.12 9.24)	$6.83 (6.11 7.54)	$6.72 (6.25 7.18)	$5.04 (4.452 5.63)
Provide one additional day of annual leave per year	$17.41 (16.26 18.56)	$13.08 (11.60 14.55)	$14.02 (12.96 15.08)	$10.49 (9.13 11.83)
Create a leave and flexible work arrangements training program	$35.34 (32.07 38.61)	$26.43 (22.28 30.56)	$16.51 (14.00 19.01)	$11.85 (8.69 15.00)
Reduce the waitlist at onsite childcare by one month	$2.19 (2.01 2.36)	$1.58 (1.35 1.80)	$2.05 (1.86 2.23)	$1.43 (1.19 1.66)
Extend onsite childcare hours to 24 hours	$6.80 (5.59 7.99)	$5.90 (4.40 7.40)	$9.29 (7.75 10.82)	$7.03 (5.10 8.95)
Extend onsite childcare hours form 7:30 AM to 8:00 PM	$9.75 (9.08 10.40)	$7.75 (6.911 8.59)	$11.84 (11.04 12.63)	$8.42 (7.39 9.44)
Create a childcare facility for sick children	$9.88 (8.37 11.38)	$6.08 (4.1 9.85)	$10.68 (8.88 12.47)	$6.00 (3.73 8.27)
Avoid the provision of referrals to caregivers with child dependents only	$10.31 (9.63 10.97)	$8.04 (7.18 8.88)	$10.05 (9.36 10.73)	$7.41 (8.28 6.52)
Avoid the provision of referrals to caregivers with adult dependents only	$6.46 (5.16 7.74)	$4.69 (3.07 6.31)	$4.90 (3.92 5.86)	$3.75 (2.53 4.96)
Provide resources and referrals services for adults and children	$5.93 (4.68 7.17)	$5.67 (4.11 7.22)	$6.10 (4.78 7.40)	$4.54 (2.89 6.17)
Create an adult drop-off center	$15.19 (13.81 16.57)	$11.12 (9.37 12.87)	$15.09 (13.42 16.75)	$10.95 (8.84 13.05)
Provide adult back up services	$16.45 (14.49 18.40)	$12.94 (10.48 15.40)	$20.58 (18.58 22.57)	$13.88 (11.34 16.41)

Means and medians are from the distribution of conditional individual estimated MWTP values. Individual MWTP values were ordered and 2% of outliers was removed from each side of the distribution before calculating mean and median. Cutting off 5% of outliers produced very close mean and median estimates to cutting 2% off. A positive MWTP is interpreted as the amount individuals are willing to sacrifice for the provision of a benefit. For the variables *Sickleave*, *Annualleave* and *Trainingprogram*, mean and median MWTP are calculated under the assumption of no interaction effect (the coefficients of the interaction terms are set to 0). Table 6 below estimates the mean and median MWTP for these three attributes in the presence of different interaction effects.

To further examine taste heterogeneity in attributes, Table 2.5 presents the distribution of MWTP for each family-friendly benefit for selected percentiles (based on two-way interaction model). Although results for the two models are presented in all tables (with the exception of Table 2.5), the subsequent analysis will mainly emphasize the two-way interaction model.

The analysis focuses on the median MWTP estimates because of their low sensitivity to outliers compared to the mean MWTP values. Before interpreting the results, it is worth mentioning that most of the attributes covered in this study have not been previously investigated. Therefore, comparison with existing literature may not always be possible.

2.5.1. Effect of a Family Supportive Work Environment on MWTP Values

This section presents preferences and MWTP estimates for additional days of sick leave, additional days of annual leave, and for the training program. It also investigates the effect of the training program on the MWTP estimates for the leave attributes. Because the total MWTP estimates for leave benefits depend on the presence of the incentive program and vice versa, we report these three MWTP values separately in Table 2.6.

The results show that the coefficients of the two interaction terms are significant. The interaction of training program is stronger with annual leave than with sick leave (Table 2.3). A focus on the first three attributes reveals that although there is substantial preference heterogeneity, the vast majority of HSC employees has a positive willingness to pay for each of them. More specifically, more than 90%, 90%, and 70% of employees

Table 2.5: Monthly MWTP for family friendly benefits by percentile (Based on the two-way interaction RPL model)

	Percentiles												
	99	95	90	75	70	60	50	40	30	25	20	10	1
SQ	369.69	168.89	132.94	40.13	21.63	-12.75	-61.35	-75.20	-93.17	-107.69	-126.83	-192.04	-609.86
Sick Leave	43.52	19.69	13.27	7.68	6.87	5.72	5.04	4.42	3.82	3.50	3.20	1.99	-16.22
Annual Leave	117.13	45.61	30.01	16.96	15.19	12.57	10.68	9.00	7.07	6.33	5.66	3.40	-9.55
Training Program	187.12	97.71	59.30	28.13	23.52	17.39	11.85	7.61	2.09	-1.01	-5.08	-18.48	-143.54
Childcare wait time	5.42	0.80	0.12	-0.55	-0.74	-1.08	-1.43	-1.80	-2.22	-2.48	-2.96	-4.96	-19.42
Childcare Hours: 24 hours	70.97	24.87	13.24	1.42	-0.75	-3.99	-7.03	-10.40	-14.05	-16.48	-19.72	-31.09	-125.52
Childcare Hours: 7:30 AM-8:00 PM	77.46	35.85	21.77	12.58	10.98	9.42	8.42	7.63	7.08	6.84	6.55	5.85	-35.84
Childcare for sick children	136.94	59.66	38.42	17.29	14.21	9.33	6.00	2.80	-0.80	-2.85	-5.07	-12.55	-68.47
Children referrals only	26.95	-2.82	-3.94	-5.54	-5.95	-6.74	-7.41	-8.46	-9.93	-11.07	-12.94	-19.30	-73.48
Adults referrals only	94.37	41.86	26.88	13.30	11.05	7.69	4.54	2.10	-1.01	-2.16	-3.84	-9.69	-92.34
Children and Adults referrals	49.29	18.71	9.98	2.43	0.90	-1.71	-3.75	-6.25	-8.80	-10.24	-11.99	-20.94	-72.31
Adult drop-off center	157.87	65.21	39.60	20.29	18.13	13.81	10.95	7.56	4.56	2.53	0.15	-7.37	-62.50
Adults back up services	197.60	85.22	53.46	25.94	22.79	18.00	13.88	10.21	6.61	4.50	2.50	-4.41	-65.40
Training*Sick	117.34	57.40	34.69	17.86	15.01	10.83	6.89	3.27	-0.73	-2.70	-5.05	-13.50	-87.45
Training*Annual	136.59	65.94	39.09	23.92	21.64	18.44	15.61	13.60	11.59	10.30	9.01	4.72	-64.54

Notes: Individual MWTP values were ordered and 2% of outliers was removed from each side of the distribution before calculating mean and median. Negative MWTP value signifies that the employee is willing to pay to keep the benefit at it current level rather than pay for it improvement.

Table 2.6: MWTP estimates per employee for the training program and for additional sick leave and annual leave

	Main effect model		Two-way interaction model	
	Mean	Median	Mean	Median
Monthly MWTP for the training program				
With no additional leave day per year	$35.34	$26.43	$16.51	$11.85
With additional day of sick leave and no additional day of annual leave per year	$35.34	$26.43	$25.47	$18.74
With additional day of annual leave and no additional day of sick leave per year	$35.34	$26.43	$36.36	$27.46
With additional day of sick leave and annual leave per year	$35.34	$26.43	$45.33	$34.35
Monthly MWTP for 1 additional day of sick leave per year				
Without the training program	$8.69	$6.83	$6.72	$5.04
With the training program	$8.69	$6.83	$15.69	$11.93
Monthly MWTP for 1 additional day of annual leave per year				
Without the training program	$17.41	$13.08	$16.31	$10.49
With the training program	$17.41	$13.08	$36.16	$26.10

have a positive MWTP for additional sick leave, additional annual leave, and the training program, respectively. Estimated mean monthly MWTP for the training program varies between $16.51 and $45.33, while the median MWTP is between $11.85 and $34.35 per month. In the interaction model the mean and median WTP estimates for the sick leave and annual leave attributes are at least two times higher with the training program than without the training program. More precisely, a look at the median monthly MWTP estimates shows that the presence of the training program increases the value of sick leave and annual leave from $5.04 to $11.93, and from $10.40 to $26.10, respectively.

2.5.2. Preferences and MWTP for Children Related Direct Services

The results indicate that reducing waitlist at onsite childcare, extending the closing time of onsite childcare to 8:00 P.M., and offering childcare services to children with moderate illnesses improve employees' utility (the coefficients of *Sickchildcare*, *Childcarehours8*, and *Waitlist* are positive (Table 2.4)). There is substantial preference homogeneity for *Childcarehours8* with more than 90% of the employees having a positive MWTP for this attribute (Table 2.5). Although employees with at least one child dependent represent only 35% of all employees, the majority of employees has a positive MWTP for the three above mentioned child related direct services. The monthly MWTP for the median employee to reduce waitlist at onsite childcare by a month, extend the hours of operation of onsite childcare to 8:00 P.M., and provide a childcare facility for sick children is $1.43, $8.42, and $6, respectively.

The provision of 24 hours onsite childcare services is the only child-related direct service with a negative MWTP. Findings suggest that the median employee is willing to pay $7.03 per month to avoid the extension of onsite childcare to 24 hours. Although there

are some evidence of preference heterogeneity for *Childcarehours24* (Table 2.3), more than 70% of employee have a negative MWTP for this attribute (Table 2.5). This may be due to that a very large proportion of HSC employees do not have clinical assignments and therefore have regular work hours (between 8:00 AM and 5:00 PM). Discussion in the focus groups indicated that those participants tended to feel strongly that overnight child care was not in the best interests of children.

2.5.3. Preferences and MWTP for Adults Related Direct Services

To the best of our knowledge, there is no econometric valuation study that has investigated attributes related to adult care direct services. All four models indicate that overall, HSC employees have a positive MWTP for adult drop-off center and back-up services. The median employee is willing to pay $10.95 and $13.88 per month respectively for a drop-off center and for back-up services. There is a substantial preference heterogeneity for these two attributes. Although only about 20% of employees has an adult dependent, at least 80% of employees are willing to pay for the provision of adult care direct services.

2.5.4. Preferences and MWTP for Resources and Referrals

The coefficients signs of resources and referrals services related attributes were unexpected. Interestingly, we found that although employees value the provision of resources and referral services to caregivers with children and/or adult dependents (*Childadultreferrals* has a positive and insignificant coefficient in the two models), restricting the availability of these services to only one group of dependent overall decreases employees' utility (in the two models, the coefficients of *Childreferrals*,

Adultreferrals are both negative). The results show that the median employee is willing to pay $7.41 and $3.75 to avoid resources and referrals being provided to children only and adults only, respectively. However, she is willing to pay $4.54 for the provision of resources and referrals to children and adults. This suggests that particular policies that are available only to a sub-category of employees may have an adverse effect on other employees' utility.

2.6. Policy Simulation

To further illustrate the impact of a family supportive work environment on benefits values, the results are applied to the economic valuation of five policy scenarios. The policy scenarios represent hypothetical investment plans that could be implemented to improve the work-life balance of employees. For each scenario, the aggregated median MWTP for each benefit for 3,450 HSC employees over a year are used to estimate the total annual and monthly amount that could be collected through payroll deduction to finance part of a family-friendly benefits investment plan. The first four family policy investment plans target specific policies: (1) the improvement of the family-friendly workplace culture through supervisors' training, (2) the provision of new childcare benefits and services, (3) the provision of adult care services, and (4) the improvement of sick leave and annual leave. Estimates for these four scenarios are presented in Table 2.7. Our interpretation will focus on Policy Scenario 5, which compare two investment plans that only differ by the presence of the training program (Table 2.8). The other benefits included in scenario 5 are three additional days of sick leave, three additional days of annual leave, average waitlist at onsite childcare reduced to six months, childcare facility for sick children, and adult care back-up services.

Table 2.8 shows that in the two models, the estimated payroll deduction that each employee is willing to sacrifice in exchange for the implementation of these new benefits and policies more than doubled under the provision of the training program. The two-way interaction model estimates that the median employee monthly WTP increases from $92 with no training program to $194 with a training program. This means that without the training program, the median employee is willing to invest 2.15% of her annual salary to finance this package of benefits and this amount increases to about 4.52% (a 110% increase) if the benefits package is supplemented with the training program. The annual amount that could be collected over 3,450 HSC employees is estimated at $3,817,504 without the training program and $8,034,328 with the training program.

2.7. Discussion

This work focuses on health professionals' preferences for family-friendly benefits and assesses the impact of a family supportive work environment on benefits value. Using a choice experiment survey of employees of a Health Sciences Center, we estimate MWTP values for twelve family-friendly benefits and services. Employees were willing to sacrifice a non-negligible amount of their salaries in exchange of the provision of these benefits.

The main finding of this study is that policies related to leave and flexible scheduling are highly valued. More specifically, the provision of a leave and incentive program that fosters the use of family-friendly benefits was the benefit most valued. The median employee was willing to sacrifice between 0.17% and 0.80% of her annual salary to remove barriers to the use of family-friendly policies. Interestingly, the provision of

Table 2.7: Policy scenarios with corresponding willingness to pay

	Policy scenario1: Improving family-friendly culture		**Policy scenario 2: Improving childcare policies and services**		**Policy Scenario 3: Improving adult care policies and services**		**Policy scenario 4: Improving sick leave and annual leave**			
	Main effect model	Two-way interaction model	Main effect Model	Two-way interaction model	Main effect Model	Two-way interaction model	Main effect model		Two-way interaction model	
							Without training program	With training program	Without training program	With training program
Policy scenario1:										
Improving the family-friendly workplace culture										
- Implement the leave and flexible work arrangement training program	$1,094,202	$490,590								
Policy scenario2:										
Improving childcare policies										
- Reduce waitlist at the childcare center to an average of six months			$1,176,423	$1,065,688						
- Extent hours of current childcare center to 7:30AM- 8:00PM			$320,877	$348,527						
- Create a childcare facility for sick children			$251,830	$248,511						
Policy Scenario3:										
Improving adult care policies										
- Create a drop-off center					$460,541	$453,246				
- Provide back-up services					$535,818	$574,731				
Policy scenario 4:										
Improving sick leave and annual leave										
- Provide 3 more days of sick leave per year to all BEE							$847,967	$847,967	$626,133	$1,481,554
- Provide 3 more days of annual leave per year to all BEE							$1,624,368	$1,624,368	$1,302,442	$3,241,772
Annual payroll deduction across all BEE	***$1,094,202***	***$490,590***	***$1,749,130***	***$1,662,726***	***$996,359***	***$1,027,977***	***$2,472,335***	***$2,472,335***	***$1,928,575***	***$4,723,326***
Annual payroll deduction per BEE	***$317.16***	***$142.20***	***$506.99***	***$481.95***	***$288.80***	***$297.96***	***$716.62***	***$716.62***	***$559.01***	***$1,369.08***
Monthly payroll deduction per BEE ($)	***$26.43***	***$11.85***	***$42.25***	***$40.16***	***$24.07***	***$24.83***	***$59.72***	***$59.72***	***$46.58***	***$114.09***
Monthly payroll deduction per BNE(%)	***0.62%***	***0.28%***	***0.98%***	***0.93%***	***0.56%***	***0.58%***	***1.39%***	***1.39%***	***1.08%***	***2.66%***

In all models, the median is used to calculate aggregated values. Median annual income = $51,554.96. BEE = benefit eligible employee. Number of HSC BEE = 3450.

Table 2.8: Policy scenario 5: Improving family-friendly benefits

	Main effect Model		Two-way interaction model	
Benefit Package Investment	Without training program	With training program	Without training program	With training program
		$1,094,110[a]		$1,422,072 [a]
Provide 3 more days of sick leave per year to benefits eligible employees	$847,967	$847,967	$626,133	$1,481,554
Provide 3 more days of annual leave per year to benefits eligible employees	$1,624,368	$1,624,368	$1,302,442	$3,241,772
Reduce the waitlist at onsite childcare to an average of six months	$1,176,423	$1,176,423	$1,065,688	$1,065,688
Create an adult care drop-off center	$251,830	$251,830	$248,511	$248,511
Provide adult care back-up services	$535,818	$535,818	$574,731	$574,731
Annual payroll deduction across all benefits eligible employees	***$4,436,407***	***$5,530,517***	***$3,817,504***	***$8,034,328***
Annual payroll deduction per benefit eligible employee	**$1,286**	**$1,603**	**$1,107**	**$2,329**
Monthly payroll deduction per benefit eligible employee	***$107.16***	***$133.59***	***$92.21***	***$194.07***
Monthly payroll deduction per benefit eligible employee	***2.49 %***	***3.11%***	***2.15 %***	***4.52 %***

[a] These values are the willingness to pay for the training program. In all models, the median is used to calculate aggregated values. Number of HSC benefits eligible employees = 3450. Median annual income = $51,554.96.

additional leave themselves had a much lower value to employees and was contingent to the presence of a mechanism that eases the use of these policies. The estimated marginal willingness to pay of the median employee for one additional day of sick leave per year was only 0.06% of her annual salary without the incentive program and was raised to 0.33% (about a 400 % increase)[12] if the incentive program was provided. Likewise, the median employee was willing to invest 0.20% of her annual salary for one additional day of annual leave per year with no incentive program and this amount increased to 0.55 % (a 175% increase) with the incentive program.

The high value of leave and work flexibility is well documented especially in Academic Health Centers (Bristol et al., 2008; Gropper et al., 2010; Welch et al., 2011). Previous studies show that the availability of leave and work flexibility is a significant determinant of job choice and turnover, particularly among employees with dependents (Moen et al., 2011). However, the literature also suggests that work-life policies initiatives should not be limited to the broadening and diversification of policies provided. To achieve their intended goal, policies should be supplemented by an organization culture that is supportive of the use of these policies (Fiksenbaum, 2014).

With respect to dependent direct services, we found substantial preferences heterogeneity. However, the proportion of employees willing to fund dependent direct services exceeds the proportion of employees with dependent care responsibilities by far. This is consistent with Drago (2001) who found that even employees who do not expect to

[12] Although a percentage increase of 400% may seem unrealistic, it is understandable. Because the MWTP estimates are small dollar values, a small change in these dollar amounts results in a large impact on the percentage increase estimates.

directly benefit from family-friendly benefits may be willing to contribute to their provision.

Regarding referral services, several reviews of the efficacy of work-life policies in improving employees' satisfaction and job outcomes have found a very modest positive and sometimes even negative impact (Butts et al., 2013). One justification given by Ryan and Kossek (2008) is the low degree of universality of some policies. They argue that particular policies by being available to only a segment of employees deter the workplace inclusion of all employees and can be perceived as discriminatory. This could explain HSC employees' lack of support for resources and referral services available only to employees with a specific type of dependents (either children or adults), but their willingness to fund referral services when there are intended to both children and adults. Consistent with my previous finding of employees' greater inclination for adult services than for childcare services, employees have a stronger opposition to children referrals only than to adult referrals only. More specifically, the median employee is willing to sacrifice $9.23 monthly to prevent the provision of childcare referrals only, but only $6.04 per month to prevent the provision of referrals to adults only.

2.8. Policy Recommendation

This study underlines the essential role of the organization work-life culture in the design of effective human resources policies. I proposed an intervention that could be used by policymakers to improve their organization perception of the use of family friendly policies. This intervention combines three tools. The first is the training of supervisors on how to effectively meet their employees' needs regarding leave and flexible work arrangements, while preserving the organization mission. The second is a formal and

informal recognition of supervisors who demonstrate an extraordinary achievement in providing opportunities for flexible work arrangements and leave, while maintaining an effective unit. Recognition could include awards, certificate of appreciation, etc. The third is developing strategies to allocate more resources to fund existing leave and flexible work arrangements, in collaboration with the Administration.

Another novelty of this study is the investigation of three childcare attributes non-existent in previous family-friendly policies valuation studies. Our results suggest that it may not be enough to provide onsite childcare, which is the general standard. Employers and policymakers should also ensure that the level of childcare services provided meet their employees needs in terms of availability of care for children moderately ill, adequate closing time, and shorter waitlist. While the provision of childcare services to employees has received a lot of attention, little has been done regarding employees caring for old adults. This gap in the literature requires serious consideration as it is expected that the demand for adult care benefits will exceed the demand for childcare benefits in the coming decades (Wagner et al., 2012). Several demographic trends motivate this projection. This trends include the increase of the proportion of women (usual caregivers) in the workforce, the aging of the population as a result of longer life expectancy, and the shift of adult care from home care or institutional care to community care (Gray and Hughes, 2005). These social trends are expected to decrease the availability of caregivers while increasing the length and complexity of care. It is crucial that employers anticipate the increase in the proportion of employees with adult dependents. These projections are consistent with my results. We found that the median employee places a much higher value on adult care direct services (drop-off center and adult care services), compared to the proposed childcare

services. The higher value of adult benefits could translate the less availability of adult care benefits relatively to childcare benefits, especially given that employees believe that their employers are more likely to allow the use of flexible work practices for childcare than for adult care (Gray and Hughes, 2005).

On a final note, we want to recognize that the implementation of some of the family-friendly policies included in this study could require a substantial initial amount of financial resources. However, our work corroborates previous findings that a successful integration of employees' work and family demands could be monetarily profitable for an organization. In past studies, financial gains resulting from the enhancement of the organizational family culture relate to the increase productivity, and the decrease in absenteeism and turnover rate. Our study is novel in that it provides the first empirical evidence that financing practices that promote employees' work-life balance could increase the economic values of family-friendly policies, and therefore is a money-wise sound investment. We proposed a channel to partially fund potential work-life policies initiatives through small monthly payroll deduction from employees' salaries. However, effective work-live policy innovations do not have to be expensive. Short and low-cost interventions as implemented in (Kossek & Hammer, 2008) can have a significant impact on employees' productivity, work-related attitudes, and overall wellbeing while promoting a family-friendly organizational culture. Even with no additional policies provided, a relatively small investment in supervisors' work-life training could increase the value of the existing programs.

Chapter 3: Effect of Patient-centered Communication on Health Outcomes and Health Care Quality

3.1. Introduction

The health care delivery system in the United States (US) faces several major challenges related to the inefficient coordination and delivery of health care services, unnecessary use of certain medical procedures, high frequency of medical errors, and misdiagnosis and overtreatment of patients (Berwick and Backharth, 2012; Majette, 2009). Among the health care models proposed to address the poor delivery of health care services, patient-centered care is gaining increasing attention and is now recognized as the cutting edge of medical practices (Epstein et al., 2010; Frampton and Guastello, 2014). The Institute of Medicine ([IOM], 2001) defines patient-centered care as "providing service that is respectful of and responsive to individual patient preferences, needs, and values, and ensuring that patient values guide all clinical decision". This definition highlights the importance to switch from a doctor-centered or disease-centered care to a personalized care that places patient-centered communication at the heart of medical care.

Effective patient-centered communication is essential to the practice of medicine. It facilitates correct disease diagnosis and allows personalized therapeutic decision making that integrates patients' preferences, needs and values, which ultimately lead to better health outcomes and patient experience (Epstein et al., 2005; Ha et al., 2010). The growing enthusiasm of health care organizations and policymakers towards patient-centered care in general and patient-centered communication in particular begs questions related to their effectiveness to improve health outcomes and health care delivery. Attempts to answer

these questions have produced mixed results (Street Jr, 2013; Street Jr, Makoul et al., 2009). On one hand, theoretical studies suggest that patient-doctor communication can have an immediate positive effect on health outcomes such as patient's anxiety and discomfort (Street Jr, 2013; Street Jr et al. 2009). However, most therapeutic effects of doctor-patient communication are mediated by factors such as improved access to care, higher quality of medical decision through shared-decision making, improved self-management skills, better commitment and adherence to prescribed treatment, increased social support, trust in the health care system, and satisfaction with the health care services received (Street Jr, 2013; Street Jr et al. 2009; King and Hope, 2013). On the other hand, several empirical studies have found no association between medical provider communication skills and patient's health outcomes (e.g. Ward et al. 2003).

The lack of consistency in these results has been attributed to factors such as the variety of health outcomes under investigation (Street Jr. 2013), the presence of multiple possible confounders uncontrolled by researchers that may influence research outcomes (King and Hope, 2013; Street et al., 2009), and the lack of theory justifying the patient-centered communication measures used (Street Jr, 2013; Street Jr et al. 2009). The goal of this paper is to address these shortcomings and provide new insights on the effectiveness of patient-centered communication in improving general health, mental health, and the quality of health care services. I use a large sample of 38,315 individuals obtained by combining six panels (from 2007 to 2013) of the Medical Expenditure Panel Survey (MEPS), a survey of a nationally representative sample of the US population. This paper addresses the call to enrich the patient-centered communication debate by developing and testing new theory-based constructs (Street, 2013). I introduce a novel multifaceted

measure of patient-centered communication that incorporates four items related to key components of patient-centered communication, namely cultural competency, coordinated care, shared-decision making and patient-centeredness. These elements are well-recognized key components of patient-centered care (Berenson, et al., 2011) and therefore ground our measure of patient centered-communication in the patient centered care setting. I test the effect of our measure on general health, mental health and patients' rating of health care quality. Inverse probability weighting and propensity score matching techniques are applied to pooled and lagged models to account for potential endogeneity and selectivity issues (Hogan and Landcaster, 2004; Leslie and Thiebaud, 2007; Mansournia and Altman, 2016). This allows estimating the immediate effect (same year) and long-term effect (one year later) of patient-centered communication on the outcomes of interest.

3.2. Data, Variables, and Study Population

The data comes from MEPS, a survey conducted by the Agency for Health care Research and Quality that collects health-related information about medical services utilization and expenditures from a representative sample of households in the United States. Each participant is followed for five rounds during a two-year time period. The six panels of the MEPS conducted from 2007 to 2013 (Panel 12 to Panel 17) are used in this investigation.

3.2.1. Patient-Centered Communication Measure

Patient-centered communication is defined in various ways. Most definitions recognize the complexity of the patient-centered communication concept, which has been mainly characterized by its core components. Well-recognized elements include (1) cultural competency, (2) information exchange or coordinated care, (3) shared-decision making, and (4) patient-centeredness (Epstein et al. 2005; King and Hope, 2013; Street Jr, 2013). Although each of these four components is also multidimensional and no unique definition exists, a conceptual definition endorsed by several physicians' societies has been proposed by Berenson et al. (2011). They define cultural competency, information exchange or coordinated care, shared-decision making, and patient-centeredness respectively as follows: (1) ensuring that information is conveyed to patients in a language and method they understand, taking cultural differences into account; (2) monitoring all other care received by patients; (3) patients actively participating in selecting treatment options; and (4) providing care based on the needs and preferences of patients and their families. The importance of each of these patient-centered communication components has been individually documented (Alvarez et al. 2016; Barry and Edgman-Levitan, 2012; Chu et al. 2016; Dobrzykowski and Tarafdar, 2015; Philpot et al., 2016; Schol et al., 2014; Stockbridge et al., 2014). My measure of patient-centered communication combines all four elements and is the five-level categorical variable labelled *Patient-centered communication* that takes the value i ($i = 0, 1, 2, 3, 4$), if the patients reported experiencing i of the four patient centered communication components. Thus, my construct is multidimensional and accounts for the comprehensiveness of the doctor-patient communication.

Survey participants were asked whether they had a usual source of care. Conditional of having a usual source of care, they were asked a battery of questions regarding their conversations with their medical provider. Table 3.1 recalls the definition of cultural competency, coordinated care or information exchange, shared-decision making and patient-centeredness as proposed by Berenson et al. (2011), and presents the MEPS questions involved in the creation of the four patient-centered communication components. Table 3.1 also shows how the MEPS questions where coded to create each patient-centered communication component indicators. The resulting four indicators are then used to generate a single multidimensional measure of patient-centered communication.

3.2.2. Health Outcomes and Health Care Quality Measures

The three outcomes of interest are the self-reported general health status, mental health status and rating of the quality of health care services received. The general health status variable (N = 38,315) and mental health status variable (N = 38,314) come from the MEPS Household Component and is reported in each of the five rounds of the survey. However, the quality of health care variable (N = 26,791) are derived from the Self-Administered Questionnaire, a supplement to the MEPS Household Component that surveys individuals 18-years or older during the second and fourth rounds of the survey. Survey respondents were asked to state their general and mental health status based on

Table 3.1: Measuring patient-centered communication components using MEPS.

Patient-centered communication components	Formal Definition (Berenson et al., 2011).	MEPS Questions	Variable Definition
Cultural competency[a]	The practice ensures information is conveyed to patient in a language and method they erstand, taking cultural differences into account.	Does {a medical person at} {PROVIDER} present and explain all options to {PERSON}? 1: Yes 2: No	1: Yes 0: No
Coordinated care	The practice monitors all other care received by their patients (e.g., from specialists to manage patients' care.	Does {someone at} {PROVIDER} usually ask about prescription medications and treatments other doctors may give them? 1: Yes 2: No	1: Yes 0: No
Patient-centered care	Care is based on the needs and preferences of patients and their families.	Thinking about the types of medical, traditional and alternative treatments that {PERSON} (is/are) are happy with, how often does {a medical person at} {PROVIDER} show respect for these treatments? 1: Never 2: Sometimes 3: Usually 4: Always	1= Usually, Always 0 = Never, Sometimes
Shared decision-making	Patient actively participates in selecting component options.	If there were a choice between treatments, how often would {a medical person at} {PROVIDER} ask {PERSON} to help make the decision? 1: Never 2: Sometimes 3: Usually 4: Always	1= Usually, Always 0 = Never, Sometimes

[a]Provider's ability to present and explain all treatment options to a patient does not fully capture provider's cultural competency. However, due to data limitation, this variable was used as a proxy.

the five-scale rating system poor, fair, good, very good and excellent. They were also asked to rate the quality of health care received from 0 (worst health care possible) to 10 (best health care possible). For all three variables, we restrict our analysis to data collected in the second and fourth rounds. The population under investigation consists of individuals

18 years old or more who had a usual source of care, and who did not have missing data in the variables included in the analysis.

3.2.3. Other Covariates

Demographic, socio-economic and health-related explanatory variables are used. The demographic data are age, gender, race (Non-Hispanic White, Others), region (West, South, Midwest, Northeast), and marital status (married, not married). The socio-economic variables are years of education and personal income adjusted based on the 2013 Consumer Price Index of each of the four regions (obtained from the Bureau of Labor Statistics). The health-related variables used are the number of comorbidities, an indicator of whether the individual has health insurance coverage, and an indicator variable for current smokers. The number of comorbidities counts the following health conditions: high blood pressure, heart attack, heart disease, other heart diseases, angina, stroke, diabetes, cancer, emphysema, high cholesterol, joint pain, asthma, arthritis, and bronchitis. All of the explanatory variables are collected each year during Round 2 (first year) and Round 4 (second year) of the panel survey. Table 3.2 gives the exact formulation of the survey questions used to construct dependent variables and provides a brief description of all the variables involved in this analysis.

3.3. Empirical Model and Hypotheses

Assume patients in a medical intervention received any combination of four components of patient-centered communication: cultural competency, information exchange or coordinated care, shared-decision, and patient-centeredness. The goal of the

Table 3.2: Description of variables

Variables	Definition	N	Mean	SD		Min/Max
Outcome variables						
General Health	In general, compared to other people of {your/his/her} age, would you say that {your/his/her} health is excellent, very good, good, fair or poor? 1 = Poor, 2 = Fair, 3=Good, 4=Very Good, 5 = Excellent	78,578	3.491	1.082		1/5
Mental Health	In general, would you say that {your/PERSON}'s mental health is excellent, very good, good, fair or poor 1 = Poor, 2 = Fair, 3=Good, 4=Very Good, 5 = Excellent	78,561	3.852	1.026		1/5
Health care Quality	Using any number from 0 to 10 where 0 is the worst health care possible and 10 is the best health care possible, what number would you use to rate all your health care in the last 12 months? 1 = 0 to 5, 1 = 6 to 8, 2 = 9 and 10	57,250	2.440	0.639		1/3
Treatment variable						
Patient-centered communication (PCC)	Number of PCC components (Cultural competency, coordinated care, patient-centeredness, shared-decision making): 0 = No PCC component, 1 = 1 PCC component, 2 = 2 PCC components, 3 = 3 PCC components, 4 = 4 PCC components	78,587	3.541	0.788		0/4
Health-related covariates						
Comorbidities	Number of comorbidities	78,587	1.889	1.888		0/12
Currently smoke	1= Currently smoke, 0 = Otherwise	78,587	0.158	0.365		0/1
Insured	1= Insured at any time during the given year, 0 = Otherwise	78,587	0.883	0.322		0/1
Socio-economic and demographic covariates						
Income	Personal income adjusted for the 2013 regional CPI. The regressions use lnincome = ln (income + 1)	78,587	28,506.27	30,790.08		0 / 264,311
Education	0 = No Degree (reference), 1 = High School Diploma Graduate (HSDG), GED, or some college, 2 = Bachelor's Degree or more	78,587	1.383	0.489		0/2
Non-Hispanic White	Race/Ethnicity: 1= Non-Hispanic White, 0 = Others	78,587	0.531	0.499		0/1
Female	1 = Female, 0 = Male	78,587	0.585	0.492		0/1
Age	Age at the first year of the survey	78,587	48.180	17.506		18/85
Agesqr	Age squared divided by 1000	78,587	2,627.745	1,762.487		324/7225
Married	Marital status: 1 = married, 0 = Other	78,587	0.548	0.498		0/1
Panel	Indicator of the panel of the survey: 12= Panel12, 13 = Panel13, 14 = Panel14, 15 = Panel15, 16 = Panel16, 17 = Panel 17 (reference)	78,587	14.632	1.693		12/17
Region	Indicator of the region: 1 = Northeast (reference), 2 = Midwest, 3 = South, 4 = West	78,587	2.713	1.03		0 / 4
Year	Indicator of the year: 0 = First year, 1= Second year	78,587	0.506	0.500		0/1

Note: Descriptive statistics are based on pooled data

study is to estimate the effect of patient-centered communication on three outcomes: general health, mental health, and health care quality. The model can be formulated as:

$$Outcome_i = \alpha_0 + \alpha_1 OnePCCCComponent_i + \alpha_2 TwoPCCCComponents_i + \alpha_3 ThreePCCCComponents_i + \alpha_4 FourPCCCComponents_i + \beta Z_i + + \epsilon_i$$

where *Outcome* denotes any of the three outcome variables of interest. *OnePCCCComponent, TwoPCCCComponents, ThreePCCCComponents*, and *FourPCCCComponents* are four levels of the five-level categorical variable *Patient centered communication*, each indicating the number of components involved in the treatment received. The reference group consists of individuals who did not experience any of the patient-centered communication components. Z_i is the vector of demographic, socio-economics and health-related covariates, and β is the set of parameters associated Z_i. Finally, ϵ_i denotes the random error term.

I test the following two hypotheses:

Hypothesis 1: Patient-centered-care communication has a positive effect on general health, mental health, and health care quality. And this effect significantly increases with the number of components of the patient-centered communication.

Hypothesis 2: The effect of patient-centered communication on general health, mental health, and health care quality persists even one year after the clinical encounter.

The validation of Hypothesis 1 will support the effectiveness of patient-centered communication as a tool to improve patients' health outcomes and the quality of health care services delivery overall. It will also underline the importance of multifaceted patient-centered communication measures relatively to unidimensional construct. Hypothesis 2

helps to compare the effectiveness of patient-centered communication the same year and a year after the medical visit.

3.4. Estimation Method

3.4.1. Inverse Probability Weighted Ordinal Logistic Models

I use ordinal logistic models to assess the effect of patient-centered communication on the outcomes of interest. I kept the original 5-level scale coding that were used to rate the health outcomes variables (poor, fair, good, very good, and excellent). However, the rating of the health care quality is recoded into three categories: 0 – 5 (poor or fair health care quality), 6 – 8 (good health care quality), and 9 to 10 (very good or excellent health care quality).

Two potential econometric issues in observational studies are selection and endogeneity biases. These issues usually arise in programs evaluations where not only the assignment to a treatment status is not randomized, but also the treatment and the outcome are often dependent. In this study for example, self-selection and endogeneity may exist because individual unobserved characteristics (such as patient active involvement in their medical experience) may simultaneously affect the level of patient-doctor communication and outcomes such as self-reported mental health condition and perceived quality of care received. In this case, differences in health outcomes between the treated group and control group may be due to fundamental differences between the two groups, not the treatment per se. Failure to address potential selection and endogeneity issues could lead to biased

estimates (Hogan and Landcaster, 2004; Leslie and Thiebaud, 2007; Mansournia and Altman, 2016).

To disentangle the effects of the treatment and other confounders on the outcome variables, I use inverse probability weighting. This technique often used to estimate treatment effects in non-randomized control trials corrects for the missing data issue that arises when individuals are not observed in both treated and non-treated statuses (Imbens, 2000; Hirano et al., 2003; Tan, 2010). I apply the method to the ordinal treatment variable (*Patient-centered communication*). This is a two-step procedure where the first step estimates the probabilities of receiving the treatment using an ordered logit model. Then a weighted ordered logit model is used to estimate the average treatment effect on the treated population. Weights are defined as the inverse of the estimated probabilities of being in the observed treatment group.

I account for the panel structure of our data by estimating both pooled and lagged models. For the pooled models, standard errors are clustered at the household and individual levels. However, for the lagged models the clustering is only at the household level. While the pooled models estimate the contemporaneous effect of communication on outcomes, the lagged models estimate it impact one year after the medical encounter. Lagged models allow to not only measure the long-term repercussion of effective doctor-patient communication on patients' health and perceived health care quality, but also handle potential endogeneity issues.

3.4.2. Propensity Score Matching

While the inverse probability weighting technique minimizes the effects of potential confounders by weighting individuals differently, the propensity score matching

approach addresses selectivity by comparing only the outcomes of individuals that are as similar as possible in all covariates, except for their treatment status (Abadie and Imbens, 2006). For the propensity score analysis, the dependent variables are recoded as binary. The binary variable general health (resp. mental health) is the indicator of having a very good or excellent general health (resp. mental health). However, the indicator of the health care quality takes the value 1 if the rating of the health care is 9 or 10, and 0 otherwise. The first step consists of recoding the five level patient-centered communication variable into four dummy variables. These variables successively take the value 1 if the patient experienced *k* patient-centered communication components (k = 1,2,3,4), and 0 otherwise. Thus, the control group for each of these four treatment variables consists of individuals who did not experience any dimension of patient-centered communication. Then, as with the inverse probability weighting approach, we estimate the propensity scores (or conditional probabilities of receiving any of the four treatments given a set of covariates) using a logistic model. This estimation is done by balancing the propensity scores over the common support regions, which comprises only treated and untreated individuals with close propensity scores. Finally, for each level of patient-centered communication, treated individuals are matched with control individuals, and average treatment effect of the treated group is estimated. For sensitivity analysis, I performed the one-to-one matching and the 4-nearest neighbors matching.

3.5. Results

Table 3.3 presents the results of the inversed probability weighted ordinal regressions. Before focusing on the key independent variables, I first provide an overview of the effect

of control covariates on the outcome variables. With the exceptions of few of them, the coefficients sign of the covariates are as expected. Consistent with the literature, we find that overall, individuals with lower number of comorbidities, non-smokers, non-Hispanic white, insured, married, and high income are more likely to be healthier and highly rate their health care quality. Although most educated individuals are more likely to experience better health outcomes, they were also more likely to assign a lower rate to the quality of health care they received. Female and old people were also less likely to be physically or mentally healthier than male and young individuals. However, while being a female was associated with a positive rating of the health care quality, age did not affect this rating.

Overall, the findings suggest that patient-centered communication has a highly significant positive effect on general health, mental health, and health care services quality. The comparison of each pooled model with its counterpart lagged model shows that the coefficients of all four communication variables are both higher in magnitude and stronger in significance level in the pooled models. This suggests that patient-centered communication is most effective in improving perceived patients' physical health, mental health and health care quality the same year of the medical encounter and that this effect diminishes over time. Both pooled and lagged models also show that the magnitude of the effect of patient-centered communication strictly increases with the number of patient-centered communication components. This is illustrated on Figure 3.1 that depicts the graph of the marginal effect of patient-centered communication on outcomes

Table 3.3: Effect of patient-centered communication on general health, mental health, and health care quality: IPW weighted regressions

	General Health		Mental Health		Health care Quality	
	Pooled	Lagged	Pooled	Lagged	Pooled	Lagged
Patient-centered communication						
1 PCC component	0.235	0.095	0.075	0.063	0.558	0.292
	(0.090)***	(0.145)	(0.093)	(0.144)	(0.107)***	(0.175)*
2 PCC components	0.397	0.191	0.306	0.172	1.151	0.635
	(0.083)***	(0.135)	(0.086)***	(0.132)	(0.097)***	(0.162)***
3 PCC components	0.592	0.333	0.503	0.29	1.581	0.968
	(0.081)***	(0.131)**	(0.084)***	(0.129)**	(0.095)***	(0.157)***
4 PCC components	0.651	0.388	0.577	0.384	1.801	1.129
	(0.080)***	(0.130)***	(0.083)***	(0.127)***	(0.095)***	(0.156)***
Health related covariates						
Comorbidities	-0.479	-0.463	-0.277	-0.285	-0.121	-0.159
	(0.015)***	(0.021)***	(0.014)***	(0.019)***	(0.016)***	(0.024)***
Currently smoke	-0.411	-0.524	-0.385	-0.53	-0.21	-0.166
	(0.058)***	(0.077)***	(0.060)***	(0.081)***	(0.070)***	(0.100)*
Insured	0.209	0.26	0.077	0.173	0.261	0.428
	(0.057)***	(0.081)***	(0.062)	(0.079)**	(0.086)***	(0.139)***
Socio-economic & demographic covariates						
Income	0.038	0.041	0.04	0.037	0.028	0.01
	(0.007)***	(0.010)***	(0.007)***	(0.009)***	(0.009)	(0.011)
HSGD,GED, some college	-0.517	0.276	-0.026	2.375	-1.262	-1.758
	(0.963)	(0.518)	(0.845)	(0.561)***	(0.965)	(1.176)
Bachelor's or more	0.086	0.8	0.534	3.004	-1.096	-1.713
	(0.964)	(0.521)	(0.846)	(0.565)***	(0.965)	(1.18)
Non-Hispanic White	0.382	0.304	0.096	0.085	-0.011	0.218
	(0.042)***	(0.061)***	(0.043)**	(0.062)	(0.05)	(0.077)***
Female	-0.195	-0.193	-0.139	-0.168	-0.01	-0.045
	(0.041)***	(0.051)***	(0.042)***	(0.050)***	(0.051)	(0.07)
Age	-0.056	-0.041	-0.045	-0.028	-0.005	0.006
	(0.007)***	(0.010)***	(0.007)***	(0.010)***	(0.009)	(0.013)
Agesqr	0.547	0.384	0.417	0.235	0.285	0.13
	(0.067)***	(0.093)***	(0.062)***	(0.094)**	(0.083)***	(0.123)
Married	0.174	0.216	0.297	0.341	0.123	0.081
	(0.044)***	(0.064)***	(0.045)***	(0.065)***	(0.054)**	(0.084)
Region-West	0.582	0.048	0.466	0.127	0.139	-0.168
	(0.079)***	(0.087)	(0.078)***	(0.094)	(0.092)	(0.106)
Region-South	0.628	0.05	0.575	0.146	0.215	0.14
	(0.073)***	(0.083)	(0.074)***	(0.089)	(0.088)**	(0.11)
Region-Midwest	0.509	0.107	0.391	0.052	0.096	0.196
	(0.075)***	(0.088)	(0.076)***	(0.09)	(0.086)	(0.118)*

* p<0.1; ** p<0.05; *** p<0.01

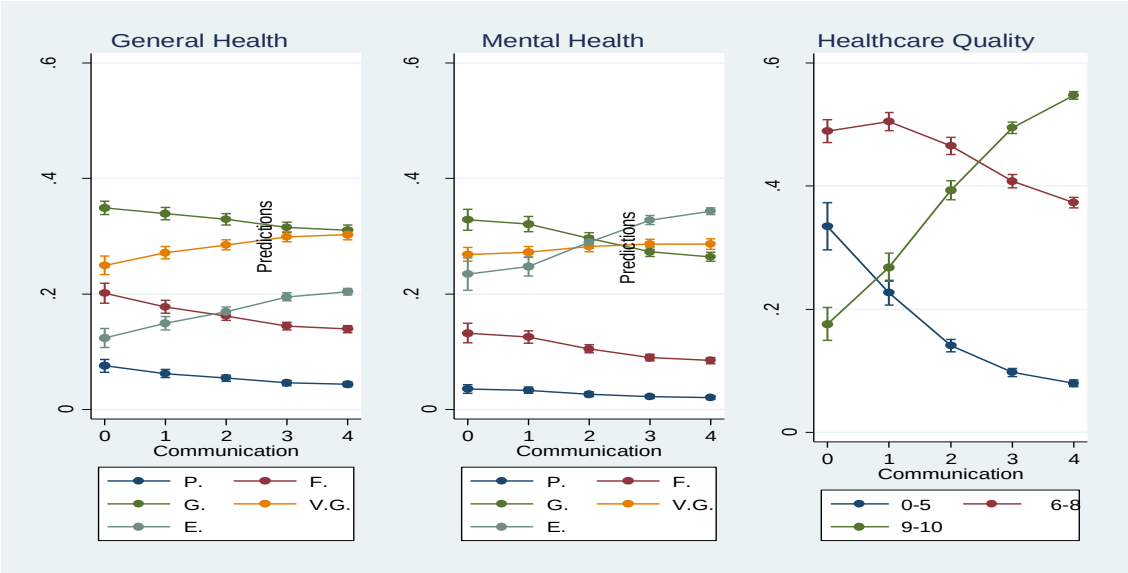
Table 3.3 (Continued): Effect of patient-centered communication on general health, mental health, and health care quality: IPW weighted regressions

	General Health		Mental Health		Health care Quality	
	Pooled	Lagged	Pooled	Lagged	Pooled	Lagged
Panel12	0.508	0.512	0.495	0.576	0.2	0.03
	(0.077)***	(0.118)***	(0.081)***	(0.113)***	(0.101)**	(0.155)
Panel13	0.502	0.541	0.404	0.657	0.115	-0.064
	(0.075)***	(0.115)***	(0.077)***	(0.111)***	(0.091)	(0.145)
Panel14	-0.04	0.54	0.103	0.494	-0.194	0.102
	(0.058)	(0.119)***	(0.059)*	(0.116)***	(0.070)***	(0.152)
Panel15	-0.035	0.555	0.105	0.598	0.053	-0.013
	(0.054)	(0.120)***	(0.059)*	(0.121)***	(0.073)	(0.144)
Panel16	0.041	0.505	0.039	0.56	0.111	-0.016
	(0.064)	(0.122)***	(0.066)	(0.122)***	(0.073)	(0.153)
Year	0.041		-0.077		0.079	
	(0.035)		(0.037)**		(0.045)*	
Cut1	-4.357	-3.47	-4.05	-1.352	-0.995	-2.111
	(0.983)***	(0.589)***	(0.870)***	(0.633)**	(1.121)	(1.233)*
Cut2	-2.532	-1.711	-2.267	0.364	-0.995	0.148
	(0.981)***	(0.579)***	(0.865)***	(0.627)		(1.233)
Cut3	-0.737	0.091	-0.518	2.254		
	(0.981)	(0.578)	(0.864)	(0.630)***		
Cut4	0.889	1.775	0.787	3.568		
	(0.981)	(0.581)***	(0.864)	(0.630)***		
N	78,575	38,315	78,561	38,314	57,250	26,791
LL(Null)	-585668.6	-281925.20	-557905.30	-266861.60	-296716.50	-132967.70
LL	-528678.1	-254442.30	-528132.10	-250350.50	-272364.20	-126193.80
Df	28	27	28	27	26	25
AIC	1057412	508938.70	1056320.00	500754.90	544780.40	252437.50
BIC	1057672	509169.60	1056580.00	500985.90	545013.20	252642.40
Chi2	2380.45	1215.25	1240.54	879.41	1388.23	398.77

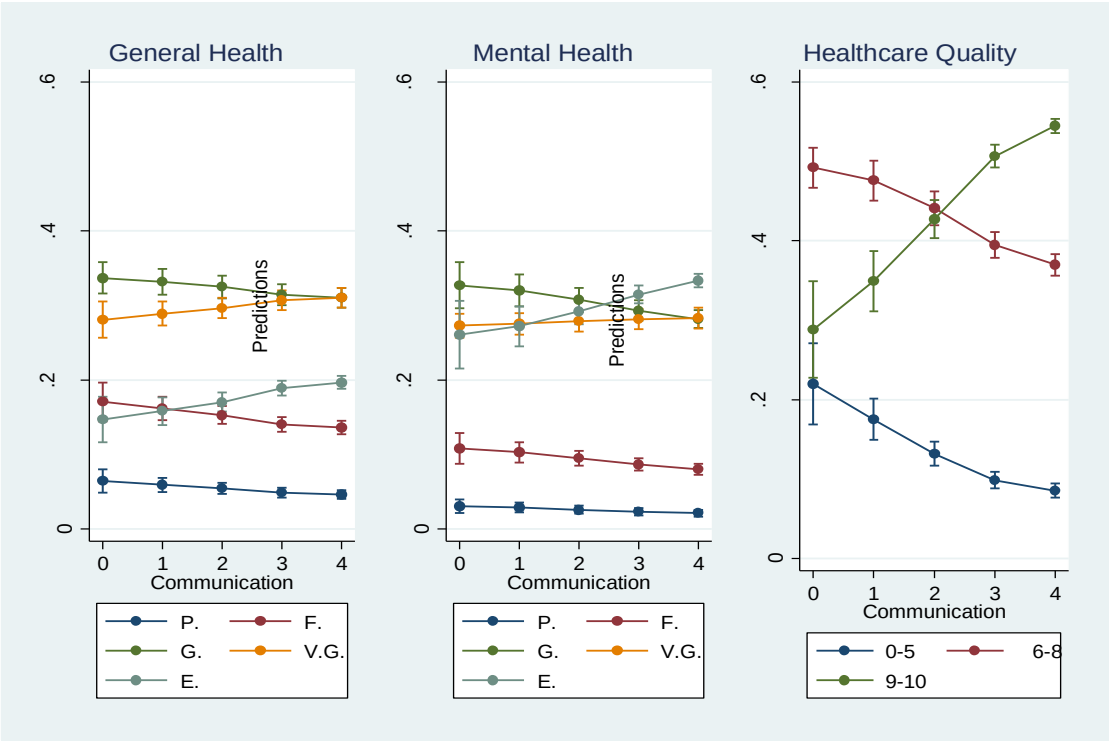
* p<0.1; ** p<0.05; *** p<0.01

variables. The marginal effect of communication on the predicted probabilities of having a poor, fair, or good health is strictly decreasing. However, the marginal effects of communication on the probabilities of being in excellent or very good health is strictly increasing. This suggests that better doctor-patient communication decreases the likelihood to have a poor, fair or good physical and mental health, while increasing the likelihood of being in excellent or very good physical and mental health. Moreover, a good-doctor patient communication increases the likelihood of rating the health care services received 9 or 10, while decreasing the likelihood of assigning a rate under 9. The

Pooled Model



Lagged Model



Note: P= Poor Health, F= Fair Health, G= Good Health, V.G.= Very Good, E= Excellent. Predicted probabilities are based the weighted ordinal regressions.

Figure 3.1: Marginal effect of patient-centered communication

marginal effect of patient-centered communication based on the pooled and lagged models yielded similar results, though the magnitude of the later is smaller.

A focus on the pooled models shows that both unidimensional and multidimensional patient-centered communication significantly improve general health and health care quality the same year of the clinical consultation. However, only multidimensional patient-centered communication is found to be effective in improving patients' mental health the same year of the medical encounter. Looking at the lagged models, I found that both unidimensional and bi-dimensional patient-centered communication had no significant effect on physical health and mental health, although it had a significant effect on the rating of health care. However, a three and four components patient-centered communication continue to affect self- reported physical and mental health, even a year after the clinical visits with the provider. Addressing selection bias through inverse probability weighting and propensity score matching (in Table 3.4) yielded consistent results.

Table 3.5 summarizes our findings.

For sensitivity analysis, I estimated the non-weighted ordered logistic model. I also estimated the non-weighted and the inverse probability weighted logistic regressions, using various binary coding of the dependent variables. These regressions were estimated using both lagged and pooled data. All results are consistent with our previous findings and available upon request.

Table 3.4: Average treatment effect of patient-centered communication on the treated population using Propensity Score Matching

Pooled Model						
Patient-centered	General Health		Mental Health		Health care Quality	
communication	n = 1	n = 4	n = 1	n = 4	n = 1	n = 4
1 PCC component	0.052	0.055	0.033	0.027	0.070	0.093
	(0.027)*	(0.022)**	(0.027)	(0.021)	(0.029)**	(0.028)***
2 PCC components	0.104	0.083	0.047	0.066	0.212	0.207
	(0.026)***	(0.023)***	(0.018)***	(0.018)***	(0.025)***	(0.021)***
3 PCC components	0.110	0.106	0.098	0.085	0.325	0.319
	(0.019)***	(0.018)***	(0.017)***	(0.017)***	(0.027)***	(0.024)***
4 PCC components	0.111	0.106	0.096	0.093	0.388	0.375
	(0.022)***	(0.020)***	(0.016)***	(0.016)***	(0.028)***	(0.021)***
Lagged Model						
Patient-centered	General Health		Mental Health		Health care Quality	
communication	n = 1	n = 4	n = 1	n = 4	n = 1	n = 4
1 PCC component	0.077	0.047	0.002	0.026	0.059	0.054
	(0.042)*	(0.039)	(0.027)	(0.028)	(0.053)	(0.054)
2 PCC components	0.055	0.055	0.041	0.021	0.127	0.125
	(0.038)	(0.038)	(0.028)	(0.026)	(0.046)***	(0.043)***
3 PCC components	0.113	0.092	0.073	0.051	0.192	0.218
	(0.039)***	(0.038)**	(0.024)***	(0.026)*	(0.044)***	(0.040)***
4 PCC components	0.088	0.067	0.051	0.049	0.254	0.239
	(0.031)***	(0.026)***	(0.026)**	(0.024)**	(0.047)***	(0.042)***

* p<0.1; ** p<0.05; *** p<0.01. n = number of neighbors. All dependent and patient-centered communication variables are binary.

Table 3.5. Hypothesis Table

Patient-centered communication	Weighted Ordinal Regressions		Propensity Score Matching			
	Pooled	Lagged	Pooled		Lagged	
			n= 1	n = 4	n= 1	n = 4
General Health						
1 PCC component	***		*	**	*	
2 PCC components	***		***	***		
3 PCC components	***	**	***	***	***	***
4 PCC components	***	***	***	***	***	***
Mental Health						
1 PCC component						
2 PCC components	***		***	***		
3 PCC components	***	**	***	***	***	*
4 PCC components	***	***	***	***	**	**
Health care Quality						
1 PCC component	***	*	***	***	***	
2 PCC components	***	***	***	***	***	***
3 PCC components	***	***	***	***	***	***
4 PCC components	***	***	***	***	***	***

* p<0.1; ** p<0.05; *** p<0.01. *PCC* = Patient-centered communication. n= Number of neighbors.

3.6. Discussion

Patient-centered communication has been subject to many investigations, because of its central role in the implementation of patient-centered care. The inconsistency in the findings has been attributed to the small sample size of most studies, diversity of disease under investigation, presence of potential unaccounted confounders, and the variety of the patient-centered communication definition and measures. This work contributes to the current patient-centered communication debate by addressing these shortcomings. Rather than focusing on specific clinical outcomes or biomedical markers, I investigate the effectiveness of patient-centered communication on general health, mental health, and health care quality. This provides a unified view on the issue at hand. One of the interesting points of our study is the introduction of a new patient-centered communication measure

related to key elements of patient-centered care. This measure addresses calls for more theory-based measure of communication. This study is also important because it assesses communication through patients' perspective, unlike most studies where doctor-patient communication quality is measured by researchers or reported by medical providers. These studies may suffer from potential measurement errors in the key covariates as it has been shown that medical providers often overestimate their communication skills (Tongue et al., 2005). Overstated communication quality between a doctor and a patient could lead to biased estimates of the effect of communication on the targeted outcomes.

Although the heterogeneity of patient-centered communication measures, targeted outcomes and estimates methods used in the published literature prevents detailed comparison with previous studies, our findings highlight the importance of patient-centered communication. More specifically, the results of this study show that doctor-patient centered communication could play a critical role in the improvement of patients' health outcomes and health care experience. Many studies have correlated different components of patient-centered communication with positive physical health outcomes such as better metabolic control in patients with diabetes (Street Jr et al. 1993), longer survival and adherence in HIV patients (Ironson et al. 2015), less organ damage in patients with lupus (Ward et al., 2003), and overall better health status (Kelley et al., 2014; Lie et al., 2011). Documented positive effects of patient-centered communication on patients' mental health and health-related behaviors include, reduced health risk factors such as obesity and cigarettes consumption (Greene and Hibbard, 2011), improved self-management behaviors (Hibbard et al., 2007, Rask et al. 2009), depression remission (Rossom et al. 2016), and better treatment adherence (Thompson and McCabe, 2012).

Finally, several studies have linked doctor communication skills to better patients' satisfaction (Rossom et al. 2016; Shirley and Sanders, 2013).

My findings further suggest that the multidimensionality of communication matters as integrating more dimensions to the patient-centered communication construct reveals more effectiveness. This is even more relevant for mental health where the unidimensional measure was found to be completely ineffective. This suggests that mentally and physically ill patients have different communication needs that should be addressed during clinical encounters.

Despite the importance of our findings, this study should be considered within the context of its limitations. Although our definition and measure of patient-centered communication combines four important elements of patient-centered communication, I acknowledge that there is no gold standard definition. Therefore, the value of this measure resides in its ability to account for the complexity of the patient-centered communication concept in a novel way, which enriches the set of existing measures. Furthermore, my construct assigns the same weight to each of the four patient-centered communication components used. However, I am fully aware that depending on socio-economic and demographic characteristics, and the health outcomes of interest, some components of patient-centered communication components could be more effective than others.

3.7. Policy Recommendation

Future research should assess the impact of our measure of patient-centered communication on health care costs and health care services utilization. In the development of new patient-centered communication measures, researchers should integrate two important factors namely the multifaceted property of patient-centered communication,

and the differentiation of mentally and physically ill patients regarding communicative needs. Finally, patient-centered communication and other patient-centered care components are interrelated and are difficult to disentangle. Studies of the effectiveness of patient centered communication should be contextualized within the patient-centered care setting to allow controlling for potential confounders and limiting the biases in estimates.

Although health care professionals and policymakers are increasingly recognizing the importance of patient-centered communication, a lot of efforts still need to be made. Strategies to develop patient-centered communication skills should be systematically taught to health care trainees and practitioners. Policy makers, health care organizations and government agencies should invest in infrastructures and information technology that facilitate the acquisition of these doctor-patient communication skills.

Chapter 4: Can Better Patient-Centered Communication Lead to Lower ER Cost? A Two-Part Correlated Random Effects Generalized Gamma Model

4.1. Introduction

Emergency Departments (ED) play an increasing role in the US health care system. Although ED expenditures represent only 2-4% of the total health care expenditures (American College of Emergency Physicians, 2012), ED services are the doorways to inpatient services which constitute almost one third of all the total health care spending (RAND, 2013). Furthermore, among all health care spending categories, ED spending grew at the fastest rate reaching an annual growth rate of 6.4% between 1996 and 2013 (Dieleman et al. 2016). Rapid growth in ED spending has been attributed to deficiencies in the primary care that motivate patients to rely on ED services for their non-urgent care needs (Xin, 2017). For example, in a 2011 study conducted by the CDC, almost 80% of participants visited ED because of the lack of access to other providers (CDC, 2012).

As a result, many health care cost reduction interventions have focused on diverging patients with non-urgent care needs from emergency rooms. Among these programs, Patient-Centered Medical Homes (PCMH) have gained a lot of attention because of their emphasis on timely access to care and effective patient-doctor communication. Several studies have investigated the effectiveness of PCMH in reducing ED services use and expenditures. Although evidence of some association between PCMH and lower ED use have been produced (Guy, 2015; Xin, 2017), findings related to ED expenditures are mixed (Raven, 2016). While some of these studies have focused on the effectiveness of practices that have achieved a formal recognition as a PCMH, others have evaluated

specific characteristics of PCMH. This study adopts the later approach by emphasizing on key elements of PCMH, namely, enhanced access to care and patient-centered communication. The goal of this study is to understand the nature of the relationship between primary care and ED services spending by (1) identifying barriers to enhanced access to primary care and patient-centered communication, and (2) analyzing the effect of enhanced access to care and patient-centered communication on ED use and expenditures. My investigation of barriers to high quality primary care focuses on cultural factors and individuals' disabilities. More specifically, I explore the effect of factors such as being foreign born, non-English proficient or having social, physical and mental disabilities on the quality of access to care and doctor-patient communication. These factors may affect individuals' ability to navigate the health care system, which could result in poor access to primary care and poor communication with medical providers.

The second objective of this study is to investigate the presence of a substitution effect (or lack thereof) between ED services and primary care. If ED services serve as substitutes to primary care, we might expect individuals with poor primary care quality to rely on ED services for their unmet primary care needs, which may result in higher ED services use and higher ED expenditures. On the other hand, ED and primary care services can complement each other if better primary care services result in better ability to recognize medical issues that require immediate care. Although unlikely to occur in the general population, this complementary effect may be observed in a population of chronically ill patients, translating better disease management.

I applied a two-part correlated random effects generalized gamma model to data from the 2007-2013 Medical Expenditures Panel Surveys. Modeling issues taken into

consideration are the complexity of the survey design, non-randomized nature of data, peculiar distribution of the ED expenditures, potential endogeneity of primary care features and ED expenditures, and unobserved heterogeneity. This helps address several challenges common in the modeling of health care data, yet not always accounted for in empirical analysis. The remainder of this study is as follows. The next section lays out the method used to answer the two research questions. More specifically this section presents the two-part decision process used as the theoretical framework in this analysis, and describes the data and the estimation strategy. Section 4.3 is devoted to the results while the last section discusses the main findings.

4.2. Methods

4.2.1. Theoretical Framework

Following Pohlmeir and Elrich (1995), my theoretical framework is based on the assumption that the total expenditures on ED services is a result of two distinct decision-making processes. First, the patient decides whether to visit an ED, then the medical provider decides the intensity of treatment. Based on the utility maximization approach (Biro, 2009; Mwabu, 2007; Kimani, et al., 2016), at each time period *t*, each individual *i* derives their utility U_{it} from the consumption of non-health related commodities C_{it} and their health status H_{it} .

$$U_{it} = U(C_{it}, H_{it}) \quad \text{.....(1)}$$

Although health status is an input in the utility function, health is also produced by investing in factors that affect health. The factors of health production included in this

study are health related behaviors B_{it} (eg. cigarettes consumption), health care services (eg. ED services (ED_{it}), and primary care quality (PCQ_{it})), and socio-demographic characteristics S_{it} (eg. education, gender, marital status, race/ethnicity, etc). Thus, the health production function can be formulated as:

$$H_{it} = H(\, ED_{it},\ PCQ_{it},\ B_{it},\ S_{it}\,) \qquad \text{.....(2)}$$

In my study, given that all individuals have primary care providers, the variable PCQ_{it} the equation (2) measures the quality of primary care, more specifically the timely access to primary care and the quality of medical encounters with primary care provider. These are measures of the efficiency of the primary care in producing health. I assume that individual *i'* s income I_{it} is allocated to purchasing only non-health related commodities C_{it} and ED services ED_{it}.

$$I_{it} = P_c C_{it} + P_{ED} ED_{it} \qquad \text{.....(3)}$$

where P_c and P_{ED} denote the prices of C_{it} and ED_{it}, respectively. The goal of individual *i* is to maximized their utility in equation (1) subject to the health production function as described in equation (2) and the budget constraint equality (3). The utility maximization problem yields the following Lagrangian function:

$$\text{L} = U(C_{it}\ , H(\, ED_{it},\ PCQ_{it},\ B_{it},\ S_{it}\,)\,) - \lambda\,(I_{it} - P_c C_{it} - P_{ED} ED_{it}) \qquad \text{.....(4)}$$

The first order condition derived from (4) is given by the following system of equations:

$$\frac{\partial L}{\partial C} = U_C - \lambda P_C = 0$$

$$\frac{\partial L}{\partial ED} = U_{ED} - \lambda P_{ED} = 0 \qquad \text{.....(5)}$$

$$\frac{\partial L}{\partial \lambda} = I_{it} - P_c C_{it} - P_{ED} ED_{it} = 0$$

Solving the system of equations (5) yields a reduced form demand for ED services:

$$ED_{it} = ED(PCQ_{it},\ B_{it},\ S_{it},\ I_{it},\ P_C, P_{ED}) \quad \ldots\ldots\ldots (6)$$

In equation (6), I normalize the price of non-health related commodities C_{it} to $P_c = 1$. Futhermore. I assume that patient decision to visit ED does not take into consideration the actual price of the visit P_{ED}. This assumption is likely to be true because (1) the choice of the treatment (and hence its price) is completely determine by the ED medical provider, after the decision to use ED services is made; (2) the actual cost of the ED visits is partially captured by the insurance status. Therefore, the demand for ED services can be rewritten as:

$$EDuse_{it} = D(PCQ_{it},\ X_{it},\ u_{it}) \quad \ldots\ldots\ldots (7)$$

where X_{it} consists of the set of variables in B_{it}, S_{it}, and I_{it}; and u_{it} captures the set of unobservable factors that can affect individuals' decision to use ED services. Likewise, total expenditure on ED services is expressed in terms of PCQ_{it}, X_{it}, v_{it}, where v_{it} captures the unobserved factors.

$$EDexp_{it} = E(PCQ_{it},\ X_{it},\ v_{it}) \quad \ldots\ldots\ldots (8)$$

Finally, to better understand factors affecting the quality of access to care and communication with medical providers, I explore the role of cultural barriers ($CulturalBarriers_{it}$), and individuals' disabilities ($Disabilities_{it}$) using the following :

$$PCQ_{it} = P(CulturalBarriers_{it},\ Disabilities_{it},\ X_{it},\ q_{it}) \quad \ldots\ldots\ldots (9)$$

where q_{it} represents unobserved factors that affects the quality of primary care.

4.2.2. Study Population and Variables

4.2.2.1. *Study Population*

The study uses data from the Medical Expenditures Panel Survey (MEPS), conducted by the Agency for Health care Research and Quality. The survey provides detailed information about health status, medical services utilization, and health care expenditures collected from a representative sample of the US civilian noninstitutionalized population. The survey uses an overlapping panel survey design that samples a new panel of households each year. Each panel consists of a series of 5 rounds of individual interviews conducted over a 2-year period. I use the MEPS longitudinal data files consisting of the six panels of individuals interviewed from 2007 to 2013 (Panel 12 to Panel 17). All data included in this analysis are collected in the second and fourth rounds. Individuals were included in the study if they were 18 years old or older, had a usual source of care, and did not have missing data in the variables of interest. This yields a total 40,835 observations.

4.2.2.2. *Outcome Variables*

There are three outcomes of interest. The first is the quality of primary care, which also serves as the key independent variable in equation (7) and equation (8) above. This variable is a measure of the presence of two key features of a PCMH in respondent's primary care: patient-centered communication, and enhanced access to primary care. In the context of this study, a patient-centered communication is one that incorporates the following four key components of a PCMH model: cultural competency, care coordination, patient-centered care, and shared decision-making. In their definition of PCMH, Berrenson et al. (2011) define each of these four features as follows: (1) *cultural competency* (ensuring that information is conveyed to patients in a language and method they understand, taking cultural differences into account.), (2) *care coordination*

(monitoring all other care received by the patient), (3) *patient-centered care* (basing care on the needs and preferences of patients and their families), and (4) *shared-decision making* (active participation of patients in selecting treatment options.). Berrenson et al. 2011 also define *enhanced access to care* as the ability to have same-day appointments, access to physician during expanded hours, and new options for communicating with clinicians. In this study a patients had enhanced access to care if they did not have too much difficulty or any difficulty contacting their primary source of care during regular hours, after regular hours, by phone and the usual source of care has office hours during nights or weekends.

I categorize the study participants into 3 groups based on their primary care features : (1) individuals with neither enhanced access to their primary care provider , nor patient-centered communication with their primary care provider (control group), (2) individuals with either enhanced access to their primary care provider, or patient-centered communication with their primary care provider (treatment group 1), (3) individuals with enhanced access to their primary care provider, and patient-centered communication with their primary care provider (treatment group 2). Thus the first outcome variable PCQ_{it} is the three-level categorical variable that takes the value 0, 1, and 2 if respondent *i* is in the control group, treatment group 1, treatment group 2 at time t, respectively.

MEPS participants reporting having a usual source of care answered a series of questions related to the quality of the communication with their medical provider and the accessibility of their primary care. Table 4.1. shows the variables used to create the indicator variables for patient-centered communication and enhanced access to care and how the resulting indicators are used to generate the control and treatment groups described above.

The second outcome of interest is the indicator of ED utilization, which is measured by an indicator of a positive ED expenditure. The last outcome is the annual emergency department expenditure. This is the total annual amount of money spent on emergency room facility and doctor services. Payment sources include insurance, patient, family, and any third party.

4.2.2.3. Independent Variables

I use two indicator variables to capture potential cultural barriers to primary care namely, being a foreign born and non-English proficiency. For the later variable, survey respondents were asked if they felt comfortable conversing in English. The three indicators of disabilities used are mental, social, and physical disabilities. Mental disability is defined as having any of the following limitations: experiencing confusion or memory loss; having problems making decisions, or requiring supervision for their own safety. Social disability is defined as any limitation in participating in social, recreational, or family activities because of impairment, or a physical or mental health problem. Finally, physical disability is limitation in physical functioning including any limitation in performing activities of daily living (eg. grocery shopping, laundry, using phone, etc.), any sensory limitation (vision or hearing), or any activity limitations (limitation in doing school work, job, or housework). Other control variables used in this analysis include socio- demographic variables (age, gender, race /ethnicity, marital status, education, indicators of region of residence and metropolitan statistical areas), economics variables (income[13], employment

[13] Each monetary variable is adjusted based on the 2013 Consumer Price Index of each of the four regions obtained from the Bureau of Labor Statistics.

Table 4.1: Measuring patient-centered communication and enhanced access to care using MEPS.

Components	Formal Definition (Berenson et al., 2011)	MEPS Questions	Variable Definition
Coordinated care	The practice monitors all other care received by their patients (e.g., from specialists to manage patients' care.	Does provider usually ask about prescription medications and components other doctors may give them? 1: Yes 2: No	1: Yes 0: No
Patient-centered care	Care is based on the needs and preferences of patients and their families.	Thinking about the types of medical, traditional, and alternative components that person is happy with, how often does provider show respect for these components? 1: Never 2: Sometimes 3: Usually 4: Always	1: Usually, Always 0: Never, Sometimes
Shared decision-making	Patient actively participates in selecting treatment options.	Does provider present and explain all options to person? 1: Yes 2: No If there were a choice between components, how often would provider ask person to help make the decision? 1: Never 2: Sometimes 3: Usually 4: Always	1: provider presents and explains all options to patient and usually or always asks patient to help make decision 0: otherwise
Patient-Centered communication	**1 = have all three patient-centered communication components (coordinated care, patient-centered care, shared-decision making), 0 = otherwise**		
Enhanced access to care	The practice offers same-day appointments, expanded hours and new options for communicating with clinicians	How difficult is it to get to usual source of care? 1: very difficult 2: somewhat difficult 3: Not too difficult 4: Not at all difficult	1: Not too difficult or not difficult at all 0: somewhat difficult or very difficult
		How difficult is it to contact usual source of care after hours? 1: very difficult 2: somewhat difficult 3: Not too difficult 4: Not at all difficult	1: Not too difficult or not difficult at all 0: somewhat difficult or very difficult
		How difficult is it to contact usual source of care by phone? 1: very difficult 2: somewhat difficult 3: Not too difficult 4: Not at all difficult	1: Not too difficult or not difficult at all 0: somewhat difficult or very difficult
		Does usual source of care have office hours at night or during weekends? 1: Yes 2: No	1: Yes 0: No
Enhanced Access to care	**1= Have not too much difficulty or no difficulty contacting usual source of care during regular hours, after regular hours, by phone and the usual source of care has office hours during nights or weekends, 0 = otherwise**		

status, indicator of students, and retired status), and health related covariates (body mass index, indicators variables for preventive care use, health insurance coverage, current smokers, and the number of comorbidities). The number of comorbidities counts the

following health conditions: high blood pressure, heart disease, angina, stroke, diabetes, cancer, emphysema, high cholesterol, joint paint, asthma, arthritis, and bronchitis. I also include time fixed effect dummy variables. Table 4.2 povides a brief description of all the variables involved in this analysis.

4.3. Estimation Strategy

4.3.1. Accounting for Selection Bias

The first issue addressed in this analysis is the potential selection bias[14]. A solution to deal with selection bias is to compare only individuals who are very similar in terms of all characteristics that may also affect the outcome variable. I use a propensity score matching technique that allows matching each individual from the treatment group with the closest[15] individual in the control group.

4.3.2. **Accounting for the Endogeneity of Primary Care Quality**

A two-part model is used to estimate the effect of enhanced access to primary care and patient-centered communication on ED expenditures. This modeling approach has two main advantages. First it allows a joint estimation of the decision to use ED services and

[14] Selection bias often arises in observational studies where individuals are not randomly assigned to treatments (Abadie and Imbens, 2006; Leslie and Thiebaud, 2007). Failure to account for selection bias may result in biased estimates due to the presence of unaccounted confounders.

[15] Proximity between two individuals is defined in term of the differences in their propensity scores, which are the treatment probabilities conditional on all the covariates. The procedure starts with the estimation of individuals' propensity scores for Treatment1 and Treatment2 using logistic regression. Logistic models only include covariates that balanced the propensity score over the common support region. Each individual in each treatment group is then matched with the closest individual in the control group, provided the difference in their propensity score remains lower than 0.01. After matching, a t-test is performed to insure that the mean of covariates does not significantly differ in the treatment and control group.

Table 4.2: Description of variables

Variables	Definition	Obs	Mean	S.E.	Min	Max
ED utilization	Binary:1 = if ED expenditures > 0; 0 = otherwise	40835	0.14	0.01	0	1
ED expenditures	Continuous: positive ED expenditures	6315	1405.57	39.36	0.92	64918.68
Control group	1= patient-centered communication =0 and enhanced access =0; 0 = otherwise	40835	0.29	0.01	0	1
Treatment group1	1= patient-centered communication =1 or enhanced access =1; 0 = otherwise	40835	0.47	0.01	0	1
Treatment group 2	1= patient-centered communication =1 and enhanced access =1; 0 = otherwise	40835	0.23	0.01	0	1
Foreign born	1 = foreign born; 0 = otherwise	40835	0.20	0.01	0	1
Non-English Proficient	1= non-english proficient; 0 = otherwise	40835	0.03	0.01	0	1
Mental disability	1 = Mental disability ; 0 = otherwise	40835	0.14	0.01	0	1
Social disability	1 = Social disability ; 0 = otherwise	40835	0.15	0.01	0	1
Physical disability	1 = Physical disability ; 0 = otherwise	40835	0.44	0.01	0	1
Comorbidities	Number of comorbidities	40835	2.62	0.05	0	12
Insured	1= Insured at any time; 0 = otherwise	40835	0.91	0.01	0	1
Currently smoke	1= currently smoke; 0 = otherwise	40835	0.23	0.01	0	1
BMI	body mass index	40835	29.06	0.14	8.9	187.2
Preventive Care	1 = having dental care at least once a year, and blood pressure check, cholesterol check, flu vaccination, and routine checkup within the year preceding the survey, 0 = otherwise	40835	0.23	0.01	0	1
Student	1 = student; 0 = otherwise	40835	0.05	0.01	0	1
Retired	1 = retired; 0 = otherwise	40835	0.14	0.01	0	1
Unemployed	1 = unemployed; 0 = otherwise	40835	0.46	0.01	0	1
Income	Personal income adjusted for 2013 regional CPI. Regressions use ln(income + 1)	40835	8.84	0.06	0	12.48
Age	Age divided by 10	40835	49.67	0.35	18	86
Agesqr	Age squared divided by 1000	40835	28.17	0.37	3.24	73.96
Female	1 = Female ; 0 = Male	40835	0.61	0.01	0	1
Non-Hispanic White	1= Non-Hispanic White; 0 = Others	40835	0.68	0.01	0	1
Bachelor	1 = Bachelor's Degree or more; 0= otherwise	40835	0.35	0.01	0	1
Married	1 = married; 0 = Other	40835	0.48	0.01	0	1
Region	1=Northeast; 2 Midwest; 3= South; 4 =West	40835	2.57	0.03	1	4
MSA	1 = metropolitan statistical area ; 0= otherwise	40835	0.74	0.02	0	1
Panel	12= Panel12 ; 13 = Panel13, 14 = Panel14; 15 = Panel15; 16 = Panel16; 17 = Panel 17	40835	14.58	0.03	12	17
Year	1= Second year; 0 = First year;	40835	0.50	0.01	0	1

Notes: Statistics are based on the unmatched sample. N denotes the sample size. Survey weights are applied to estimate population means and standard errors.

the amount of money spent on ED services as two distinct decision making processes, which is consistent with my theoretical framework. Second, it allows accounting for the peculiar distribution of ED expenditures (non-negative distribution, large mass of observations around zero, extremely right skewed distribution).

Addressing endogeneity bias is another common challenge in health care data modeling. In this study, unobserved individuals' characteristics affecting access to care and the quality of communication with medical provider could also influence whether to use ED services and how much money to spend on ED services. Instrumental variables approach and more specifically two-stage least squares estimators have been used to correct for endogeneity in linear models. However, their natural extensions to non-linear models (ie, two-stage predictor substitution estimators) are often inconsistent (Terza, 2008). To correct for this inconsistency, the first stage residuals are often included as regressors in the second-stage, rather than replacing the endogeneous treatments by the first stage predictors (Terza, 2008). This modelling technique (called two-stage residual inclusion (2SRI)) is a specific case of control function approach that consists of adding a function of residuals in the outcome equation as a regressor to correct for endogeneity. Although the 2SRI technique to handle endogeneity has increased in popularity in recent years, it merely uses a linear function of residuals and hence lacks some flexibility. Furthermore, its application to multiple treatments models is not straightforward because of the lack of consensus on the definition of residuals in the context of multinomial models (Geraci et al, 2014). Rather than using raw residuals, I use standardized residuals because of their ability to reduce bias in treatment coefficients (Geraci et al, 2014). Also, I use a second-degree polynomial of the standardized residuals rather than a linear function of the residuals as per Garido et al.

(2014). The first stage of the control function approach consists of estimating the following treatment equation using the multinomial logistic model:

$$PCQ_{it} = \alpha_0 + \alpha_1 ForeignBorn_{it} + \alpha_2 NonEnglishproficiency_{it} + \alpha_3 MentalDisability_{it} + \alpha_4 SocialDisability_{it} + \alpha_5 PhysicalDisability_{it} + AX_{it} + q_{it}^R \quad \ldots\ldots\ldots (10)$$

The estimated raw residuals $\widehat{q_{ijt}^R}$, and standardized residuals $\widehat{q_{ijt}^S}$, with unit variance are calculated as suggested by Geraci et al. (2014) as :

$$\widehat{q_{ijt}^R} = PCQ_{itj} - \widehat{Pr}(PCQ_{itj}) \quad for\ j = 0,\ 1,\ 2 \quad \ldots\ldots\ldots (11)$$

$$\widehat{q_{ijt}^S} = \widehat{Pr}(PCQ_{itj})^{-1/2}\left[1 - \widehat{Pr}(PCQ_{itj})\right]^{-1/2}\widehat{q_{ijt}^R} \quad for\ j = 0,\ 1,\ 2 \quad \ldots\ldots\ldots (12)$$

where j = 0, 1, 2 denote the control group, treatment group 1 and treatment group 2 respectively, and $\widehat{Pr}(PCQ_{itj})$ is the predicted probability to belong to group *j*. Equation (10) serves two purposes. First, it is used to investigate the effect of cultural barriers and individuals' disabilities on enhanced access to care and patient-centered communication, which is the first objective of this study. Second, the five cultural barriers and individual disabilities variables are used as instruments when estimating the second stage equations.

4.3.3. **Accounting for Unobserved Heterogeneity**

In equation (7) and (8), the unobserved factors u_{it} and v_{it} affecting ED use and expenditures, respectively, can be decomposed as:

$$u_{it} = u_i + \varepsilon_{1it} \quad \ldots\ldots\ldots (13)$$

$$v_{it} = v_i + \varepsilon_{2it} \quad \ldots\ldots\ldots (14)$$

where u_i and v_i are individual specific and time-constant random components; ε_{1it} and ε_{2it} are time varying and individuals' specific error terms assumed to be normally distributed, uncorrelated across individuals and panels, and uncorrelated with u_i and v_i, respectively.

Modeling the relationship between unobservable heterogeneity and model regressors is often challenging, especially in non-linear panel data. Common approaches to deal with unobserved heterogeneity include fixed effects and random effects methods. While the random effects approach assumes no correlation between heterogeneity and model regressors, the fixed effects approach makes no assumption on the nature of the relationship between both and estimates each individual's specific fixed effects. In this study, I use the correlated random effects (CRE) technique which unifies the random effects and the fixed effects by allowing the possibility of the observed regressors to be correlated to individual specific effects. Following Wooldwridge (2013), the relationships between the individual heterogeneity and model covariates of equation (7) and (8) can be written as:

$$u_i = \beta_7 + B_2\overline{X}_\iota + \mathrm{a_i} \quad \ldots\ldots\ldots (15)$$

$$v_i = \gamma_7 + C_2\overline{X}_\iota + \mathrm{b_i} \quad \ldots\ldots\ldots (16)$$

Where $\overline{X}_\iota$ is the set of all the means of covariates that vary across both individuals and time. These variables include Teatment1, Treatment2, Comorbidities, Insured, Currently Smoke, BMI, Preventive Care, Student, Retired, Unemployed, lnincome, Age, Agesqr,

Bachelor, Married, Region, MSA, and first stage residuals terms[16]; a_i (resp. b_i) is assumed to be normally distributed and independent of the model regressors and idiosyncratic errors ε_{1it} (resp. ε_{2it}).

4.3.4. **Modeling ED Services Use and Expenditures**

The second stage of the control function approach is estimated with a two-part model. The first part estimates the likelihood to use ED and the second part models ED expenditures as follows:

$$EDuse_{it} = \beta_0 + \beta_1 Treatment1_{it} + \beta_2 Treatment2_{it} + \beta_3 \widehat{q_{i1t}^{S}} + \beta_4 \widehat{q_{i2t}^{S}} + \beta_5 \widehat{q_{i1t}^{S}}^{2} + \beta_6 \widehat{q_{i2t}^{S}}^{2} + B_1 X_{it} + B_2 \bar{X}_i + \varepsilon_{1it}^{a} \quad \ldots\ldots\ldots (17)$$

$$EDexp_{it} = \gamma_0 + \gamma_1 Treatment1_{it} + \gamma_2 Treatment2_{it} + \gamma_3 \widehat{q_{i1t}^{S}} + \gamma_4 \widehat{q_{i2t}^{S}} + \gamma_5 \widehat{q_{i1t}^{S}}^{2} + \gamma_6 \widehat{q_{i2t}^{S}}^{2} + C_1 X_{it} + C_2 \bar{X}_i + \varepsilon_{21it}^{b} \quad \ldots\ldots\ldots (18)$$

where $\varepsilon_{1it}^{a} = a_i + \varepsilon_{1it}$ and $\varepsilon_{2it}^{b} = b_i + \varepsilon_{2it}$. $EDuse_{it}$ is the indicator of a positive ED expenditures and $ERexp_{it}$ is the annual total amount of money spent on ED conditional on using ED services during the year.

Equation (17) is estimated using the logistic regression, while the gamma and generalized gamma distributions are applied to the log-transformed expenditure variable in equation (18). Following Garrido et al. (2012), Wooldridge (2015), and Guo et al. (2015), the second stage standard errors are corrected via 100 bootstrap replications[17].

[16] The means of covariates over time that are highly correlated with their corresponding time varying covariates are automatically dropped from the regressions.

[17] Several studies have used a modified Murphy-Topel adjusted standard errors after the 2SRI errors (Geraci et al., 2014; Biro et al., 2009. However, this approach can yield excessively high standard errors if the model is misspecified (Geraci et al., 2014).

Note that in equation (17) (resp. equation (18)), the causal effects of time-constant variables may not be estimated because the identified coefficients of these variables are composite effects of element1 in B_1 and B_2 (resp. C_1 and C_2) (Contoyannis et al. 2004; Wooldwridge, 2013). Also, estimation of the causal effect of any variable that changes across time and individuals should be done with caution as this effect depends on both the variable coefficient and the coefficient of the within-individual average of that variable. Following Contoyannis et al. (2004), I interpret the effect of current variable as a transitory or temporary effect, and the effect of within-individual average as a long term or permanent effect. Survey weights are used in all regressions.

4.4. Results

The initial sample study consists of 40,855 observations obtained after pooling the data from round 2 and round 4. Approximately 85% of the study sample did not use ED services during the study period. The average ED expense of ED users is $1,405 and the minimum and maximum are $0.92 and $ 64,918, respectively. 29% of the sample had a primary care with neither enhanced access to care nor patient-centered communication, 47% had a primary care with only one of the two PCMH qualities, and 23% of sample had a primary care with both features. In the study population, 20% was foreign born, while the percentages of individuals with mental disability, social disability, and physical disability were 14%, 15% and 44% respectively. The remaining variables included in the analysis are described in Table 4.2. The propensity score analysis dropped 480

observations, leaving 40,355 observations for the subsequent analysis. Figure 4.1. depicts the kernel density graphs of treatment variables before and after matching.

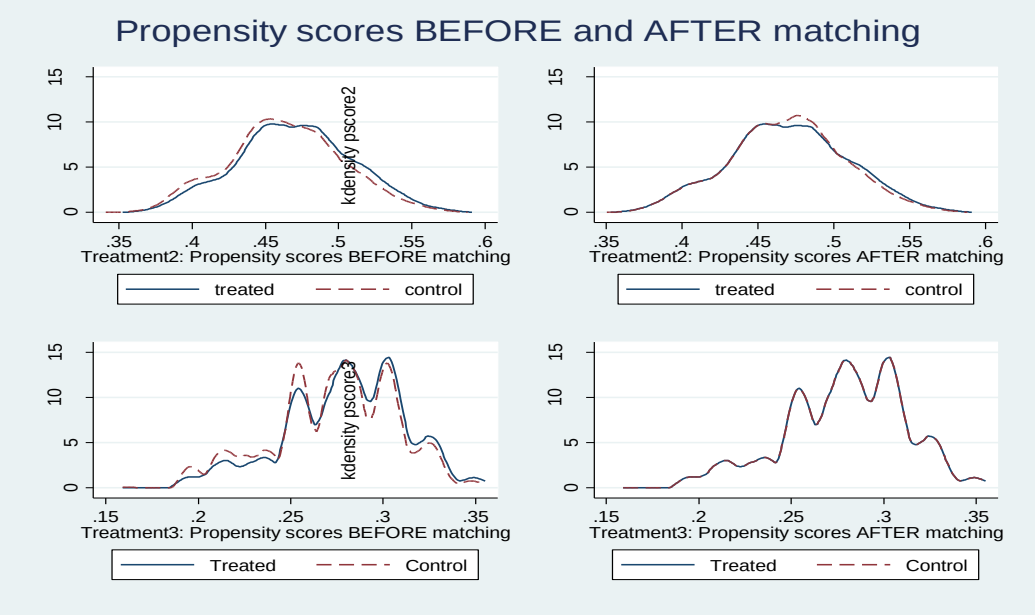


Figure 4.1: Kernel density of propensity scores before and after matching

4.4.1. **Effects of Cultural Barriers and Disabilities on Enhanced Access to Care and Patient-centered Communication**

Table 4.3.a. gives the relative risk ratios (RRR) of the multinomial logistic model of the treatment equation based on the unmatched and matched samples. The reader is referred to Table 4.3.b of Appendix C for the table of coefficients from the matched and the unmatched samples. The RRR from both matched and unmatched samples are closed in magnitude and similar in significance levels. My interpretation focuses on results from the matched sample. The RRR of the variables ForeignBorn, NonEnglishProficient,

MentalDisability, SocialDisability and PhysicalDisability are all smaller than 1 suggesting that these five variables are associated with a decrease in the likelihood to have an enhanced access to primary care and/or a patient-centered communication with the medical provider. In terms of statistical significance, the results are stronger for individuals with both enhanced access to care and patient-centered communication than for individuals with only one of the two PCMH features. More specifically, being foreign born, non-English proficient, with mental disability, with social disability, or with physical disability all decrease the likelihood to have either enhanced access to primary care or patient-centered communication by 9.3%, 9.8%, 19.9%, 3.9%, and 6.5%, respectively. Of these results, the effect of non-English proficiency (9.8%) and social disability (3.9%) are not statistically significant. Likewise being foreign born, non- English proficient, with mental disability, with social disability, or with physical disability decrease the likelihood to have both enhanced access to primary care and patient-centered communication by 13.9%, 46.2%, 19.4%, 26.9%, and 41.1% respectively. These results are all statistically significant at 5% at most. The likelihood ratio test of joint significance of all five variables suggests that all of them significantly affect the outcome variable.

Factors associated with a significantly greater likelihood to have either enhanced access to care or patient-centered communication compared to the control group are having insurance (RRR= 1.084), having preventive care (RRR = 1.138), being non-Hispanic White (RRR= 1.164), being married (RRR= 1.154), leaving in the Midwest region (RRR= =1.235), leaving in the South region (RRR = 1.127), and living in a metropolitan statistical area (RRR = 1.166). However, higher number of comorbidities and

Table 4.3.a.: Effect of cultural barriers and disabilities on enhanced access to care and patient-centered communication (Relative risk ratios)

	Unmatched		Matched	
	Treatment2	Treatment3	Treatment2	Treatment3
Foreign born	0.899	0.859	0.907	0.861
	(0.040)**	(0.045)***	(0.041)**	(0.045)***
Non-English proficient	0.891	0.536	0.902	0.538
	(0.059)*	(0.046)***	(0.06)	(0.046)***
Mental disability	0.839	0.81	0.811	0.806
	(0.055)***	(0.073)**	(0.054)***	(0.073)**
Social disability	0.957	0.728	0.961	0.731
	(0.062)	(0.065)***	(0.063)	(0.065)***
Physical disability	0.825	0.588	0.835	0.589
	(0.035)***	(0.030)***	(0.035)***	(0.031)***
Comorbidities	0.964	0.904	0.964	0.903
	(0.011)***	(0.013)***	(0.011)***	(0.013)***
Insured	1.06	1.239	1.084	1.24
	(0.051)	(0.075)***	(0.053)*	(0.075)***
Currently smoke	0.841	0.735	0.857	0.738
	(0.037)***	(0.039)***	(0.038)***	(0.039)***
BMI	1	1.005	1	1.005
	(0.003)	(0.003)*	(0.003)	(0.003)*
Preventive care	1.136	1.292	1.138	1.29
	(0.047)***	(0.061)***	(0.047)***	(0.061)***
Student	1.064	1.226	1.081	1.226
	(0.093)	(0.116)**	(0.095)	(0.116)**
Retired	0.975	1.004	1.009	1.014
	(0.06)	(0.077)	(0.063)	(0.078)
Unemployed	1.01	0.89	0.987	0.886
	(0.047)	(0.050)**	(0.047)	(0.050)**
Income	1.003	0.994	1.001	0.994
	(0.006)	(0.007)	(0.006)	(0.007)
Age	0.965	0.994	1.021	1.002
	(0.059)	(0.073)	(0.063)	(0.074)
Agesqr	1.006	1.003	0.999	1.002
	(0.006)	(0.007)	(0.006)	(0.007)

Table 4.3.a.(Continued): Effect of cultural barriers and disabilities on enhanced access to care and patient-centered communication (Relative risk ratios)

	Unmatched		Matched	
	Treatment2	Treatment3	Treatment2	Treatment3
Female	1	0.936	0.985	0.931
	(0.033)	(0.037)*	(0.033)	(0.037)*
Non-Hispanic White	1.158	1.158	1.164	1.161
	(0.040)***	(0.048)***	(0.041)***	(0.048)***
Bachelor	0.965	0.876	0.964	0.878
	(0.043)	(0.045)***	(0.043)	(0.045)**
Married	1.163	1.33	1.154	1.323
	(0.042)***	(0.058)***	(0.042)***	(0.057)***
Region: West	1.008	0.622	1.006	0.623
	(0.051)	(0.036)***	(0.051)	(0.036)***
Region: Midwest	1.225	1.006	1.235	1.011
	(0.067)***	(0.062)	(0.068)***	(0.062)
Region: South	1.18	0.67	1.127	0.665
	(0.059)***	(0.038)***	(0.056)**	(0.038)***
MSA	1.064	1.69	1.166	1.722
	(0.046)	(0.090)***	(0.051)***	(0.092)***
Panel12: 2007-2008	0.78	0.711	0.778	0.711
	(0.056)***	(0.060)***	(0.056)***	(0.060)***
Panel13: 2008-2009	0.862	0.752	0.855	0.754
	(0.060)**	(0.062)***	(0.060)**	(0.062)***
Panel14: 2009-2010	0.823	0.812	0.828	0.816
	(0.057)***	(0.067)**	(0.058)***	(0.067)**
Panel15: 2010-2011	0.949	0.842	0.945	0.843
	(0.067)	(0.071)**	(0.067)	(0.071)**
Panel16: 2011-2012	0.903	0.866	0.89	0.867
	(0.063)	(0.072)*	(0.063)*	(0.072)*
Year	0.99	1.122	1.012	1.13
	(0.031)	(0.037)***	(0.032)	(0.038)***
N		40,835	40355	
LL		-8.43E+08	-8.37E+08	
BIC		1.69E+09	1.67E+09	
AIC		1.69E+09	1.67E+09	

* p<0.1; ** p<0.05; *** p<0.01; Standard errors in parentheses.

cigarettes smoking are associated with a reduction in the likelihood to have only one of the two PCMH features by 3.6% and 14.3%, respectively. Factors associated with a significantly greater likelihood to have both enhanced access to care and patient-centered communication compared to the control group are having insurance (RRR= 1.24), having preventive care (RRR = 1.29), being a student (RRR = 1.226), being non-Hispanic White (RRR= 1.161), being married (RRR= 1.323), and living in a metropolitan statistical area (RRR = 1.722). However, higher number of comorbidities, cigarettes smoking, having a Bachelor's degree or more, and being unemployed are associated with a reduction in the likelihood to have both PCMH features by 9.7%, 26.2%, 12.2%, and 11.4%, respectively. Age, income and being retired did not affect the likelihood to be in any of the two treatment groups.

4.4.2. **Effects of Enhanced Access to Care and Patient-centered Communication on ED Utilization and Expenditures**

The estimates of the effect of enhanced access to care and patient-centered communication on ED utilization and expenditures using two-part models (logit-gamma, and logit-generalized gamma) with and without correlated random effects are presented in Table 4.4.a and Table 4.4.b, respectively. Both tables include estimates based on the unmatched and matched samples. When comparing the resulting 8 models based on the AIC, BIC, and log likelihood criteria, all models consistently show that each matched model outperforms its counterpart unmatched (ie. matched two-part gamma versus unmatched two-part gamma). These three goodness of fit measures also show that each generalized gamma model outperforms its counterpart gamma model, and finally each model with correlated

random effects outperforms its counterpart without correlated random effects[18]. Overall, coefficients sign and significance level are also very consistent across all 8 models. Of note, in all 8 models almost all 1st degree and 2nd degree standardized residuals are significant, even after controlling for the individual specific average of these residuals. This confirms that enhanced access to care and patient-centered communication are endogeneous to the ED utilization and expenditures. Of all the 8 models estimated, the matched two-part generalized gamma model with correlated random effects provides the best fit of the data, followed by the matched two- part generalized gamma model without correlated random effects. The subsequent analysis focuses on these two models.

4.4.2.1. Emergency Department Services Utilization

This subsection focuses on the analysis of the results from the first part (binary) of the two-part generalized gamma models which are estimated using logistic regressions with and without correlated random effects. Overall, results are very robust across the two regressions. Both models show that having an enhanced access to primary care and/or patient-centered communication significantly decreases (at 1% level of significance) the likelihood to use ED services. Other factors associated with a significant lower likelihood to use ED services are being a student, being older, and having a Bachelor's degree or more. Also compared to individuals of panel 17 (surveyed in 2012-2013), individuals from the previous panel were significantly less likely to use ED services. More specifically, the results suggest that the likelihood to use ED services overall consistently increased over the years. Being a female, a non-Hispanic White, living in a metropolitan statistical area,

[18] The LR test comparing models with and without CRE confirms that the former models provide a better fit of the data.

Table 4.4.a: Effects of enhanced access to care and patient-centered communication on ED expenditures (Models with correlated random effects)

	Unmatched				Matched			
	Gamma		Generalized Gamma		Gamma		Generalized Gamma	
	First Part	Second Part	First Part	Second Part	First Part	Second Part	First Part	Second Part
Treatment1	-5.932	-1.354	-5.932	-1.348	-5.146	-1.145	-5.146	-2.052
	(1.194)***	(1.276)	(1.087)***	(1.334)	(1.018)***	(1.368)	(1.067)***	(1.186)*
Treatment2	-6.046	-1.929	-6.046	-1.847	-6.169	-1.744	-6.169	-2.118
	(0.471)***	(0.718)***	(0.465)***	(0.658)***	(0.567)***	(0.804)**	(0.588)***	(0.612)***
Comorbidities	-0.02	-0.083	-0.02	-0.001	-0.046	-0.1	-0.046	-0.018
	(0.045)	(0.058)	(0.042)	(0.053)	(0.07)	(0.088)	(0.075)	(0.075)
Insured	0.377	0.032	0.377	0.184	0.29	0.094	0.29	0.351
	(0.148)**	(0.159)	(0.150)**	(0.164)	(0.231)	(0.328)	(0.233)	(0.369)
Currently smoke	-0.328	-0.03	-0.328	-0.012	-0.394	0.245	-0.394	0.062
	(0.145)**	(0.175)	(0.143)**	(0.15)	(0.242)	(0.225)	(0.242)	(0.206)
BMI	-0.023	0.003	-0.023	-0.001	-0.037	0.022	-0.037	-0.001
	(0.011)**	(0.01)	(0.011)**	(0.01)	(0.015)**	(0.017)	(0.015)**	(0.017)
Preventive care	0.265	0.011	0.265	-0.001	0.303	0.235	0.303	0.197
	(0.087)***	(0.131)	(0.080)***	(0.11)	(0.120)**	(0.146)	(0.120)**	(0.128)
Student	-0.462	0.208	-0.462	0.214	-0.442	0.208	-0.442	0.215
	(0.104)***	(0.116)*	(0.104)***	(0.113)*	(0.102)***	(0.115)*	(0.104)***	(0.103)**
Retired	-0.067	-0.131	-0.067	-0.067	-0.023	-0.121	-0.023	-0.044
	(0.065)	(0.099)	(0.066)	(0.082)	(0.069)	(0.107)	(0.065)	(0.085)
Unemployed	0.056	-0.12	0.056	-0.218	0.032	-0.108	0.032	-0.221
	(0.059)	(0.09)	(0.058)	(0.064)***	(0.057)	(0.1)	(0.058)	(0.071)***
Income	0.012	0.005	0.012	0.002	0.01	0.008	0.01	0.002
	(0.007)	(0.01)	(0.008)	(0.008)	(0.008)	(0.01)	(0.008)	(0.008)
Age	-0.584	0.14	-0.584	0.104	-0.511	0.177	-0.511	0.124
	(0.067)***	(0.091)	(0.066)***	(0.077)	(0.064)***	(0.113)	(0.059)***	(0.082)
Agesqr	0.043	-0.013	0.043	-0.011	0.034	-0.016	0.034	-0.013
	(0.007)***	(0.009)	(0.007)***	(0.007)	(0.006)***	(0.011)	(0.006)***	(0.008)*

Table 4.4.a (Continued): Effects of enhanced access to care and patient-centered communication on ED expenditures (Models with correlated random effects)

	Unmatched				Matched			
	Gamma		Generalized Gamma		Gamma		Generalized Gamma	
	First Part	Second Part	First Part	Second Part	First Part	Second Part	First Part	Second Part
Female	0.19	-0.023	0.19	-0.018	0.184	-0.007	0.184	-0.019
	(0.045)***	(0.056)	(0.041)***	(0.042)	(0.040)***	(0.053)	(0.041)***	(0.048)
Non-Hispanic White	0.084	0.108	0.084	0.18	0.091	0.115	0.091	0.184
	(0.044)*	(0.050)**	(0.044)*	(0.048)***	(0.047)*	(0.058)**	(0.049)*	(0.047)***
Bachelor	-0.349	0.198	-0.349	0.208	-0.365	0.185	-0.365	0.208
	(0.053)***	(0.074)***	(0.054)***	(0.064)***	(0.050)***	(0.063)***	(0.052)***	(0.056)***
Married	0.68	0.182	0.68	0.275	0.476	-0.047	0.476	0.033
	(0.305)**	(0.325)	(0.298)**	(0.302)	(0.42)	(0.49)	(0.407)	(0.443)
Region: West	0.81	0.445	0.81	0.621	-0.149	-2.754	-0.149	-1.896
	(0.727)	(0.652)	(0.686)	(0.525)	(1.435)	(1.195)**	(1.376)	(0.959)**
Region: Midwest	-0.053	0.543	-0.053	0.954	-0.175	-3.106	-0.175	-2.119
	(0.664)	(0.633)	(0.645)	(0.635)	(1.507)	(1.532)**	(1.385)	(1.375)
Region: South	0.298	-0.399	0.298	-0.262	-0.436	-2.736	-0.436	-2.053
	(0.649)	(0.559)	(0.631)	(0.424)	(1.273)	(1.075)**	(1.191)	(0.928)**
MSA	0.192	0.108	0.192	0.151	0.267	-0.028	0.267	0.072
	(0.112)*	(0.137)	(0.108)*	(0.131)	(0.141)*	(0.155)	(0.140)*	(0.158)
Panel12: 2007-2008	-0.576	-0.419	-0.576	-0.38	-0.603	-0.437	-0.603	-0.389
	(0.096)***	(0.121)***	(0.098)***	(0.102)***	(0.092)***	(0.113)***	(0.094)***	(0.101)***
Panel13: 2008-2009	-0.398	-0.151	-0.398	-0.179	-0.412	-0.169	-0.412	-0.18
	(0.079)***	(0.122)	(0.078)***	(0.097)*	(0.084)***	(0.113)	(0.084)***	(0.097)*
Panel14: 2009-2010	-0.551	-0.046	-0.551	-0.132	-0.555	-0.056	-0.555	-0.136
	(0.078)***	(0.117)	(0.075)***	(0.102)	(0.072)***	(0.121)	(0.078)***	(0.099)
Panel15: 2010-2011	-0.316	-0.014	-0.316	-0.016	-0.333	-0.051	-0.333	-0.025
	(0.082)***	(0.1)	(0.084)***	(0.088)	(0.071)***	(0.101)	(0.070)***	(0.093)
Panl16: 2011-2012	-0.354	-0.062	-0.354	-0.053	-0.375	-0.091	-0.375	-0.067
	(0.083)***	(0.099)	(0.082)***	(0.085)	(0.074)***	(0.102)	(0.073)***	(0.089)
Year	0.005	0.017	0.005	0.051	0.027	-0.005	0.027	0.036
	(0.04)	(0.05)	(0.038)	(0.042)	(0.043)	(0.055)	(0.044)	(0.048)

p<0.1; ** p<0.05; *** p<0.01; Standard errors in parentheses.

Table 4.4.a. (Continued): Effects of enhanced access to care and patient-centered communication on ED expenditures (Models with correlated random effects)

	Unmatched				Matched			
	Gamma		Generalized Gamma		Gamma		Generalized Gamma	
	First Part	Second Part	First Part	Second Part	First Part	Second Part	First Part	Second Part
Suhat2	2.913	0.724	2.913	0.727	2.528	0.583	2.528	1.031
	(0.592)***	(0.639)	(0.538)***	(0.668)	(0.510)***	(0.683)	(0.534)***	(0.588)*
Suhat3	3.04	1.005	3.04	1.047	3.09	0.963	3.09	1.111
	(0.235)***	(0.401)**	(0.229)***	(0.326)***	(0.300)***	(0.435)**	(0.310)***	(0.334)***
Suhat2sqr	-0.373	0.358	-0.373	0.024	-0.216	0.082	-0.216	-0.02
	(0.188)**	(0.378)	(0.194)*	(0.232)	(0.115)*	(0.185)	(0.117)*	(0.132)
Suhat3sqr	-0.481	-0.118	-0.481	-0.171	-0.454	-0.131	-0.454	-0.156
	(0.066)***	(0.101)	(0.065)***	(0.070)**	(0.054)***	(0.088)	(0.055)***	(0.066)**
Mean of Covariates								
Treatment1	0.746	0.253	0.746	-0.526	dropped	Dropped	dropped	dropped
	(0.46)	(0.554)	(0.473)	(0.665)				
Treatment2	-0.048	0.134	-0.048	-0.191	dropped	Dropped	dropped	dropped
	(0.24)	(0.336)	(0.248)	(0.266)				
Comorbidities	0.171	0.087	0.171	-0.006	0.191	0.098	0.191	0.013
	(0.049)***	(0.061)	(0.045)***	(0.056)	(0.071)***	(0.086)	(0.076)**	(0.073)
Insured	0.038	0.031	0.038	0.116	0.169	-0.053	0.169	-0.08
	(0.16)	(0.177)	(0.16)	(0.171)	(0.241)	(0.33)	(0.24)	(0.367)
Currently smoke	0.391	0.047	0.391	-0.05	0.45	-0.249	0.45	-0.133
	(0.146)***	(0.187)	(0.137)***	(0.152)	(0.251)*	(0.227)	(0.252)*	(0.204)
BMI	0.034	-0.006	0.034	-0.003	0.048	-0.025	0.048	-0.004
	(0.012)***	(0.011)	(0.011)***	(0.011)	(0.016)***	(0.017)	(0.016)***	(0.017)
Preventive care	-0.027	-0.003	-0.027	0.065	-0.058	-0.277	-0.058	-0.172
	(0.091)	(0.146)	(0.088)	(0.125)	(0.132)	(0.152)*	(0.131)	(0.138)
Married	-0.625	0.079	-0.625	-0.016	-0.422	0.301	-0.422	0.237
	(0.305)**	(0.341)	(0.298)**	(0.314)	(0.42)	(0.49)	(0.405)	(0.44)
Region: West	-1.244	-0.4	-1.244	-0.523	-0.294	2.787	-0.294	1.993
	(0.734)*	(0.661)	(0.703)*	(0.533)	(1.441)	(1.215)**	(1.379)	(0.976)**
Region: Midwest	0.103	-0.43	0.103	-0.801	0.228	3.214	0.228	2.283
	(0.675)	(0.643)	(0.662)	(0.641)	(1.509)	(1.542)**	(1.391)	(1.379)*

* p<0.1; ** p<0.05; *** p<0.01; Standard errors in parentheses.

Table 4.4.a. (Continued): Effects of enhanced access to care and patient-centered communication on ED expenditures (Models with correlated random effects)

	Unmatched				Matched			
	Gamma		Generalized Gamma		Gamma		Generalized Gamma	
	First Part	Second Part	First Part	Second Part	First Part	Second Part	First Part	Second Part
Region: South	-0.584	0.387	-0.584	0.359	0.112	2.731	0.112	2.148
	(0.646)	(0.577)	(0.639)	(0.441)	(1.279)	(1.080)**	(1.196)	(0.929)**
MSA	0.012	0.077	0.012	-0.018	0.04	0.219	0.04	0.1
	(0.131)	(0.148)	(0.128)	(0.133)	(0.146)	(0.159)	(0.145)	(0.158)
Suhat2	-0.363	-0.17	-0.363	0.199	Dropped	dropped	dropped	dropped
	(0.217)*	(0.272)	(0.223)	(0.335)				
Suhat2sqr	0.173	-0.352	0.173	-0.072	Dropped	dropped	dropped	dropped
	(0.222)	(0.356)	(0.224)	(0.248)				
Suhat3sqr	0.046	-0.027	0.046	0.031	Dropped	dropped	dropped	dropped
	(0.057)	(0.076)	(0.058)	(0.06)				
Constant	3.824	7.715	3.824	8.12	3.647	7.582	3.647	8.185
	(0.675)***	(0.854)***	(0.633)***	(0.724)***	(0.623)***	(1.035)***	(0.667)***	(0.741)***
C		0.777		8.655		0.775		7.943
		(0.017)***		(2.381)***		(0.019)***		(2.737)***
K				0.267				0.278
				(0.034)***				(0.041)***
N		40,835		40,835		40,355		40,355
LL		-1.30E+09		-1.29E+09		-1.28E+09		-1.27E+09
BIC		2.60E+09		2.59E+09		2.56E+09		2.55E+09
AIC		2.60E+09		2.59E+09		2.56E+09		2.55E+09

* p<0.1; ** p<0.05; *** p<0.01; Standard errors in parentheses. c and k are shape parameters of the density of the generalized gamma distribution. k = 1 corresponds the gamma distribution.

Table 4.4.b: Effects of access to care and face-to-face doctor-patient communication on ED expenditures (Models without Correlated Random Effects)

	Unmatched				Matched			
	Gamma		Generalized Gamma		Gamma		Generalized Gamma	
	First Part	Second Part	First Part	Second Part	First Part	Second Part	First Part	Second Part
Treatment1	-5.351	-1.002	-5.351	-1.902	-5.142	-1.22	-5.142	-2.098
	(1.145)***	(1.299)	(1.129)***	(1.154)*	(1.056)***	(1.377)	(1.028)***	(1.193)*
Treatment2	-6.169	-1.656	-6.169	-2.002	-6.199	-1.766	-6.199	-2.127
	(0.447)***	(0.830)**	(0.453)***	(0.664)***	(0.571)***	(0.857)**	(0.569)***	(0.593)***
Comorbidities	0.144	-0.002	0.144	-0.003	0.141	-0.006	0.141	-0.006
	(0.013)***	(0.021)	(0.013)***	(0.017)	(0.017)***	(0.02)	(0.018)***	(0.017)
Insured	0.413	0.062	0.413	0.284	0.449	0.046	0.449	0.276
	(0.054)***	(0.098)	(0.055)***	(0.079)***	(0.058)***	(0.117)	(0.055)***	(0.097)***
Currently smoke	0.016	0.025	0.016	-0.057	0.030	0.021	0.030	-0.059
	(0.055)	(0.081)	(0.055)	(0.059)	(0.053)	(0.084)	(0.049)	(0.059)
BMI	0.009	-0.003	0.009	-0.004	0.01	-0.003	0.01	-0.004
	(0.002)***	(0.003)	(0.002)***	(0.003)	(0.003)***	(0.003)	(0.003)***	(0.003)
Preventive care	0.244	-0.002	0.244	0.046	0.252	0.005	0.252	0.054
	(0.050)***	(0.078)	(0.051)***	(0.06)	(0.047)***	(0.07)	(0.049)***	(0.053)
Student	-0.475	0.196	-0.475	0.207	-0.447	0.198	-0.447	0.215
	(0.103)***	(0.116)*	(0.103)***	(0.110)*	(0.101)***	(0.112)*	(0.095)***	(0.103)**
Retired	-0.07	-0.129	-0.07	-0.068	-0.024	-0.131	-0.024	-0.049
	(0.065)	(0.1)	(0.067)	(0.081)	(0.067)	(0.113)	(0.072)	(0.083)
Unemployed	0.066	-0.107	0.066	-0.217	0.037	-0.104	0.037	-0.220
	(0.057)	(0.1)	(0.057)	(0.067)***	(0.058)	(0.102)	(0.057)	(0.069)***
Income	0.012	0.006	0.012	0.002	0.01	0.007	0.01	0.002
	(0.007)*	(0.011)	(0.007)*	(0.008)	(0.008)	(0.01)	(0.008)	(0.009)
Age	-0.575	0.16	-0.575	0.099	-0.501	0.168	-0.501	0.123
	(0.067)***	(0.095)*	(0.066)***	(0.073)	(0.059)***	(0.122)	(0.063)***	(0.082)
Agesqr	0.042	-0.015	0.042	-0.01	0.033	-0.015	0.033	-0.013
	(0.007)***	(0.009)	(0.007)***	(0.007)	(0.006)***	(0.012)	(0.006)***	(0.008)*

* p<0.1; ** p<0.05; *** p<0.01; Standard errors in parentheses.

Table 4.4.b (Continued): Effects of access to care and face-to-face doctor-patient communication on ED expenditures (Models without Correlated Random Effects)

	Unmatched				Matched			
	Gamma		Generalized Gamma		Gamma		Generalized Gamma	
	First Part	Second Part	First Part	Second Part	First Part	Second Part	First Part	Second Part
Female	0.19	-0.015	0.19	-0.015	0.182	-0.016	0.182	-0.019
	(0.043)***	(0.056)	(0.045)***	(0.042)	(0.039)***	(0.056)	(0.040)***	(0.049)
Non-Hispanic White	0.091	0.114	0.091	0.18	0.093	0.120	0.093	0.185
	(0.044)**	(0.054)**	(0.041)**	(0.049)***	(0.047)**	(0.059)**	(0.047)**	(0.049)***
Bachelor	-0.363	0.187	-0.363	0.212	-0.372	0.185	-0.372	0.209
	(0.052)***	(0.074)**	(0.050)***	(0.065)***	(0.053)***	(0.062)***	(0.053)***	(0.054)***
Married	0.065	0.245	0.065	0.26	0.056	0.249	0.056	0.266
	(0.04)	(0.066)***	(0.043)	(0.054)***	(0.045)	(0.076)***	(0.047)	(0.055)***
Region: West	-0.423	0.045	-0.423	0.107	-0.447	0.041	-0.447	0.101
	(0.087)***	(0.101)	(0.082)***	(0.08)	(0.078)***	(0.105)	(0.074)***	-0.092
Region: Midwest	0.058	0.099	0.058	0.157	0.053	0.110	0.053	0.165
	(0.079)	(0.104)	(0.077)	(0.078)**	(0.065)	(0.111)	(0.066)	(0.082)**
Region: South	-0.272	-0.018	-0.272	0.096	-0.326	-0.006	-0.326	0.094
	(0.102)***	(0.117)	(0.098)***	(-0.1)	(0.076)***	(0.107)	(0.075)***	(0.092)
MSA	0.197	0.16	0.197	0.131	0.303	0.163	0.303	0.158
	(0.065)***	(0.074)**	(0.064)***	(0.067)**	(0.057)***	(0.081)**	(0.059)***	(0.068)**
Panel12: 2007-2008	-0.591	-0.414	-0.591	-0.375	-0.607	-0.419	-0.607	-0.382
	(0.098)***	(0.122)***	(0.098)***	(0.110)***	(0.088)***	(0.108)***	(0.094)***	(0.101)***
Panel13: 2008-2009	-0.407	-0.15	-0.407	-0.169	-0.416	-0.156	-0.416	-0.175
	(0.075)***	(0.122)	(0.078)***	(0.100)*	(0.084)***	(0.109)	(0.086)***	(0.097)*
Panel14: 2009-2010	-0.562	-0.027	-0.562	-0.127	-0.558	-0.034	-0.558	-0.133
	(0.076)***	(0.119)	(0.081)***	(0.103)	(0.073)***	(0.122)	(0.077)***	(0.103)
Panel15: 2010-2011	-0.323	-0.02	-0.323	-0.01	-0.337	-0.036	-0.337	-0.020
	(0.082)***	(0.097)	(0.083)***	(0.088)	(0.071)***	(0.094)	(0.073)***	(0.098)
Panel16: 2011-2012	-0.365	-0.06	-0.365	-0.046	-0.378	-0.068	-0.378	-0.060
	(0.081)***	(0.098)	(0.083)***	(0.089)	(0.073)***	(0.096)	(0.074)***	(0.092)

* p<0.1; ** p<0.05; *** p<0.01; Standard errors in parentheses.

Table 4.4.b (Continued): Effects of access to care and face-to-face doctor-patient communication on ED expenditures (Models without correlated Random Effects)

	Unmatched				Matched			
	Gamma		Generalized Gamma		Gamma		Generalized Gamma	
	First Part	Second Part	First Part	Second Part	First Part	Second Part	First Part	Second Part
Year	-0.02	0.012	-0.02	0.044	0.013	0.006	0.013	0.045
	(0.039)	(0.048)	(0.038)	(0.042)	(0.041)	(0.056)	(0.042)	(0.049)
Suhat2	2.627	0.513	2.627	0.956	2.525	0.623	2.525	1.055
	(0.570)***	(0.647)	(0.560)***	(0.577)*	(0.530)***	(0.69)	(0.517)***	(0.589)*
Suhat3	3.087	0.921	3.087	1.047	3.106	0.977	3.106	1.119
	(0.239)***	(0.433)**	(0.240)***	(0.341)***	(0.300)***	(0.464)**	(0.298)***	(0.322)***
Suhat2sqr	-0.234	0.107	-0.234	-0.032	-0.216	0.094	-0.216	-0.014
	(0.099)**	(0.165)	(0.102)**	(0.104)	(0.117)*	(0.196)	(0.118)*	(0.133)
Suhat3sqr	-0.454	-0.127	-0.454	-0.144	-0.457	-0.134	-0.457	-0.158
	(0.047)***	(0.076)*	(0.047)***	(0.057)**	(0.052)***	(0.092)	(0.052)***	(0.065)**
Constant	4.028	7.471	4.028	8.118	3.7	7.624	3.7	8.205
	(0.675)***	(0.923)***	(0.678)***	(0.721)***	(0.661)***	(1.081)***	(0.652)***	(0.744)***
C		0.775		8.485		0.773		8.082
		(0.018)***		(2.594)***		(0.019)***		(3.437)**
K				0.269				0.275
				(0.035)***				(0.041)***
N		40,835		40,835		40,355		40,355
LL		-1.30E+09		-1.29E+09		-1.28E+09		-1.27E+09
BIC		2.60E+09		2.59E+09		2.56E+09		2.55E+09
AIC		2.60E+09		2.59E+09		2.56E+09		2.55E+09

* p<0.1; ** p<0.05; *** p<0.01; Standard errors in parentheses. c and k are respectively shape parameters of the density of the generalized gamma distribution. k = 1 corresponds to the gamma distribution.

having preventive care, a higher number of comorbidities, or higher BMI[19], cigarette smoking, and having insurance were associated with higher likelihood to use ED services in both models. However, marital status, income and work status (retired, unemployed) did not have any effect on the likelihood to use ED services.

4.4.2.2. Emergency Department Expenditures

Table 4.5. gives the estimated treatment effects for the first and second treatment groups derived from the two-part generalized gamma models. Based on the model without and with CRE respectively, both estimated on the matched sample, individuals whose primary care only had one of the two PCMH features spent on average $2213.94 and $1180.53 less on ED services. However, these results are not significant. Having a primary care with both PCMH features resulted in a significantly lower ED expenditure by $1191 (model without CRE) and $1180.53 (CRE model). These two estimates were highly statistically significant (at 1%).

4.5. Discussion

Two major findings emerge from this chapter. First, being foreign born, non-proficient in English, with mental, social, or physical disability are all factors that significantly reduce access to care and quality of communication with medical providers. Of all these five factors, language barriers were the most detrimental factor preventing

[19] Controlling for the average of the variables number of comorbidities, BMI and insured changed the signs and /or significance levels of these three variables. However, the positive association between these three variables and ED use observed in the model without CRE is captured by the average of these variables that are positive and significant (for the average of comorbidities and the average of BMI), and insignificant (for the average of insured).

Table 4.5. Marginal effect of enhanced access to care and patient-centered communication on ED expenditures (Matched data)

Marginal Effects	With CRE	Without CRE
Treatment1	-2265.017	-2213.941
	(1413.437)	(1371.848)
Treatment2	-1191.899	-1180.534
	(244.518)***	(250.3341)***

* p<0.1; ** p<0.05; *** p<0.01; Standard errors in parentheses.

access to care and doctor-patient communication. The risk of having enhanced access to care and patient-centered communication of non-English proficient individuals is almost half that of English fluent individuals. This result is consistent with previous studies that found a positive association between non English proficiency and forgone needed medical care (Shi et al., 2009), poorer communication with providers (Barton et al., 2014; Pockety et al., 2007), lower likelihood to have a medical visit (Shi et al., 2009; Ngo-Metzger et al.,2007), lower likelihood to have a usual source of care, and difficulty obtaining information or advice by phone (Pippins et al., 2007). Other reported negative outcomes associated with language barriers are lower insurance coverage (Eneriz-Wiemer, 2014), lower health education (Ngo-Metzger et al., 2007), lower patient satisfaction (Eneriz-Wiemer, 2014; Flower et al., 2017), higher readmission rate (Karliner, et al., 2016) and poorer health outcomes (Okafor, 2013; Eneriz-Wiemer, 2014). Given the well-documented negative effects of language barriers on access to care, health care quality and health outcomes, policymakers should invest in health care services that have been proven to mitigate these effects. Potential resources include doctor-patient language concordance,

professional language translation, and interpretation services (Ngo-Metzger et al., 2007; Karliner et al., 2016). Furthermore, political and technological changes should be implemented to improve the accessibility of the health care environment to individuals with disabilities, and remove communication barriers.

The second important finding of this study is that timely access to care and better communication with medical provider significantly reduce not only the likelihood to use ED services, but also ED expenditures. Although several studies have found a negative association between high quality primary care and ED services use (Guy et al., 2015; Xin et al., 2017), results related to ED expenditures are mixed (Raven et al., 2015). For example, some studies have found a negative association between provider accessibility at night and during the weekend and ED expenditures (Stockbridge, 2014; Philpot et al, 2016), while other have suggested that better communication with primary care provider can result in a higher ED expenditures (eg. Philpot et al., 2016). My results suggest that individuals with either better access to care or better communication may not spend significantly less on ED services. However, the combination of both enhanced access to care and effective communication with primary care could result in significantly lower ED expenditures. Efforts to reduce the fast rising cost of ED expenditures should incorporate changes that contribute to both a better access to care and better doctor-patient communication.

Chapter 5: Concluding Remarks

5.1. Overview

The shortage of health care professionals, inefficiency of the health care system, and high level of medical expenditures are critical concerns in the United States. Because these problems are predicted to worsen during the coming decades, the pressure to find solutions has placed the health care system at the center of political debate in the United States. This dissertation addressed some facets of these multidimensional issues. First, I explored the potential of supervisor support as a strategy to increase the value of family-friendly policies. Enhancing the value of family-friendly policies could have a positive impact on the recruitment and retention rates of health care professionals, hence constitutes a viable tool to address the penury of health care workers. Second, I analyzed the effect of patient-centered communication on health outcomes and health care quality. Finally, I investigated barriers to access to care and patient-centered communication, which are key PCMH features. I also estimated the effect of enhanced access to primary care and patient-centered communication on ED services use and expenditures.

In this chapter, I first present the gaps in the literature that motivate the questions addressed in this dissertation and explain the contribution of this work in finding solution to the above-mentioned problems. Then, I summarize my findings and discuss policies implications. Finally, I propose future directions to this work.

5.2. Chapter Two

In Chapter 2, I examined the impact of a family-friendly work environment on the value of family-friendly policies and benefits. Although the published literature provides evidence that a family-friendly work environment is the main determinant of the utilization rate of family-friendly benefits, no investigation of the effect of such environment on the value of benefits provided exists. Furthermore, while the choice experiment technique used in this chapter has been previously applied to the investigation health care professionals' preferences for job characteristics, studies have focused on intrinsic job characteristics such as job flexibility, work facility size and location, number of night shifts, etc. Family-friendly policies extrinsic to jobs have been largely overlooked in choice experiment studies.

The first contribution of this study is the enrichment of the literature at the intersection of health care labor market and choice experiment by providing a choice experiment survey of family friendly benefits in the health care academic institution setting. Because at the time of the survey, the institution under investigation was engaged in a long-term planning effort to improve the family friendly policies of its employees, it constitutes a suitable case to address questions related to family-friendly benefits.

Second, the uniqueness of this study comes from of the originality of the family friendly benefits job attributes investigated, which include child and adult care related services, sick and annual leaves, and a supervisors' training program to facilitate the use of existing family friendly benefits and policies. Choice experiments on children related family-friendly benefits have been limited to the provision of onsite childcare services and resources and referrals for employees with child dependents. However, even when onsite

childcare is provided, several factors could prevent its utilization. In this study, I introduced three childcare availability attributes: the availability of childcare for moderately sick children, reduction of admission time, and extension of hours of operation. These three attributes are new in the choice experiment literature and constitute complementary dimensions of childcare availability.

Third, the introduction of adult care benefits and services constitutes another important contribution of this study. Although caregiving for adults is becoming an increasing challenge for many employees due to the aging of the U.S. population, studies on family-friendly benefits available to employees with adult dependents are almost inexistent. In addition to resources and referrals services which are the standard benefits provided to employees with adult dependents, I investigated employees' preferences for the provision of an adult care center and back-up adult care services.

Finally, and most importantly, this paper is the first attempt to quantify the value of organizational support for the use of work-life policies and its economic impact on these policies. My results suggested that the creation of a family supportive work environment may be the most valued work-life balance initiative. In addition to creating an environment that facilitates the implementation and use of work-life policies, it can increase the economic value of benefits already provided.

The benefits of this study are numerous. First, this research will inform the decision makers of the HSC under investigation of their employees' preferences, attitudes and needs regarding the provision of alternative family friendly benefits. This will help them prioritize among several investment options. Second, the data collected could be used to generate estimates of employees' willingness to pay for each benefits valued. These

estimates are useful to implement cost-benefits analysis of the benefits considered and design financial strategies to fund the adopted investment plans.

Moreover, many Health Sciences Centers in the United States face several challenges in meeting employees' needs related to work-life benefits. This project provides a unique opportunity to address the general problem of high turnover rate, stress management, and job dissatisfaction among health care professionals. The results derived from this case study could be extended to others Health Sciences Centers using a benefit transfer analysis.

Future research could investigate how preferences for family-friendly policies and willingness to pay estimates vary across socio-economic and demographic groups. More specifically, the effect of career stages (such as age, marital status, having children, or adult dependents) on the monetary value of family-friendly benefits could be explored. Other considerations that could affect the value of family friendly benefits are career stages. Factors such as academic ranks (Assistant Professor, Associate Professor, Professor), and job duties (research, clinical, or teaching) play an important role on how faculty in Health Sciences Centers view and value the benefits available to them. Understanding these effects could be useful in designing policies that account for the specificities of different categories of employees.

Another avenue for this work is the application of the attribute non-attendance technique to infer marginal willingness to pay values for family-friendly benefits. It is commonly assumed that survey respondents consider all the information presented in the choice task when choosing among alternatives. However, there is mounting evidence that respondents actually restrict their attention to a set of attributes when making their choices,

totally ignoring others. This is referred to as attribute non-attendance. Erdem et al. (2014) recognized another form of attribute non-attendance where respondents may only ignore some levels of an attribute, while attending the others. This behavior is called attribute-level non- attendance. Future research could propose an econometric model that accounts for attribute-level non- attendance, and preference heterogeneity in choice experiments. Current research findings suggest that simultaneously modeling attribute-level non-attendance and preference heterogeneity might produce more precise willingness to pay estimates, with more reliable policy implications. The findings could have implications across a diverse set of areas of study (environment, health, and transportation, among others).

5.3. Chapter Three

Patient-centered communication is a critical component to the successful implementation of patient-centered care models. However, studies related to the effectiveness of patient-centered communication in improving health outcomes and health care quality have produced mixed results. The inconsistency in the findings have been attributed to the small size of the populations studied, diversity of clinical outcomes investigated, presence of unaccounted confounding factors, and use of patient-centered communication measures not grounded in the theoretical literature. This study addressed these limitations by using a large nationally representative survey to investigate the effect of patient-centered communication on physical health, mental health, and the quality of health care received. I found that patients who have a patient-centered communication with their medical care provider are more likely to be physically and mentally healthier than

patients who did not. They are also more likely to have a better health care experience. The results also show that patient-doctor communication is more effective when it incorporates multiple elements of patient-centered communication such as shared-decision making, cultural competency, coordinated care, and patient-centered care. My results suggest that patient-centered communication is an important determinant of patients' health outcome and patients' satisfaction with health care services received. Health care professionals' education and training should emphasize on strategies that foster better patient-centered communication skills.

Medically underserved population groups (such as disabled and non-English proficient individuals) often have poorer health and poorer health care quality. Future research could investigate whether patient-centered communication could help reduce health disparities and alleviate health-related challenges faced by medically vulnerable population groups.

5.4. Chapter Four

The United States spends more on health care than any other country in the world. With a total national health care spending accounting for almost 18% of the GDP in 2015 (Centers for Medicare & Medical Services, 2016), the U.S. health care system is posing a threat to other sectors of the U.S. economy. Controlling the rising cost of health care expenditures has become one of the major concerns of policy makers. This chapter contributed to the identification of health costs reduction strategies by focusing on ED services, the fastest growing health care expenditures category. I particularly focused on the role of accessibility and quality of primary care as studies have suggested that a large

proportion of ED expenditures is devoted to non-urgent care that could be provided in less expensive medical settings (Niska et al., 2012). First, I explored barriers to access to care and health care qualities. Then I investigated the effect of enhanced access to care and patient-centered communication on ED services use and expenditures. My findings showed that cultural factors (such as being foreign born, non-English proficient), mental, social and physical disabilities all significantly reduce access to primary care and the quality of communication with medical provider. My results also showed that having an enhanced access to primary care and a patient-centered communication with primary care provider significantly reduce both the likelihood to use ED services and ED expenditures. The estimated average reduction in ED expenditures attributed to a better access to primary care and a patient centered-communication varies from $1,180.53 to $1,191.89 per year per individual.

Previous studies have suggested that the effectiveness of primary care in reducing ED use or expenditures might depend on the primary care feature investigated (Stockbridge et al., 2014; Raven et al., 2016) or on patients' characteristics (Guy et al., 2015; Philpot et al., 2016). For example, some researchers have found that better primary care is more likely to reduce ED services use or expenditures for patients with specific chronic illnesses (Guy et al., 2015; Philpot et al., 2016), or without health insurance (Xin et al., 2017). An interesting extension of this work could be investigating whether better access to care and better doctor-patient communication would be more effective in reducing ED use and expenditures for disadvantaged populations such as immigrants, non-English proficient patients, and disabled. Although the results of this chapter suggested that for these

subpopulations, better access to care and quality of care could potentially results in lower ED use and expenses, no direct estimate has been provided.

APPENDIX

Appendix A: Survey Questionnaire

Benefits and Services for HSC Faculty, Staff, and Students
What is Important to You?

Please provide the following identifiers. This information will be used to link your survey data to your demographic data.

UNM Netid (Not the HSC NetID):
UNM Banner ID (eg: 101966712):

The University of New Mexico
Informed Consent for Surveys

Benefits and Services for HSC Faculty, Staff, and Students:
What is Important to You?

Introduction

You are being asked to participate in an HSC-initiated survey on the benefits and services that HSC employees (faculty, staff, and students and other trainees) value most. The results of this survey will be published and communicated with HSC policymakers to help them in formulating appropriate work-life policies. These policies will benefit HSC employees by potentially improving job satisfaction, reducing job-related stress, and reducing the psychological and economic burden of caregivers. Completion of this survey will also help to inform a graduate student's PhD completion.

What will happen if I decide to participate?
If you agree to participate, you will be asked to respond to a set of questions that focus on identifying your views on which family friendly benefits and services the HSC should prioritize. Completing the survey will take approximately twenty minutes. There are no risks or costs associated with taking this survey. Your involvement in the study is voluntary, and you may choose not to participate.

To shorten the survey, the following Human Resource Services data have been requested and will be linked to the survey data: the branch of HSC where you work, the terms of your employment (type of contract, work load, pay grades, salary), the number of years at HSC, your age, gender, ethnicity, ZIP code, and the number of leave days used in 2014 if applicable.

How will my information be kept confidential?
We will take measures to protect the security of all your personal information. All identifying information will be deleted as soon as the data are downloaded from Opinio. The data files will be password protected, kept on the PI and the Co-PI's computers, and deleted at the end of the project. Only researchers will have access to the files. Only aggregated results will be reported.

Who can I call with questions or complaints about this study?
If you have any questions about this study, please contact the research team working on this project at hscfamilybenefits@unm.edu. If you have questions regarding your legal rights as a research subject, you may call the UNM Office of the IRB (OIRB) at(505) 277-2644.

By clicking "Yes, I agree to participate", you will be consenting to participate in the above described study.

Thank you for your consideration.
Sincerely,

Jennifer Thacher
Associate Professor

- ○ **Yes, I agree to participate**
- ○ **No, I do not agree to participate**

Introduction

The UNM Health Sciences Center (HSC) is discussing possible long-term changes to improve its employees (faculty, staff, and students) work environment. The goal of the changes is to help HSC employees balance their work and life and to reduce employees turnover rate. We would like your input on what benefits and services to provide. This project focuses on the following benefits:

- Additional sick leave and annual leave days per year
- Leave and flexible work arrangements incentive program
- Childcare benefits and services
- Adult care benefits and services

By expressing your opinion, you will help HSC design a package of benefits that best fits your needs. **Even if you are not interested in a specific type of benefit, please answer all the questions. Your responses are important to understand what benefits are desired.**

Annual Leave and Sick Leave

Annual leave is leave that employees can take throughout the year for vacation or for personal issues.

Sick leave is leave that is used for specific purposes such as personal illness (including

1. How satisfied are you with the following amount of leave included in your current contract? *Please check only one per row.*

	Very not satisfied	Somewhat not satisfied	Somewhat satisfied	Very satisfied	Does not apply to me
Annual leave	1	2	3	4	5
Sick leave or extended sick leave	1	2	3	4	5

2. How supportive are you of increasing the amount of the following leave? *Please check only one per row.*

	Very not supportive	Somewhat not supportive	Somewhat supportive	Very supportive
Annual leave	1	2	3	4
Sick leave	1	2	3	4

3. How likely would you use the following additional leave if they were available to you? *Please check only one per row.*

	Very Unlikely	Unlikely	Likely	Very likely	Does not apply to me
Additional annual leave	1	2	3	4	5
Additional sick leave	1	2	3	4	5

4. Please check the best response that describes your situation last time you needed to take formal leave. *Check only one.*
    1. I never needed to take formal leave …….(*Skip Question 5*)
    2. I needed to take formal leave but was not able to do so
    3. I took formal leave…… (*Skip Question 5*)
    4. Does not apply to me

5. What was the most important factor preventing you from taking leave? *Check only one.*
    1. I could not take leave because I was the only one able to do my job
    2. I had already used all my paid leave
    3. I did not want to seem uncommitted to my work
    4. My supervisor does not support leave
    5. Other (please specify)…….
    6. Does not apply to me

Flexible Work Arrangements

Below are some types of flexible work arrangements that are currently being used in different areas of HSC:

- **Flexible hours:** allows a flexible starting and quitting time.
- **Job sharing**: divides a full-time position between two people.
- **Part-time:** gives a full time employee the opportunity to switch to a part time schedule.
- **Telecommuting**: work at another location different from the office on prearranged days of the workweek.
- **Compressed workweek:** allows taking time off during the workweek in exchange for extended hours on the days worked.

6. Which of the following work arrangements do you currently use? *Check all that apply.*

    1. Standard work schedule for faculty
    2. Standard work schedule for staff (8 hours per day, 5 days per week)
    3. Standard work schedule for physician resident
    4. Flexible hours
    5. Job-sharing
    6. Part-time
    7. Compressed work week
    8. Telecommuting
    9. Other (please specify)……

7. Which of the following work arrangements would you like to be able to use? *Check all that is compatible with your job, to the best of your knowledge.*

    1. Flexible hours
    2. Job-sharing
    3. Part-time
    4. Compressed workweek
    5. Telecommuting
    6. None of the above
    7. Other (please specify)……

8. What factors prevented you from using the flexible work arrangements you mentioned in the previous question? *Please check all that apply.*

    1. I did not need it in the past
    2. My department lacks the resources necessary to provide these work arrangements
    3. My department does not support the use of these work arrangements
    4. I did not want to seem uncommitted to my work
    5. Other (please specify)……

9. How satisfied are you with your current work arrangement? *Please check only one.*

Very not satisfied	Somewhat not satisfied	Somewhat satisfied	Very Satisfied
1	2	3	4

Leave and Flexible Work Arrangements Incentive Program

Several types of leave and flexible work arrangements are available to HSC employees to help them balance their work and life. However, most employees who actually need them do not use them. This may be due to the lack of information, or the lack of supervisors support for these programs, etc.
HSC could create a Leave and Flexible Work Arrangements Incentive Program with a goal of increasing the use of leave and flexible work arrangements through strategies such as:

- The training of supervisors on how to effectively meet their employees' needs regarding leave and flexible work arrangements, while preserving UNM's mission;
- The formal and informal recognition of supervisors who demonstrate an extraordinary achievement in providing opportunities for flexible work arrangements and leave, while maintaining an effective unit. Recognition could include awards, certificate of appreciation, etc.;
- The development of strategies to allocate more resources to fund leave and flexible

10. How supportive are you of creating an HSC Leave and Flexible Work Arrangements Incentive Program? *Check only one.*

Very not supportive	Somewhat not supportive	Somewhat supportive	Very supportive
1	2	3	4

Childcare Benefits and Services

Now we will ask you specific questions about your preferences for different types of childcare benefits.
Even if you don't currently have any dependent children (children, stepchildren or any children for whom you are the legal guardian), or you do not anticipate having dependent children in the future, we want to hear your opinion.

Wait List at Onsite Childcare

UNM has a childcare center, the UNM's Children Campus, which is also available to HSC employees. The average time on the wait list for children to be admitted in the daycare program is currently 2 years.

11. How supportive are you of reducing the average time on the onsite childcare waitlist? *Check only one*

Very not supportive	Somewhat not supportive	Somewhat supportive	Very supportive
1	2	3	4

Hours of Operation of Onsite Childcare

Currently, the UNM childcare center provides daycare and before and after school care from 7:00 AM to 5:30.

12. How supportive are you of extending the onsite childcare hours to HSC employees as follows? *Check only one per row.*

Hours of Operation	Very not supportive	Somewhat not supportive	Somewhat supportive	Very supportive
7:00 AM – 8:00 PM	1	2	3	4
24 hour	1	2	3	4

Childcare Facility for Sick Children

At most childcare centers, parents are required to keep their children at home when they are sick. A childcare facility for sick children could be provided to HSC employees. Located at a different site than the onsite childcare center but close to UNM, this facility could provide the following services:

- Care to children age newborn through 16 with moderate illnesses (sore throat, ear infection, etc.),
- Quiet and safe environment with isolation rooms and sheltered drop-off point,
- Trained pediatric caregivers.

13. How supportive are you of providing a childcare facility for sick children to HSC employees? *Check only one.*

Very not supportive	Somewhat not supportive	Somewhat supportive	Very supportive
1	2	3	4

Adult Care Direct Services

Now we will ask you specific questions about your preferences for different types of adult care benefits. **Even if you don't currently have any adult dependent (parents, grandparents, stepparents, parents in law, etc.), or you do not anticipate having adult dependents in the future, we want to hear your opinion.**

Onsite drop-off adult care center

A drop-off adult care center provides social activities and basic personal care (assistance with bathing, dressing, eating, medication management, etc.), dependent on the individual's needs.

14. How supportive are you of providing an onsite drop-off adult center to HSC employees? *Check only one.*

Very not supportive	Somewhat not supportive	Somewhat supportive	Very supportive
1	2	3	4

Back-up in-home adult care

HSC can contract with a third party agency that provides back-up in-home adult care to adults when their regular care provider is not available.

- A qualified caregiver is dispatched to the adult dependent's home when needed.
- The negotiated rate is paid by the employee.
- This service can be provided throughout the US.

15. How supportive are you of providing back-up in-home adult care services to HSC employees? *Check only one.*

Very not supportive	Somewhat not supportive	Somewhat supportive	Very supportive
1	2	3	4

Resource and Referral Services

The following resource and referral services could be made available:

- Resources and referrals for children
- Resources and referrals for Adults

In either case, such services would include:

- Case worker who provides care givers with information on local, state and national services designed to assist with child, elder and family needs,
- Legal advice and services in partnership with the UNM law school on dependent care related issues,
- Financial advice resources and referrals for dependents.

16. How supportive are you of providing the following resource and referral services to HSC employees? *Check only one.*

	Very not supportive	Somewhat not supportive	Somewhat supportive	Very supportive
Resources and referrals for children	1	2	3	4
Resources and referrals for adults	1	2	3	4

Dependents

We will now ask you some questions about whether you currently provide care to any dependents or expect to in the future. By "care" we mean everything that you might do to assist financially or physically. The definition of "dependent" is as given by the current UNM policy and includes step, adopted, foster or natural dependents such as children, parents, grandparents, etc.

17. For how many dependents that need childcare (babysitting, before and after school, etc.) or adult care (transportation, assistance with personal care such as eating, dressing, etc.) are you (or your spouse/partner, if applicable) currently providing care? *Check only one for each dependent type.*

	Children	Adults
None	○	○
One	○	○
Two	○	○
Three	○	○
Four	○	○
Five	○	○
More than five	○	○

18. Do you (or your spouse/partner, if applicable) expect to need dependent's childcare or adult care benefits and services within the next ten years? *Select only one per row.*

	Yes	No
Childcare benefits and services	1	2
Adult care benefits and services	1	2

Dependents Children Needs

19. How likely would you be to use the following childcare services if they were available to you? *For each service, check only one.*

	Very not likely	Not likely	Likely	Very likely
Onsite childcare from 7:30 AM to 5:30 PM	1	2	3	4
Onsite childcare from 5:30 AM to 8:00 PM	1	2	3	4
Childcare overnight	1	2	3	4
Onsite facility for sick children	1	2	3	4
Childcare resources and referrals	1	2	3	4

20. How satisfied are you with your current childcare arrangement? *Check only one.*

Very not satisfied	Somewhat not satisfied	Somewhat satisfied	Very satisfied	Does not apply to me
1	2	3	4	5

Adults Dependents Needs

21. Which of the following best describe where your adult dependents live? *Check all that apply.*

    1. In your home
    2. Very close to your home
    3. Other New Mexico location
    4. Another State/Territory in the U.S.
    5. Out of the U.S.
    6. Does not apply to me

22. How likely would you use the following adult care services if they were available to you? *For each service, check only one.*

	Very not likely	Not likely	Likely	Very likely	Does not apply to me
Onsite drop-of adult care center	○	○	○	○	○
Back-up in-home adult care services	○	○	○	○	○
Adult care resources and referrals	○	○	○	○	○

23. How satisfied are you with your current adult care arrangements? *Check only one.*

Very not satisfied	Somewhat not satisfied	Somewhat satisfied	Very satisfied	Does not apply to me
○	○	○		○

What benefits should HSC prioritize?

24. What level of priority should HSC give to providing the following benefits and services to its employees? *Check only one per row.*

	Low Priority	Some priority	A lot of Priority	High Priority
Additional annual leave	○	○	○	○
Additional sick leave	○	○	○	○
Leave and flexible work arrangements incentive program	○	○	○	○
Shorter wait list at onsite childcare	○	○	○	○
Childcare from 7:00 AM to 8:AM	○	○	○	○
24 hour childcare	○	○	○	○
Childcare facility for sick children	○	○	○	○
Onsite drop-of adult care center	○	○	○	○
Back-up in-home adult care services	○	○	○	○
Childcare resources and referrals	○	○	○	○
Adult care resources and referrals	○	○	○	○

Which Benefits Package and Payroll deduction do you prefer?

In order to get a better understanding of which benefits are most important to you, we will present you with four questions. In each question, we are asking you to imagine that you have to choose between four options. The first three options are possible combinations of benefits and payroll deduction and the last option describes your current benefits package.

- Assume that all the job characteristics under the four options such as job duties, work environment, etc. are the same. The options only differ in terms of the benefits listed and payroll deduction;
- The payroll deduction is a monthly after tax deduction regardless the benefits utilized:
- We would like you to choose the option you prefer;
- When making a choice, think about your current and future needs and pay attention to the level of benefits in each table;
- There are no right or wrong answers.

25. Which benefits package and payroll deduction do you prefer? If needed, you can hover on each benefits underlined, for additional information. *Check only one*

Additional benefits and services	**Option A: Benefits package and payroll deduction**	**Option B: Benefits package and payroll deduction**	**Option C: Benefits package and payroll deduction**	**Your current benefits package and payroll deduction**
Additional leave	5 more days of annual leave	5 more days of sick leave	3 more days of annual leave and 3 more days of sick leave	None
Leave and Flexible Work Arrangements Incentive Program	No	Yes	No	No
Wait list at onsite childcare	12months	12 months	24 months	24 months
Hours of operation of onsite childcare	24 hours	7:00 AM - 8:00 PM	7:00 AM – 5:30 PM	7:00 AM – 5:30 PM
Childcare facility for sick children	Yes	No	Yes	No
Adult care direct services	None	Back-up in home services	Drop-off center	None
Resources and referrals	None	Children and Adults	Adults	None
Universal monthly after tax payroll deduction	$150	$40	$75	$0
I choose	⬭	⬭	⬭	⬭

26. On a scale of 1 to 10, how certain are you of your answer to the previous question? *Select **1** if you are very uncertain and **10** if you are very certain.*

1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○

27. Which benefits package and payroll deduction do you prefer? If needed, you can hover on each benefits underlined, for additional information. *Check only one*

Additional benefits and services	**Option A: Benefits package and payroll deduction**	**Option B: Benefits package and payroll deduction**	**Option C: Benefits package and payroll deduction**	**Your current benefits package and payroll deduction**
Additional leave	3 more days of annual leave and 3 more days of sick leave	None	5 more days of annual leave	None
Leave and Flexible Work Arrangements Incentive Program	No	Yes	Yes	No
Wait list at onsite childcare	12 months	6 months	24 months	24 months
Hours of operation of onsite childcare	24 hours	7:00 AM – 5:30 PM	7:00 AM – 8:00 PM	7:00 AM – 5:30 PM
Childcare facility for sick children	No	Yes	Yes	No
Adult care direct services	Drop-off center	Back-up services	None	None
Resources and referrals	Adults	None	Adults and Children	None
Universal monthly after tax payroll deduction	$40	$100	$75	$0
I choose	⬭	⬭	⬭	⬭

28. On a scale of 1 to 10, how certain are you of your answer to the previous question? *Select **1** if you are very uncertain and **10** if you are very certain.*

1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○

29. which benefits package and payroll deduction do you prefer? If needed, you can hover on ach benefits underlined, for additional information. *Check only one*

Additional benefits and services	**Option A: Benefits package and payroll deduction**	**Option B: Benefits package and payroll deduction**	**Option C: Benefits package and payroll deduction**	**Your current benefits package and payroll deduction**
Additional leave	3 more days of sick leave	5 more days of annual leave	3 more days of annual leave and 3 more days of sick leave	None
Leave and Flexible Work Arrangements Incentive Program	Yes	No	Yes	No
Wait list at onsite childcare	24 months	12months	6 months	24 months
Hours of operation of onsite childcare	7:00 AM – 5:30 PM	7:00 AM – 8:00 PM	7:00 AM – 5:30 PM	7:00 AM – 5:30 PM
Childcare facility for sick children	Yes	No	No	No
Adult care direct services	Drop-off center	Back-up services	None	None
Resources and referrals	Children	Adults	None	None
Universal monthly after tax payroll deduction	$150	$40	$10	$0
I choose	⬭	⬭	⬭	⬭

30. On a scale of 1 to 10, how certain are you of your answer to the previous question? *Select **1** if you are very uncertain and **10** if you are very certain.*

1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○

31. Which benefits package and payroll deduction do you prefer? If needed, you can hover on each benefits underlined, for additional information. *Check only one*

Additional benefits and services	**Option A: Benefits package and payroll deduction**	**Option B: Benefits package and payroll deduction**	**Option C: Benefits package and payroll deduction**	**Your current ben package and pay deduction**
Additional leave	3 more days of annual leave	5 more days of sick leave	3 more days of sick leave	None
Leave and Flexible Work Arrangements Incentive Program	Yes	No	Yes	No
Wait list at onsite childcare	12 months	24 months	6 months	24 mont
Hours of operation of onsite childcare	7:00 AM – 8:00 PM	7:00 AM – 5:30 PM	24 hours	7:00 AM 5:30 PM
Childcare facility for sick children	Yes	No	No	No
Adult care direct services	Drop-off center	None	None	None
Resources and referrals	Children	Adults	Children and Adults	None
Universal monthly after tax payroll deduction	$125	$100	$40	$0
I choose	⬭	⬭	⬭	⬭

32. On a scale of 1 to 10, how certain are you of your answer to the previous question? *Select **1** if you are very uncertain and **10** if you are very certain.*

1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○

33. When choosing among the different options presented to you, which of the following option attributes, if any, did you ignore? *Select all that apply.*

1. Amount of annual leave
2. Amount of sick leave
3. Leave and flexible work arrangements incentive program
4. Wait list at onsite childcare
5. Extended hours at onsite childcare
6. Childcare facility for sick children
7. Drop-off adult care center
8. Back-up in-home adult care
9. Childcare resources and referrals
10. Adult care resources and referrals
11. Change from current HSC after tax salary
12. I did not ignore any option attribute

You and Your Household

34. How likely will you leave HSC within the next five years? *Check only one.*

Very unlikely	Unlikely	Likely	Very likely
○	○	○	○

35. Which of the following best describes you? *Check only one.*

1. I am married and live with my spouse
2. I am not married, but live with a domestic partner
3. I am married or partnered, but we reside in different locations
4. I am single and not partnered

36. How many people in the following age groups live in your household at least 50% of the time (do not count yourself). *Fill out every row.*

Age Group	Number of individuals
Age 2 and under	
Age 3-5	
Age 6-12	
Age 13-17	
Age 18-64	
Age 65-75	
Over age 75	

37. What is the highest degree or level of studies you have completed? *Check only one.*

    1. High school diploma or GED
    2. Some college but no degree
    3. Associate degree
    4. Bachelor's degree
    5. Master's degree
    6. Professional or Doctorate degree (e.g: MD, PhD, DDS, JD, PharmD, etc.)

38. What is the range that best describes your total household income before taxes in 2014? (Include wages, interests and any other income). *Check only one.*

    1. Less than $19,999
    2. $20,000 to $39,999
    3. $40,000 to $59,999
    4. $60,000 to $99,999
    5. $100,000 to $149,000
    6. $150,000 to $199,999
    7. $200,000 to $299,999
    8. $300,000 or more

39. Please take a moment to tell us what benefits you would like to see offered by UNM Health Sciences Center. List any benefits: they do not have to be child care or adult care related.

Thank you for taking this survey

Appendix B: Supplemental Materials of chapter 3

Table 3.6: Effect of patient-centered communication on general health, mental health, and health care quality: unweighted ordinal regressions

	General Health		Mental Health		Health care Quality	
	Pooled	Lagged	Pooled	Lagged	Pooled	Lagged
Patient-centered communication						
1 PCC component	0.27	0.102	0.114	0.106	0.621	0.351
	(0.092)***	(0.146)	(0.096)	(0.145)	(0.111)***	(0.187)*
2 PCC components	0.426	0.202	0.34	0.222	1.25	0.754
	(0.085)***	(0.135)	(0.089)***	(0.133)*	(0.100)***	(0.171)***
3 PCC components	0.621	0.339	0.545	0.338	1.693	1.107
	(0.082)***	(0.132)**	(0.087)***	(0.129)***	(0.097)***	(0.166)***
4 PCC components	0.68	0.394	0.621	0.432	1.916	1.27
	(0.082)***	(0.130)***	(0.086)***	(0.127)***	(0.096)***	(0.165)***
Health related covariates						
Comorbidities	-0.471	-0.465	-0.263	-0.261	-0.086	-0.075
	(0.005)***	(0.007)***	(0.005)***	(0.007)***	(0.006)***	(0.008)***
Currently smoke	-0.444	-0.462	-0.435	-0.445	-0.184	-0.233
	(0.021)***	(0.028)***	(0.022)***	(0.029)***	(0.026)***	(0.037)***
Insured	0.221	0.219	0.117	0.135	0.295	0.278
	(0.024)***	(0.033)***	(0.023)***	(0.033)***	(0.034)***	(0.052)***
Socio-economic & demographic covariates						
Income	0.048	0.047	0.044	0.044	0.008	0.015
	(0.003)***	(0.003)***	(0.003)***	(0.003)***	(0.003)***	(0.004)***
HSGD, GED, some college	0.354	0.732	0.784	1.521	-0.002	-1.398
	(0.406)	(0.339)**	(0.476)*	(0.646)**	(0.629)	(1.043)
Bachelor's or more	0.87	1.229	1.249	1.989	0.03	-1.359
	(0.406)**	(0.340)***	(0.477)***	(0.647)***	(0.629)	(1.044)

* p<0.1; ** p<0.05; *** p<0.01

Table 3.6 (Continued): Effect of patient-centered communication on general health, mental health, and health care quality: unweighted ordinal regressions

	General Health		Mental Health		Health care Quality	
	Pooled	Lagged	Pooled	Lagged	Pooled	Lagged
Non-Hispanic White	0.413	0.396	0.111	0.116	0.079	0.096
	(0.017)***	(0.023)***	(0.017)***	(0.024)***	(0.020)***	(0.029)***
Female	-0.139	-0.145	-0.101	-0.109	0.106	0.109
	(0.016)***	(0.018)***	(0.016)***	(0.017)***	(0.019)***	(0.023)***
Age	-0.062	-0.062	-0.039	-0.041	-0.002	0.001
	(0.003)***	(0.003)***	(0.003)***	(0.003)***	(0.003)	(0.004)
Agesqr	0.581	0.584	0.339	0.36	0.208	0.18
	(0.026)***	(0.034)***	(0.026)***	(0.034)***	(0.031)***	(0.043)***
Married	0.149	0.16	0.267	0.283	0.078	0.084
	(0.017)***	(0.023)***	(0.017)***	(0.023)***	(0.020)***	(0.028)***
Region-West	0.373	-0.064	0.376	0.061	-0.025	-0.059
	(0.032)***	(0.035)*	(0.032)***	(0.035)*	(0.037)	(0.042)
Region-South	0.384	-0.038	0.37	0.126	0.001	0.055
	(0.030)***	(0.032)	(0.030)***	(0.033)***	(0.035)	(0.039)
Region-Midwest	0.413	-0.006	0.372	-0.009	0.03	0.122
	(0.030)***	(0.035)	(0.030)***	(0.036)	(0.035)	(0.043)***
Panel12	0.431	0.419	0.428	0.405	0.034	-0.027
	(0.031)***	(0.044)***	(0.031)***	(0.046)***	(0.036)	(0.054)
Panel13	0.321	0.372	0.345	0.405	-0.048	-0.026
	(0.030)***	(0.042)***	(0.030)***	(0.043)***	(0.034)	(0.051)
Panel14	-0.082	0.432	0.06	0.419	-0.025	-0.018
	(0.024)***	(0.042)***	(0.024)**	(0.044)***	(0.028)	(0.051)
Panel15	-0.071	0.429	0.103	0.427	0.088	-0.024
	(0.022)***	(0.044)***	(0.022)***	(0.045)***	(0.026)***	(0.053)
Panel16	-0.023	0.332	-0.01	0.385	0.158	-0.086
	(0.025)	(0.042)***	(0.025)	(0.043)***	(0.029)***	(0.050)*
Year	0.041		-0.031		0.076	
	(0.011)***		(0.011)***		(0.015)***	
Cut1	-3.749	-2.653	-3.257	-2.653	0.138	-1.871
	(0.419)***	(0.666)***	(0.489)***	(0.666)***	(0.641)	(1.064)*
Cut2	-1.904	-0.912	-1.481	-0.912	2.588	0.577
	(0.419)***	(0.665)	(0.489)***	(0.665)	(0.641)***	(1.064)
Cut3	-0.108	0.953	0.36	0.953		
	(0.419)	(0.665)	(0.488)	(0.665)		
Cut4	1.583	2.328	1.742	2.328		
	(0.419)***	(0.665)***	(0.489)***	(0.665)***		
N	78,575	38,315	78,561	38,314	57,250	26,791
LL(Null)	-114120.70	-55466.43	-106292.60	-51960.52	-52077.16	-24172.79
LL	-103531.30	-50300.42	-101319.80	-49496.81	-50487.08	-23577.59
Df	28	27	28	27	26	25
AIC	207118.60	100654.80	202695.70	99047.62	101026.20	47205.17
BIC	207378.30	100885.80	202955.30	99278.57	101259.00	47410.07
Chi2	14823.04	8811.09	6882.71	4042.08	2559.36	935.19

* p<0.1; ** p<0.05; *** p<0.01

Table 3.7: Effect of patient-centered communication on general health, mental health, and health care quality: unweighted logistic regressions

	General Health		Mental Health		Health care Quality	
	Pooled	Lagged	Pooled	Lagged	Pooled	Lagged
Patient-centered communication						
1 PCC component	0.409	0.228	0.18	0.182	0.605	0.214
	(0.118)***	(0.192)	(0.129)	(0.207)	(0.137)***	(0.191)
2 PCC components	0.493	0.219	0.535	0.285	1.121	0.535
	(0.107)***	(0.176)	(0.120)***	(0.187)	(0.128)***	(0.175)***
3 PCC components	0.694	0.43	0.748	0.426	1.527	0.884
	(0.103)***	(0.170)**	(0.115)***	(0.179)**	(0.125)***	(0.170)***
4 PCC components	0.774	0.48	0.862	0.54	1.746	1.03
	(0.101)***	(0.168)***	(0.114)***	(0.176)***	(0.124)***	(0.168)***
Health related covariates						
Comorbidities	-0.5	-0.501	-0.327	-0.325	-0.072	-0.061
	(0.008)***	(0.010)***	(0.009)***	(0.011)***	(0.006)***	(0.008)***
Currently smoke	-0.438	-0.412	-0.56	-0.541	-0.115	-0.157
	(0.030)***	(0.040)***	(0.035)***	(0.046)***	(0.026)***	(0.037)***
Insured	0.217	0.147	-0.109	-0.129	0.218	0.188
	(0.035)***	(0.050)***	(0.046)**	(0.063)**	(0.033)***	(0.050)***
Socio-economic & demographic covariates						
Income	0.077	0.074	0.074	0.065	0.003	0.01
	(0.003)***	(0.004)***	(0.004)***	(0.005)***	(0.003)	(0.004)**
HSGD,GED,some college	0.107	-0.497	1.072	1.493	-0.262	-1.377
	(0.516)	(0.846)	(0.518)**	(0.671)**	(0.499)	(1.081)
Bachelor's or more	0.743	0.078	1.613	2.036	-0.281	-1.377
	(0.517)	(0.846)	(0.520)***	(0.672)***	(0.499)	(1.081)
Non-Hispanic White	0.432	0.428	0.132	0.15	0.051	0.065
	(0.026)***	(0.035)***	(0.032)***	(0.042)***	(0.020)**	(0.029)**
Female	-0.05	-0.062	0.017	0.004	0.121	0.123
	(0.025)**	(0.030)**	(0.031)	(0.037)	(0.020)***	(0.024)***

* p<0.1; ** p<0.05; *** p<0.01

Table 3.7 (Continued): Effect of patient-centered communication on general health, mental health, and health care quality: unweighted logistic regressions

	General Health		Mental Health		Health care Quality	
	Pooled	Lagged	Pooled	Lagged	Pooled	Lagged
Female	-0.05	-0.062	0.017	0.004	0.121	0.123
	(0.025)**	(0.030)**	(0.031)	(0.037)	(0.020)***	(0.024)***
Age	-0.065	-0.06	-0.036	-0.036	0.002	0.003
	(0.004)***	(0.005)***	(0.005)***	(0.006)***	(0.003)	(0.005)
Agesqr	0.594	0.561	0.347	0.337	0.175	0.156
	(0.039)***	(0.051)***	(0.049)***	(0.061)***	(0.032)***	(0.044)***
Married	0.304	0.334	0.576	0.623	0.056	0.065
	(0.026)***	(0.035)***	(0.032)***	(0.043)***	(0.021)***	(0.029)**
Region-West	0.551	-0.048	0.555	0.077	-0.07	-0.046
	(0.054)***	(0.051)	(0.068)***	(0.062)	(0.039)*	(0.043)
Region-South	0.532	-0.024	0.593	0.057	-0.04	0.076
	(0.051)***	(0.046)	(0.064)***	(0.056)	(0.037)	(0.040)*
Region-Midwest	0.662	0.155	0.539	0.156	-0.014	0.13
	(0.051)***	(0.054)***	(0.063)***	(0.064)**	(0.037)	(0.044)***
Panel12	0.602	0.681	0.562	0.726	-0.007	-0.069
	(0.053)***	(0.072)***	(0.065)***	(0.089)***	(0.038)	(0.057)
Panel13	0.505	0.585	0.5	0.717	-0.08	-0.063
	(0.051)***	(0.068)***	(0.064)***	(0.084)***	(0.036)**	(0.053)
Panel14	-0.079	0.676	0.08	0.644	0.023	-0.056
	(0.038)**	(0.069)***	(0.046)*	(0.083)***	(0.029)	(0.053)
Panel15	-0.069	0.593	0.058	0.663	0.115	-0.058
	(0.035)**	(0.070)***	(0.042)	(0.085)***	(0.027)***	(0.055)
Panel16	0.106	0.525	0.152	0.618	0.17	-0.127
	(0.040)***	(0.067)***	(0.048)***	(0.083)***	(0.030)***	(0.052)**
Year	0.116		0.016		0.071	
	(0.017)***		(0.021)		(0.015)***	
Cut1	1.639	2.562	0.548	0.393	-2.119	-0.289
	(0.536)***	(0.873)***	(0.545)	(0.712)	(0.522)***	(1.102)
N	78,575	38,315	78,561	38,314	57,250	26,791
LL(Null)	-36844.18	-17694.41	-24765.31	-12148.33	-39634.27	-18531.76
LL	-30120.69	-14452.83	-22030.02	-10809.46	-38381.83	-18053.64
Df	25	24	25	24	25	24
AIC	60291.38	28953.66	44110.03	21666.91	76813.66	36155.29
BIC	60523.18	29158.95	44341.82	21872.20	77037.54	36351.99
Chi2	8101.94	4804.23	4063.48	2470.16	1979.19	779.53

* p<0.1; ** p<0.05; *** p<0.01

Table 3.8: Effect of patient-centered communication on general health, mental health, and health care quality:IPW weighted regressions

	General Health		Mental Health		Health care Quality	
	Pooled	Lagged	Pooled	Lagged	Pooled	Lagged
Patient-centered communication						
1 PCC component	0.363	0.235	0.169	0.187	0.574	0.184
	(0.119)***	(0.191)	(0.128)	(0.21)	(0.140)***	(0.195)
2 PCC components	0.476	0.22	0.533	0.248	1.1	0.483
	(0.107)***	(0.174)	(0.120)***	(0.189)	(0.129)***	(0.179)***
3 PCC components	0.683	0.436	0.744	0.413	1.516	0.829
	(0.103)***	(0.168)***	(0.115)***	(0.181)**	(0.127)***	(0.173)***
4 PCC components	0.762	0.483	0.862	0.527	1.736	0.975
	(0.102)***	(0.166)***	(0.113)***	(0.178)***	(0.126)***	(0.171)***
Health related covariates						
Comorbidities	-0.512	-0.495	-0.342	-0.348	-0.101	-0.114
	(0.020)***	(0.031)***	(0.022)***	(0.028)***	(0.015)***	(0.023)***
Currently smoke	-0.371	-0.379	-0.496	-0.573	-0.076	-0.086
	(0.077)***	(0.112)***	(0.085)***	(0.130)***	(0.068)	(0.098)
Insured	0.207	0.023	-0.061	-0.145	0.244	0.266
	(0.088)**	(0.145)	(0.111)	(0.169)	(0.079)***	(0.126)**
Socio-economic & demographic covariates						
Income	0.066	0.066	0.052	0.038	-0.011	0.011
	(0.009)***	(0.013)***	(0.011)***	(0.016)**	(0.009)	(0.011)
HSGD,GED, some college	-0.033	-0.411	0.809	2.613	-1.322	-1.893
	(0.669)	(0.905)	(0.666)	(0.910)***	(0.938)	(1.224)
Bachelor's or more	0.854	0.312	1.665	3.6	-1.392	-1.926
	(0.674)	(0.911)	(0.673)**	(0.916)***	(0.938)	(1.228)
Non-Hispanic White	0.354	0.355	0.153	0.056	-0.001	0.15
	(0.065)***	(0.097)***	(0.079)*	(0.11)	(0.05)	(0.079)*
Female	-0.121	-0.124	-0.07	-0.05	0.037	0.034
	(0.064)*	(0.083)	(0.077)	(0.097)	(0.051)	(0.072)
Age	-0.052	-0.039	-0.034	-0.009	0.003	0.009
	(0.011)***	(0.014)***	(0.012)***	(0.017)	(0.009)	(0.013)
Agesqr	0.495	0.397	0.398	0.134	0.217	0.097
	(0.098)***	(0.134)***	(0.113)***	(0.172)	(0.082)***	(0.121)
Married	0.329	0.411	0.415	0.648	0.054	0.043
	(0.066)***	(0.098)***	(0.081)***	(0.122)***	(0.053)	(0.082)
Region-West	0.996	-0.006	0.935	0.243	0.04	-0.14
	(0.135)***	(0.134)	(0.166)***	(0.165)	(0.092)	(0.114)
Region-South	0.908	-0.039	1.029	0.195	0.075	0.196
	(0.122)***	(0.125)	(0.156)***	(0.147)	(0.089)	(0.111)*

* p<0.1; ** p<0.05; *** p<0.01

Table 3.8 (Continued): Effect of patient-centered communication on general health, mental health, and health care quality:IPW weighted regressions

	General Health		Mental Health		Health care Quality	
	Pooled	Lagged	Pooled	Lagged	Pooled	Lagged
Region-South	0.908	-0.039	1.029	0.195	0.075	0.196
	(0.122)***	(0.125)	(0.156)***	(0.147)	(0.089)	(0.111)*
Region-Midwest	0.908	0.174	0.701	0.366	-0.106	0.214
	(0.125)***	(0.147)	(0.154)***	(0.161)**	(0.087)	(0.124)*
Panel12	0.871	0.845	0.775	0.988	0.107	-0.09
	(0.129)***	(0.188)***	(0.170)***	(0.210)***	(0.104)	(0.16)
Panel13	0.915	0.716	0.74	1.077	0.016	-0.218
	(0.127)***	(0.184)***	(0.155)***	(0.197)***	(0.094)	(0.144)
Panel14	-0.053	0.73	0.136	0.725	-0.114	-0.109
	(0.091)	(0.184)***	(0.115)	(0.197)***	(0.072)	(0.156)
Panel15	-0.019	0.725	0.117	0.951	0.195	-0.19
	(0.085)	(0.202)***	(0.107)	(0.242)***	(0.074)***	(0.151)
Panel16	0.136	0.649	0.224	0.833	0.133	-0.071
	(0.1)	(0.204)***	(0.123)*	(0.214)***	(0.076)*	(0.148)
Year	0.15		0.039		0.072	
	(0.057)***		(0.067)		(0.045)	
Cut1	1.23	1.909	0.451	-1.554	-1.024	0.191
	(0.733)*	(0.999)*	(0.749)	(1.036)	(0.972)	(1.292)
N	78,575	38,315	78,561	38,314	57,250	26,791
LL(Null)	-208264.80	-97558.07	-155522.20	-70491.10	-189749.40	-90448.78
LL	-167598.90	-79491.17	-136420.10	-61056.77	-172126.90	-85949.57
Df	25	24	25	24	25	24
AIC	335247.70	159030.30	272890.20	122161.50	344303.80	171947.10
BIC	335479.50	159235.60	273122.00	122366.80	344527.70	172143.80
Chi2	1422.59	661.79	731.06	510.26	1169.64	318.20

* p<0.1; ** p<0.05; *** p<0.01

Appendix C: Supplemental Materials of Chapter 4

Table 4.3.b.: Effect of cultural barriers and disabilities on access to care and face-to-face doctor-patient communication (Coefficients).

	Unmatched		Matched	
	Treatment2	Treatment3	Treatment2	Treatment3
Foreign born	-0.107	-0.153	-0.097	-0.15
	(0.045)**	(0.052)***	(0.045)**	(0.052)***
Non-English proficient	-0.115	-0.623	-0.103	-0.62
	(0.067)*	(0.085)***	(0.067)	(0.086)***
Mental disability	-0.176	-0.211	-0.209	-0.216
	(0.066)***	(0.090)**	(0.066)***	(0.090)**
Social disability	-0.044	-0.318	-0.04	-0.314
	(0.064)	(0.089)***	(0.065)	(0.089)***
Physical disability	-0.192	-0.531	-0.18	-0.529
	(0.042)***	(0.052)***	(0.042)***	(0.052)***
Comorbidities	-0.037	-0.101	-0.037	-0.102
	(0.011)***	(0.014)***	(0.011)***	(0.014)***
Insured	0.058	0.214	0.08	0.215
	(0.049)	(0.061)***	(0.049)*	(0.061)***
Currently smoke	-0.174	-0.308	-0.154	-0.303
	(0.045)***	(0.053)***	(0.045)***	(0.053)***
BMI	0.001	0.005	0.001	0.005
	(0.003)	(0.003)*	(0.003)	(0.003)*
Preventive care	0.128	0.256	0.129	0.255
	(0.041)***	(0.047)***	(0.041)***	(0.047)***
Student	0.062	0.204	0.078	0.204
	(0.088)	(0.094)**	(0.088)	(0.094)**
Retired	-0.025	0.004	0.009	0.014
	(0.062)	(0.076)	(0.062)	(0.077)
Unemployed	0.01	-0.116	-0.013	-0.121
	(0.047)	(0.056)**	(0.047)	(0.056)**
Income	0.003	-0.006	0.001	-0.006
	(0.006)	(0.007)	(0.006)	(0.007)
Age	-0.035	-0.006	0.021	0.002
	(0.061)	(0.074)	(0.062)	(0.074)
Agesqr	0.006	0.003	-0.001	0.002
	(0.006)	(0.007)	(0.006)	(0.007)

Table 4.3.b.(Continued): Effect of cultural barriers and individual disabilities on access to care and face-to-face doctor-patient communication (Coefficients).

	Unmatched		Matched	
	Treatment2	Treatment3	Treatment2	Treatment3
Female	-0.001	-0.066	-0.015	-0.071
	(0.033)	(0.039)*	(0.033)	(0.039)*
Non-Hispanic White	0.146	0.147	0.152	0.149
	(0.035)***	(0.042)***	(0.035)***	(0.042)***
Bachelor	-0.035	-0.132	-0.037	-0.13
	(0.044)	(0.051)***	(0.045)	(0.051)**
Married	0.151	0.285	0.143	0.28
	(0.006)	(0.007)	(0.036)***	(0.043)***
Region: West	0.008	-0.475	0.006	-0.474
	(0.051)	(0.058)***	(0.051)	(0.058)***
Region: Midwest	0.203	0.006	0.211	0.011
	(0.055)***	(0.061)	(0.055)***	(0.061)
Region: South	0.166	-0.4	0.119	-0.408
	(0.050)***	(0.057)***	(0.050)**	(0.057)***
MSA	0.062	0.525	0.153	0.543
	(0.044)	(0.053)***	(0.044)***	(0.053)***
Panel12: 2007-2008	-0.249	-0.342	-0.251	-0.341
	(0.072)***	(0.085)***	(0.073)***	(0.085)***
Panel13: 2008-2009	-0.148	-0.285	-0.157	-0.283
	(0.070)**	(0.082)***	(0.070)**	(0.082)***
Panel14: 2009-2010	-0.195	-0.208	-0.189	-0.204
	(0.069)***	(0.082)**	(0.070)***	(0.082)**
Panel15: 2010-2011	-0.052	-0.172	-0.057	-0.171
	(0.071)	(0.085)**	(0.071)	(0.085)**
Panel16: 2011-2012	-0.102	-0.144	-0.117	-0.143
	(0.07)	(0.083)*	(0.070)*	(0.083)*
Year	-0.01	0.115	0.012	0.122
	(0.031)	(0.033)***	(0.031)	(0.033)***
Constant	0.584	0.037	0.421	0.009
	(0.181)***	(0.219)	(0.182)**	(0.219)
N		40,835		40355
LL		-8.43E+08		-8.37E+08
BIC		1.69E+09		1.67E+09
AIC		1.69E+09		1.67E+09

* p<0.1; ** p<0.05; *** p<0.01; Standard errors in parenthesis.

Appendix D: Stata Code

Chapter 2 Code

*********RPL: main effect model
mixlogit choice , rand(sickleave anleave incentivep waitlist hours24 hours12 sickchildren childrefonly adultrefonly bothref adultdrop adultback ncost) group(case) id(id) nrep(500) robust
mixlbeta sickleave anleave incentivep waitlist hours24 hours12 sickchildren childrefonly adultrefonly bothref adultdrop adultback ncost id, saving(RPLnointerel) replace

*********RPL: two way inetarction model effect model
mixlogit choice , rand(sickleave anleave incentivep waitlist hours24 hours12 sickchildren childrefonly adultrefonly bothref adultdrop adultback sickincentive anincentive ncost) group(case) id(id) nrep(500) robust
mixlbeta sickleave anleave incentivep waitlist hours24 hours12 sickchildren childrefonly adultrefonly bothref adultdrop adultback ncost sickincentive anincentive id, saving(RPLinterel) replace

* Calculating wtp
gen wtpsickleave = sickleave/ ncost
gen wtpanleave = anleave/ ncost
gen wtpincentivep = incentivep/ ncost
gen wtpwaitlist = waitlist/ ncost
gen wtphours24 = hours24/ ncost
gen wtphours12 = hours12/ ncost
gen wtpsickchildren = sickchildren/ ncost
gen wtpchildrefonly = childrefonly/ ncost
gen wtpadultrefonly = adultrefonly/ ncost
gen wtpbothref = bothref/ ncost
gen wtpadultdrop = adultdrop/ ncost
gen wtpadultback = adultback/ ncost

* Calculate the mean
mean wtpsickleave wtpanleave wtpincentivep wtpwaitlist wtphours24 wtphours12 wtpsickchildren wtpchildrefonly wtpadultrefonly wtpbothref wtpadultdrop wtpadultback
*calculate the median
centile wtpsickleave wtpanleave wtpincentivep wtpwaitlist wtphours24 wtphours12 wtpsickchildren wtpchildrefonly wtpadultrefonly wtpbothref wtpadultdrop wtpadultback, centile(50) normal

Chapter 3 Code

clear
cap log close
version 13
set more off
log using E:\MEPS\Statafiles\Panel\CommunicationRating\healthrate.log, replace
use "E:\MEPS\Statafiles\Panel\Panel\Reshape.dta"
egen ID_DUID = group(ID DUID)

****
*POOLED DATA
****

```
**********1. GENERATING BINARY OUTCOME VARIABLES
*Generating binary outcomes variables
gen birating  = 0 if Rating == 1 | Rating ==2
replace birating = 1 if Rating == 3

gen biphealth = 0 if Phealth == 1 | Phealth == 2
replace biphealth = 1 if Phealth == 3| Phealth == 4 | Phealth == 5

gen bimhealth = 0 if Mhealth == 1 | Mhealth == 2
replace bimhealth = 1 if Mhealth == 3| Mhealth == 4 | Mhealth == 5

********** 2. GENERATING TREATMENT VARIABLES
*Generating the treatment variable communication as the sum  of culturalcompetency + coordination +
decision + patientcentered
gen communication = com_explop + com_patientcentered + com_decision + com_coordination

*generating binary treatment variables
gen communication1 = 1 if communication == 1
replace communication1 = 0 if communication == 0

gen communication2 = 1 if communication== 2
replace communication2 = 0 if communication == 0

gen communication3 = 1 if communication == 3
replace communication3 = 0 if communication == 0

gen communication4 = 1 if communication== 4
replace communication4 = 0 if communication == 0

**********3. OTHER INDEPENDENT VARIABLES

global xlist comorbidities  smoke insured  plnincome GED bachelor whiteNH female age agesqr1000
married  panel12 panel13 panel14 panel15 panel16   west south midwest year

********** 4. GENERATING INVERSE PROBABILITY WEIGHTS
ologit communication $xlist, vce(cluster ID_DUID )
predict pscommunication0  pscommunication1  pscommunication2 pscommunication3 pscommunication4
sum pscommunication0  pscommunication1  pscommunication2 pscommunication3 pscommunication4

gen ipwcommunication = 1/pscommunication0 if communication == 0 & age >= 19
replace ipwcommunication = 1/pscommunication1 if communication == 1 & age >= 19
replace ipwcommunication = 1/pscommunication2 if communication == 2 & age >= 19
replace ipwcommunication = 1/pscommunication3 if communication == 3 & age >= 19
replace ipwcommunication= 1/pscommunication4 if communication== 4 & age >= 19

********** 5. INVERSE PROBABILITY WEIGHTING: OLOGIT
ologit Phealth  i.communication  $xlist [pw =ipwcommunication] if age >= 19, vce(cluster ID_DUID  )
margins  i.communication  , predict(outcome(1))
saving(E:\MEPS\Statafiles\Panel\CommunicationRating\fileOP11, replace)
margins  i.communication , predict(outcome(2))
saving(E:\MEPS\Statafiles\Panel\CommunicationRating\fileOP21, replace)
margins  i.communication , predict(outcome(3))
saving(E:\MEPS\Statafiles\Panel\CommunicationRating\fileOP31, replace)
margins  i.communication , predict(outcome(4))
saving(E:\MEPS\Statafiles\Panel\CommunicationRating\fileOP41, replace)
```

```
margins  i.communication , predict(outcome(5))
saving(E:\MEPS\Statafiles\Panel\CommunicationRating\fileOP51, replace)

ologit Mhealth  i.communication $xlist [pw =ipwcommunication] if age >= 19, vce(cluster ID_DUID  )
margins  i.communication  , predict(outcome(1))
saving(E:\MEPS\Statafiles\Panel\CommunicationRating\fileOM11, replace)
margins  i.communication , predict(outcome(2))
saving(E:\MEPS\Statafiles\Panel\CommunicationRating\fileOM21, replace)
margins  i.communication , predict(outcome(3))
saving(E:\MEPS\Statafiles\Panel\CommunicationRating\fileOM31, replace)
margins  i.communication , predict(outcome(4))
saving(E:\MEPS\Statafiles\Panel\CommunicationRating\fileOM41, replace)
margins  i.communication , predict(outcome(5))
saving(E:\MEPS\Statafiles\Panel\CommunicationRating\fileOM51, replace)

ologit Rating  i.communication  $xlist [pw =ipwcommunication] if age >= 19, vce(cluster ID_DUID  )
margins  i.communication  , predict(outcome(1))
saving(E:\MEPS\Statafiles\Panel\CommunicationRating\fileOR11, replace)
margins  i.communication , predict(outcome(2))
saving(E:\MEPS\Statafiles\Panel\CommunicationRating\fileOR21, replace)
margins  i.communication , predict(outcome(3))
saving(E:\MEPS\Statafiles\Panel\CommunicationRating\fileOR31, replace)
margins  i.communication , predict(outcome(4))
saving(E:\MEPS\Statafiles\Panel\CommunicationRating\fileOR41, replace)
margins  i.communication , predict(outcome(5))
saving(E:\MEPS\Statafiles\Panel\CommunicationRating\fileOR51, replace)

********** 6. INVERSE PROBABILITY WEIGHTING: LOGIT

logit biphealth  i.communication   $xlist [pw =ipwcommunication] if age >= 19, vce(cluster ID_DUID  )
logit bimhealth  i.communication  $xlist [pw =ipwcommunication] if age >= 19, vce(cluster ID_DUID  )
logit birating  i.communication   $xlist [pw =ipwcommunication] if age >= 19, vce(cluster ID_DUID  )

********** 7.  PROPENSITY SCORE MATCHING
global xlist comorbidities  smoke insured  plnincome GED bachelor whiteNH female age agesqr1000
married  panel12 panel13 panel14 panel15 panel16   west south midwest year

*1. Estimation of the propensity score and balancing test (before) matching over the common support
region
pscore communication1 $xlist, pscore(pscomm1 ) comsup

*Matching , balancing test, and bootstrap estimation of average treatment effects
set seed 12345
psmatch2 communication1 $xlist if age >= 19, outcome(biphealth ) neighbor(1)  common  logit ties
pstest ,both
bs "psmatch2 communication1  $xlist if age >= 19, out(biphealth) neighbor(1) common  logit ties" "r(att)"

psmatch2 communication1  $xlist  if age >= 19, outcome(biphealth ) neighbor(4)  common  logit ties
pstest ,both
bs "psmatch2 communication1  $xlist  if age >= 19, out(biphealth) neighbor(4) common  logit ties" "r(att)"

psmatch2 communication1 $xlist if age >= 19, outcome(bimhealth ) neighbor(1)  common  logit ties
pstest ,both
bs "psmatch2 communication1 $xlist if age >= 19 , out(bimhealth) neighbor(1)  common  logit ties" "r(att)"

psmatch2 communication1 $xlist if age >= 19, outcome(bimhealth ) neighbor(4)  common  logit ties
```

```
pstest ,both
bs "psmatch2 communication1 $xlist if age >= 19 , out(bimhealth) neighbor(4) common  logit ties" "r(att)"

psmatch2 communication1 $xlist if age >= 19, outcome(birating ) neighbor(1)  common  logit ties
pstest ,both
bs "psmatch2 communication1 $xlist if age >= 19, out(birating ) neighbor(1)  common  logit ties" "r(att)"

psmatch2 communication1 $xlist if age >= 19, outcome(birating ) neighbor(4)  common  logit ties
pstest ,both
bs "psmatch2 communication1 $xlist if age >= 19 , out(birating) neighbor(4) common  logit ties" "r(att)"

**********communication2
global xlist2 comorbidities  smoke plnincome GED bachelor whiteNH female age agesqr1000  married
panel12 panel13 panel14 panel15 panel16   south midwest year
pscore communication2 $xlist2, pscore(pscomm22 ) comsup

psmatch2 communication2 $xlist2 if age >= 19, outcome(biphealth ) neighbor(1)  common  logit ties
pstest ,both
bs "psmatch2 communication2  $xlist2 if age >= 19, out(biphealth) neighbor(1) common  logit ties" "r(att)"

psmatch2 communication2  $xlist2 if age >= 19, outcome(biphealth ) neighbor(4)  common  logit ties
pstest ,both
bs "psmatch2 communication2  $xlist2 if age >= 19 , out(biphealth) neighbor(4) common  logit ties"
"r(att)"

psmatch2 communication2 $xlist2 if age >= 19, outcome(bimhealth ) neighbor(1)  common  logit ties
pstest ,both
bs "psmatch2 communication2 $xlist2 if age >= 19 , out(bimhealth) neighbor(1)  common  logit ties"
"r(att)"

psmatch2 communication2 $xlist2 if age >= 19, outcome(bimhealth ) neighbor(4)  common  logit ties
pstest ,both
bs "psmatch2 communication2 $xlist2 if age >= 19 , out(bimhealth) neighbor(4) common  logit ties"
"r(att)"

psmatch2 communication2 $xlist2 if age >= 18, outcome(birating ) neighbor(1)  common  logit ties
pstest ,both
bs "psmatch2 communication2 $xlist2 if age >= 19 , out(birating ) neighbor(1)  common  logit ties" "r(att)"

psmatch2 communication2 $xlist2 if age >= 19, outcome(birating ) neighbor(4)  common  logit ties
pstest ,both
bs "psmatch2 communication2 $xlist2 if age >= 19  , out(birating) neighbor(4) common  logit ties" "r(att)"


**********communication3
global xlist3 comorbidities     plnincome GED bachelor whiteNH female age agesqr1000  married  panel12
panel13 panel14 panel15 panel16   west south midwest year

pscore communication3 $xlist3, pscore(pscomm3333 ) comsup
psmatch2 communication3 $xlist3 if age >= 19, outcome(biphealth ) neighbor(1)  common  logit ties
pstest ,both
bs "psmatch2 communication3  $xlist3 if age >= 19, out(biphealth) neighbor(1) common  logit ties" "r(att)"

psmatch2 communication3  $xlist3 if age >= 19, outcome(biphealth ) neighbor(4)  common  logit ties
pstest ,both
```

```
bs "psmatch2 communication3  $xlist3 if age >= 19 , out(biphealth) neighbor(4) common  logit ties"
"r(att)"

psmatch2 communication3 $xlist3 if age >= 19, outcome(bimhealth ) neighbor(1)  common  logit ties
pstest ,both
bs "psmatch2 communication3 $xlist3 if age >= 19, out(bimhealth) neighbor(1)  common  logit ties"
"r(att)"

psmatch2 communication3 $xlist3 if age >= 19, outcome(bimhealth ) neighbor(4)  common  logit ties
pstest ,both
bs "psmatch2 communication3 $xlist3 if age >= 19, out(bimhealth) neighbor(4) common  logit ties" "r(att)"

psmatch2 communication3 $xlist3 if age >= 19, outcome(birating ) neighbor(1)  common  logit ties
pstest ,both
bs "psmatch2 communication3 $xlist3 if age >= 19, out(birating ) neighbor(1)  common  logit ties" "r(att)"

psmatch2 communication3 $xlist3 if age >= 19, outcome(birating ) neighbor(4)  common  logit ties
pstest ,both
bs "psmatch2 communication3 $xlist3 if age >= 19  , out(birating) neighbor(4) common  logit ties" "r(att)"
outreg using E:\MEPS\Statafiles\Panel\CommunicationRating\Results\communication3, title(rating)
starlevels(10 5 1) bdec(3) varlabels se    ctitle("","r5")  summstat(F \ r2_a\N) summtitle(F statistic \
Adjusted R-squared\N) summdec(1 2) merge

**********communication4
global xlist4 comorbidities  insured  plnincome GED bachelor whiteNH female age agesqr1000  married
panel12 panel13 panel14 panel15 panel16   west south midwest year

pscore communication4 $xlist4, pscore(pscom44) comsup

psmatch2 communication4 $xlist4 if age >= 19, outcome(biphealth ) neighbor(1)  common  logit ties
pstest ,both
bs "psmatch2 communication4  $xlist4 if age >= 19, out(biphealth) neighbor(1) common  logit ties" "r(att)"

psmatch2 communication4  $xlist4 if age >= 19, outcome(biphealth ) neighbor(4)  common  logit ties
pstest ,both
bs "psmatch2 communication4  $xlist4  if age >= 19, out(biphealth) neighbor(4) common  logit ties"
"r(att)"

psmatch2 communication4 $xlist4 if age >= 19, outcome(bimhealth ) neighbor(1)  common  logit ties
pstest ,both
bs "psmatch2 communication4 $xlist4 if age >= 19, out(bimhealth) neighbor(1)  common  logit ties"
"r(att)"

set seed 12345
psmatch2 communication4 $xlist4 if age >= 19, outcome(bimhealth ) neighbor(4)  common  logit ties
pstest ,both
bs "psmatch2 communication4 $xlist4 if age >= 19, out(bimhealth) neighbor(4) common  logit ties" "r(att)"

psmatch2 communication4 $xlist4 if age >= 19, outcome(birating ) neighbor(1)  common  logit ties
pstest ,both
bs "psmatch2 communication4 $xlist4 if age >= 19 , out(birating ) neighbor(1)  common  logit ties" "r(att)"

psmatch2 communication4 $xlist4 if age >= 19, outcome(birating ) neighbor(4)  common  logit ties
pstest ,both
bs "psmatch2 communication4 $xlist4 if age >= 19 , out(birating) neighbor(4) common  logit ties" "r(att)"
```

Chapter 4 Code

```
clear
cap log close
version 13
set more off
svyset [pweight=LONGWT], strata(VARSTR) psu(VARPSU)
egen ID_DUID = group(ID DUID)
xtset ID_DUID year

*Dropping individuals age 18 and younger and with missing data on  ER expenditures
drop if age <18
drop if erexp == .

*****************************************************
**************1. GENERATING TREATMENT VARIABLES
*****************************************************
*Patient-centered communication
gen communication = com_explop + com_patientcentered + com_decision + com_coordination
gen communication4 = 1 if communication== 4
replace communication4 = 0 if communication == 0| communication == 1| communication == 2 |
communication == 3

*Treatment variable: 3 levels
gen treatment = 1 if communication4 == 0 & access_contact == 0
replace treatment = 2 if communication4 == 1 & access_contact == 0
replace treatment = 2 if communication4 == 0 & access_contact == 1
replace treatment = 3 if communication4 == 1 & access_contact == 1

* Dummy treatment variables
gen treatment1 = 1 if  treatment == 1
replace treatment1 = 0 if  treatment == 2 | treatment == 3

gen treatment2 = 1 if  treatment == 2
replace treatment2 = 0 if  treatment == 1  | treatment == 3

gen treatment3 = 1 if  treatment == 3
replace treatment3 = 0 if  treatment == 1  | treatment == 2

*****************************************************
**************2.INDEPENDENT VARIABLES
*****************************************************
gen age2 = age/10
gen age2sqr = age2*age2
* By subcategories
global xtime2  panel12 panel13 panel14 panel15 panel16 year
global xlocation2 west midwest  south  msa
global xdemographic2  age2 age2sqr  female  whiteNH   bachelor married
global xeconomic2 student retired unemployed  lnincome
global xertot  comorbidities  insured  smoke bmi prevent $xeconomic2 $xdemographic2 $xlocation2
$xtime2
```

```
**************************************************
**********3.PROPPENSITY SCORE MATCHING: 1 Neighnor, caliper = 0.01
**************************************************

**********CONSTRUCTING MATCHING SAMPLE FOR THE FIRST TREATMENT GROUP
* Before matching testing and balancing treatment3 on the common support region and saving resulting variables in xtreat2
pscore treatment2  insured  smoke  student retired unemployed  lnincome age2 age2sqr female bachelor west midwest  south  msa panel12 panel14  panel16 year, pscore(pscore21)  logit comsup
global xtreat2 insured  smoke  student retired unemployed  lnincome age2 age2sqr female bachelor west midwest  south  msa panel12 panel14  panel16 year

* Matching treatment2  using xtreat2
set seed 12345
psmatch2 treatment2 $xtreat2,  outcome(erexp)  noreplace neighbor(1) cal(0.01)
*Balancing test after matching
pstest
* Checking the common sopport region to make sure there is enought overlap between the treatment and control group to make reasonable comparison
psgraph, saving(hist2c, replace)  xtitle("Treatment2")
*retreiving and renaming the generated id of observations and their matches n1
sort  _id
rename _id id2c
rename _n1 n2c
rename _treated treated2c
rename _pscore pscore2c
sum id2c  ID n2c treated2c treatment2
tab treated2c
* generating the matched sample for treatment2
gen match2c=n2c
replace match2c=id2c if match2c==.
duplicates tag match2c, gen(dup2c)
tab dup2c
// The dup2 == 1 is an indicator of the matched sample for treatment2*/

* compare _pscores before matching & save graph to disk
twoway (kdensity pscore2c if treated2c==1) (kdensity pscore2c if treated2c==0, ///
lpattern(dash)), legend( label( 1 "treated") label( 2 "control" ) ) ///
xtitle("Treatment2: Propensity scores BEFORE matching") saving(before2c, replace)

* compare _pscores *after* matching & save graph to disk
twoway (kdensity pscore2c if treated2c==1) (kdensity pscore2c if treated2c==0 ///
& dup2 >0, lpattern(dash)), legend( label( 1 "treated") label( 2 "control" )) ///
xtitle("Treatment2: Propensity scores AFTER matching") saving(after2c, replace)

*combine these two graphs that were saved to disk put both graphs on y axes with common scales
graph combine before2c.gph after2c.gph , ycommon


********** CONSTRUCTING MATCHING SAMPLE FOR THE SECOND TREATMENT GROUP
* Before matching testing and balancing treatment3 on the common support region and saving resulting variables in xtreat3
pscore treatment3  insured  retired  female  bachelor married  midwest  panel15 panel16 year , pscore(pscore32)  logit comsup
global xtreat3  insured  retired  female  bachelor married  midwest  panel15 panel16 year
```

```
* Matching treatment3  using xtreat3

psmatch2 treatment3 $xtreat3,  outcome(erexp)  noreplace neighbor(1)
*Balancing test after matching
pstest
* Checking the common sopport region to make sure there is enought overlap between the treatment and
control group to make reasonable comparison
psgraph, saving(hist3c, replace) xtitle("Treatment3")
*retreiving and renaming the generated _id of observations and their matched _n1
sort  _id
rename _id id3c
rename _n1 n3c
rename _treated treated3c
rename _pscore pscore3c
sum id3  ID treated3c
* generating the matched sample for treatment2
* generating the matched sample for treatment2
*Constructing matching sample
gen match3c=n3c
replace match3c=id3c if match3c ==.
duplicates tag match3c, gen(dup3c)
// The dup3 == 1 is an indicator of the matched sample for treatment2*/

* compare _pscores before matching & save graph to disk
twoway (kdensity pscore3c if treated3c==1) (kdensity pscore3c if treated3c==0, ///
lpattern(dash)), legend( label( 1 "Treated") label( 2 "Control" ) ) ///
xtitle("Treatment3: Propensity scores BEFORE matching") saving(before3c, replace)

* compare _pscores *after* matching & save graph to disk
twoway (kdensity pscore3c if treated3c==1) (kdensity pscore3c if treated3c==0 ///
& dup3>0, lpattern(dash)), legend( label( 1 "Treated") label( 2 "Control" )) ///
xtitle("Treatment3: Propensity scores AFTER matching") saving(after3c, replace)

*combine these two graphs that were saved to disk put both graphs on y axes with common scales

graph combine before2c.gph after2c.gph before3c.gph after3c.gph, ycommon r(2) title("Propensity scores
BEFORE and AFTER matching")


**********************************************************************
* generating the matched sample
gen matchedc = 1 if  dup2c ==1 | dup3c==1
replace matchedc = 0 if matchedc != 1

*unmatched sample
save "E:\MEPS\Statafiles\Panel\Panel\unmatcheddata.dta", replace

*matched sample:1 neighbor, caliper = 0.01
clear
use "E:\MEPS\Statafiles\Panel\Panel\unmatcheddata.dta"
keep if matchedc ==1
save "E:\MEPS\Statafiles\Panel\Panel\matcheddatac.dta", replace
```

```
*****************************************************
**************4.FIRST STAGE OF SRI:  ESTIMATING MULTINOMIAL MODEL
*****************************************************
clear
use "E:\MEPS\Statafiles\Panel\Panel\unmatcheddata.dta"
mlogit treatment $xinstrument  $xertot  [pweight=LONGWT], base(1) rrr   vce(cluster ID_DUID )
mlogit treatment $xinstrument  $xertot [pweight=LONGWT]  if matchedc == 1, base(1) rrr  vce(cluster
ID_DUID )

*TESTING THE STRENGHT OF THE INSTRUMENTS
test foreignborn nonenglishproficiency limitation_cognitive limitation_social limitation_any

*****************************************************
**************5.SECOND STAGE TWO PART MODELS (MATCHED DATA)
*****************************************************
clear
use "E:\MEPS\Statafiles\Panel\Panel\matcheddatac.dta", replace
global xtime  panel12 panel13 panel14 panel15 panel16 year
global xlocation west midwest  south  msa
global xdemographic  age2 age2sqr  female  whiteNH   bachelor married
global xeconomic student retired unemployed  lnincome
global xertot  comorbidities  insured  smoke bmi prevent $xeconomic $xdemographic $xlocation  $xtime
global xinstrument foreignborn nonenglishproficiency limitation_cognitive limitation_social limitation_any

egen msabar = mean (msa), by(ID_DUID)
global xlocationbar westbar midwestbar  southbar  msabar

egen age2bar = mean (age2), by(ID_DUID)
egen age2sqrbar = mean (age2sqr), by(ID_DUID)
egen bachelorbar = mean (bachelor),  by(ID_DUID)
egen marriedbar = mean (married), by(ID_DUID)
global xdemographicbar  age2bar age2sqrbar   bachelorbar marriedbar

egen studentbar = mean (student),  by(ID_DUID)
egen retiredbar = mean (retired), by(ID_DUID)
egen unemployedbar = mean (unemployed), by(ID_DUID)
egen lnincomebar = mean (lnincome), by(ID_DUID)
global xeconomicbar  lnincomebar

egen comorbiditiesbar = mean (comorbidities),  by(ID_DUID)
egen insuredbar = mean (insured), by(ID_DUID)
egen smokebar = mean (smoke), by(ID_DUID)
egen preventbar = mean (prevent),  by(ID_DUID)
egen bmibar = mean (bmi),  by(ID_DUID)
global xertotbar  comorbiditiesbar  insuredbar smokebar bmibar preventbar  $xeconomicbar
$xdemographicbar $xlocationbar

*First stage
mlogit treatment $xertot $xinstrument  [pweight=LONGWT] if matchedc == 1, base(1)  vce(cluster
ID_DUID )

*Predicted probabilities
predict p1 p2 p3

*Raw residuals
```

```
gen Rtreatuhat1 =  treatment1- p1
gen Rtreatuhat2 =  treatment2 - p2
gen Rtreatuhat3 =  treatment3 - p3

*Standardized residuals
gen Streatuhat1 =  ((p1)^(-0.5))*(( 1-p1)^(-0.5))*Rtreatuhat1
gen Streatuhat2 =  ((p2)^(-0.5))*(( 1-p2)^(-0.5))*Rtreatuhat2
gen Streatuhat3 =  ((p3)^(-0.5))*(( 1-p3)^(-0.5))*Rtreatuhat3

sum  Streatuhat1 Streatuhat2 Streatuhat3  Rtreatuhat1 Rtreatuhat2 Rtreatuhat3   p1 p2 p3

gen Streatuhat2Sq =  Streatuhat2*Streatuhat2
gen Streatuhat3Sq =  Streatuhat3*Streatuhat3

egen treatment2bar = mean (treatment2), by(year)
egen treatment3bar = mean (treatment3), by(year)

egen Streatuhat2bar = mean (Streatuhat2), by(year)
egen Streatuhat3bar = mean (Streatuhat3), by(year)

egen Streatuhat2Sqbar = mean (Streatuhat2Sq), by(year)
egen Streatuhat3Sqbar = mean (Streatuhat3Sq), by(year)

global xtreatmentbar Streatuhat2 Streatuhat3 Streatuhat2Sq Streatuhat3Sq  treatment2bar treatment3bar
Streatuhat2bar Streatuhat3bar Streatuhat2Sqbar Streatuhat3Sqbar

*Two-part gamma
set more off
capture program drop twopgammaprob
program define twopgammaprob
args lnf theta1 theta2 c
tempvar k
# delimit ;

//for generalized gamma; c k parameters
   gen double `k' = 1;   // gamma
          quietly replace `lnf'=  ///
          (-ln(1+exp(-`theta2'))) + ///
          ln(`k') -lngamma(`c') +`c'*`k'*ln(exp(lngamma(`c'+(1/`k')))/exp(lngamma(`c'))) ///
          -ln($ML_y1) +`c'*`k'*ln($ML_y1/exp(`theta1')) ///
          -(exp(lngamma(`c'+(1/`k')))/exp(lngamma(`c')) ///
          *($ML_y1/exp(`theta1'))) ^`k' if $ML_y1 > 0;
          quietly replace `lnf'= -`theta2' - ln(1+exp(-`theta2')) if $ML_y1==0;
#delimit cr
end

program twopgammaprobMcre
ml model lf twopgammaprob ///
(theta1:erexp = i.treatment2 i.treatment3 $xertot $xertotbar  $xtreatmentbar) ///
 (theta2:erexp =  i.treatment2 i.treatment3 $xertot $xertotbar  $xtreatmentbar ) ///
 /c [pw = LONGWT] , ///
 technique(bfgs nr)  vce(cluster ID_DUID )
ml search
ml maximize
end
```

```
bootstrap, rep(100) seed(1):  twopgammaprobMcre
margins , dydx(treatment2 treatment3) ///
expression((1/(1+exp(-predict(eq(theta2), `theta2')))) *exp(predict(eq(theta1),`theta1'))) atmeans
scalar llGgammaU=e(ll)
display llGgammaU
scalar aicGgammaU = -2*e(ll)+2*e(k)
dis "AIC of Gen Gamma    "
dis aicGgammaU
scalar bicGgammaU = -2*e(ll)+ln(e(N))*e(k)
dis "BIC of Gen Gamma  Unmatched  "
dis bicGgammaU

*twopart generalized gamma model:  k = 1 => gamma
set more off
capture program drop twopGgammaprob
program define twopGgammaprob

args lnf theta1 theta2 c k
# delimit ;
        quietly replace `lnf'=  ///
        (-ln(1+exp(-`theta2'))) + ///
        ln(`k') -lngamma(`c') +`c'*`k'*ln(exp(lngamma(`c'+(1/`k')))/exp(lngamma(`c'))) ///
        -ln($ML_y1) +`c'*`k'*ln($ML_y1/exp(`theta1')) ///
        -(exp(lngamma(`c'+(1/`k')))/exp(lngamma(`c')) ///
        *($ML_y1/exp(`theta1'))) ^`k' if $ML_y1 > 0;
                quietly replace `lnf'= -`theta2' - ln(1+exp(-`theta2')) if $ML_y1==0;
#delimit cr
end

capture program drop twopGgammaprobMcre
program twopGgammaprobMcre
ml model lf twopGgammaprob ///
(theta1:erexp = i.treatment2 i.treatment3 $xertot $xertotbar $xtreatmentbar  ) ///
 (theta2:erexp =  i.treatment2 i.treatment3 $xertot $xertotbar  $xtreatmentbar  ) ///
 /c /k [pw = LONGWT] if matchedc ==1, ///
 technique(bfgs nr bhhh)  vce(cluster ID_DUID )
ml search
ml maximize
end

bootstrap , rep(100)seed(1):  twopGgammaprobMcre
margins , dydx(treatment2 treatment3) ///
expression((1/(1+exp(-predict(eq(theta2), `theta2')))) *exp(predict(eq(theta1),`theta1'))) atmeans
scalar llGgammaMcre=e(ll)
display llGgammaMcre
scalar aicGgammaM = -2*e(ll)+2*e(k)
dis "AIC of Gen Gamma    "
dis aicGgammaM
scalar bicGgammaM = -2*e(ll)+ln(e(N))*e(k)
dis "BIC of Gen Gamma  Unmatched  "
dis bicGgammaM


log close
```

References

Abadie A., and Imbens, G.W., (2006). Large sample properties of matching estimators for average treatment effects. *Econometrica, 74*, 235-267.

Abayasekara, A. (2015). Addressing clinician workforce shortage. *Journal of Health Care for Poor and Underserved, 26*(1), 1-4.

Agyei-Baffour, P., Kotha, S. R., Johnson, J. C., Gyakobo, M., Asabir, K., Kwansah, J., … Kruk, M. E. (2011). Willingness to work in rural areas and the role of intrinsic versus extrinsic professional motivations-a survey of medical students in Ghana. *BMC Medical Education*, 11(1),56.

American College of Emergency Physicians. (2012). Cost of Emergency Care, from http://www.acep.org/contenet.aspx?id=25902 .

Alvarez, K. A., Wang, Y., Alegria, M., Ault-Brutus, A., Ramanayake, N., Yeh, Y., Jeffries, J. R., Shrout, P. E. (2016). Psychometrics of shared decision making and communication as patient centered measures for two language groups. *Psychological Assessment, 28*(9), 1074-1086.

Bagger, J., & Li, A. (2014). How does supervisory family support influence employees' attitudes and behaviors? A social exchange perspective. *Journal of Management*, 40(4), 1123–1150.

Bardoel, E. A., Drago, R., Cooper, B., & Colbeck, C. (2011). Bias avoidance: Cross-cultural differences in the US and Australian academies. *Gender, Work & Organization*, 18(s1), e157–e179.

Barton, J. L., Trupin, L., Tonner, C., Imboden, J., Katz, P., Schillinger, D., and Yelin, E. H.(2014). English language proficiency, health literacy, and trust in physician are associated with shared decision making in Rheumatoid Arthritis. *The Journal of Rheumatology*, 41(7), 1290-1297.

Barry, M. J., and Edgman-Levitan, S. (2012). Shared decision making-the pinnacle of patient-centered care. The New England Journal of Medicine, 366(9),780-781. DOI: 10.1056/NEJMp1109283.

Berenson, R. A., Devers, K. J., & Burton, R. A. (2011). Will the patient-centered Medical Home Transform the delivery of Health Care? *Timely Analysis of Immediate Health Policy Issues*. Robert Wood Johnson Foundation, 1-16.

Berwick, M. D. & Hackbarth, A. (2012). Eliminating waste in US health care. *The Journal of the American Medical Association*, *307*(14), 1513-1516.

Biro, A. (2009). Health care utilization of older people in Europe- Does financing structure matter? *Central European University*.

Bristol, M. N., Abbuhl, S., Cappola, A. R., & Sonnad, S. S. (2008). Work-life policies for faculty at the top ten medical schools. *Journal of Women's Health*, 17(8), 1311–1320. http://doi.org/10.1089/jwh.2007.068.

Buerhaus, P. I. (2008). Current and future state of the US nursing workforce. *Journal of of the American Medical Association, 300* (20), 2422-2424.

Bureau of Labor Statistics, Employment Projections: 2014-24 Summary. Released on December 8, 2015. Accessed on June May, 2017

CDC. (2012). Emergency Room Use Among Adults Aged 18-64: Early Release of Estimates From the National Health Interview Survey, January-June 2011.

Centers for Medicare & Medicaid Services. National Health Expenditures 2015 Highlights. Published 12/2016. www.cms.gov/Research-Statistics-Data-and-Synthesis Accessed 06/2017.

Chu, J., Leino, A., Pflum, S. and Sue. S. (2016). A model for theoretical basis of cultural competency to guide psychotherapy. *Professional Psychology: Research and Practice, 47*(1), 18-29.

Contoyannis, P., Jones, A. M., Rice, N. (2014).The dynamics of health in the British household panel survey. *Journal of Applied Econometrics*, 19, 473-503.

Colombo, S., Calatrava-Requena, J., & Hanley, N. (2007). Testing choice experiment for benefit transfer with preference heterogeneity. *American Journal of Agricultural Economics*, 89(1), 135–151.

Dieleman, J. L., Baral, R., Birger, M., et al. (2016). US spending on personal health care and public health, 1996-2013. *Journal of American Medical Association*, 316 (24) 2627- 2646.

Dillman, D.A. (2007). Mail and internet survey: The tailored design method, 2nd ed. New York: John Wiley and Sons.

Drago, R., Colbeck, C. L., Stauffer, K. D., Pirretti, A., Burkum, K., Fazioli, J., … Habasevich, T. (2006). The avoidance of bias against caregiving the case of academic faculty. *American Behavioral Scientist*, 49(9), 1222–1247.

Drago, R., Colbeck, C., Stauffer, K. D., Pirretti, A., Burkum, K., Fazioli, J., … Habasevich, T. (2005). Bias against caregiving. *Academe*, 91(5), 22–25.

Drago, R., Costanza, D., Caplan, R., Brubaker, T., Cloud, D., Harris, N., … Riggs, T. L. (2001). The willingness-to-pay for work-family policies: a study of teachers. *Industrial & Labor Relations Review*, 55(1), 22–41.

Dobrzykowski, D.D., Tarafdar, M. (2015). Understanding information exchange in health care operations: evidence from hospitals and patients. *Journal of Operations Management, 36,* 201-214.

Eneriz-Wiemer, M., Sanders, L. M., Barr, D. A., and Mendoza, F. S. (2014). Parental limited English proficiency and health outcomes for children with special health care needs: A systematic review. *Academic Pediatrics*, DOI: http://dx.doi.org/10.1016/j.acap.2013.10.003

Epstein, R. M., Fiscella, K., Shields C. G., Lesser, C. S., and Stange, K. C. (2010). Why the nation needs a policy push on patient-centered health care. *Health Affairs, 29*(8), 1489-1495.

Epstein, R. M., Franks, P., Fiscella, K., Shields C. G., Meldrum, S. C., Kravitz, R. L., Duberstein, P. R. (2005). Measuring patient-centered communication in patient–physician consultations: Theoretical and practical issues. *Social Science & Medicine, 61,* 1516–1528.

Erdem, S., Campbell, D., Hole, A.R. (2014). Accounting for attribute level non-attendance in health choice experiment: Does it matter? *Health Economic*, DOI: 10.1002/hec.3059

Flower, K. B., Skinner, A. C., Yin, H. S. Rothman, R. L., Sanders, L. M., Delamater, A., Perrin, E. M (2017). Satisfaction with communication in primary care for spanish-speaking and english-speaking parents. *Academics Pediatrics*, 17 (4), 416- 423.

Fiksenbaum, L. M. (2014). Supportive work–family environments: implications for work–family conflict and well-being. *The International Journal of Human Resource Management*, 25(5), 653–672.

Frampon, S. B., and Guastello, S. (2014). Time to embrace a new patient-centered care rallying cry: "Why not?". *Patient*, 7, 231-233.

Garrido, M. M., Deb, P., Burgess Jr., J. F., and Penrod, J. D. (2012). Choosing models for health care costs analysis: Issues of nonlinearity and endogeneity. *Health Services Research*, 47(6), doi: 10.1111/j.1475-6773.2012.0140.x

Geraci, A., Fabbri, D. Monfardini, C. (2014). Testing exogeneity of multinomial regressors in count data models: does two stage residual inclusion work? *Journal of Econometric Methods.* Doi.org/10.1515/jem-2014-0019.

Global Health Workforce Alliance and World Health Organization. (2013). A universal truth: No health without a workforce. www.who.int/workforcealliance/knowledge/resources/GHWA-a_universal thruth_report.pdf. Accessed on 01/12/2016.

Gray, M., & Hughes, J. (2005). Caring for children and adults: Differential access to family-friendly work. *Family Matters*, (70), 18.

Greenhaus, J. H., Ziegert, J. C., & Allen, T. D. (2012). When family-supportive supervision matters: Relations between multiple sources of support and work–family balance. *Journal of Vocational Behavior*, 80(2), 266–275.

Greene, J., and Hibbard, J. H. (2011). Why does patient activation matter? An examination of the relationships between patient activation and health- related outcomes. *Journal of General Internal Medicine, 27*(5), 520-6.

Gropper, A., Gartke, K., & MacLaren, M. (2010). Work-life policies for Canadian medical faculty. *Journal of Women's Health*, 19(9), 1683–1703.

Grzywacz, J. G., & Smith, A. M. (2016). Work–family conflict and health among working parents: potential linkages for family science and social neuroscience. *Family Relations*, 65(1), 176–190.

Gunn, C. M., Freund, K. M., Kaplan, S. A., Raj, A., & Carr, P. L. (2014). Knowledge and perceptions of family leave policies among female faculty in academic medicine. *Women's Health Issues*, 24(2), e205–e210.

Günther, O. H., Kürstein, B., Riedel-Heller, S. G., & König, H.-H. (2010). The role of monetary and nonmonetary incentives on the choice of practice establishment: a stated preference study of young physicians in Germany. *Health Services Research*, 45(1), 212–229.

Guo, J., Konetzka, R. T., and Manning, W. G. (2015). The causal effects of home care use on institutional long-term care utilization and expenditures. Health Economics, 24(1), 4-17.

Guy, D., Gunnarsson, C., Saynisch, P. A., Chawla, R., and Nigam, S. (2015). Do Patient- centered medical homes reduce emergency department visists? *Health Services Research*, 50 (2) . doi: 10. 1111/1475-6773.12218

Holte, J. H., Kjaer, T., Abelsen, B., & Olsen, J. A. (2015). The impact of pecuniary and non-pecuniary incentives for attracting young doctors to rural general practice. *Social Science & Medicine*, 128, 1–9.

Ha, J. F., Anat, D. S., and Longnecker, N. (2010). Doctor-patient communication: a review. *The Ochsner Journal*, 10, 38-43.

Hibbart, J. H., Mahoney, E. R. Stock, R., Tusler, M. (2007). Do increases in patient activation results in improved self-management behaviors? *Health Services Research, 42*, 1443-63.

Hirano, K., Imbens, G. W., and Ridder, G. (2003). Efficient estimation of average treatment effect using the estimated propensity score. *Econometrica, 71*, 1161-1189.

Hogan, J.W., Lancaster, T. (2004). Instrumental variables and inverse probability weighting for causal inference from longitudinal observational studies. *Statistical Method in Medical Research, 13*(1), 17-48.

Ibems, G. W. (2000). The role of propensity score in estimating dose-response functions. *Biometrika, 87*, 706-710.

Ironson, G., Lucette, A., McIntosh, R. C. (2015). Doctor-patient relationship: active patient involvement (DPR:API) is related to long survival status and predicts adherence change in HIV. *Aids and Clinical Research, 6 (2),* 1-5.

Institute of Medicine (IMO). (2011). *Crossing the Quality Chasm: A new Health System for the 21th Century* . Washington, D.C.: National Academy Press.

Jennings, K. S., Sinclair, R. R., & Mohr, C. D. (2016). Who benefits from family support? Work schedule and family differences. *Journal of Occupational Health Psychology*, 21(1), 51.

Kahn, J. A., Degen, S. J., Mansour, M. E., Goodman, E., Zeller, M. H., Laor, T., … Boat, T. F. (2005). Pediatric faculty members' attitudes about part-time faculty positions and policies to support part-time faculty: A study at one medical center. *Academic Medicine*, 80(10), 931–939.

Karliner, L.S., Perez-Stable, E.J., and Gregorich, S.E. (2016). Convenient access to professional interpreters in the hospital decreases readmission rates and estimated hospital expenditures for patients with limited English proficiency. *Medical Care*, 00 (00), 1-8

Kelley, J. M., Kraft-Todd, G., Schapira, L., Kossowsky, J., Riess, H. (2014). The influence of the patient-clinician relationship on health care outcomes: a

systematic review and meta-analysis of randomized controlled trials. *PLoS ONE* *9*(4): e94207. doi:10.1371/journal.pone.0094207.

Kimani, D. N., Mugo, M. G., Kioko, U. M. (2016). An econometric, analysis of health care utilization in Kenya. *European Scientific Journal*, 12(16).

King, A., Hope, R. B., (2013). "Best practice" for patient-centered communication: A narrative review. *Journal of Graduate Medical Education*, doi: http://dx.doi.org/10.4300/JGME-D-13-00072.1

Kossek, E., & Hammer, L. (2008). Work-life training for supervisors gets big results. *Harvard Business Review*, 36.

Krinsky, I., & Robb, A. L. (1986). On approximating the statistical properties of elasticities. *The Review of Economics and Statistics*, 715–719.

kroezen, M., Dussault, G., Craveiro, I., Dieleman, M., Jansen, C., Buchan, J., Barriball, L., Rafferty, A.M., Bremner, J., Sermeus, W. (2015). Recruitment and retention of health professionals across Europe: A literature review and multiple case study research. *Health Policy*, *119*(12), 1517-1528.

Kuhfeld, W. (2004). Experimental designs, efficiency, coding and choice designs. Technical Report TS-722C, SAS: available at http://support. sas. com/techsup/tnote/tnote stat. html# market.

Lagarde, M., & Blaauw, D. (2009). A review of the application and contribution of discrete choice experiments to inform human resources policy interventions. *Hum Resour Health*, 7(62), 10.1186.

Lagarde, M., Pagaiya, N., Tangcharoensathian, V., & Blaauw, D. (2013). One size does n ot fit all: Investigating doctors' stated preference heterogeneity for job incentives to inform policy in Thailand. *Health Economics*, 22(12), 1452–1469.

Leslie, S. and Thiebaud, P. (2007). Using Propensity Scores to Adjust for Treatment Selection Bias. Proceedings of the SAS Global Forum 2007 Conference, Orlando, FL. 2007.

Lie, D.A., Lee-Rey, E., Gomez, A. et al. (2011). Does cultural competency training of health professionals improve patient outcomes? A systematic review and proposed algorithm for future research. *Journal of General Internal Medicine 26*: 317. doi:10.1007/s11606-010- 1529-0.

Lobo, V.M., Fisher, A., Bauman, A., Akhtar-Danesh, N. (2012). "Effective retention strategies for midcareer critical care nurses: A Q-method study". *Nursing Research*. 61(4) 300-308.

Majette, G. R. (2009). From concierge Medicine to patient-centered medical homes: international lessons and the search for a better way to deliver primary health care in the U.S. *American Journal of Law and Medicine , 35*, 585-619.

Mandeville, K. L., Lagarde, M., & Hanson, K. (2014). The use of discrete choice experiments to inform health workforce policy: a systematic review. *BMC Health Services Research*, 14(1), 367.

Mas-Machuca, M., Berbegal-Mirabent, J., & Alegre, I. (2016). Work-life balance and its relationship with organizational pride and job satisfaction. *Journal of Managerial Psychology*, 31(2), 586–602.

Mansournia, M. A., Altman, D.G. (2016). Inverse probability weighting. *The British Medical Journal*, 352, doi:10.1136/bmj.i189.

Matthews, R. A., & Toumbeva, T. H. (2015). Lagged effects of family-supportive organization perceptions and supervision in relation to generalized work-related resources. *Journal of Occupational Health Psychology*, 20(3), 301.

McNamara, T. K., Pitt-Catsouphes, M., Brown, M., & Matz-Costa, C. (2012). Access to and utilization of flexible work options. *Industrial Relations*, 51(4), 936–965.

Niska, R., Bhuiya, F., Xu, J. National Hospital Ambulatory Medical Care Survey: 2007 emergency department summary. *National Health Statistics Report*, 16, 1-31

Moen, P., Kelly, E. L., & Hill, R. (2011). Does enhancing work-time control and flexibility reduce turnover? A naturally occurring experiment. *Social Problems*, 58(1), 69.

Mwabu, G. (2007). Health economics for low-income countries. Center discussion paper No. 955. Economics Growth Center, Yale University.

Ngo-Metzger, Q., Sorkin, D. H., Phillips, R. S., Greenfield, S. Massagli, M. P., Clarridge, B., Kaplan, S. H. (2007). Providing high-quality care for limited english proficient patients: The importance of language concordance and interpreter use. *Journal of General Internal Medicine*, 22(2), 324-330.

Odle-Dusseau, H. N., Britt, T. W., & Greene-Shortridge, T. M. (2012). Organizational work–family resources as predictors of job performance and attitudes: The process of work–family conflict and enrichment. *Journal of Occupational Health Psychology*, 17(1), 28.

Okafor, M-T. C., Carter-Pokras, O. D., Picot, S. J., Zhan, M. (2013). The relationship of language acculturation (english proficiency) to current self-rated health among African immigrant adults. *Journal of Immigrant and Minority Health*, 15 (3), 499-509.

Philpot L.M., Stockbridge E.L., Padrón N. A., and Pagán J. A. (2016) Patient-centered medical home features and health care expenditures of medicare beneficiaries with chronic disease dyads. *Population Health Management 19*(3): 206-211. doi:10.1089/pop.2015.0077.

Pippins, J. R., Alegria, M., Haas, J. S., (2007). Association between language proficiency and the quality of primary care among a national sample. *Medical Care*, 45(11), 1020-1025.

Pohlmeir, W., and Ulrich, V. (1995). An econometric model of the two-part decisionmaking process in the demand for health care. *The Journal of Human Resources*, 30 (2), 339-361.

Qu, H., & Zhao, X. R. (2012). Employees' work–family conflict moderating life and job satisfaction. *Journal of Business Research*, 65(1), 22–28.

RAND. (2013). The evolving role of emergency departments in the United States.

Rask, K. J., Ziemer, D. C., Kohler, S. A., Hawley, J. N., Folakemi, J., Arinde, F. J., Barnes, C. S., (2009). Patient activation is associated with healthy behaviors and ease in managing diabetes in an indigent population. *Diabetes Education, 35*(4), 622-30.

Raven, M. C., Kushel, M., Ko, M. J., Penko, J., Bindman, A. B. (2016). The effectiveness of emergency department visist reduction programs: A systematic review. *The American Journal of Emergency Physicians*, 68 (4) 467-483.

Roehling, P. V., Roehling, M. V., & Moen, P. (2001). The relationship between work-life policies and practices and employee loyalty: A life course perspective. *Journal of Family and Economic Issues*, 22(2), 141–170.

Rossom, R. C., Solberg, L. I., Vazquez-Benitez, G., Crain, A. L., Beck, A., Whitebird, R., and Glasgow, R. E. (2016). The effects of patient-centered depression care on patient satisfaction and depression remission. *Family Practice*, doi: 10.1093/fampra/cmw068.

Ryan, A. M., & Kossek, E. E. (2008). Work-life policy implementation: Breaking down or creating barriers to inclusiveness? *Human Resource Management*, 47(2), 295–310. http://doi.org/10.1002/hrm.20213

Scarpa, R., Thiene, M., & Hensher, D. A. (2012). Preferences for tap water attributes within couples: an exploration of alternative mixed logit parameterizations. *Water Resources Research*, 48(1).

Scholl, I., Zill, J., Härter, M., Dirmaier, J. (2014). An integrative model of patient-centeredness- a systematic review and concept analysis. *PLOS ONE*, http://dx.doi.org/10.1371/journal.pone.0107828.

Scott, A. (2001). Eliciting GPs' preferences for pecuniary and non-pecuniary job characteristics. *Journal of Health Economics*, 20(3), 329–347.

Shi, L., Lebrun, L. A., Tsai, J. (2009). The influence of english proficiency on access to care. *Ethnicity and Health, 14 (6)*, 625-642.

Shirley, E. D., Sanders, J., O. (2013). Patient Satisfaction: Implications and Predictors of Success. *Journal of Bone and Joint Surgery*, *95* (10). e69. http://dx.doi.org/10.2106/JBJS.L.01048.

Sivey, P., Scott, A., Witt, J., Joyce, C., & Humphreys, J. (2012). Junior doctors' preferences for specialty choice. *Journal of Health Economics*, 31(6), 813–823.

Street Jr, R. L. (2013). How clinician-patient communication contributes to health improvement: modelling pathways from talk to outcome. *Patient Education and Counseling*, *92*, 286- 291.

Street Jr, R. L., Makoul, G., Arora, N. K. Epstein, R. M. (2009). How does communication heal? Pathways linking clinician-patient communication to health outcomes. *Patient Education and Counseling, 74*, 295-301.

Street Jr, R. L., Piziak, V. K. Carpentier W.S., Herzog, J., Hejl, J., Skinner, G., et al. (1993). Provider-patient communication and metabolic control. *Diabetes Care, 16*, 714-21.

Stockbridge, E. L., Philpot L.M., Pagán J. A. (2014). Patient-centered medical home features and expenditures by Medicare beneficiaries. *The American Journal of Managed Care, 20* (5):379-385

Tan, Z. (2010). Bounded, efficient and doubly robust estimation with inverse weighting. *Biometrica*, *97*, 661-682.

Terza, J. V., Basu, A., Rathouz, P. J., (2008). Two-stage residual inclusion estimation: Addressing endogeneity in health econometrics modeling. *Journal of health Economics*, 27(3), 531-543.

Thompson, C. A.,Beauvais, L. L., & Lyness, K. S. (1999). When work–family benefits are not enough: The influence of work–family culture on benefit utilization, organizational attachment, and work–family conflict. *Journal of Vocational Behavior*, 54, 392–415.

Thompsom, L., and McCabe, R. (2012). The effect of clinician-patient alliance and communication on treatment adherence in mental care: a systematic review. BMC Psychiatry, 12(87), 1-12.

Thorsteinson, T. (2003). Job attitudes of part-time vs. full time workers: A meta-analytic review, *Journal of Occupational and Organizational Psychology*, 76: 151-177.

Timms, C., Brough, P., O'Driscoll, M., Kalliath, T., Siu, O. L., Sit, C., & Lo, D. (2015). Flexible work arrangements, work engagement, turnover intentions and psychological health. *Asia Pacific Journal of Human Resources,* 53(1), 83–103.

Tongue, J. R., Epps H. R., Forese L.L. (2005). Communication skills for patient-centered care: research-based, easily learned techniques for medical interviews that benefit orthopedic surgeons and their patients. *The Journal of Bone and Joint Surgery Surgery*. 87,652–658.

Tower, L. E. (2015). Changing work-life policy in institutions of higher education. *Family-Friendly Policies and Practices in Academe*, 115.

UNM Division of Human Resources. 2011.

Waldman, J. D., Kelly, F., Aurora, S., Smith, H. L. (2004). The shocking cost of turnover in health care. *Health Care Management Review*, 29(1).

Ward, M.M., Sundaramurphy, S., Lotstein, D. Bush, T.M., Neuweit C.M., Street JR. R.L. Participatory patient -physician communication and morbidity in patients with systemic lupus erythematosus. *Arthritis and Rheumatology, 49*, 810-8.

Wheatley, D. (2016). Employee satisfaction and use of flexible working arrangements. *Work Employment & Society*. doi: 10.1177/0950017016631447

Welch, J. L., Wiehe, S. E., Palmer-Smith, V., & Dankoski, M. E. (2011). Flexibility in faculty work-life policies at medical schools in the Big Ten conference. *Journal of Women's Health*, 20(5), 725–732.

Wells, S. J. (2007). Are you too family friendly? HR Magazine, 52(10), 34.

Wooldridge, J. M. (2013). Non linear models correlated random effects panel data models, IZA summer School in Labor Economics. http://www.iza.org/conference_files/SUMS_2013/viewProgram?conf

Wooldridge, J. M. (2015). Control function methods in applied econometrics. *Journal of Human Resources*, 50(2), 420-445.

Xin, H., Kilgore, M. L., Sen, B. (2017). Is access to and use of patient-centered medical homes associated with reduced non-emergent emergency department use? *American Journal of Medical Quality*, 32 (3) 246-253.