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The Impact of Objective Quality Ratings on Patient Selection of Community Pharmacies: A Discrete Choice Experiment and Latent Class Analysis

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THE IMPACT OF OBJECTIVE QUALITY RATINGS ON PATIENT SELECTION OF COMMUNITY PHARMACIES: A DISCRETE CHOICE EXPERIMENT AND LATENT CLASS ANALYSIS

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University

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List of Abbreviations

ABMS: Appointment-Based Medication Synchronization

AHRQ: Agency for Healthcare Research and Quality

AIV: Attribute Importance Value

CABG: Coronary Artery Bypass Graft Surgery

CAHPS: Consumer Assessment of Healthcare Providers and Systems

CAIC: Consistent Akaike Information Criterion

CBC/HB: Choice-Based Conjoint/Hierarchical Bayes

CBC/LC: Choice-Based Conjoint/Latent Class

CL: Conditional Logit Regression

CMR: Comprehensive Medication Review

CMS: Centers for Medicare and Medicaid

DCE: Discrete Choice Experiment

DDI: Drug-Drug Interaction

GED: General Educational Development

HAI: Hospital-Acquired Infection

HEDIS: Healthcare Effectiveness Data and Information Set

IOM: Institute of Medicine

ISPOR: International Society for Pharmacoeconomics and Outcomes Research

JCAHO: The Joint Commission on Accreditation of Healthcare Organizations

MDT: Measure Development Team

NCQA: National Committee for Quality Assurance

NHANES: National Health and Nutrition Examination Study

NQF: National Quality Forum

OBGYN: Obstetrician-Gynecologist

OTC: Over-The-Counter

PDC: Proportion of Days Covered

PQA: Pharmacy Quality Alliance

PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses

QHP: Qualified Health Plan

QRS: Quality Rating System

RASA: Renin Angiotensin System Antagonists

SD: Standard Deviation

SMRT: Software Market Research Tool

SNF: Skilled Nursing Facility

Abstract

THE IMPACT OF OBJECTIVE QUALITY RATINGS ON PATIENT SELECTION OF COMMUNITY PHARMACIES: A DISCRETE CHOICE EXPERIMENT AND LATENT CLASS ANALYSIS

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Background: Pharmacy-related performance measures have gained significant attention in the transition to value-based healthcare. Pharmacy-level quality measures, including those developed by the Pharmacy Quality Alliance, are not yet publicly accessible. However, the publication of report cards for individual pharmacies has been discussed as a way to help direct patients towards high-quality pharmacies. This study aimed to measure the relative strength of patient preferences for community pharmacy attributes, including pharmacy quality. Additionally, this study aimed to identify and describe community pharmacy market segments based on patient preferences for pharmacy attributes.

Methods: This study elicited patient preferences for community pharmacy attributes using a discrete choice experiment (DCE) among a sample of 773 adults aged 18 years and older. Six attributes were selected based on published literature, expert opinion, and pilot testing feedback. The attributes included hours of operation, staff friendliness/courtesy, pharmacist communication, pharmacist willingness to establish a personal relationship, overall quality, and a drug-drug interaction specific quality metric. Participants responded

to a block of ten random choice tasks assigned by Sawtooth v9.2 and two fixed tasks, including a dominant and a hold-out scenario. The data were analyzed using conditional logit and latent class regression models, and Hierarchical Bayes estimates of individual-level utilities were used to compare preferences across demographic subgroups.

Results: Among the 773 respondents who began the survey, 741 (95.9%) completed the DCE and demographic questionnaire. Overall, study participants expressed the strongest preferences for quality-related pharmacy attributes. The attribute importance values (AIVs) were highest for the specific, drug-drug interaction (DDI) quality measure, presented as, "The pharmacy ensured there were no patients who were dispensed two medications that can cause harm when taken together," (40.3%) and the overall pharmacy quality measure (31.3%). The utility values for 5-star DDI and overall quality ratings were higher among women (83.0 and 103.8, respectively) than men (76.2 and 94.5, respectively), and patients with inadequate health literacy ascribed higher utility to pharmacist efforts to get to know their patients (26.0) than their higher literacy counterparts (16.3). The best model from the latent class analysis contained three classes, coined the Quality Class (67.6% of participants), the Relationship Class (28.3%), and the Convenience Class (4.2%).

Conclusions: The participants in this discrete choice experiment exhibited strong preferences for pharmacies with higher quality ratings. This finding may reflect patient expectations of community pharmacists, namely that pharmacists ensure that patients are not harmed by the medications filled at their pharmacies. Latent class analysis revealed underlying heterogeneity in patient preferences for community pharmacy attributes.

Chapter 1: Introduction

1.1 Introduction

The amount of publicly available healthcare quality data has proliferated in recent decades. Patients may now access a variety of quality information compiled through governmental (e.g. HEDIS), for-profit (e.g. HealthGrades), and not-for-profit (e.g. LeapFrog) outlets. A substantial body of literature has debated the impact of these metrics on patient selection of healthcare providers and facilities. While pharmacy-level quality metrics are not yet publicly accessible, the publication of report cards for individual pharmacies has been discussed as a way to help direct patients towards high-quality pharmacies.[1]

The effort to quantify and promote pharmacy quality has been led by the Pharmacy Quality Alliance (PQA), a non-profit, multi-stakeholder organization founded in 2006.[2] PQA aims to collaboratively and strategically establish meaningful performance measures at the pharmacy and pharmacist-level.[2] Furthermore, health-plan level PQA measures are included in the Health Insurance Marketplace plan rating system[3] and Medicare Part D Plan star ratings, which impact payments from the Centers for Medicare and Medicaid (CMS).[4]

Most studies examining how American patients choose pharmacies have focused on patient decisions to select mail order pharmacies[5–7] or were conducted over twenty years ago. Older studies on patient selection of community pharmacies reported that patients consider location,[8,9] pharmacist friendliness and professionalism,[10,11] price,[10] and pharmacist services[10] to be important factors when selecting a pharmacy. More recently, a survey asked patients to indicate the importance, on a scale of one to five, of 26 attributes when choosing a pharmacy. The survey also assessed the degree to which respondents perceived those attributes to differ between pharmacies.[12] Survey participants expressed

strong preferences for pharmacies with competent, knowledgeable, and friendly pharmacists and staff. Furthermore, these attributes were perceived as the most differentiating factors between competing pharmacies.[12] Location, prescription prices, and hours of operation were important to most patients but were not seen as differentiating.[12] In another study, participants commonly cited relationships with staff (43.6%), convenience (28.2%), and local pharmacy ownership (15.4%) as important factors when choosing a pharmacy.[13] Themes surrounding relationships with staff and owners were also prevalent in a series of focus groups conducted by Shiyanbola and Mort.[14]

A limited number of qualitative studies have explored the potential impact of quality metrics on the pharmacy selection process. While many participants in one series of focus groups indicated a willingness to use publicly available quality measures when choosing a pharmacy, rural patients often expressed a reluctance to use outside metrics given their relationships with their pharmacy's owner(s).[14] Others stated that the measures would be useful for pharmacy selection only in specific scenarios, including in the aftermath of a negative experience or error or if they were moving to a new area.[15] The relative importance of pharmacy structures, processes, and quality-related outcomes of care has not yet been fully examined, particularly among modern patients with increasing access to quality and satisfaction information. This research study adds to body of knowledge on the potential impact of publicly available pharmacy quality metrics by quantitatively assessing the relative strengths of patient preferences when selecting a community pharmacy.

A discrete choice experiment among a sample of 500 adults (≥18 years) was conducted for this study. An initial list of sixteen potential attributes for the DCE experiment was formed based on expert opinion and published literature on how patients

select healthcare providers. The attribute selection process was guided by the Donabedian Model for healthcare quality and the SERVQUAL framework for service quality. Pilot testing feedback was used to reduce the number of attributes to six: hours of operation, staff friendliness/courtesy, pharmacist communication, pharmacist willingness to establish a personal relationship, overall quality, and a specific quality metric related to drug-drug interactions. Participants responded to a block of ten random choice tasks and two fixed tasks, including a dominant and a hold-out scenario. A conditional logit analysis was used to quantified the importance of quality information to patients when choosing a community pharmacy relative to the importance placed on pharmacy characteristics reflecting structures and processes of care. Additionally, a latent class analysis was used to identify and describe segments in the community pharmacy market based on patient preferences.

The study rationale, specific aims, and study significance are provided in the latter half of Chapter 1. Background information and a systematic review of the literature are provided in Chapter 2. The methods and results for this study are presented in Chapters 3 and 4, respectively. In chapter 5, a discussion of the study results, study limitations, suggestions for future research, and study conclusions are presented.

1.2 Study Rationale and Specific Aims

1.2.1 Study Rationale

Patients select healthcare providers and facilities based on a complex array of factors. Insights into patient understanding and use of quality information are increasingly pertinent to community pharmacy given the recent development of pharmacy quality metrics[16] and growing emphasis on pharmacy differentiation.[2] Focus group participants have demonstrated varying degrees of comprehension of and willingness to use pharmacy quality measures.[14,15] At the same time, pharmacy attributes like staff friendliness and convenience are well understood and consistently ascribed importance by pharmacy patrons.[12–15] A clearer understanding of patients' priorities during pharmacy selection and the relative perceived importance of quality metrics can inform pharmacy organizations of the extent to which publicly available pharmacy quality ratings may drive patients to high quality community pharmacies. The results may also help to ascertain future needs for marketing efforts promoting the impact of pharmacists on the quality of medication management. Additionally, the identification of market segments based on patient preferences for pharmacy attributes may help pharmacies to provide more effective patient-centered care by targeting and personalizing services.

1.2.2 Specific Aims

This study aims to explore the relative importance of pharmacy attributes during the community pharmacy selection process and to identify market segments based on patient preferences for pharmacy characteristics. I propose the following specific aims:

Specific Aim 1

To measure the relative strength of patient preferences for community pharmacy attributes, including quality metrics, during pharmacy selection

Specific Aim 2

A) To describe the associations between patient sociodemographic characteristics and preferences for pharmacy attributes during pharmacy selection

B) To describe the associations between patient health status, literacy, and confidence and preferences for pharmacy attributes during pharmacy selection

Specific Aim 3

A) To describe community pharmacy market segments based on patient preferences for pharmacy attributes

B) To describe the sociodemographic and health characteristics of patients in each of the identified community pharmacy market segments

C) To compare the sociodemographic and health characteristics of patients in each of the identified community pharmacy market segments to those of patients in other segments

Chapter 2: Background and Literature Review

2.1 The History of Quality Metrics in American Healthcare

The movement to improve healthcare quality in the United States encompasses diverse stakeholders and approaches. In the last twenty years, governmental agencies and initiatives, including the Agency for Healthcare Research and Quality (AHRQ) and the Institute of Medicine's (IOM) Health Care Quality Initiative, were established to focus and prioritize research efforts on the evaluation and improvement of healthcare quality. AHRQ works within the U.S. Department of Health and Human Services to produce evidence that improves the safety, quality, and accessibility of health care.[17] The Agency developed AHRQ Quality Indicators (QIs), standardized quality measures derived from hospital inpatient administrative data. The QIs are used both by health systems for internal quality improvement initiatives and by external agencies for quality-based purchasing and coverage decisions. The IOM, established in 1996, has published a number of seminal reports on the quality of healthcare in America, including *Crossing the Quality Chasm: A New Health System for the 21st Century*, and *To Err is Human: Building a Safer Health System. To Err is Human* has been credited with increasing awareness of medical errors and establishing the goal of reducing errors by 50 percent over five years. The organization also published reports making recommendations for the measurement and reporting of performance data, stating, "public reporting is integral to improving performance."[18]

Non-profit organizations have also played a critical role in the rise of healthcare quality metrics in the United States. The Joint Commission on Accreditation of Healthcare Organizations (JCAHO), the National Committee for Quality Assurance (NCQA), and the National Quality Forum (NQF) emerged over the last 40 years to measure the performance

of healthcare facilities, practitioners, and health plans. In addition to offering accreditations and certifications, these multidisciplinary organizations have dedicated considerable resources to the development of standardized performance metrics for the risk-adjusted evaluation of healthcare organizations.[19]

The Centers for Medicare and Medicaid Services (CMS) is increasingly utilizing healthcare quality metrics in reimbursement decisions and incentive programs. For example, the AHRQ QIs are used by CMS in its Hospital Value-Based Purchasing Initiative, the Accountable Care Organizations (ACO) program, and the Meaningful Use Incentive program. Quality metrics are also commonly made publicly available to inform consumer decision-making. The Healthcare Effectiveness Data and Information Set (HEDIS), maintained by NCQA, contains over 80 measures of health plan quality relating to effectiveness of care, access/availability of care, experience of care, utilization, and relative resource use.[20] The Consumer Assessment of Healthcare Providers and Systems (CAHPS) family of surveys, also maintained by NCQA, publicly report on patient experiences with a variety of healthcare facilities. The NCQA combines HEDIS, CAHPS, and accreditation standards scores into a single rating, on a scale of 1-5, for public and private health insurance plans. Furthermore, the 2009 Affordable Care and Patient Protection Act enhanced federal funding for a number of quality-related initiatives, including the Center for Medicare and Medicaid Innovation, the Medicaid Incentives for Prevention for Chronic Diseases program, and the Testing Experience and Functional Assessment Tools (TEFT) grant program.[21]

The Hospital Quality Alliance, a public-private collaboration established in 2002 to promote and inform hospital quality of care,[22] publicly released hospital performance data

on ten process of care measures though the Hospital Compare website in 2005.[19] Since that time, similarly formatted sites hosted by Medicare.gov have been generated to provide consumers with quality metrics for nursing homes, physicians, home health agencies, and dialysis facilities; an analogous site publicly reporting pharmacy quality has not yet been developed.

2.2 The Development and Emergence of Pharmacy Quality Metrics

2.2.1 Pharmacy Quality Alliance Quality Metrics

A formal, concerted effort to develop pharmacy-related quality metrics began in 2006 with the establishment of the non-profit, multi-stakeholder Pharmacy Quality Alliance (PQA). Through a consensus-based process, PQA defines and endorses performance measures that focus on the appropriate use of medications and pharmacy services.[2] The process by which PQA performance measures are endorsed is lengthy and includes concept identification, evaluation and refinement. In the first step, PQA staff, members, and a Measure Advisement Group review national priorities and create lists of potential measure concepts to meet clinical needs and fill measure gaps.[23] Based on a list of measure concepts prioritized by the Measure Advisement Group, Measure Development Teams (MDTs), which consist of experts in specific medication use systems or therapeutic areas, each focus on the development of a single draft measure.

PQA member organizations are invited to comment on draft measures, and the feedback received is used to edit and refine the measures. Experts in quality and performance measures then test each draft measure for feasibility, usability, and validity. Based on the results of these tests, a Strategic Advisory Panel decides whether to

recommend the measure for endorsement. If a measure is recommended, member comments are elicited via the PQA website, mail, and a conference call for member organizations. Following these comments, member organizations vote on whether to endorse a measure.[24]

PQA measures are defined by precise measure specifications and must be used according to specific criteria in order to allow for the evaluation of rates across comparators. As of February 20, 2017, PQA maintains 18 endorsed quality metrics, each of which are reviewed annually. Adherence features prominently in the quality metrics, which include the proportion of days covered (PDC) for each of ten chronic medications and non-warfarin oral anticoagulants. A measure of primary medication non-adherence has also been endorsed. Other quality metrics reflect the therapeutic appropriateness of medication therapy. These metrics include diabetes medication dosing; statin use in persons with diabetes and coronary artery disease; medication therapy for persons with asthma; use of high risk medications in the elderly; and opioid and antipsychotic use in high risk populations. The prevalence of drug-drug interactions and the proportion of comprehensive medication reviews (CMRs) completed are also captured by PQA-endorsed pharmacy quality metrics. In December 2016, PQA endorsed two new measures reflecting the concurrent use of opioids and benzodiazepines and adherence to non-infused disease modifying agents to treat multiple sclerosis.[25]

PQA quality measures are used in a number of official capacities. Beginning in 2017, Qualified Health Plans (QHPs) in the Health Insurance Marketplace are required to report three PQA metrics to the Quality Rating System (QRS). These measures include the PDCs from the 2016 coverage year for renin angiotensin system antagonists (RASA), oral

diabetes medications, and statins.[26] PQA quality metrics also play a role in Medicare Part D Plan Star Ratings. Specifically, five PQA measures are included in in the "Drug Pricing & Patient Safety" domain of the star ratings. These measures are the PDCs for renin angiotensin system antagonists (RASA), oral diabetes medications, and statins as well as the use of high-risk medications in the elderly and the CMR completion rate. The PQA adherence and high risk medication measures are heavily weighted in the calculation of the overall plan ratings and are weighted twice as highly as, for example, the criteria "getting needed prescription drugs", "appeals upheld", and "members choosing to leave the plan." Furthermore, CMS publicly reports "display measures" for Part D plans on a patient safety website. The PQA measures for drug-drug interactions, oral diabetes medication dosing, and statin use in persons with diabetes are included as display measures. In conclusion, the Pharmacy Quality Alliance has pioneered the development and validation of pharmacy quality metrics that are now used in a number of governmental capacities related to health plan ratings.

2.2.2 Patient Perceptions of Pharmacy Quality

Although pharmacy quality experts have endorsed pharmacy quality metrics through a consensus-driven process, little consensus exists among patients regarding the components and definition of pharmacy quality. In a series of focus groups guided by the Donabedian Framework, British patients and pharmacists discussed attributes of a "good" community pharmacy.[27] Patients felt that high quality pharmacies have structures in place to manage their workload and provide reliable and individualized care. They also maintained that high quality pharmacies educate their patients about their medications

and how to take them.[27] Shiyanbola et al. also used the Donabedian Framework to inform their study on older adults' perceptions of what constitutes a high-quality pharmacy. [28] The focus group participants in that study most commonly perceived a quality pharmacy to be one focused on the processes of care. That is, when asked to describe the "kinds of things that make a pharmacy good," focus group participants often responded with attributes focused on the relational aspects of community pharmacy, including the friendliness and helpfulness of staff and pharmacist availability to communicate directly with patients.[28] Therefore, though the body of literature on patient perceptions of pharmacy quality is limited, patients have consistently opined that pharmacy quality primarily reflects processes, rather than outcomes, of care.

2.3 The Impact of Publicly Reported Quality Metrics in the United States

The impact of published quality metrics in the United States has been widely discussed by both proponents and opponents of public performance data. Advocates for publicly available quality measures assert that the data allow patients to make more informed decisions about their care and spurs providers to focus on quality improvement efforts.[29] Concerns have been raised, however, that concentrating energy and resources on improving the public measures may come at the cost of innovation and improvements in other clinically important outcomes.[29] In a 2015 survey of primary care physicians, half of those surveyed felt that the increased use of physician quality metrics is negatively impacting healthcare quality.[30] A number of studies have specifically examined the impact of quality metrics on healthcare quality and market share, a proxy for patient choice, to more empirically assess the effect of public performance data.

2.3.1. The Impact of Quality Metrics on Healthcare Quality

Conflicting evidence exists on the impact of publicly available healthcare quality metrics on the quality of healthcare systems, providers, and health plans. A 2012 evidence-based practice report from AHRQ concluded that studies on this topic report inconsistent results, particularly regarding metrics' impact on outcome measures.[31] A Cochrane Review and a systematic review in the Annals of Internal Medicine echoed this finding, stating that there is an inconsistent association between publicly available metrics and the quality of healthcare precluding firm conclusions about the relationship.[32,33]

The 2012 AHRQ report cited the potential for unintended negative effects in the wake of public quality reporting, but studies on these consequences report mixed findings.[31] The reported reductions in mortality rates for coronary artery bypass graft surgery (CABG) following New York State's public release of CABG report cards have raised questions about physician "cherry-picking" by turning away and referring the sickest patients.[34–36] Healthcare providers and facilities may also focus their quality efforts on the specific outcomes published publicly to the detriment of others and on short-term metrics rather than long-term improvements.[37] These changes in provider behavior on account of public reporting have complicated the pursuit of high quality evidence on the effect of publicly available quality metrics on overall healthcare quality.

Though the impact of publicly reported metrics on the quality of healthcare is not clear, the impact on the structures and processes of healthcare is more evident.[31] The results of a study in Wisconsin suggest that publicized quality ratings may increase the number of quality improvement efforts undertaken by hospitals, particularly those with low reported quality.[38] Nursing homes were also shown to improve unreported measures

of care processes through quality improvement efforts following the implementation of public reporting.[39] Both the Cochrane[32] and Fung [33] reviews report positive associations between public reporting and hospital-initiated quality improvement activities. Overall, then, while the impact of quality metrics on healthcare outcomes is debated, publicly reported quality data has consistently been associated with improvements in the structures and processes of healthcare provision.

2.3.2 The Impact of Publicly Reported Quality Metrics on Provider Market Share

An assumption underlying many studies on the impact of metrics on healthcare quality asserts that public reporting will incentivize providers and facilities to improve quality in order to retain or attract patients. A number of studies have used administrative claims to test that assumption by assessing patient response – in the form of market share and patient volume – to publicly reported quality metrics.

The evidence on the impact of hospital report cards on market share is conflicting. Hospital performance on one specific hospital-based procedure, coronary artery bypass graft (CABG), received significant attention in the 1990s as states began publicly reporting hospitals' mortality rates for the procedure. Following the publication of New York state surgery mortality reports, one study reported that hospitals with higher mortality rates had small but significant decreases in the growth rate of market share (1.8 percentage points).[40] However, another study reported that significant market share gains for high quality hospitals were short-lived, disappearing three months after report card publication.[41] A study of Pennsylvania's CABG mortality report cards reported non-significant changes in the number of CABG surgeries per quarter at high- and low-mortality

hospitals [42] Significant changes were, however, seen in the surgeon-level analyses; high-mortality surgeons and those without report cards performed 4.76 and 8.04 fewer surgeries per quarter after the release of the report cards.[42]

Apart from CABG-specific report cards, overall hospital ratings and performance data for other hospital services have generally shown very limit impact on market share. A study of 30 hospitals in Cleveland, Ohio reported that hospital outlier status was not significantly associated with market share.[43] Similarly, the publication of graft survival rates for kidney transplants had a limited impact on patient registration, with only registrations for young patients (aged 18-40 years) decreasing at low performing hospitals.[44] A 2005 commentary published in the Journal of the American Medical Association summarized the body of literature on the impact of public report cards. The authors concluded that there is "limited evidence" that public report cards influence market share by allowing consumers to make more informed choices between providers.[35]

The responsiveness of hospital markets to public quality information may be limited by the often-urgent nature of the hospital selection process as well as differences in insurance network status and location. Several studies have examined the effects of public report cards in markets where decision-making may be less impacted by urgency, cost, and/or location. One such study investigated the impact of Medicare's Home Health Compare report cards on the market share of home health agencies among Medicare patients.[45] Given that the home health care market uniquely demands no travel costs or copayments, the authors hypothesized that report cards may have a greater impact on the home health care market than the markets for other healthcare providers and services. Consistent with this hypothesis, the study results suggested that a one standard deviation

increase in quality scores for functional outcomes could be expected to increase an agency's annual market share for hospital-discharged and community dwelling patients by 0.6 and 0.9 percentage points, respectively.[45] Similar results were reported in an analysis of the skilled nursing facility (SNF) market, though the impact of specific metrics for SNFs differed. [46] Specifically, an increase from the 25th to the 75th percentile on the performance metric reflecting patient pain control was associated with a 0.1-0.7-percentage point increase in market share, depending on market size. However, a performance metric reflecting rates of patient delirium was not found to be associated with market share.[39]

Although they provide very different services than home health agencies and skilled nursing facilities, fertility clinics are similarly situated in that patients generally select clinics in the absence of significant time pressures and insurance network considerations. In a study on the impact of the introduction of online fertility clinic report cards in 1998, market share increased for fertility clinics with higher birth rates and decreased for clinics that treated primarily younger patient populations or did not report quality information.[47] Model simulations predicted that increasing the reported birth rate by 0.13 percentage points, equivalent to increasing from the 25th percentile of clinics to the 75th, would result in an increase in market share of 2.9 percentage points. [47]

The results of several market share studies suggest that patient demographics may play a role in the impact of public report cards. The authors in the fertility clinic study suggested that the demographics of patients undergoing fertility treatments, who are disproportionately wealthy, young, and highly educated, likely contributed to their finding that public quality information impacted market share.[47] Similarly, patients with higher

education levels demonstrated a slightly larger response to report cards in an analysis of nursing home market share using Medicare claims data.[39]

In conclusion, the impact of public report cards on provider market share is debated but is likely minimal. Statistically significant changes in market share following public release of quality data for skilled nursing facilities and home health care were limited in magnitude. The largest documented market share changes were seen in the fertility clinic market, which may reflect the disproportionately well educated, wealthy demographics of patients undergoing fertility treatments and the lack of insurance networks for the services.

2.4 Patient Perceptions of Healthcare Quality Metrics

The publication of two systematic reviews concluding that quality metrics have no or minimal impact on hospital market share[48,49] has raised questions as to the factors underlying the negative findings. Several theories about these factors have been posited. Specifically, researchers have suggested that capacity constraints may limit referrals to high quality providers, that patients may be unable to change providers due to insurance networks, and that the stability of quality ratings of over time contributes to a lack of attention-grabbing "news" surrounding report cards.[34,49] Furthermore, in order for publicly reported quality metrics to impact patient selection of health care providers, patients must use and act upon these metrics. For patients to act upon quality data, 1) report cards must exist; 2) patients must know about them and have access to them; 3) patients must understand and believe the rankings; and 4) patients must act on the rankings.[35] A number

of studies have investigated each of these underlying processes involved in the use of report cards during patient selection of healthcare facilities and providers.

2.4.1 Patient Awareness of Healthcare Quality Metrics

The current body of literature suggests that patient awareness of healthcare report cards is limited. A study of nearly 12,000 adults with chronic illness in 2008 and 2012 reported that awareness of hospital and physician quality measures was generally low and showed substantial regional variation.[50] In 2008, approximately a quarter (25.5%) of patients were aware of publicly available hospital quality metrics, while half as many (12.8%) were aware of physician quality information. Awareness of physician quality metrics varied geographically, ranging from 6.9% (Maine) to 19.3% (Detroit). Similarly, patients in the Midwest more commonly reported awareness of hospital quality metrics than those on the West Coast. From 2008 to 2012, awareness of physician, but not hospital, comparative quality information increased, though the magnitude of that change, 3.7 percentage points, was small.[50,51]

Conflicting results have been reported on the impact of demographic characteristics on patient awareness of quality measures. In a nationally representative survey of patients with chronic illnesses, demographic factors had limited impact on patient awareness of quality metrics, which was generally low among individuals of all races, educational backgrounds, and income levels.[51] Patients also report low awareness of quality metrics for other types of healthcare providers. Many focus group participants who had recently help loved ones select home health care agencies were not aware that ratings for these agencies existed.[52] Notably, whether patients *want* to be aware of comparative quality information is

debated. When interviewed, many patients expressed perceptions that "ignorance [is] bliss" when it comes to hospital practices. [53]

Public awareness of commercial or employer-provided reports appears to be substantially higher than knowledge of government reports, including Hospital Compare. Huesch et al., who investigated Google search behavior, reported that searches for Health Grades, a physician rating and comparison database, occurred as many as 80 times more often than searches for Hospital Compare from 2012-2013.[54] In a survey of nearly 1,000 (n = 927) individuals with employer-sponsored HMO health insurance, 63% reported having seen employer report cards.[55] A similar proportion (65%) of a nationally representative sample (n = 2,137) was aware of online physician ratings.[56] Ease of accessibility to quality information may not have a significant impact on patient awareness. When an employer group mailed quality ratings on local hospitals directly to employees' homes, only 61% reported being exposed to the ratings either by seeing the report or hearing about it from someone else.[57] Awareness declined substantially over time; two years later, only 6% remembered seeing the report.[57] While the awareness of these report cards exceeds that of non-profit and governmental report cards, it is still far lower than awareness of ratings for cars (87%), movies/books (82%), and restaurants (81%).[56] In conclusion, low levels of patient awareness for objective quality information may present a considerable barrier to the widespread use of this data by patients in healthcare decision-making.

2.4.2 Patient Understanding of Healthcare Quality Metrics

The ability of patients to properly interpret and understand publicly available quality metrics has gained considerable attention among quality researchers. A number of

studies have investigated the degree to which patients are able to understand quality metrics and the influence of the quality data presentation on patients' levels of understanding.

Comprehension tests have been used to assess the degree to which participants are able to correctly interpret healthcare quality data. In these tests, participants are presented data and asked questions regarding the information contained in that data. For example, a participant may be presented with information about a quality metric presented in a bar chart with a benchmark bar representing the state average for that metric. A participant may then be asked, "Do bigger bars on the chart show better or worse quality?" and "Does Facility A have a better score on this measure than typical facilities in this state?"[58] Two studies on nursing home quality data reported that, for each comprehension question asked, approximately 70-90% of participants answered correctly.[59,60] However, the percentage of correct responses was much lower (47%) when information was presented only in a bar graph.[60] In another study, participants answered, on average, about 5.4 of 8 comprehension questions correctly, a finding interpreted by the authors as suggesting high levels of understanding.[58] In qualitative interviews, however, many patients were confused about how to interpret various indicators related to hospital-acquired infections (HAI).[53] Additionally, some expressed confusion about the distinction between the number of cases and rates, whether longer length of stay reflected higher quality of care, and why a high score on a process measure did not necessarily result in a high score on a corresponding outcome measure.[53]

Many, but not all, studies on the presentation of quality metrics report a significant association between presentation format and patient comprehension. Several studies have

identified simplification of data presentation as a key change to improving understanding. Simplification may include limiting the amount of information displayed. In a study by Peters et al., patients were best able to identify the hospital with the highest quality when hospital profiles were focused only on quality and non-quality hospital information was omitted from hospital profiles.[61] Similarly, the likelihood that seniors selected the lowest cost Medicare Part D plan in a choice experiment increased when less non-cost related information about the plans was presented.[62] Limiting the number of providers, facilities, or health plans, presented simultaneously to patients may also improve their comprehension of quality metrics.[59,62,63] Furthermore, ratings presented in a star format with a scale of one star to three stars may be clearer to patients than those presented on a scale of one star to five stars.[59] However, not all forms of simplification have been shown to improve comprehension. Presenting patients with a lesser number of quality metrics was not associated with comprehension in a study testing patient understanding of nursing home quality metrics.[59] The number of quality metrics displayed was also a weak predictor of patient comprehension of hospital quality information.[64]

Beyond simplification, the use of evaluative symbols in addition to or in place of numerical or graphical data has been shown to promote patient understanding of quality information. In focus groups and cognitive testing, many participants have qualitatively expressed preferences for star systems rather than percentages, letter grades, or numerical scales.[14,60] Others, however, see symbols as more difficult to interpret or a way to "hide something" that would have been revealed if rates or percentages were displayed.[53,65] When comparing different forms of data presentation, colored dots[59] and stars[60,66] outperform other symbols and numbers in promoting patient understanding of quality

metrics, and bar graphs are consistently,[59,60] but not exclusively,[67] associated with the lowest levels of comprehension. Bar charts were commonly misinterpreted in patient interviews; one patient remarked "the bar chart says nothing."[65]

The impact on comprehension of evaluative word labels (e.g. excellent, good, fair, poor) added to graphical or numerical information is debated in the literature. While the addition of word labels to bar graphs[59] or evaluative tables[60] has been shown to improve comprehension, this finding is not consistent.[68] Word labels may have a greater impact on patient understanding of quality measures when the labels are used to clarify whether a high or low number is better for a specific indicator (e.g. mortality rate, infection rate).[53] Additionally, when the addition of general word labels that broadly define what quality metric stars represent, (e.g. "doctor quality," rather than "quality rating" or "star rating") may improve patients' understanding of what quality stars actually measure.[69] Similarly, in qualitative interviews on comparative information for health plans, patients expressed a desire for clear representations of the meaning of quality stars.[65] In the absence of this information, patients may misunderstand what the stars actually represent; one patient in a qualitative study interpreted "quality indicators" as representing the extent to which a health care plan pays attention to patients.[65]

Patient comprehension of benchmarking and risk-adjusted quality measure varies considerably based on the presentation of the information. Qualitative interviews have suggested that many patients struggle to understand the definition of risk adjustment.[53] In one study that presented hypothetical physician quality information for coronary artery bypass grafts, fewer than a quarter of patients selected the physician with the lowest risk-adjusted patient mortality rate when the that metric was presented alongside observed

patient mortality rates and number of operations completed.[70] However, when only risk-adjusted data was presented to participants, either in a bar graph (53%) or with benchmarked symbols (66%), the majority of patients selected physicians with the highest quality (i.e., lowest risk-adjusted mortality rate).[70] These results are consistent with reports that the presentation of quality metrics in both absolute and relative (benchmarked) forms simultaneously may create confusion among patients.[65] Despite the finding that benchmarking may improve patient comprehension of risk-adjusted quality measures, benchmarked quality data may still be confusing and/or undesirable to patients. Symbols based on benchmarks have confused patients in cognitive testing.[65] Furthermore, patients in focus groups found little value in comparing a pharmacy's quality to a state average, stating, "I don't really care what the state average is," and "what if I don't know what the state average is necessarily? What if the whole state is doing poorly?"[14]

In several focus groups, patients suggested that presenting an overall performance scale in addition to more specific quality metrics would aid in the identification of high-quality pharmacies and hospitals. [14,53,71] These qualitative findings are consistent with experimental data demonstrating that survey participants were more consistently able to identify high quality nursing homes when an overall performance measure was included in addition to specific quality metrics.[59] Another study examined patient choices when presented with three pieces of quality information for each of five hospitals, including an overall safe practices score and specific hospital acquired infection and mortality rates.[67] When one hospital had the best overall score but another hospital had the best infection and mortality rates, more patients (46%) indicated that they would choose the hospital with the best overall score than one with the best component scores (34%), suggesting a

reliance on general quality scores for decision-making.[67] Many patients, however, do not want to be presented with only a single, overall performance metric. Participants in several focus groups expressed a desire to see more detailed quality information beyond just an aggregated, overall measure,[14,71] suggesting that overall and specific scores may appeal to different subgroups of the population seeking comparative quality information.

Demographic characteristics have consistently been associated with patient comprehension of healthcare quality data. Three studies on nursing home quality information reported that more educated participants more often correctly interpreted quality information when compared to less educated respondents.[58,63] Participants with at least a college education were also more often able to identify the "best" hospital[67] or surgeon[70] when presented with quality information than their lower educated counterparts. However, higher health literacy and numeracy, rather than education level, may more strongly predict comprehension of quality information.[64,72] Age is also significantly associated with patient understanding of quality data, with younger patients consistently demonstrating higher levels of understanding than older patients.[58,63,64]

Overall, patient understanding of quality metrics is relatively limited, though some presentations of quality data may promote higher degrees of comprehension. Simplifying the amount and type of information displayed, presenting information with symbols like stars or colored dots, and adding evaluative word labels (e.g. excellent, good, fair, poor) to charts and graphs may improve patient understanding of quality information. Finally, patient preferences for benchmarked data and overall performance scores vary considerably, and though risk-adjusted quality scores present a more accurate picture of provider quality, risk-adjustment may be difficult for patients to understand or interpret.

2.4.3 Patient Perceptions of Trustworthiness of Healthcare Quality Metrics

Patients who access and understand quality metrics can only be expected to consider the quality information during provider selection if they believe both the source and the measurement of the metrics to be credible. Only a fraction of the quality information to which patients are exposed is disseminated by non-profit organizations that, like PQA and NCQA, are dedicated to measure development and validation. The quality metrics designed by these organizations – and others - may be published by governmental organizations. Employers and insurers regularly circulate quality information, and personal conversations with family and friends often yield informal provider assessments and recommendations. Furthermore, healthcare-specific (e.g. healthgrades.com, ratemds.com) and general ratings websites (e.g. yelp.com, google.com) provide patients with easy access to opinions on and experiences with healthcare providers and facilities. The relative credibility of and trust in these sources of information among patients will impact the degree to which validated quality metrics are used in patient decision-making.

When surveyed, patients often express high degrees trust in the opinions of their family, friends, and existing physicians. One survey of a nationally representative sample of individuals with chronic diseases asked participants the extent to which they would trust the information about health care quality they received from each of seven sources of information on a scale of "a lot", "a little" and "not at all." The results indicated that patients very often placed "a lot" of trust in information received from their doctor (83.4%), their hospital (56.0%) and their friends and family (47.4%). In comparison, fewer than one quarter placed "a lot" of trust in information received from their employer (23.2%) or a

government agency (24.5%).[73] In qualitative cognitive interviews exploring patient perspectives on comparative information on health plans, some patients especially valued the opinion of family doctors on the plans,[65] while others felt that "family doctors do not know how their fellow clinicians do their work."[65] Similarly, participants in a focus group on comparative provider information for hospitals all agreed that the opinions of family and friends are highly trustworthy, with one participant remarking, "It's simple, you rely on the experiences of the people you know."[71] The group debated the merits of physicians' recommendations, however, with some asserting that "you will tend to listen to your [primary care physician]" and others maintaining, "you can't expect that the PCP knows everything about this." [71]

In contrast to the high degree of trust placed in the opinions of family and friends, patients often express concerns over the trustworthiness of quality information provided by insurers, employers, and government agencies. Nearly a quarter of older adults surveyed felt that Medicare performance data would serve primarily to help save the government money rather than to help patients receive better care.[74] When asked to rate the trustworthiness of CAHPS and HEDIS data, only 13.5% and 15.1% of patients perceived the data to be "very" trustworthy. However, most patients (69.6%, 70.2% respectively) felt that these sources were "somewhat" trustworthy, suggesting that patients may not consider agency quality information to be categorically untrustworthy.[75] Notably, in the same survey, subjective patient comments included alongside objective CAHPS and/or HEDIS data were perceived as no more trustworthy as the objective measures[75] despite evidence that many patients find narrative comments desirable.[76] Focus group participants have also expressed skepticism towards metrics on the use of evidence-based medicine.[77]

When presented with a hypothetical quality metric, "uses treatments proven to get results," many participants wanted to know who had decided that a treatment was proven effective and were concerned about bias from industry-sponsored trials.[77]

Published opinions of former patients were also viewed with skepticism among patients in cognitive testing of health plan quality information, with one patient remarking, "the 'opinion of ex-patients;' Well maybe only two patients were questioned? So I'd like to know more about this."[65] A participant in the same study noted regarding the quality information on health plans, "I'd never make a decision based on this kind of information. Perhaps rather on personal experiences of others, I would ask others,"[65] reflecting again the perception that the opinions of family and friends are more trustworthy than agency-developed quality metrics. Participants in another focus group questioned the credibility of comparative information and expressed a desire to see the sources of the information as well as a disclaimer about the reliability of specific measures and a declaration of conflicts of interest.[71]

Demographic characteristics have been shown to impact the degree of trust that patients have towards healthcare quality information received from varying sources. Males have demonstrated higher levels of trust in provider sources of information and are less likely to trust personal sources than females.[73] Evidence on the impact of age and education on attitudes towards information sources is conflicting. One study reported that age had no impact on the level of trust that patients had on different sources of quality information.[73] Higher levels of education have been associated with increased trust in provider and institutional sources of information and decreased trust in information provided by family and friends.[73]

In conclusion, patients exhibit some skepticism towards quality metrics provided by insurers, employers, or government, expressing concerns about bias and ulterior motives. They feel significantly more comfortable with quality as assessed by trusted physicians, family, or friends. The degree to which demographic characteristics like age and education level influence patients' perceptions of objective quality information as credible is debated and should be explored in future research.

2.5 Patient Selection of Healthcare Providers

Healthcare is increasingly focused on shared decision-making between patients and practitioners.[78,79] However, prior to shared decision-making taking place, patients must first select a healthcare provider. The degree to which patients feel that they have sufficient choice of physicians[80] is associated with patient trust in their doctors which, in turn, may increase self-efficacy, self-rated health, health related quality of life, and adherence to physician recommendations.[81,82] Therefore, a clear understanding of the factors involved in patient selection of healthcare providers may ultimately promote increased patient engagement and outcomes.

2.5.1 Patient Selection of Healthcare Providers: Functional Quality

Patients looking to select a high-quality healthcare provider often look for a provider with a high degree of functional quality. In contrast to technical quality, which reflects staff competence, compliance to professional standards of care, and technical accuracy in diagnosis and treatment, functional quality refers to the manner in which care is delivered.[83] In surveys and focus groups, patients often discuss quality by describing

provider courtesy, communication, understanding, caring, and physical environment, all of which describe attributes of functional quality.[83] When moderators of focus groups among Medicaid beneficiaries posed the question, 'what are the most important things for getting good quality care," participants focused the discussion primarily on interpersonal themes, including attentiveness, communication, and respect.[84] One participant remarked, "When I'm talkin' to my doctor, is he listening, does he know my fears, does he understand what my needs are when I leave him, what my concerns are?"[84]

Among surveys specifically focused on patient selection of healthcare providers, physician bedside manner and communication consistently rate highly among patients as determinant factors. When patients in one survey were asked to denote the importance of 40 different factors when selecting a primary care physician, nearly all patients considered 'physician spends adequate time answering questions' (94%) and 'physician discusses illness in a way I can understand' (91%) to be important or very important.[85] In another survey, female patients were asked to rate the importance of a variety of physician characteristics on a scale of 1-6 when considering selecting three types of physicians: an obstetrician-gynecologist (OBGYN), a family physician, and a surgeon.[86] For OBGYN and family physicians, factors related to interpersonal communication, including 'listens to me,' 'explains things clearly,' 'respectful,' 'easy to talk to,' and 'caring,' were rated more highly (mean ratings: 5.7-5.9) than those related to clinical competence (mean ratings: 4.8-5.5). In contrast, clinical competence was rated as more important to patients when selecting a surgeon; patients responded that 'expert in my particular problem' (mean rating: 5.8) was equally as important as interpersonal communication factors (mean ratings: 5.7-5.9) when evaluating surgeons.[86] Bedside manner was also important to patients selecting a spine

surgeon (mean rating, on a scale of 1-10: 8.01), though this indicator of functional quality was not as important to that patient population as board-certification (9.26).[87] Among patients undergoing elective joint arthroplasty, physician manner and physician quality were rated as similarly important to patients (mean ratings 4.68 and 4.64, respectively, on a scale of 1-5).[88]

Functional quality encompasses not only characteristics related to interpersonal communication but also physical appearances of providers and facilities. In a survey on the selection of a primary care physician, the physical appearance of the doctor and the doctor's office were rated by patients as more important (mean rating 8.00-8.15 on a scale of 1-10) than wait time as at the office (7.39), cost of care to the patient (6.46), and proximity of the office (5.94), factors often assumed to be the most important to American patients.[89] Similarly, the appearance of clinic facilities was more important to patients selecting spine surgeons (mean rating 7.47 on a scale of 1-10) than recommendations by family members, friends (6.51), or other physicians (6.37) and online reviews (6.11-6.26).[87]

In addition to prioritizing communication and facilities, patients consistently view convenience as an important, but not necessarily critical, factor when selecting a healthcare provider. Factors related to convenience, including waiting time, proximity, and the availability of weekend and evening hours, were viewed as only moderately important among patients selecting primary care physicians.[89] Convenient location and out-of-pocket costs were also reported as moderately important to patients when selecting a surgeon for total joint arthroplasty (mean rating 3.5, on a scale of 1-5); these factors were significantly less important to that patient population than physician manner (4.68) and quality

(4.64).[88] In another survey, only about half of patients (55%) reported that convenient office location was important or very important when selecting a primary care physician; far more felt that factors relating to communication and reputation were important (89-94%). [85]

Overall, patients consistently report placing considerable value on aspects of functional quality when they select healthcare providers. Patients demonstrate strong preferences for physicians with superior bedside manner and communication skills. The importance of these attributes, which also include respectfulness, willingness to answer questions, and a caring nature, exceeds that of convenience. Patients also prefer providers and offices with professional appearances, again more strongly than they prefer convenience, suggesting that outward appearance may serve for patients as a proxy measure for quality.

2.5.2 Patient Selection of Healthcare Providers: Technical Quality

When surveyed on their priorities when selecting physicians, patients commonly place substantial emphasis on physician board certification. When asked to rate the importance of a variety of factors when choosing a spine surgeon, patients rated board certification highest (mean rating: 9.26, on a scale of 1-10).[87] This rating exceeded the ratings patients assigned to being within their insurance network (8.1) and bedside manner (8.01). In the same way, a different set of patients considered board certification to be the most important factor when selecting a primary care physician (average rating: 9.31) and scored certification significantly higher than the second and third most important factors, physical appearance of the doctor's office (8.15) and doctor (8.0).[89]

These results were again echoed in a survey of primarily female plastic surgery patients, with board certification (average rating: 9.2) tying surgeon reputation (average rating: 9.2) as the most important factor during physician selection.[90] In another survey asking patients to rank the importance of primary care physician characteristics, board certification lagged behind satisfaction ratings but was consistently ranked as more important than objective quality metrics.[91] This suggests that board certification may be a more readily understood measure of technical quality than specific metrics.

The relative importance of provider reputation, as assessed by friends, family or other providers, when patients select providers is debated in the literature. Reputation was viewed as less important than interpersonal communication and technical expertise among women surveyed about preferences for OBGYNs, family physicians, and surgeons.[86] In contrast, recommendations from friends and family were rated as more important than several potential measures of technical expertise in a different survey of patients on selecting a primary care physician. [89] Yet another survey reported that similar proportions of patients considered physician reputation (89%) and provider communication (91%) to be important or very important when selecting a primary care physician.[85] Therefore, though the literature is not conclusive on the importance of reputation relative to other factors when selecting providers, reputation is consistently shown to be important to patients. Consistent with this assertion, the vast majority of older adults interviewed on how they selected a surgeon reported that surgeon and hospital reputation were "extremely" or "very" important to deciding on a surgeon (80% and 79%, respectively).[74]

The impact of the source of the provider reputation, namely, friends/family versus other physicians, on its perceived importance also varies by study. The women surveyed in

the Mavis et al. study rated reputation among other doctors (mean rating, scale 1-6: 5.2-5.5) as more important than reputation among friends or family (4.8-5.0).[86] When asked why they felt that a particular surgeon or hospital had a good reputation, twice as many older adults responded that comments from their referring doctor (64%), rather than comments from friends or family (31%), had influenced their perception of the provider's reputation.[74] Patients selecting a spine surgeon rated recommendations by family and friends members (mean rating, scale 1-10: 6.51) as similarly important to physician recommendations (6.51).

Information on provider reputation in the form of recommendations by family, friends, or a physician, may be more important to patients than objective quality information. Sinaiko conducted a survey to examine patient decision-making in the context of a hypothetical tiered insurance plan.[92] In the presented insurance plan, higher quality physicians were assigned to Tier 1 and lower quality physicians to Tier 2.[92] In the absence of any information beyond tier classification, the vast majority of participants selected high quality, Tier 1 physicians (84%) and indicated that the doctor's tier ranking was 'very important' to their choice (59%). However, when told that a friend or family had seen a Tier 2 doctor and had a good experience, far fewer participants selected a Tier 1 doctor (44%), and nearly as many selected the "recommended" Tier 2 doctor (39%). When a primary care physician had recommended a Tier 2 physician, two-thirds (67%) of patients selected the recommended physician over the higher quality, Tier 1 physician (24%).[92] Simulations of the effect of introducing higher copayments for Tier 2 physicians suggested that the differential between Tier 1 and Tier 2 copayments would need to exceed $300 to counteract the impact of the peer or provider recommendations for lower quality

physicians.[92] Peer and physician recommendations were also more important to patients selecting a plastic surgeon than objective quality ratings, though only marginally.[90] Specifically, patients asked to rate the importance of various factors when choosing a plastic surgeon rated reputation (mean rating 9.2, on a scale of 1-10), friend referral (7.77) and physician referral (7.76) as slightly more important than physician quality (7.56).[90]

Information regarding providers' reputations may not only be shared by friends, family, and other providers but also in the form of anonymous patient satisfaction ratings. Patients selecting healthcare providers have generally expressed views that anonymous satisfaction ratings are important to decision-making. Patient satisfaction ratings were viewed as more important when selecting a primary care physician than quality metrics, credentials, and health plan ratings.[91] However, anonymous reviews have consistently been rated as less important than recommendations from friends and family.[87]

In conclusion, board certification is the most commonly reported objective technical quality measure used by patients to select providers. However, given that nearly 80% of physicians are board certified,[93] measure is unlikely to serve as a differentiating factor between physicians. Beyond board certification, patients are much less likely to use objective quality metrics in decision-making than other factors they perceive to be credible sources of quality information, including provider reputation and recommendations from physicians, family, and friends.

2.5.3 Patient Selection of Healthcare Providers: Effect of Demographic Characteristics

Demographic characteristics have consistently been associated with small but significant differences in patient preferences during healthcare provider selection. When selecting an OBGYN, older patients and those with less education placed a higher priority on factors related to interpersonal communication.[86] Furthermore, women at either end of the age spectrum (≥40 years or ≤ 26 years), minority, and unmarried women placed a higher value on having a female OBGYN than their white, median age, married counterparts.[86] However, women placed a much lower emphasis on provider gender when selecting other types of physicians, including primary care physicians[89] and surgeons.[94]

Patient education level may also impact the relative priority that patients place on functional and technical characteristics during provider selection. In one study, those with lower levels of education placed a greater emphasis on attributes related to functional quality and less priority on technical competence. Specifically, women with a high school education or less rated interpersonal communication attributes as more important when selecting family physicians and surgeons than did women with at least some college.[86] Similarly, interpersonal skills were ranked as more important to primary care physician selection among those with a high school education than their more educated counterparts.[91] Another study found that increasing education level was positively correlated with the importance that patients assigned to the prestige of a provider's medical school, residence, or fellowship.[94] Patients who considered 'convenient office location' to be an important factor when selecting a primary care physician were more likely to be those with lower education levels, a finding attributed by the authors to difficulty with transportation in that group.[85] In conclusion, a variety of demographic

characteristics have been associated with patient preferences for healthcare providers, including age, race, gender, and education level.

2.6 Patient Perceptions of Pharmacists as Healthcare Providers

The role of pharmacists has expanded considerably over the last 20 years. According to the Pharmacy Workforce Center's 2014 National Pharmacist Workforce Survey, the proportion of pharmacists who provided medication therapy management and immunizations increased from 13% and 15% respectively, in 2004 to 60% and 53% in 2014.[95] While the growing emphasis on the role of pharmacists as healthcare providers is clearly evident to those within pharmacy practice, the diffusion of pharmacists' new roles is likely slower among patients. A longitudinal segmentation analysis by Schommer et al. identified market segments based patient perceptions of the pharmacist's role.[96] The largest segment, to which nearly half of patients belonged, was characterized by the perception that medication information should be, and/or is, provided primarily by the physician. Another segment contained the approximately one-fifth of patients who maintained not only the aforementioned reliance on physicians but also believed talking with a pharmacist takes too much time and that pharmacist roles should be legally or ethically restricted.[96] The proportion of patients in each of these segments remained steady over the 15 year study period from 1995-2010 despite efforts to promote the role of pharmacists as healthcare providers during that time.[96] Additional literature on pharmacist expectations of community pharmacists is summarized in Chapter 2.8.

These findings suggest that a significant subgroup of patients may be unlikely to view pharmacists as healthcare providers or select a pharmacy in a manner consistent with

preferences for healthcare providers. As a result, these patients' preferences during pharmacy selection may be more analogous to their preferences during retail or grocery store selection than their priorities during physician selection. Notably, however, marketing research suggests that many of the same variables that impact health care decision-making play a role in retail or grocery store selection. For example, individuals with higher incomes are more likely to frequent a specialty grocery or warehouse club,[97,98] while those with lower incomes and education levels are more likely to shop at a supercenter.[97] Men have also demonstrated stronger preferences for fast grocery store service but weaker preferences for friendly service than their female counterparts.[99,100] Preferences for grocery stores may also vary by age; a study of older adults (55+) reported that the importance of convenience and special discounts decreased and increased, respectively, with age.[101] Grocery store shoppers also cite factors regarding location convenience, hours of operation, wait time, and service quality as important during store selection.[99,102,103] In conclusion, customer priorities for healthcare providers and retail services maintain considerable overlap such that most of the attributes used in this study of patient selection of community pharmacies are likely to be relevant to respondents regardless of whether or not they perceive pharmacists to be healthcare providers.

2.7 Patient Selection of Pharmacy Channel

Before patients select a community pharmacy, they must first make the decision to visit a brick-and-mortar pharmacy over a mail order or internet pharmacy. Mail order pharmacies have grown in size and popularity, in large part due to insurance mandates or incentives to use this channel. The market share of mail order pharmacies doubled from

6% in the late 1980s to 12% in 2000 and again to 23.5% in 2010.[104] Nearly every (96.7%) employer sponsored insurance plan now offers a mail service pharmacy option.[104] Because the decision between pharmacy channels acts as a form of selection bias to filter the population of patients deciding on community pharmacies, consideration of the distribution of mail order pharmacy usage is warranted.

A study examining channel selection in insurance programs that incentivize or mandate mail order pharmacy use reported that the strongest predictors of using a community pharmacy were living within a 5-minute drive of a community pharmacy, having filled previous prescriptions exclusively at community pharmacies, and having no maintenance medications.[105] Younger adults (<55 years) also more commonly selected community pharmacies than older patients.[105] Nevertheless, mail order pharmacy use remains high among older adults, with 56.7% of surveyed adults over 65 years of age indicating that they had used a mail-order pharmacy at least once.[104] Approximately one in eight (12.3%) reported using mail order based on insurance plan requirements,[104] and one in four for insurance reasons that included price incentivization.[106] Mail-order users in a rural, elderly population were primarily male, non-Hispanic white, retirees with employer-provided insurance. Additionally, each additional prescription drug taken by a patient increased the likelihood of mail-order pharmacy use by 21%.[106]

Although online pharmacies vary considerably in their legitimacy, accredited online pharmacies present a credible alternative to mail order and community pharmacies. The number of online pharmacies – both accredited and not – has increased rapidly in the past decade,[107] yet awareness and patronage of this channel remains limited. A 2012 study among emergency department patients reported that a slight majority (57%) of patients

were aware that online pharmacies existed, but very few (5.4%) had ever used one.[108] Despite concerns that patients use illegitimate pharmacies to circumvent the need to obtain a prescription,[109] the majority of online pharmacy users used pharmacies administered by their insurance companies. Additionally, a much higher proportion of patients who used online pharmacies used them for convenience (66%), cost (40%), or because it was required by their insurance carrier (7%) than to avoid obtaining a prescription (2%).[108] Patients who select community pharmacy as their pharmacy distribution channel may therefore systematically differ in their priorities and preferences for pharmacy care than patients who opt to receive their medications from mail order and/or internet pharmacies.

2.8 Patient Perceptions of Community Pharmacies: A Systematic Literature Review

Understanding consumer perceptions is a fundamental task of all businesses including pharmacies. That understanding can be used to better serve customers and influence perceptions of the business. The complex interplay between consumer preferences, expectations, perceptions, and satisfaction has been extensively explored in marketing literature. It has been posited that a customer's satisfaction, or dissatisfaction, with a service experience reflects their perceptions of the service meeting, exceeding, or failing to meet their expectations for that service.[110–112] Evidence also suggests that some attributes of the service experience have greater impact on perceptions than others.[110,113]

The importance of understanding perceptions of healthcare consumers has intensified light of the inclusion of patient satisfaction measures in the Centers for Medicare and Medicaid Services' value-based purchasing program[114] and the growing

emphasis on incorporating patient preferences into treatment approaches.[115] Associations between patient expectations, preferences, and satisfaction have been explored for a number of healthcare settings and services.[116–118] In primary care settings,[119] total knee arthroplasty,[120] and orthopedic interventions to the hand,[121] patient expectations were significant determinants of post-visit or post-intervention satisfaction. Treatment preferences and patient expectations have also been found to be predictors of satisfaction among patients with acute and sub-acute low back pain.[122] Similarly, patient preferences for strength improvement over pain reduction were associated with satisfaction with carpel tunnel release surgery.[123]

Patient satisfaction is associated with a number of meaningful outcomes for healthcare providers, including patient appointment attendance and retention. A survey of specialty pharmacy customers who switched pharmacies over the course of a year reported that 12% of patients switched due dissatisfaction with customer service.[124] Dissatisfaction has also been given as a reason for patients not keeping appointments with their dieticians[125] and general practitioners.[126] Visit satisfaction has also been identified as a determinant of intent to keep follow-up appointments[127] and customer loyalty in retail and service markets.[128,129]

The pharmacy literature has examined patient preferences and expectations for community pharmacies. Internationally, pharmacy preferences have been found to differ between countries because of differences in medication out-of-pocket costs, pharmacist roles and available services, medical culture, and other factors.[130,131] A comparison of pharmacy preferences in Poland and the UK found that patients in the UK gave greater preference to pharmacy consultations than Polish patients, who placed greater emphasis

on medication prices and promotions.[131] These differences may reflect the higher prices Polish patients pay for their medications compared to their UK counterparts. Patients in Australia rated location as less important than Polish and British patients.[130,131] A recent discrete choice experiment conducted on patient preferences for community pharmacies focused on attributes surrounding the UK's pharmacist-managed Minor Ailments Service; a comparable service does not yet exist in the US. [132]

2.8.1 Literature Review Aims

Because of the difficulty in comparing pharmacy preferences in different countries with corresponding structural and cultural differences, this paper will limit its literature review to patient perceptions of community pharmacies in the United States. Specifically, this paper will summarize the body of knowledge on patient preferences for, expectations of, and satisfaction with community pharmacies in the United States.

2.8.2 Literature Review Methods

A systematic literature review was conducted in October 2016. MEDLINE and CINAHL were searched for the following terms in the title or abstract: "patient choice" OR "consumer choice" OR "patient selection" OR "consumer selection" OR "patient preferences" OR "consumer preferences" AND " pharmacy" OR "community pharmacy" OR "pharmacy services." Google Scholar was searched using three sets of search terms: "patient preferences" AND "community pharmacy"; "patient expectations" AND "community pharmacy"; and "patient satisfaction" AND "community pharmacy." Title and abstracts were first screened for inclusion and exclusion criteria, and duplicates were

removed. Full-text articles were then screened for eligibility, with reasons for exclusion recorded, according to the PRISMA guidelines.[133] Inclusion criteria included: (1) directly evaluates patient expectations of, preferences for, or satisfaction with general community pharmacy practice; and (2) published in the last 10 years (2006-present). Exclusion criteria included: (1) Does not directly assess patient expectations, preferences, or satisfaction; (2) Does not broadly assess patient perceptions for community pharmacy practice, or focuses on specific pharmacy services; and (3) was not conducted in the United States. The search over all databases yielded 3,114 results. In addition, the citations included in review articles and articles included in the full-text screens were searched for relevant literature not captured in the systematic literature search. After applying the inclusion and exclusion criteria at the title, abstract, and full-text screening stages, a total of ten original research articles were found. The flow of articles throughout these stages is depicted in the PRISMA-style diagram contained in Figure 1. Articles are summarized in Table 1, and results are presented in Figure 2.

Figure 1. PRISMA diagram of systematic literature review on patient preferences for, expectations of, and satisfaction with community pharmacies in the United States.

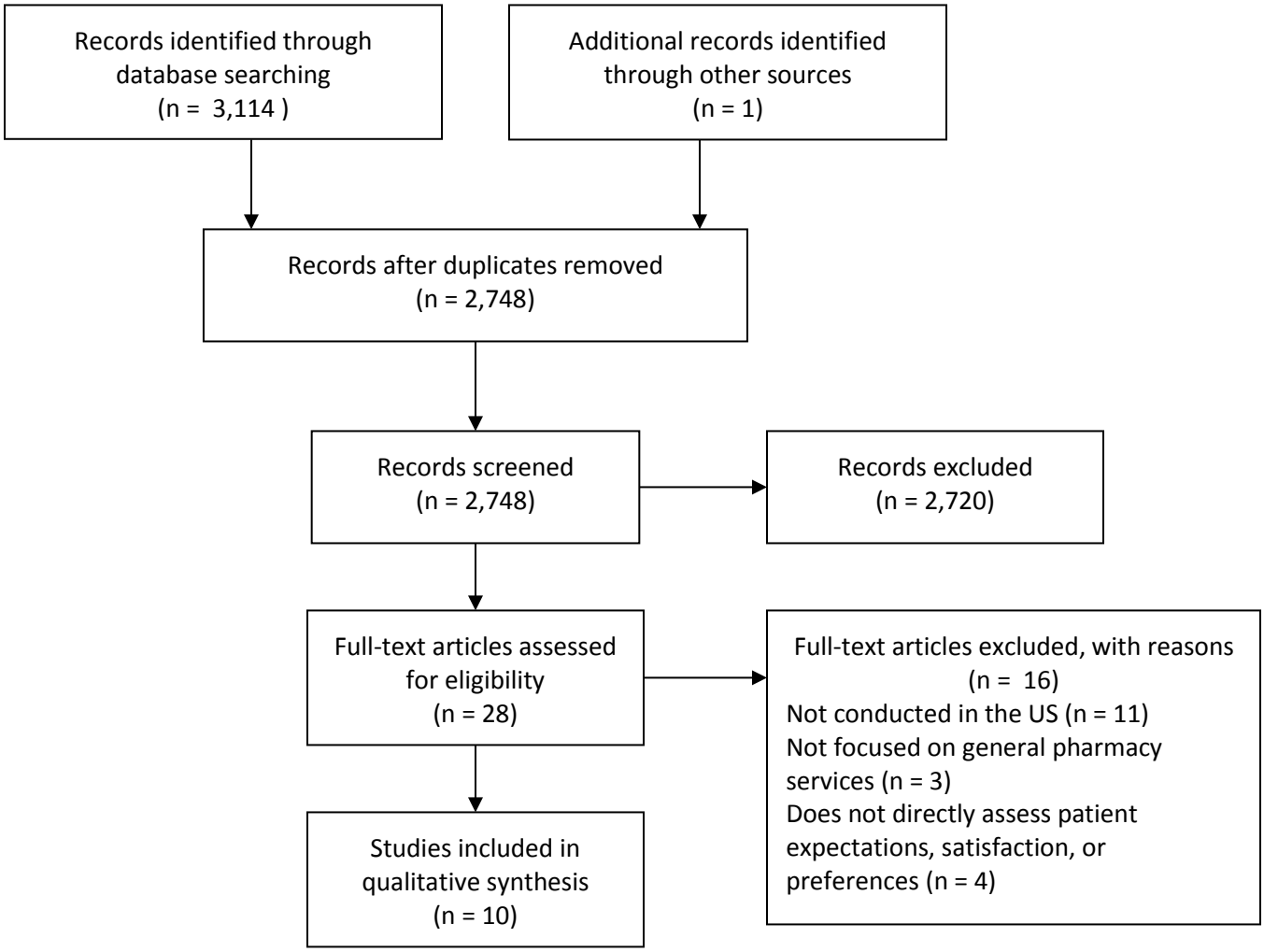


Table 1. Summary of literature assessing patient preferences for, expectations of, and satisfaction with community pharmacies in the United States.

Author (Year)	Construct Assessed	Population	Method	Findings
Patterson (2013)	Patient satisfaction with and preferences for community pharmacies; Patient awareness of pharmacy services	Stratified random sample from prescription and clinical pharmacy service records of a single independent pharmacy (n = 241)	Survey; 21 items on patient satisfaction, 8 items on service awareness and use, open ended question on patronage motive	Service awareness: The majority of patients were aware that pharmacists dispensed prescriptions (92.5%). Patients were less commonly aware that the pharmacy offered herpes zoster vaccinations (34.9%) and adherence packaging (34.0%). Patronage motives: Patients most commonly selected their pharmacy based on relationships with staff (43.6%), convenience (28.2%), and local pharmacy ownership (15.4%). Satisfaction: The majority of patients reported that the pharmacy services they received were excellent (70.5%) or very good (22.9%). A lower proportion (40.1%) felt that the pharmacist's efforts to help them improve their health or stay health were "excellent." Other areas of lower satisfaction included the pharmacist's interest in their health and the amount of time the pharmacist offers to spend with patients.
Collum (2013)	Patient expectations for and satisfaction with community pharmacist communication	Purposive sample of patients who receive care at a clinic-based community pharmacy; Patients aged 65 years or older who filled at least 8 unique prescription medications between November 1, 2011, and January 31, 2011 (n = 19)	Structured telephonic interview conducted by one trained data collector using an established script; 52 questions on patient expectations and use of literacy-based communication techniques	Patient expectations: A minority of patients expected the pharmacist to counsel on a new medication's indication (33%), how to take a new medication (44.4%), and what may happen if the patient is nonadherent (22.2%). A slightly higher proportion expected to be counseled on a new medication's side effects (55.6%). Satisfaction: Most patients (73.7%) reported being very satisfied with pharmacy counseling. Many more patients felt that the pharmacist spends enough time answering questions on new prescriptions (94.7%) than on old prescriptions (58.8%).

Table 1. Summary of literature assessing patient preferences for, expectations of, and satisfaction with community pharmacies in the United States.

Author (Year)	Construct Assessed	Population	Method	Findings
Cretton-Scott et al. (2011)	Patient preferences for pharmacist attire	Convenience sample of adult patients at a chain pharmacy (n = 43) and an independent pharmacy (n = 43)	Survey; Patients were shown four sets of photographs with different combinations of pharmacist attire (business casual or business formal; with or without white coat)	Most patients reported that the pharmacists in formal business attire and white coats were most professional (62.8%), knowledgeable (54.1%), and competent (58.2%). However, the majority of patients saw pharmacists in business casual attire as most approachable (52%).
Franic et al. (2008)	Patient preferences for community pharmacies	Convenience sample of adult patients at two independent pharmacies (n = 81), two grocery store pharmacies (n = 44), two community chain (n = 27), and three discount store pharmacies (n = 23)	Survey; Rated, on a scale of 1 to 5 for each of 26 attributes the attribute's importance when selecting a pharmacy and the degree to which a perceived difference exists between pharmacies	Competent, knowledgeable, and friendly staff and pharmacists were seen as the most important and differentiating attributes. Location, confidentiality, prescription prices, and hours of operation were also important but not differentiating. Pharmacy hours of operation were important to patrons of all types of pharmacies except independent community pharmacies. Location was a determinant attribute only for patients patronizing grocery store and discount store pharmacies.
Malewski (2015)	Patient satisfaction with community pharmacies	Convenience sample of adult pharmacy patients at 10 chain pharmacies (n = 326)	Survey; 30 items addressing 4 areas of patient satisfaction: satisfaction with the relationship with and service received from the pharmacist, pharmacy facility satisfaction, pharmacy accessibility, and pharmacy financial concerns	Overall satisfaction with pharmacist customer service (88.4%) and the pharmacy experience (92.5%) was high and higher among suburban patients than urban patients. Patients expressed high degrees of confidence in pharmacists' ability to dispense prescriptions correctly (85.7%) and trust that pharmacists give accurate information about their medication therapy (91.1%). The vast majority of patients agreed with statements that pharmacists are understanding (81.2%), listen carefully (81.8%), and explain things in an understandable way (81.2%). Fewer patients felt that pharmacists are willing to establish a personal relationship (67.3%).

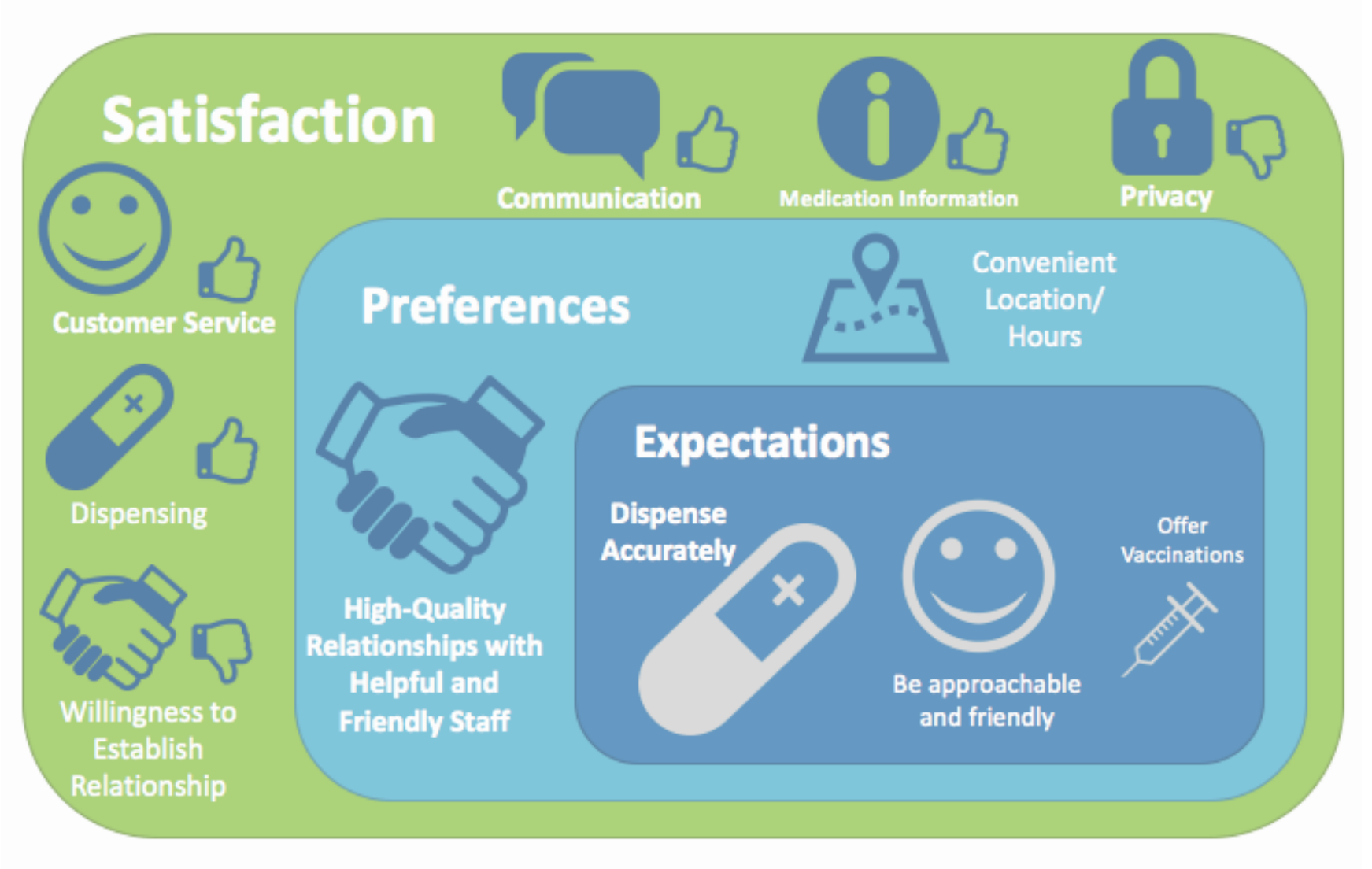
Table 1. Summary of literature assessing patient preferences for, expectations of, and satisfaction with community pharmacies in the United States.

Author (Year)	Construct Assessed	Population	Method	Findings
Worley (2006)	Patient perceptions of pharmacist-patient communication, commitment, and relationship quality	Random sample of community dwelling older adults (≥ 65 years) filling at least one prescription medication for diabetes at a nonmail order pharmacy (n = 221)	Survey; Questions on patients' perceptions of their pharmacist's participative behavior/ patient-centeredness (13 items) their own participative behavior (12 items), pharmacist - patient communication (5 items), relationship quality (8 items, including satisfaction), and relationship commitment (5 items).	Predictors of patient perceptions of a high-quality pharmacist-patient relationship included pharmacist participative behavior/patient-centeredness and pharmacist-patient interpersonal communication. Relationship quality was, in turn, predictive of a patient's relationship commitment to their pharmacist.
Shiyanbola (2014)	Patient preferences for pharmacy quality information	Convenience sample recruited from a rural and urban geographical location (n = 34)	Surveys + a semi-structured focus group; surveys assessed demographic and health characteristics of participants as well as their understanding of specific quality metrics.	Several focus group participants stated that they would access pharmacy quality information that was made publicly available. Many rural patients, however, expressed a reluctance to use quality measures given their relationships with their pharmacy's owner(s) and the credibility of their local pharmacies. Additionally, patients felt that customer service, including feeling comfortable with a pharmacist, feeling like you can ask questions, and knowing that the pharmacist is going to take time to answer questions, are important attributes during pharmacy selection that are not captured in objective quality metrics.

Table 1. Summary of literature assessing patient preferences for, expectations of, and satisfaction with community pharmacies in the United States.

Author (Year)	Construct Assessed	Population	Method	Findings
Shiyanbola (2015; Int J Clin Pharm)	Patient perceptions and expectations of a quality pharmacy	Purposive sample of older adults (≥65 years) who had filled a prescription at a community pharmacy in the last 90 days (n = 60)	Six semi-structured focus groups conducted in a group interview format	The most commonly identified expectation for pharmacists' roles was that staff would inform them when the refill medications looked different than they had in previous fills. Participants expected that pharmacists deliver care in a manner that is friendly, respectful, and private. They did not expect pharmacists to look through their medications, which they perceived as the physician's role. Structural pharmacy characteristics, including convenient location, short wait times, and home delivery, as well as relationship-oriented attributes like pharmacist and staff responsiveness, helpfulness, and friendliness, were very important to the focus group participants. It was noted that "good" pharmacies have pharmacists that are friendly and willing to establish a long-term relationship.
Shiyanbola (2015; BMJ Open)	Patient preferences during pharmacy selection	Convenience sample recruited from a rural and urban geographical location (n = 34)	Semi-structured focus group	Participants expressed preferences for pharmacies scoring highly on validated quality measures, but only in certain situations. These situations included if they or someone they knew had a negative experience or error and if they were moving to a new area.
Worley (2007)	Patient expectations of a community pharmacist	Nationwide sample of adult (≥ 18 years) patients (n = 500)	Survey; Patients were asked to indicate on a Likert Scale (1 = very strongly disagree to 7 = very strongly agree) the degree to which they agreed with statements regarding the role of the community pharmacist and patient	Patients most commonly agreed that pharmacists should listen to patients when they have a medication question (mean, 6.0), be approachable to discuss a patient's medication concerns (6.0), and make sure that patients understand how to use their medications (5.8). They felt less strongly that pharmacists should talk with patients if the patient does not have any medication questions (4.4), greet patients at the counter (4.7), and show an interest in working with patients to meet their healthcare needs (5.2).

Figure 2. Summary of the Patient Experience at Community Pharmacies



2.8.3 Literature Review Results

Patient Expectations for Community Pharmacies

Consistent with the early, product-focused nature of pharmacy practice,[134] patient expectations for community pharmacy practice often center on dispensing roles. In one study, patients who were asked about their awareness of services offered by pharmacists most commonly reported awareness of prescription dispensing (92.5%) and influenza vaccinations (87.1%).[13] Similarly, the most commonly identified expectation for pharmacists' roles in the medication refill process among a group of older adults was that staff would inform them when the refill medications looked different than they had in previous fills.[28] The same older adults also expected pharmacists to provide good customer service by delivering care in a manner that is friendly, respectful, and private.[28]

Patient expectations of pharmacist activities beyond simple dispensing were more varied are relatively low. Patients in one study strongly agreed that pharmacists should be approachable, listen to patients' medication concerns, and make sure that patients understand how to use their medications.[135] However, in a survey of older adults prescribed at least eight unique medications, only 44.4% expected the pharmacist to counsel on how to take a new medication.[136] While a slightly higher proportion expected to be counseled on a new medication's side effects (55.6%), only a third of those patients expected the pharmacist to provide counseling on the medication's indication.[136] Similarly, many older adult focus group participants did not expect pharmacists to look through their medications, as they felt that their physicians were responsible for medication management.[28] This finding was consistent with the relatively weak level of expectation in another study that pharmacists show an interest in working with patients to meet their

healthcare needs.[135] Finally, the independent pharmacy patients who were nearly all aware of pharmacist dispensing roles were much less commonly aware that pharmacists could provide compounded prescriptions (52.5%) and herpes zoster vaccinations (34.9%).[13]

Patient Preferences for Community Pharmacies

Evidence for pharmacy preferences has come primarily from qualitative research assessing patient perspectives on preferred attributes when selecting a pharmacy. One study presented participants with an open-ended question asking why they chose their pharmacy.[13] The most common reasons offered were relationships with staff (43.6%), convenience (28.2%), and local pharmacy ownership (15.4%). Some respondents (<10%) also mentioned pharmacy atmosphere, personnel competency, pharmacy reputation, and wait times as motives for pharmacy patronage.[13] Similar findings were reported following a series of focus groups among older adults.[28] Those patients preferred certain structural pharmacy characteristics, including convenient location, short wait times, and home delivery, as well as relationship-oriented attributes like pharmacist and staff responsiveness, helpfulness, and friendliness.[28] Pharmacist and staff characteristics were also consistently rated as very important by patients who were asked to indicate, on a scale of one to five, the degree to which each of 26 attribute was important to them when choosing a pharmacy.[12] In that survey, respondents expressed strong preferences for pharmacies with competent, knowledgeable, and friendly pharmacists and staff. Furthermore, these attributes were perceived as most differentiating between competing pharmacies.[12] Location, prescription prices, and hours of operation were also important to most patients but were not seen as differentiating factors.[12] The authors concluded that

pharmacy personnel, rather than characteristics of the pharmacy site, were the primary determinant attributes for pharmacy selection.[12]

Pharmacy patrons maintain preferences for not only specific attributes of pharmacies but also general pharmacy settings (i.e., independent, chain, grocery store, and mass merchandiser). In a survey among older adults with diabetes, patients most commonly reported patronizing a retail chain pharmacy (48.6%), independent pharmacies (26.2%), and grocery store pharmacies (12.9%).[137] Specific pharmacy preferences may also drive selection of one pharmacy setting over another. In a survey by Franic et al.,[12] pharmacy hours of operation were important to patrons of all types of pharmacies except independent community pharmacies. Location was a determinant attribute, or an attribute that was viewed as both important and differentiating, only for patients patronizing grocery store and discount store pharmacies.[12] Finally, certain preferences may drive pharmacy loyalty. In one survey, patients who had selected a pharmacy based on pharmacy atmosphere, the availability of a unique service, and personnel competency were significantly less likely than those without those specific motives to have visited another pharmacy in the last 12 months.[13]

Cretton-Scott et al. explored patient preferences for a very different pharmacy attribute: pharmacist attire.[138] Patients were presented with four sets of photographs featuring a pair of pharmacists in casual or formal business attire with or without white coats.[138] Patients commonly reported that the pharmacists in formal business attire and white coats were most professional (62.8%), knowledgeable (54.1%), and competent (58.2%). However, the majority of patients saw pharmacists in business casual attire as most approachable (52%). Over three-fourths of patients (77.5%) preferred pharmacists in

white coats, but preferences for the attire under the white coats were split between business casual and business, likely reflecting a perceived trade-off between professionalism and approachability.[138]

The degree to which patients prefer pharmacies that provide high quality medication management has not yet been extensively explored; patient preferences for these services may be poorly formed due to low expectations for and limited experience with pharmacist cognitive services.[13,28,136] When presented with validated pharmacy quality measures established by the Pharmacy Quality Alliance (PQA), many patients maintained that these measures were not appropriate for rating pharmacies.[14] Still, when the same patients were asked whether they would use quality measures to choose a pharmacy, they often responded affirmatively.[14] Many rural patients, however, expressed a reluctance to use quality measures given their relationships with their pharmacy's owner(s) and the credibility of their local pharmacies. One patient asserted that he or she couldn't imagine anybody not wanting to know whether their pharmacy was doing what they're supposed to be doing.[14] Participants in another set of focus groups expressed preferences for pharmacies that scored well on validated quality measures, but only in certain situations.[15] These situations included a scenario in which they or someone they knew had a negative experience or error and if they were moving to a new area.[15]

Patient Satisfaction with Community Pharmacies

Satisfaction, a complex construct associated with both preferences and expectations, is generally high among community pharmacy patrons. In a survey of 241 patients at an independent community pharmacy, the majority of patients reported that the pharmacy

services they received were excellent (70.5%) or very good (22.9%).[13] Similar levels of satisfaction were seen among older adults prescribed at least eight medications, with 73.7% reporting being very satisfied with pharmacy counseling.[136] Another study compared the satisfaction of 326 patients at urban and suburban chain-pharmacies.[139] Overall satisfaction with pharmacist customer service (88.4%) and the pharmacy experience (92.5%) was high, though satisfaction differed by location, with suburban patients reporting higher levels of satisfaction than their urban counterparts. High levels of satisfaction reflected patients' high degrees of confidence in their pharmacists' abilities to fulfill the common patient expectations for pharmacists discussed above. Specifically, the vast majority of patients expressed confidence in their pharmacists' abilities to dispense prescriptions correctly (85.7%) and trusted their pharmacists to give accurate information about their medication therapy (91.1%).[139]

Beyond general satisfaction, patients have consistently reported high degrees of satisfaction with the specific manners in which pharmacists provided care. The vast majority of surveyed patients in one study agreed with statements that pharmacists are understanding (81.2%), listen carefully (81.8%), and explain things in an understandable way (81.2%).[139] In another survey, over 90% of patients marked as "excellent" or "very good" the ability of pharmacists to answer questions, the degree of courtesy and respect shown by the pharmacy staff, and the professionalism of the staff.[13] Although not directly assessing satisfaction, most participants in a series of focus groups among older adults felt that "good" pharmacies have pharmacists that are friendly and willing to establish a long-term relationship.[28] Patients also reported appreciating helpful staff at their current pharmacies.[28] A group of older adults with diabetes reported maintaining a relationship

with the same pharmacist for an average of 11.2 years,[137] suggesting a high degree of satisfaction.[140]

Though patients are generally satisfied with pharmacists' communication skills and abilities to fulfill basic expectations for prescription dispensing, pharmacy patrons report lower levels of satisfaction with more complex pharmacist services. Far more patients in one survey were satisfied with pharmacists' provision of medication information (91.1%) than their willingness to establish a personal relationship (67.3%).[139] Additionally, many more patients in another survey felt that their pharmacist spends enough time answering questions on new prescriptions (94.7%) than on old prescriptions (58.8%).[136] An even lower proportion (40.1%) felt that the pharmacist's efforts to help them improve their health or stay health were "excellent."[13] The other areas in which patients were least satisfied included the pharmacist's interest in their health and the amount of time the pharmacist offers to spend with patients.[13]

Patient satisfaction with pharmacy services reflects their satisfaction with not only pharmacists and their staff but also with the pharmacy's location and appearance. In two studies, most patients reported that pharmacies are conveniently located.[28,139] The vast majority of those surveyed in another study (87.4%) felt that pharmacies have good appearances.[139] However, fewer patients in that study maintained that pharmacy layouts are organized in a way to ensure privacy,[139] and satisfaction with the privacy of conversations with the pharmacist was relatively low in another group of patients.[13]

2.8.4 Literature Review Discussion

Overall, patient expectations and preferences for community pharmacies revolve predominately around dispensing functions and relationship-oriented attributes, and satisfaction with these aspects and overall pharmacy practice is high. Patients expect that pharmacists will dispense their prescriptions accurately while providing good customer service. Additionally, patients prioritize long-term relationships with pharmacists that are fostered by friendly and responsive care. This priority is consistent with patient preferences for other healthcare providers, including physicians. Fostering long-term patient-pharmacist relationships may further improve satisfaction with care[141] and reduce healthcare costs,[142] as is seen in studies on the impact of long-term patient-physician relationships.

Satisfaction with the customer service and medication information provided by pharmacists is notably high and exceeds consumer satisfaction with the general environments in which pharmacists practice, including supermarkets, retail stores, and discount stores.[143] Patients also report a greater degree of satisfaction with the medication information they receive from community pharmacists than they do during a hospitalization.[144] However, community pharmacies have been less successful in ensuring that patients feel that they have spent adequate time with their pharmacist. Many patients reported that they do not feel that pharmacists are willing to establish a long-term relationship or spend ongoing time with them. This challenge is not unique to pharmacy, as patients' satisfaction with the amount of time spent with physicians is lower than their satisfaction with other aspects of care.[145] Indeed, community pharmacists have expressed a desire to devote more of their time to patient consultations and medication management,[146] but time pressures often limit opportunities for increasing time spent with

patients.[147] Given the association between increased pharmacist counseling and improved medication adherence[148,149] as well as the low levels of patient satisfaction with the amount of time spent with pharmacists, future community pharmacy practice models should focus on increasing the ability of pharmacists to dedicate time to patient-centered, rather than dispensing, functions to improve outcomes and satisfaction.

Patient expectations for more cognitively demanding pharmacist tasks, including health and medication management, are more limited, and few patients appear likely to select pharmacies based on these services. However, further research is needed to explore the modern patient's decision-making process during pharmacy selection and patients' relative preferences for new and/or high-quality pharmacy services. As the scope of pharmacy practice continues to increase, efforts should be made to increase patient expectations for pharmacists and encourage patients to select pharmacies based on the provision of high-quality medication management. At the same time, pharmacists should focus on increasing patient satisfaction with pharmacists' efforts to improve their health by embracing their burgeoning role as healthcare providers and prioritizing the development of long-term relationships with patients.

2.8.5 Literature Review Conclusion

Patients express high levels of satisfaction with most attributes of pharmacy practice. However, these satisfaction levels may reflect relatively low expectations for pharmacists focused primarily on dispensing roles and customer service. Many patients maintain preferences for long-term relationships with their pharmacists but do not feel that their pharmacists are willing to establish such relationships. New models of pharmacy

practice should focus on expanding patients' expectations for cognitive services and improving the capacity for pharmacists to dedicate time to patient-centered activities.

2.9 Multiple Pharmacy Use

Underlying many of the aforementioned studies on patient interactions with community pharmacies are assumptions that patients select a single pharmacy according to consistent expectations and preferences. Though the majority of patients fill their prescriptions at only one pharmacy, the proportion of patients who use two or more pharmacies simultaneously may be increasing. An analysis of Medical Expenditure Panel Survey data over seven years reported that multiple pharmacy use increased 18.7% from 2003 to 2009, from 36.4% to 43.2%.[150] Individuals more likely to use multiple pharmacies include those who use a mail order pharmacy, are less than 40 years, and are female.[151] Consistent with this finding, multiple pharmacy users most commonly used two pharmacies (vs. three or more) per year (70%), most frequently combining use of a mail order pharmacy and a community pharmacy.[150] The overall prevalence of the simultaneous use of mail order and community pharmacies is debated in the literature. Nearly a quarter (23.3%) of older adults in Texas reported use of both a mail order and a community pharmacy.[152] However, in another study, only 6.9% of 324,968 patients with multiple prescriptions split their prescriptions between the two channels.[105]

The current literature on patient selection of pharmacies has not examined the process of patient decision-making surrounding the use of multiple pharmacies. Accordingly, it is not well understood whether patients have different priorities for pharmacy selection depending on the medication(s) to be filled at that pharmacy. For

example, given the demographics of individuals who most commonly use multiple pharmacies, a young adult female may choose to receive birth control by mail order pharmacy given the consistency of this prescription. She may simultaneously elect to fill her antidepressant at a community pharmacy as she works with a physician to optimize the drug and dosage.

In conclusion, an assumption that an individual patient has consistent preferences for a community pharmacy may be violated if that patient maintains different priorities for pharmacy services based upon the specific medication to be filed there. However, although multiple pharmacy use is increasing, patients who patronize multiple pharmacies most commonly combine use of a community pharmacy and a mail order pharmacy. It may still therefore be reasonably assumed that a patient will exhibit consistent decision-making preferences when selecting a community pharmacy.

2.10 Segmentation in the Healthcare Market

Market segmentation identifies consumer subsets based on common behaviors, attitudes, and preferences, enabling businesses to more effectively create tailored messaging and targeted marketing. Although traditionally used to study retail markets, healthcare providers and facilities have increasingly recognized the utility of market segmentation in identifying patient segments with different healthcare needs and preferences. The Deloitte Center for Health Solutions conducted and disseminated one of the most widely recognized healthcare market segmentation efforts. Patients in each of Deloitte's market segments differ with regards to their views and attitudes towards the healthcare system and health policy; healthcare resource utilization; satisfaction with

healthcare providers; use of information sources and technology; and payment systems.[153] While the Deloitte market segmentation offers insight into segments based on broad healthcare utilization and preferences, many other studies have taken more targeted approaches to segmenting patients by their needs and priorities for specific healthcare services.

Segments in the market for primary care practitioners often consist of patients who prioritize either cost, convenience, technical quality of care, or interpersonal aspects of care. In a latent class analysis of British patients' preferences for general practitioner appointments, three classes of patients were identified.[154] Members of the class with the highest probability of membership (0.54) preferred attributes reflecting cost and convenience. The other classes, with membership probabilities of 0.20 and 0.26, strongly preferred a thorough examination and having a doctor that knows you well, respectively.[154]

Segmentation studies of pharmacy customers have largely focused on identifying market segments based on patient perceptions of pharmacist roles or preferences for specific pharmacy services. A longitudinal segmentation analysis of community pharmacy patients reported that the majority of patients belonged to a segment termed "reliance on physician," reflecting the prevalence of perceptions that physicians are better qualified than pharmacists to give medication-related information.[96] Another segmentation analysis, a latent class analysis conducted among Australian pharmacy patrons, identified classes based on patient preferences for pharmacy-based asthma services.[155] The classes varied primarily based on preferences for the intensity of the asthma services and level of pharmacist involvement and ranged from a class preferring a lower intensity service ("Minimalistic Model" class) to higher intensity service ("Holistic Model" class). The highest

proportion of patients belonged to the intermediate class characterized by preferences for a medium intensity service ("Partial Model" class).[155] This latent class analysis was conducted among a specific patient population, namely, asthma patients who were poorly controlled, and examined preferences for a specific and specialized pharmacy service. A far broader segmentation analysis of the community pharmacy market was conducted using cluster analysis but was published over 30 years ago.[10]

2.11 Theoretical Foundations

2.11.1 Donabedian Model of Healthcare Quality

First proposed by Donabedian in 1966,[156] the Donabedian structure, process, and outcome model was conceived as a theoretical foundation for the assessment of healthcare quality.[156] Donabedian recognized that healthcare outcomes that are often influenced by many factors other than the quality of care received. Accordingly, he recommended that structures and processes of care be considered alongside outcomes in the evaluation of healthcare quality. He considered processes of care, defined as the activities associated with care provision and the manner in which care is provided, to be a reflection of whether "good" medical care had been applied.[156] Structures of care were defined as the settings in which care takes place and the structures and operations that support the processes of care.[156]

The Donabedian model has frequently been employed as a theoretical basis for community pharmacy-based research. A 2013 effort to define professional pharmacy services within the community pharmacy setting centered on Donabedian's framework, incorporating organizational structure, processes of care, and outcome measures into the

definition.[157] Additionally, the model has informed much of the existing literature on patient perceptions and understanding of pharmacy.[15,27,28] Structures, as they specifically relate to community pharmacy, may include the ability to request refills online, the availability of programs like appointment-based medication synchronization and home delivery, and location.[28] Processes within the community pharmacy setting often reflect the nature of the interpersonal relationship between the patient and the pharmacist or pharmacy staff. These may include the amount of time a pharmacist takes to communicate with patients, the friendliness and helpfulness of the staff, and the degree to which the pharmacy staff shows concern and knows an individual's needs.[28] Community pharmacy outcomes, though traditionally limited to the ability of the pharmacist to accurately fill prescriptions, have expanded to include clinically-focused measures.[16]

2.11.2 SERVQUAL Framework

SERVQUAL is a multi-item instrument for measuring customer perceptions of service quality[111] based on a conceptual framework of the way in which consumers compare their expectations for a service with their perceptions of the service they received.[111] Critics of SERVQUAL assert that service quality is better conceptualized through an attitudinal model than an expectations/disconfirmation model and that the framework fails to incorporate foundational research in the social sciences.[158] However, the framework is widely used to study service quality in diverse industries, and even developers of competing frameworks suggest that the elements of SERVQUAL "should probably be put on any first pass at a list of attributes for a service."[159]

Ten determinants of service quality underlie the SERVQUAL framework: tangibles, reliability, responsiveness, communication, credibility, security, competence, courtesy, understanding/knowing the customer, and access. Hedvall et al. applied a body of qualitative pharmacy research to define each of these determinants in the context of community pharmacy (Table 1). [160] Additionally, a critical examination of the performance of an adapted SERVQUAL instrument[161] when assessing customer satisfaction with community pharmacy services reported that the instrument demonstrated high convergent and criterion validity as well as high overall internal reliability.[162]

For this study, both the Donabedian Model and the SERVQUAL framework were used to inform the attribute selection process in order to more comprehensively approach the complex nature of community pharmacy practice, in which healthcare services are provided in a retail setting.[163]

Table 1. SERVQUAL dimensions, as understood in a community pharmacy settings, adapted from Hedvall et al.[160]

Dimension	Pharmacy-Specific Definition
Accessibility	Approachability and ease of contact; the pharmacy is easy to locate, opening hours are convenient, the products are well displayed, items in the self-service sector are easy to find, and the pharmacy is easy to contact by phone
Communication	Customers are informed about prescription and non-prescription medicines, questions concerning health and related matters, prices of services and products in a language the consumers understand
Competence	The pharmacists possess the skills and knowledge necessary to perform their duties in the pharmacy
Courtesy	The staff is polite, respectful, considerate, and friendly
Credibility	The pharmacist is trustworthy and honest and has the customer's best interests at heart
Reliability	The medicine is dispensed accurately, is correctly priced, and is available at the time promised to the customer
Responsiveness	The staff is willing and ready to perform the service required by the customer, and there is an available stock of all medicines required
Security	Freedom from risk or doubt that confidential information about the customer's medicines and health status will go beyond the pharmacy.
Tangibles	The pharmacy has adequate physical attributes, such as the size of the premises, equipment, furnishings, and a comfortable place to wait while prescriptions are being made up
Understanding/Knowing the Customer	The staff makes the effort to understand his/her needs, findings out his/her specific requirements, and gives individual attention

2.11.3 Random Utility Theory

Random utility theory provides a theoretical basis for analyzing the choices made by participants in a discrete choice experiment. Underlying discrete choice experiments is an assumption that the choices that participants make reveal their preferences for the attributes used to differentiate alternatives. That is, it is assumed that consumers have preferences for attributes and, when presented with a choice of alternatives, will choose a

particular alternative if and only if that option conveys higher utility than any of the presented alternatives.[164] Furthermore, random utility theory posits that the utility for a given individual is a latent construct that cannot be directly observed by researchers.[165] The latent utilities are thought to be a function of both explainable preferences and a random component.[164,165] This random component, which comprises all unobserved or unidentified factors that impact respondents' choices in a DCE,[165] may be attributed to unobservable or unobserved attributes, preference variations within or between individuals, or error.[164] The random utility theory necessarily underlies this research given the use of a discrete choice experiment to assess patient preferences.

Chapter 3: Methods

3.1 Introduction to Discrete Choice Experiments

This study elicited patient preferences for community pharmacy attributes using a discrete choice experiment (DCE). In discrete choice experiments, participants are presented with a series of choices in which they must select their preferred choice between two or more alternatives that differ on a number of selected attributes. Through analysis of participants' choices, the effects of specific attributes on choice selection can be estimated.

3.2 Survey Instrument

3.2.1 Model Identification

For the discrete choice experiment, participants received a series of choices between pharmacies that differ on the basis of six attributes reflecting pharmacy structures, processes, and outcomes. Each of the six attributes had no more than three levels. The inclusion of six attributes was consistent with International Society for Pharmacoeconomics and Outcomes Research (ISPOR) guidelines[166] and common practices in pharmacy DCEs.[167] The selection of an appropriate number of attributes and levels may improve choice consistency, or the variability in stated preferences that is not explained by attributes and preference weights.[168] As the number of attributes and the variability in the levels of the attributes increase, the difficulty of the choice decision increases, and choice consistency is reduced.[169]

A status quo or opt-out option was not included. The omission of a status quo option allowed this experiment to assess patient preferences in the absence of status quo bias and

pharmacy loyalty, known to be dominating factors in pharmacy selection.[15,170] The lack of a status quo option is consistent with the majority of discrete choice experiments of pharmacy services.[167]

Cost and location were held constant throughout the experiment to control for these potentially dominating factors.[171] Although guidelines for appropriate attribute selection recommend the inclusion of all attributes important to an individual's decision-making to prevent respondents from making inferences about omitted variables, the exclusion of dominant attributes has been recommended to prevent participant decision-making from becoming deterministic based on a single attribute.[164,172] In order to reduce the likelihood of introducing omitted variable bias by excluding salient attributes, participant instructions included above each choice set delineated the assumptions of constant cost and location. [164] The presentation of these instructions is consistent with ISPOR recommendations for studies that do not include a cost attribute.[166] Keeping cost and location consistent also reflects real world pharmacy selection for many patients. Medication costs for insured patients are often identical at in-network pharmacies, and most patients live within a five-mile radius of several pharmacies.[173]

3.2.2 Attribute Selection

An initial list of sixteen potential attributes for inclusion in the discrete choice experiment was formed based on published literature on patient selection of healthcare providers and expert opinion. Pilot testing (n=12) of a DCE with these sixteen attributes was then conducted. Pilot test participants were selected through purposive sampling, and testing was continued until saturation was reached. Pilot testing sessions lasted 25-45

minutes. Feedback from the pilot tests was used to reduce the number of attributes to six, refine the wording of specific attributes, and select the final levels for the included attributes.

The sixteen attributes evaluated in the pilot tests are presented in Table 2. The following criteria were then applied during the attribute reduction process based on feedback received during the pilot tests. First, attributes that were confusing or not well understood by a majority of patients were eliminated if the confusion regarding the attribute would not be ameliorated by a change in its wording. This step reflects recommendations that pilot tests be used to identify and exclude attributes that are not well understood and/or not relevant to the participant population.[164,174] Specifically, appropriate attributes have been described as those that are salient, plausible, and capable of being traded.[172] Secondly, attributes that left substantial room for participant interpretation were eliminated to lessen the impact of unnecessary variability based on differences of interpretation. This step is consistent with recommendations that the attribute development process ensure that the desired meaning is evoked during attribute presentation.[172]

Thirdly, where focus groups revealed a consensus of participant opinion that an attribute was unimportant, the inconsequential attribute was eliminated. Universally unimportant attributes do not necessarily require elimination from discrete choice experiments, as they will simply yield very low importance scores, but inclusion of these attributes would be contrary to recommendations that all included attributes be salient to the respondent population.[172] Furthermore, the inclusion of unimportant attributes may unnecessarily increase the task complexity, thereby introducing random variability into the

responses.[174] Lastly, the reduction in the number of attributes from sixteen to six necessitated the final inclusion of only those attributes that would best advance the experiment's ability to capture meaningful data on why patients choose pharmacies and differentiate market segments. The inclusion of attributes that were not meaningful to any patients would not have advanced either of these goals.

Finally, a decision was made to include an hours of operation attribute while eliminating the wait time attribute. While pilot test participants ascribed varying levels of importance to each of these attributes, both assessed the degree to which patients prioritize the underlying construct of accessibility. Conceptual overlap between attributes, or inter-attribute correlation, can obscure the estimation of the main effects of each attribute individually.[175,176] Hours of operation was selected over wait time for a number of reasons, primarily due to the attribute's superior ability to produce novel, actionable findings. While it is well understood from existing pharmacy and medical literature that many or most patients prioritize short wait times for healthcare services, much less is known about the degree to which the differences in the typical hours of operation for grocery, mass merchandiser, chain, and independent pharmacies impact the pharmacy selection process. While hours of operation may be an important factor in the ability of community pharmacies to best serve their patients, the long shifts characteristic of pharmacies with extended hours of operation are associated with decreased pharmacist job satisfaction.[177] The negative effects of shifts ≥ 12 hours on job satisfaction, intention to leave current job, and burnout are well documented in other healthcare professionals.[178,179] A clearer understanding of the hours most important to patients may improve pharmacies' ability to create schedules that balance patient accessibility and pharmacist engagement.

Specific details about the data reduction process for specific attributes are included in Table 3. Based on expert opinion and pilot testing feedback, a new attribute, "The pharmacist is willing to establish a personal relationship with me", was selected for inclusion.

Feedback on attribute levels was also gathered in the pilot tests and used to select the most appropriate levels for the included attributes. The initial levels presented during the pilot testing phase of the experiment were selected based on real world levels. During the pilot testing, participants were asked to provide their interpretation of those levels and indicate where a change from one level to another would provide meaningful information for pharmacy selection. The final selection of attribute levels required an assessment of the balance between the need for sufficient variation to yield precise, meaningful utility estimates [174,175,180] and the demonstrated reduction in choice consistency as the number of attribute levels increases.[169] Two levels were specified for half of the attributes, and the remaining three attributes each had three levels, consistent with recommendations to limit levels to three or four per attribute.[166]

Following pilot testing, the number of levels for the attributes "staff friendliness/courtesy" and "pharmacist communication" was reduced from four (Always, Very Often, Sometimes, Rarely) to two (Always, Sometimes). This change was made for two reasons. First, pilot test participants indicated that they felt that a "rarely" level was implausible. Secondly, there was considerable variability in pilot test participants' interpretation of the "very often" level. Some respondents felt that "very often" is "almost always," while others felt that "very often" was considerably closer to "sometimes" than "always." The ISPOR Task Force recommendations for Conjoint Analysis note that levels

which require subjective interpretation by the respondents should be excluded in order to avoid the introduction of unnecessary ambiguity and variability.[166] Finally, pilot test participants noted that the difference between "always" and "sometimes" for those two attributes was both meaningful and plausible.

The number of levels for the two quality-specific attributes was also reduced following pilot test feedback. Participants maintained that little meaningful difference existed when two alternatives varied by only one star level but felt that a difference of two star levels did indicate variability between the options. Therefore, the five levels differing by one star (★,★★,★★★,★★★★,★★★★★) were reduced to three levels differing by two stars (★,★★★,★★★★★). The final six attributes and their levels are included in Table 4.

Table 2. Sixteen Attributes Initially Included in Pilot Testing, based on Donabedian Framework

Attributes	Levels	Source
Pharmacy Structure		
Pharmacy Closing Time	Traditional hours (8:00am-8:00pm) Extended hours on weekdays (7:00am-10:00pm) Extended hours on weekdays and weekends (7:00am-10:00pm weekdays; open Saturday and Sunday)	12,181,182
Counseling Space	No Private Space (e.g. counsel at pharmacy counter); Semi-Private Space (e.g. extension of pharmacy counter); Private Space (e.g. closed room)	183
Ease of Prescription Fill Process	The pharmacy has systems in place that make it easier to fill your medications. Examples of these systems may include medication synchronization, automatic refill notification via phone call or text, and online prescription management Levels: Yes, No	183
The staff is available to reduce wait times	Always; Very Often; Sometimes; Rarely	
Pharmacy Processes		
The Pharmacy Staff is Friendly and Courteous	Always; Very Often; Sometimes; Rarely	10,12,132,154,183,184
The Pharmacist Shows Concern and Knows Your Needs	Always; Very Often; Sometimes; Rarely	12,15,185
Health and Medication-focused Communication; Existing Prescriptions	The staff at the pharmacy **level** asks if you are having any problems with your medicine Levels: Always; Very Often; Sometimes; Rarely	183,184
Health and Medication-focused Communication; New Prescriptions	When you have a **new** prescription filled the staff **level** tells you what to avoid when taking your medicine or what to do if you have bad reactions Levels: Always; Very Often; Sometimes; Rarely	183
Health and Medication-focused Communication; Oral Communication	The pharmacist explains things about your medications in a way that is easy to understand Levels: Always; Very Often; Sometimes; Rarely	
Waiting Time	10 minutes; 20 minutes	12,132,186
Resolving Medication-Related Problems	When problems arise, your pharmacist **level** works with you to resolve them. Level: Always; Very Often; Sometimes; Rarely	183
Medication Appropriateness	Your pharmacist **level** reviews your medications to make sure they are the best for you Levels: Always; Very Often; Sometimes; Rarely	183
Pharmacy Outcomes		
Drug-Drug Interactions	★ (Much Below Average); ★★ (Below Average); ★★★ (Average); ★★★★ (Above Average); ★★★★★ (Much Above Average)	14,15
Helping Patients Get Needed Medications (Medication Adherence)	★ (Much Below Average); ★★ (Below Average); ★★★ (Average); ★★★★ (Above Average); ★★★★★ (Much Above Average)	14,15
Overall Pharmacy Quality	★ (Much Below Average); ★★ (Below Average); ★★★ (Average); ★★★★ (Above Average); ★★★★★ (Much Above Average)	14,15
Patient Satisfaction - Yelp.Com Rating	★; ★★; ★★★; ★★★★; ★★★★★	56,187,188

Table 3. Attribution Reduction Process: Reasons for Exclusion

Reason for Exclusion			
Unclear/Misunderstood	**Variability in Interpretation**	**Consensus of Unimportance**	**Redundancy**
Staff availability to reduce wait times	Yelp.com rating	Medication appropriateness	Communication regarding new prescriptions
The pharmacist shows concern and knows your needs	Ease of prescription fill process		Wait Time
Communication regarding existing prescriptions			
Resolving medication-related problems			
Medication adherence quality measure			

Table 4. Final Attributes and Levels for Inclusion in the Discrete Choice Experiment

Attribute	Levels	Donabedian Framework	Service Quality Dimension
Pharmacy Hours of Operation[189]	9am-9pm Weekdays; 9am-7pm Saturday; 10am-6pm Sunday 8am-10pm 7 days/week 8am-6pm Weekdays; 10am-3pm Saturday; Closed Sunday	Structure	Access
Staff Friendliness/Courtesy	Always Sometimes	Process	Courtesy
Pharmacist Communication	Always Sometimes	Process	Communication
The pharmacist is willing to establish a personal relationship with me[139]	Yes No	Process	Understanding/Knowing the Customer
Quality Measure, Overall	★ ★★★ ★★★★★	Outcome	Competence
Quality Measure, DDI[14,15]	★ ★★★ ★★★★★	Outcome	Safety

3.2.3 Experimental Design

A fractional factorial design was employed. Only full factorial designs allow for the independent estimation of all main and interaction effects, including three-way and higher order interactions. In contrast, fractional factorial design limits the analysis to estimating main and two-way interaction effects. Therefore, the use of a fractional factorial design requires the assumption that three-way and higher order interaction effects do not confound the main and two-way interaction effects. Despite the limitation that this potentially unmet assumption may bias the estimates of effect, fractional factorial designs are considered sufficient for a model used to estimate only main effects or in a subset of possible interactions.[180,190] Furthermore, the full factorial design is simply not feasible without a prohibitively large sample size and number of choice sets. A 2014 review of discrete choice experiments in healthcare reported that 88% of healthcare-related DCEs published from 2009-2012 reported using a fractional factorial design, compared with 6% using a full factorial design.[191]

Sawtooth Lighthouse Studio v9.2 (Orem, UT) was used to assign profiles for a total of 120 random choice tasks using complete enumeration. In complete enumeration, the alternatives presented within each task are as different as possible.[192,193] This minimal overlap improves statistical efficiency and the precision of main effect estimates. Furthermore, minimal overlap in one study did not increase fatigue, perceived difficulty, or consistency compared to more moderate overlap.[194] In this study, the use of complete enumeration rather than balanced overlap, which allows for a greater degree of overlap, was associated with a 23% increase in efficiency.

Two prohibitions were introduced into the study design based on pilot testing

feedback. Pilot test participants found the combination of a one star rating on one of the quality metrics and a five-star rating on the other metric to be implausible. When this combination appeared, they expressed distrust of the pharmacy quality ratings and placed little to no value on the metrics when making their selections. Therefore, for each of the quality metrics, a prohibition was introduced such that a single pharmacy could not have a one star rating on one of the quality metrics (overall or DDI) and a five-star rating on the other. The efficiency of the design with the prohibitions was only 91% of that without the prohibitions, but this loss of design efficiency was considered acceptable given the likely increase in response efficiency as a result of eliminating implausible scenarios. Indeed, the ISPOR task force on experimental designs for discrete choice experiments cautions that implausible combinations may increase the potential for bias; introduce unobserved, heterogenous interpretations by respondents; and/or lower response efficiency. [180]

Participants were randomly assigned to one of 12 blocks consisting of 10 random choice tasks. The profiles of two additional choice sets were created separately for the assessment of internal validity. First, a dominant scenario was created. Secondly, a single hold-out scenario for all participants, regardless of block placement, was created using a separate complete enumeration design process. These two fixed scenarios were added for the assessment of internal validity, as discussed later in this chapter. Thus, the total number of choice tasks provided to each participant was 12.

The number of choice tasks was selected based on empirical literature and expert opinions on the effects of the number of tasks on experimental precision and reliability. Additional consideration was given to the appropriate number of tasks when individual-level utility estimates will be made, as was done for the latent class analysis. The optimal

balance of minimizing task complexity and optimizing design efficiency when selecting the number of choice tasks is debated in the literature. Several studies have assessed changes in response variability when study participants are provided with varying numbers of choice tasks. The results have commonly suggested that the number of attributes, the number of attribute level differences, and the number of alternatives presented in each task have a greater impact on respondent fatigue and choice consistency than the number of choice tasks.[195–198] An appropriate number of tasks for a typical discrete choice experiment may range from 5[199] or 6[200] to 24 or more.[201,202] However, several researchers have recommended an intermediate number (8-16) of choice tasks given diminishing empirical gains from additional choice tasks.[198,201,203,204] Accordingly, the mean number of choice tasks used in healthcare-related discrete choice experiments is reportedly 12-14 tasks per respondent.[205–207]

The selection of the number of choice tasks per respondent for this study required additional consideration given the proposed use of individual-level utility estimates during latent class modeling. Sawtooth recommends the inclusion of at least 10 choice tasks if individual-level utility estimates are intended.[208] Health-related discrete choice experiments that employed latent class modeling for segmentation have predominately used 12-16 choice sets per respondent.[209–211]

Blocking was introduced into the experimental design in order to lower the number of tasks required of each participant while maintaining acceptable levels of statistical efficiency. [164] Two ISPOR task force reports on conjoint analysis note that blocking is often necessary to increase the response efficiency of large designs,[166,180] and the vast majority of DCEs on pharmacy services used blocked designs[167] The 12-block design increased the

efficiency of the study 8-fold compared with a design consisting of only one block. Though Sawtooth is capable of generating up to 999 questionnaire versions, or blocks, the 12-block design was selected due to diminishing returns of efficiency with additional blocks. Furthermore, with the 12-block design, approximately 40 participants were assigned to each block, well above the recommended minimum of 20 participants per version.[164]

Because there is no gold standard for evaluating experimental design,[166] the strength of the study design was evaluated from a number of perspectives. First, an efficiency test was conducted through Sawtooth's "test design" feature. The logit report with simulated responses for 500 participants estimated the standard errors for the effect estimates to range from 0.01417 to 0.03191. These estimates meet the suggested guideline that effect estimates for main effects be no larger than 0.05.[212] Secondly D-efficiency, a relative measure, was compared between several potential experimental designs, including complete enumeration vs. balanced overlap, designs with different number of questionnaire versions, and designs with and without prohibitions. Finally, it was confirmed that Sawtooth's internal assessment for design deficiencies did not flag any attributes or levels as deficient.

Internal validity was assessed using a hold-out and a dominant scenario. The use of tests for rationality and validity is common[213] and recommended[166] but raises theoretical concerns about rational explanations for irrational responses. For example, participants may exhibit lexicographic preferences, in which they select an alternative based on the attribute they believe is most important rather than the overall trade-offs of all alternatives. Such preferences may result in the rational selection of the dominated alternative.[214] It has also been suggested that participants may base their choices on

assumptions and inferences about how the alternatives may differ on attributes not included in the experiment.[214] Because these participants are indeed expressing rational and valid preferences, deleting those who fail the dominant scenario may lead to bias and reduced efficiency.[164] Accordingly, and based on ISPOR recommendations, respondents failing the internal validity assessment were not dropped from the data set. Rather, the frequency of response errors and a discussion of associations between response errors and demographic characteristics are presented in the results.[166]

Attribute randomization was used to reduce the potential for bias that would adversely impact the study's internal validity. The Sawtooth attribute randomization feature randomizes the order in which attributes are presented across respondents while holding that order constant within each respondent. Pilot test participants strongly favored a consistent attribute order, reporting that consistency dramatically decreased cognitive burden. Furthermore, attribute randomization was consistent with ISPOR recommendations[166]

3.2.4 Sociodemographic and Health Information

Health and sociodemographic characteristics included in the survey as well as the levels presented to survey respondents are listed in Tables 5-8. Patient-specific health and sociodemographic characteristics have been shown to influence preferences for health providers and/or understanding of quality ratings. Basic demographic information collected included sex, age, race, household annual income, and highest level of education completed. These characteristics have been associated with preferences during healthcare provider selection[215,216] as well as use and understanding healthcare quality metrics and

ratings.[217,218] Several of these demographic characteristics are also mentioned as individual characteristics of clinical and policy interest in the ISPOR Good Research Practices for Conjoint Analysis Workforce.[166]

In addition to basic demographic information, the survey collected information on marital status, urbanicity, and US census region of residence. Marital status was included in light of a study on hospital selection among elderly males reporting that widowed men were less likely to select a high-quality hospital, as assessed by US News & World Report, than their married counterparts.[219] Urbanicity data was collected given the documented impact of urbanicity on patient priorities for and satisfaction with their pharmacies.[5,12,14,139] US census region of residence was included in the survey because a recent study found that greater proportions of patients in the Midwest and West used mail order pharmacies than those in the Northeast and South,[105] suggesting that priorities during pharmacy selection may vary by region.

Several health-related characteristics were also collected in the questionnaire. A single, validated screening question was used to identify participants with inadequate health literacy.[220] Health literacy may influence patient understanding of quality information and the extent to which quality data is prioritized during health care provider selection.[61,221,222] Current pharmacy patronage was also collected. In a determinant attribute analysis conducted by Franic et al., patients who patronized independent community pharmacies ascribed less importance to pharmacy hours of operation than customers of other types of community pharmacies.[12]

Self-reported health status was collected with the survey question "would you say that your health is excellent, very good, good, fair, or poor?" Self-reported health status has

been associated with awareness of quality information, but its impact on the use of such information during healthcare decision-making may be limited. A study among older adults found that patients with better self-reported health were less likely to be aware of physician quality information.[218] However, patients in another study who reported good or excellent health were more likely to report having seen comparative quality information than their less healthy counterparts.[51] However, this increased exposure to quality information was not associated with increased use of the information when choosing a healthcare provider.[51] Harris surveyed patients regarding their use of formal quality information, information from doctors and nurses, and recommendations from friends and family when selecting a healthcare provider. In that survey, health status was not shown to impact the likelihood of using quality information.[223]

Patient activation, measured in this study with a single question assessing patient confidence in their ability to manage their health, has garnered attention in healthcare research due to its association with health outcomes and patient perceptions of their care experiences.[224] In a study examining patient awareness and use of comparative quality information, patients with lower activation scores were less likely than highly activated patients to have seen and used comparative quality information for physicians and hospitals.[51] Similarly, Hibbard et al. reported that patients with high activation demonstrated higher comprehension of quality information and were more likely to choose a high quality hospital in a hypothetical scenario than less activated patients.[72] However, activation was not associated with awareness of physician quality information in a study among older adults.[218] Patient confidence, as used in this study, is associated with health outcomes and health behaviors, and the measure is closely correlated with other

engagement measures.[225] Furthermore, the assessment of patient confidence requires only a single question and does not necessitate payment of a licensing fee.

Finally, this survey collected information on a patient's current number of chronic medications and the number of chronic medications which they currently manage for an individual for whom they serve as a primary caregiver. This measure impacted choice of pharmacy setting among older adult Department of Defense beneficiaries[6] and emergency department patients.[108] The number of chronic medications used was also associated with multiple pharmacy use among US adults.[151] Additionally, the proportion of patients with chronic diseases varied substantially in the healthcare market segments identified by the Deloitte Center for Health Solutions.[153] Information on both the patient's and their care recipients' medication use was collected given the high prevalence of informal caregiving in the US[226] documented role of caregivers in medication management.[227,228] Furthermore, a discrete choice experiment of community pharmacy preferences among Australian consumers specifically included both patients and unpaid caregivers.[130]

Table 5. Sociodemographic Characteristics Included in Questionnaire

Sociodemographic Characteristics	Levels	Source
Sex	Male; Female	166,215–218
Age	18-24; 25-34; 35-44; 45-54; 55-64; 65-74; ≥75	166,215–218
Race	Non-Hispanic, White; Non-Hispanic, Black; Hispanic, Other	166,215,218,223
Household Annual Income	≤$25,000; $25,001-$50,000, $50,001-$75,000; $75,001-$100,000; $100,001-$150,000; >$150,000	166,215,218
Highest Level of Education	Less than High School; High School Degree; Some College; Bachelor's Degree; Some Post-Graduate; Post-Graduate Degree	166,215–218
Marital Status	Never Married; Married; Separated/divorced/widowed	219
US Census Region of Residence	Northeast; Midwest; South; West	105
Urbanicity	Urban; Suburban; Rural	5,12,14,139

Table 6. Health Characteristics Included in Questionnaire

Health Characteristics	Levels	Source
Health Literacy Screening Question	Adequate, Inadequate	215
Self-Reported Health Status	Excellent, very good, good, fair, poor	51,218,223
Number of Chronic Medications, Self	None; 1-3; 4-7; 8-11, ≥11	6,108,229
Current Pharmacy Patronage	Chain pharmacy (i.e. CVS); Independent Pharmacy; Grocery Pharmacy (i.e. Kroger); Mass Merchandiser Pharmacy (i.e. Walmart); Mail Order Pharmacy	12
Number of Chronic Medications, Care Recipients	None; 1-3; 4-7; 8-11, ≥11	6,108,229
Know Pharmacist's Name	Yes/No	12,230
Health Confidence	High (≥ 7), Low (<7)	218,225

Table 7. Level Selection for Demographic Characteristics on Questionnaire

Characteristic	Levels	Source for Level Selection
Sex	Male; Female	231
Age	18-24; 25-34; 35-44; 45-54; 55-64; 65-74; ≥75	231
Race	Non-Hispanic, White; Non-Hispanic, Black; Hispanic, Other	231
Household Annual Income	<$25,000; $25,000-$49,999; $50,000-$74,999; $75,000-$99,999; $100,000-$149,999; ≥$150,000	232,233
Highest Level of Education	Less than High School; High School Degree; Some College; Bachelor's Degree; Some Post-Graduate; Post-Graduate Degree	231,234
Marital Status	Never Married; Married; Separated/divorced/widowed	234,235
US Census Region of Residence	Northeast; Midwest; South; West	235
Urbanicity	Urban; Suburban; Small Town, Rural	236

Table 8. Level Selection for Health Characteristics in Questionnaire

Characteristic	Levels	Source for Level Selection
Single Question Health Literacy Screening	Adequate, Inadequate	220
Self-Perceived Health Status	Excellent, very good, good, fair, poor	237
Number of Chronic Medications, Self	Interval	229
Current Pharmacy Patronage	Chain pharmacy (i.e. CVS); Independent Pharmacy; Grocery Pharmacy (i.e. Kroger); Mass Merchandiser Pharmacy (i.e. Walmart); Mail Order Pharmacy	12
Number of Chronic Medications, Care Recipients	Interval	229
I Know My Pharmacist's Name	Yes; No	12,230
Health Confidence	High (≥ 7), Low (<7)	225,238
Pharmacy Services	Automatic Refill; E-mail or Text Message Refill Reminders; Appointment-Based Medication Synchronization; Medication Synchronization (without an appointment); Medication Adherence Packaging (e.g. blister packaging, pill box organization); Medication Therapy Management; Immunization, Influenza; Immunization, Non-Influenza; Prescription Compounding; Home Delivery; Smartphone App	

3.3 Participant Selection and Data Collection

3.3.1 Administration of Discrete Choice Experiment

A Qualtrics research panel was used to gather a sample of American adults (≥ 18 years) for the online administration of the discrete choice experiment. Online administration of DCEs is increasingly common in health economics,[213] and patient preferences did not significantly differ between those responding to the health state valuation instrument face-to-face and online.[239] In order to proceed to the survey, participants must have answered "yes" to the question "Have you filled a prescription at a pharmacy, other than a mail-order pharmacy, within the last 12 months." This screening criteria was instituted to exclude those who had not recently filled a prescription at a brick-and-mortar pharmacy. A gender quota was implemented to ensure that the proportions of males and females did not exceed a 60/40 split for either gender. While the Qualtrics panel is opt-in such that participants are not randomly selected, the panel has been shown to have an acceptable level of national representativeness.[240] Furthermore, compared with the demographic composition of other opt-in panels, Qualtrics has more representative proportions of older adults, racial minorities, those with low levels of educational attainment, and those living in urban and rural areas.[240] This study was approved by the Virginia Commonwealth University Institutional Review Board.

Prior to the discrete choice experiment, participants were provided information about the forthcoming choice tasks and the pharmacy quality measures. The specific wording and information presented was selected based on expert opinion, ISPOR guidelines for discrete choice experiments, existing literature, and feedback from the pilot testing. Because past literature has identified the potential for patient confusion over

whether a higher or lower number is better for a specific quality indicator,[53] participants were supplied with specific information that the ratings would appear on a scale of one to five stars, where more stars were better. A scale of the star levels, along with their evaluative word labels (i.e. "much below average" to "much above average") was also presented prior to the start of the experiment. The addition of word labels to the star ratings reflects the real-world presentation format of quality metrics on Medicare's Hospital Compare and Nursing Home Compare websites. The addition of world labels is also associated with improved understanding of quality stars.[65,69] Based on pilot testing feedback, a statement was added to the survey instructions noting, "An overall rating is computed based on a number of scores on specific aspects of pharmacy practice. Accordingly, an overall quality rating **may differ** from any single, specific rating." While past studies have reported that the presentation of an overall performance measure in addition to specific quality metrics aids in the identification of high-quality providers,[14,53,71] pilot test participants commonly felt confused when the two scores differed.

The instructions prior to each choice task presented the hypothetical scenario under which participants would be making their choice (i.e. having moved to a new location) and the key assumptions of this DCE, namely that price and location were held constant. Finally, an example choice task was provided. The three primary elements included in the pre-survey introduction – the context of the study scenario, a description of the quality attributes and levels, and the example choice task – are consistent with ISPOR recommendations.[166]

3.3.2 Sample Size

There is no gold standard for determining the sample size for a DCE.[166] Sample size recommendations vary considerably and include both set sample sizes (e.g. 100 respondents) and sample sizes calculated based on parametric approaches.[166,241] Formulas for sample size calculation may require input of population proportions, variance, expected parameter values, statistical power and/or the number of parameters estimated, choice sets, and alternatives.[241] Considerable variability exists in the sample sizes used in published healthcare-related DCEs, and very few (6%) report use of parametric approaches for sample size estimation.[241] Given the lack of consensus on optimal approaches for sample size calculations, the need for parameter value estimates for sample size calculations, and the limited use of parametric approaches in health economics thus far, a calculation-based approach to sample size calculation was not used in this study.[180,241]

This study targeted a sample size of 500. The target sample size was decided upon after considering expert recommendations, common practices for healthcare-related DCEs, and the a priori plan to conduct a latent class analysis. Two reports from the ISPOR Good Research Practices for Conjoint Analysis Task Force cite recommendations that conjoint analyses include at least 300 study participants.[166,180] A review article of discrete choice experiments in healthcare stated that the mean sample size of conjoint analysis studies in health care was 259 respondents.[166] Furthermore, Monte-Carlo simulations suggest that sample sizes over 100 are acceptable for latent class analysis, with sample sizes of 500 resulting in precise parameter estimates even under conditions of low data quality.[242] Accordingly, recent latent class analyses in healthcare report sample sizes of approximately 200-500.[209,210,243]

Additional consideration was given to the a priori analysis plan to evaluate the community pharmacy preferences of the subgroup of patients taking chronic medications. An estimated 50% of all Americans live with a chronic condition. [244–246] With the use of chronic medications come concerns about high levels of nonadherence[247] and an increased risk for drug-drug interactions between two prescribed medications[248] or a prescribed and an over-the-counter (OTC) medication.[249] A sample size of at least 250 patients taking chronic medications was targeted in order to have a sufficient number of patients for a valid and meaningful subgroup analysis. All study participants, per the inclusion criteria, must have reported filling a prescription at a non-mail order pharmacy in the last 12 months. In an average month, the vast majority (>80%) of prescriptions filled for adult patients are chronic medications.[250] Additionally, the prescribing rate for antibiotics, the most commonly prescribed acute medications, among non-elderly adults is approximately 350 prescriptions per 1,000 patients.[251] The assumption was thus made that at least half of the 500 study participants would be taking at least one chronic medication, yielding a predicted sample size of 250 for the subgroup analysis.

3.4 Data Analysis

3.4.1 Data Analysis, Sample Characteristics

The sample characteristics were summarized using Sawtooth v9.2. Continuous variables were presented as mean (SD), and categorical variables were presented as the proportion of respondents in each group. The number of participants failing the dominant scenario was also summarized. Chi-square and ANOVA tests were used to assess whether categorical and continuous, respectively, health and demographic characteristics varied

between those who failed the scenario and those who did not, with $p < 0.05$ denoting statistical significance.

3.4.2 Data Analysis, Study Aim 1

Sawtooth v.9.2 (Sawtooth Software, Orem, UT) was used to conduct a conditional logit regression (CL) to analyze the effect of attribute levels on consumer preferences for community pharmacies. For the primary CL analysis, only main effects were considered,[192,213] and preferences were estimated using effects coding[166,252,253] with the following model:[254]

$$U_i = \beta_1 GroceryHours_i + \beta_2 Chain\ Hours_i + \beta_3 AlwaysFriendly_i + \beta_4 AlwaysExplains_i + \beta_5 Relationship_i + \beta_6 Quality3Star_i + \beta_7 Quality5Star_i + \beta_8 DDI3Star_i + \beta_9 DDI5Star_i + \varepsilon_i$$

Where the overall utility of alternative *i* is a function of estimated coefficients β_1 to β_9, the attribute levels of alternative *i*, and a random error term. Estimated regression coefficients were expressed as part-worth utilities. Sawtooth was also used to calculate attribute importance values, which reflect the difference each attribute could make in an alternative's utility and are used to characterize the relative importance of each attribute.

The model fit was assessed by evaluating the chi-square comparing the log likelihood of the full and null models, with the degrees of freedom calculated by subtracting the number of attributes from the total number of levels to obtain the number of additional effects in the full model.[192,252] T-ratios were used to evaluate the significance of individual

attributes. A p-value < 0.05 denoted statistical significance.

3.4.3 Data Analysis, Study Aim 2

For Study Aim 2, the effects of sociodemographic and health characteristics on patient preferences for community pharmacy attributes were described. Though this aim was descriptive in nature, subgroup comparisons were made using Sawtooth Software's CBC/Hierarchical Bayes (CBC/HB) module. CBC/HB estimates individual-level utility data and normalizes it using zero-centered differentials. Through this process, individuals are made to having same utility scaling, ensuring that they will be equally weighted within the population. T-tests and one-way ANOVAs were then used to assess for the significance of the differences in part-worth utilities between subgroups, with understanding of the caution required with repeated testing of differences. It is well known that repeated testing of differences between subgroups inflates the probability of a false positive result, and the p-value denoting statistical significance should be adjusted accordingly.[255,256] The Bonferroni adjustment was used for post-hoc pairwise comparisons.

3.4.4 Data Analysis, Study Aim 3

The Sawtooth Latent Class Segmentation (CBC/LC) module was used for the proposed community pharmacy market segmentation. Latent class models allow for preference heterogeneity by identifying segments with similar preferences, estimating those preferences, and assessing the probability that each study participant belongs to each segment.[257] The CBC/LC module requires the user to pre-specify the number of segments, or classes, in the population. The module was run five times to create segmentation solutions with two to six segments. Measures of model fit were then compared between the

five solutions. The model that best described the patterns of participant responses was identified based on the Consistent Akaike Information Criterion (CAIC), where the smallest value or the inflection point indicates the appropriate number of segments.[257] The CAIC is the evaluation criterion provided in the CBC/LC module and has performed well in independent simulations testing decision-making criteria for the number of classes in latent class analyses.[258] In addition to CAIC, consideration was given to obtaining interpretable and meaningful market segments. Once the optimal solution was selected, the sizes, part-worth utilities, and attribute importance values were estimated and reported for each segment.

Descriptive statistics, mean/SD for continuous variables and proportions for categorical variables, were calculated for each market segment. The health and demographic characteristics of the members in each class were compared with chi-square and one-way ANOVA tests for categorical and continuous variables, respectively, where $p < 0.05$ denoted statistical significance.

Chapter 4: Results

4.1 Sample Size and Characteristics

A total of 773 respondents began the survey. Thirty-two participants were excluded, including thirty who entered the survey through the survey panel administrator but did not begin the choice task and two who failed to complete the choice experiment, for a total sample size of 741. The two participants who began the choice tasks but did not complete the experiment withdrew after the third and eighth choice tasks.

Demographic and health characteristics of the survey respondents and the US adult population are presented in Table 9. The sample was predominately female (55.8%), non-Hispanic white (83.1%), and married (63.2%). Middle-aged adults were slightly overrepresented relative to national estimates, with participants most commonly reporting an age of 35-54 years (40.9% vs. 35% nationally) or 55-64 years (22.9% vs. 16% nationally).[259] Young adults (18-24 years) and older adults (≥65 years) were underrepresented in the study population (3.5% vs. 12.9% nationally and 12.2% and 18.3% nationally). Nearly two-thirds of participants (62.7%) reported an annual household income level above the median US household income. Study respondents were more highly educated than the general population. Compared to the population at large, participants were more likely to report attaining at least a high school diploma/GED (98.8% vs. 87.1%) and at least a Bachelor's degree (47.4% vs. 30.6%).[260] Consistent with national estimates of population by US Census region of residence, approximately one-third of study participants reported residing in the South (34.0% vs. 37.1% nationally), and a quarter lived in the Midwest (25.3% vs. 21.7% nationally).[261] However, respondents were much more likely to live in the Northeast (29.5% vs. 17.9% nationally) and much less likely to live in the West

(11.3% vs 23.3% nationally) than the general population.[261] Survey participants more commonly reported living in a suburban area (47.2%) than an urban (24.8%) or rural (17.2%) area.

The estimated prevalence of inadequate health literacy in the study population was 6.1%. Low health confidence was more common (15.2%) than low health literacy. Most participants perceived their health to be very good (38.6%) or good (31.2%). The proportion of participants reporting fair or poor health (14.0%) was slightly lower than has been reported nationally (17.5%). The vast majority of respondents reported use of at least one chronic medication (85.1%), with an average of 2.7 medications reported per study participant. Among only those study participants who reported chronic medication use, the average utilization was 3.2 chronic medications.

The proportion of participants reporting any chronic medication use did not vary significantly by age ($p = 0.559$) and ranged from 81.5% in the youngest respondents (18-24 years) to 88.9% in those over 65 years of age. However, the mean number of chronic medications did increase significantly with age ($p = 0.0179$), from 2.3 among 18-24 year olds to 4.6 in those over 75 years of age. The reported use ($p = 0.284$) and number ($p = 0.122$) of chronic medications did not vary by sex. The majority (58.9%) of participants reported responsibility for at least one medication for a direct care recipient. The mean number of chronic medications taken by care recipient(s) was 3.5. Caregivers were most commonly 35-44 (26.4%) and 25-34 years old (23.5%). The majority of respondents reported filling their prescriptions primarily at a chain pharmacy (51.5%), and approximately one-third (35.1%) stated that they know their pharmacist's name.

Pharmacy Patronage and Demographic Characteristics

A number of demographic and health characteristics were associated with type of pharmacy patronized (Table 10). Mail order pharmacy use was significantly higher among older adults (≥ 65 years; 18.9%) than those under 65 years of age (4.2%). Consequently, while older adults comprised only 12.2% of the total study sample, nearly 4 in 10 (38.7%) of those reporting primary use of a mail order pharmacy were older than 65 years. A greater proportion of the lowest income respondents (<$25,000; 21.7%) patronized independent pharmacies than the highest income participants (≥$150,000; 6.8%), who more often reported use of a chain pharmacy (61.0% vs. 45.4%). Independent pharmacy patronage was least common (4.8%) amongst participants living in the West, where mail order pharmacy use was more common than in other areas of the country (10.8% vs 5.1-5.9%). Compared with their rural counterparts, suburban participants more commonly patronized chain pharmacies (58.8% vs. 40.9%) and less commonly used independent pharmacies (6.6% vs. 16.5%). The proportion of independent pharmacy patrons reporting that they knew their pharmacist's name (59.3%) was nearly double that of those using chain (32.7%), grocery (35.2%), and mass merchandiser pharmacies (31.0%).

Pharmacy Services Utilization

Of the eleven services surveyed, automatic refill service was the most commonly utilized, with 57.9% of participants reporting use (Table 11). The proportion of respondents using automatic refill was higher among those patronizing grocery (65.1%), mail order (63.6%) and chain (60.4%) pharmacies than independent pharmacies (45.7%).

The use of technological services, including e-mail or text message reminders and smartphone apps, was highest among patrons of chain and mail order pharmacies. Nearly half of chain (45.4%) and mail order (47.7%) patrons reported using e-mail or text message reminders, compared with 17.3%-31.0% among patients at other types of pharmacies. Similarly, pharmacy-based smartphone apps were more commonly used by chain and mail order pharmacy patrons (13.7% and 11.4%, respectively) than by customers of independent, grocery, and mass merchandiser pharmacies (4.9%-7.1%). The use of appointment-based medication synchronization was highest among patients at independent pharmacies (16.1%). Among patrons of brick-and-mortar pharmacies, home delivery was most commonly used by patients at independent pharmacies (24.7%).

4.2 Survey Responses

The median time to survey completion was 5 minutes, 38 seconds (IQR: 3 minutes, 58 seconds - 8 minutes, 11 seconds). Median elapsed time did not vary by health literacy, age, sex, level of education, or health confidence. The median time per choice task was 12 seconds. Respondents' time per choice task significantly decreased as they progressed through the experiment ($p<0.001$). Median time per choice task was 29 seconds for the first completed choice task, 19 for the second, 15 for the third, and 10-13 for the remaining tasks. The median time for the dominant choice task was 13 seconds.

In the dominant scenario, 93.4% of participants selected the dominant choice. Males more commonly failed the dominant scenario (8.9%) than females (4.9%). Respondents in rural areas who, on average reported lower levels of education and health literacy than their more urban counterparts, less commonly failed the dominant scenario (1.6%) than

those from small towns (5.1%) and suburban (6.0%) and urban (12.0%) areas. The median time spent on the survey by participants failing the dominant scenario was not significantly different than that of those who did not fail. Thirteen (1.8%) and two (0.3%) respondents always selected the alternative on the left or right, respectively. Overall, the left alternative was selected in 47.3% of random choice tasks.

Table 9. Baseline Characteristics of the Study Respondents, Overall, Compared with the US Adult Population

Baseline Characteristics	Study Respondents, n (%)	U.S. Adult Population (%)
Male Sex	325 (44.2)	48.6
Age		
18-24 years	26 (3.5)	12.9
25-34 years	151 (20.5)	17.8
35-44 years	164 (22.3)	16.8
45-54 years	137 (18.6)	18.2
55-64 years	169 (22.9)	16.2
65-74 years	81 (11.0)	10.3
≥75 years	9 (1.2)	8.0
Race		
Non-Hispanic, White	608 (83.1)	62.4
Non-Hispanic, Black	54 (7.4)	12.3
Hispanic	34 (4.6)	17.1
Other	36 (4.9)	8.2
Household Annual Income		
<$25,000	98 (13.3)	22.2
$25,000-$49,999	176 (24.0)	22.7
$50,000-$74,999	170 (23.1)	16.7
$75,000-$99,999	131 (18.0)	12.1
$100,000-$149,999	100 (13.6)	14.1
≥$150,000	59 (8.0)	12.3
Highest Level of Education		
Less Than High School/GED	9 (1.2)	12.9
High School Degree	140 (19.1)	27.6
Some College	151 (20.5)	29.0
Associate's Degree	87 (11.8)	
Bachelor's Degree	219 (29.8)	19.0
Some Post-Graduate	33 (4.5)	11.6
Graduate Degree	96 (13.1)	
Marital Status		
Never Married	161 (22.0)	36.7
Married	463 (63.2)	49.2
Separated/Divorced/Widowed	109 (14.9)	18.9

Table 9. Baseline Characteristics of the Study Respondents, Overall, Compared with the US Adult Population, Continued

Baseline Characteristics	Study Respondents, n (%)	U.S. Adult Population (%)
Region of Residence		
Northeast	217 (29.5)	17.9
Midwest	186 (25.3)	21.7
South	250 (34.0)	37.1
West	83 (11.3)	23.3
Urbanicity		
Urban	184 (24.8)	71.2
Suburban	348 (47.2)	
Small Town	79 (10.7)	9.5
Rural	127 (17.2)	19.3
Health Literacy		
Inadequate	45 (6.1)	26
Self-Perceived Health		
Excellent	120 (16.3)	82.5
Very Good	285 (38.6)	
Good	230 (31.2)	
Fair	84 (11.4)	17.5
Poor	19 (2.6)	
No. of Chronic Medications		
Self, mean (SD)	2.74 (3.32)	
Care Recipients, mean(SD)	2.03 (3.56)	
Type of Pharmacy		
Chain	379 (51.5)	
Independent	81 (11.0)	
Grocery	106 (14.4)	
Mass Merchandiser	126 (17.1)	
Mail Order	44 (6.0)	
I Know My Pharmacist's Name		
Yes	258 (35.1)	
No	316 (42.9)	
Unsure	76 (10.3)	
I do not interact with the same pharmacist regularly	86 (11.7)	
Health Confidence		
Mean (SD)	8.56 (2.03)	
High (≥7)	628 (84.8)	

Table 10. Population Characteristics, Overall, by Current Pharmacy Patronage

	Number (%), by current pharmacy patronage				
	Chain	**Independent**	**Grocery**	**Mass Merchandiser**	**Mail Order**
Number (%)	381 (51.6)	81 (11.0)	106 (14.4)	126 (17.1)	44 (6.0)
Male Sex	155 (40.9)	38 (46.9)	48 (45.7)	60 (47.6)	24 (54.6)
Age[c]					
18-24 years	16 (4.2)	4 (4.9)	1 (0.9)	4 (3.2)	1 (2.3)
25-34 years	86 (22.7)	23 (28.4)	20 (18.9)	21 (16.7)	1 (2.3)
35-44 years	89 (23.5)	19 (23.5)	22 (20.8)	29 (23.0)	5 (11.4)
45-54 years	66 (17.4)	15 (18.5)	23 (21.7)	25 (19.8)	7 (15.9)
55-64 years	85 (22.4)	11 (13.6)	26 (24.5)	34 (27.0)	13 (29.6)
65-74 years	32 (8.4)	9 (11.1)	12 (11.3)	13 (10.3)	15 (34.1)
≥75 years	5 (1.3)	0	2 (1.9)	0	2 (4.6)
Race					
Non-Hispanic, White	304 (81.3)	71 (87.7)	90 (84.9)	105 (83.3)	37 (84.1)
Non-Hispanic, Black	30 (8.0)	4 (4.9)	10 (9.4)	7 (5.6)	3 (6.8)
Hispanic	21 (5.6)	1 (1.2)	4 (3.8)	6 (4.8)	2 (4.6)
Other	19 (5.1)	5 (6.2)	2 (1.9)	8 (6.4)	2 (4.6)
Household Annual Income[c]					
<$25,000	44 (11.7)	21 (25.9)	10 (9.4)	16 (12.7)	6 (13.6)
$25,000-$49,999	83 (22.0)	20 (24.7)	20 (18.9)	41 (32.5)	12 (27.3)
$50,000-$74,999	79 (21.0)	17 (21.0)	33 (31.1)	34 (27.0)	7 (15.9)
$75,000-$99,999	78 (20.7)	12 (14.8)	18 (17.0)	18 (14.3)	6 (13.6)
$100,000-$149,999	57 (15.1)	7 (8.6)	18 (17.0)	8 (6.4)	10 (22.7)
≥$150,000	36 (9.6)	4 (4.9)	7 (6.6)	9 (7.1)	3 (6.8)
Highest Level of Education[a]					
Less Than High School/GED	3 (0.8)	4 (4.9)	1 (1.0)	0 (0)	1 (2.3)
High School Degree	70 (18.5)	10 (12.4)	19 (18.1)	31 (24.8)	8 (18.2)
Some College	79 (20.9)	26 (32.1)	19 (18.1)	22 (17.6)	5 (11.4)
Associate's Degree	39 (10.3)	8 (9.9)	15 (14.3)	19 (15.2)	6 (13.6)
Bachelor's Degree	123 (32.3)	21 (25.9)	32 (30.5)	34 (27.2)	10 (22.7)
Some Post-Graduate	15 (4.0)	5 (6.2)	5 (4.8)	3 (2.4)	5 (11.4)
Graduate Degree	50 (13.2)	7 (8.6)	14 (13.3)	16 (12.8)	9 (20.5)

[a] $p < 0.05$; [c] $p < 0.001$

Table 10. Population Characteristics, Overall, by Current Pharmacy Patronage, Cont.

	Number (%), by current pharmacy patronage				
	Chain	**Independent**	**Grocery**	**Mass Merchandiser**	**Mail Order**
Marital Status					
Never Married	87 (23.2)	24 (29.6)	18 (17.1)	28 (22.2)	4 (9.1)
Married	243 (64.8)	42 (51.9)	68 (64.8)	76 (60.3)	33 (75.0)
Separated/Divorced/Widowed	45 (12.0)	15 (18.5)	19 (18.1)	22 (17.5)	7 (15.9)
Region of Residence[a]					
Northeast	127 (33.7)	26 (32.1)	20 (18.9)	32 (25.4)	11 (25.0)
Midwest	85 (22.6)	20 (24.7)	29 (27.4)	41 (32.5)	11(25.0)
South	129 (34.2)	31 (38.3)	38 (35.9)	38 (30.2)	13 (29.6)
West	36 (9.6)	4 (4.9)	19 (17.9)	15 (11.9)	9 (20.5)
Urbanicity[c]					
Urban	91 (24.0)	28 (34.6)	29 (27.4)	29 (23.0)	7 (15.9)
Suburban	204 (53.8)	23 (28.4)	50 (47.2)	50 (39.7)	20 (45.5)
Small Town	32 (8.4)	9 (11.1)	9 (8.5)	23 (18.3)	5 (11.4)
Rural	52 (13.7)	21 (25.9)	18 (17.0)	24 (19.1)	12 (27.3)
Health Literacy					
Inadequate	22 (5.8)	9 (11.1)	7 (6.6)	7 (5.6)	0
Self-Perceived Health					
Excellent	67 (17.7)	15 (18.5)	16 (15.1)	18 (14.3)	4 (9.1)
Very Good	156 (41.2)	26 (32.1)	43 (40.6)	42 (33.3)	18 (40.9)
Good	106 (28.0)	25 (30.9)	34 (32.1)	48 (38.1)	15 (34.1)
Fair	43 (11.4)	10 (12.4)	12 (11.3)	15 (11.9)	4 (9.1)
Poor	7 (1.9)	5 (6.2)	1 (0.9)	3 (2.4)	3 (6.8)
Chronic Medications					
Self, mean (SD)	2.4 (2.7)	2.8 (2.5)	3.3 (5.2)	2.7 (3.4)	4.5 (2.8)
Care Recipients, mean(SD)	1.8 (2.8)	2.6 (4.5)	2.6 (5.6)	1.7 (2.5)	2.9 (3.9)
I Know My Pharmacist's Name[c]					
Yes	124 (32.7)	48 (59.3)	37 (35.2)	39 (31.0)	10 (22.7)
No	165 (43.5)	21 (25.9)	42 (40.0)	68 (54.0)	19 (43.2)
Unsure	39 (10.3)	10 (12.4)	12 (11.4)	8 (6.4)	7 (15.9)
I do not interact with the same pharmacist regularly	51 (13.5)	2 (2.5)	14 (13.3)	11 (8.7)	8 (18.2)
Health Confidence					
Mean (SD)	8.6 (2.0)	8.1 (2.0)	8.6 (1.9)	8.4 (2.1)	8.9 (2.4)
High (≥7)	326 (86.0)	63 (77.8)	93 (87.7)	104 (82.5)	38 (86.4)

[a] $p < 0.05$; [c] $p < 0.001$

Table 11. Pharmacy Services Utilization by Current Pharmacy Patronage

		Number (%), by current pharmacy patronage				
	Number (%)	**Chain**	**Independent**	**Grocery**	**Mass Merchandiser**	**Mail Order**
Automatic Refill[a]	429 (57.9)	229 (60.4)	37 (45.7)	69 (65.1)	63 (50.0)	28 (63.6)
E-mail or Text Message Reminders[a]	276 (37.2)	172 (45.4)	14 (17.3)	30 (28.3)	39 (31.0)	21 (47.7)
Appointment-Based Medication Synchronization[a]	44 (5.9)	18 (4.8)	13 (16.1)	4 (3.8)	6 (4.8)	3 (6.8)
Medication Synchronization	42 (5.7)	17 (4.5)	6 (7.4)	6 (5.7)	10 (7.9)	3 (6.8)
Adherence Packaging	60 (8.1)	26 (6.9)	12 (14.8)	10 (9.4)	8 (6.4)	4 (9.1)
Medication Therapy Management	19 (2.6)	8 (2.1)	2 (2.5)	5 (4.7)	3 (2.4)	1 (2.3)
Influenza Vaccine	198 (26.8)	101 (26.7)	18 (22.2)	30 (28.3)	33 (26.2)	15 (34.1)
Non-Influenza Vaccine	57 (7.7)	37 (9.8)	2 (2.5)	6 (5.7)	7 (5.6)	4 (9.1)
Prescription Compounding	25 (3.4)	12 (3.2)	3 (3.7)	3 (2.8)	6 (4.8)	1 (2.3)
Home Delivery[a]	90 (12.2)	30 (7.9)	20 (24.7)	3 (2.8)	7 (5.6)	30 (68.2)
Smartphone App[a]	77 (10.4)	52 (13.7)	4 (4.9)	7 (6.6)	9 (7.1)	5 (11.4)

[a] $p < 0.05$

Table 12. Characteristics of Those Who Failed the Dominant Scenario

Baseline Characteristics	Failed Dominant Scenario, n (%)	All Respondents, n (%)
Male Sex[a]	29 (59.2)	325 (44.2)
Age		
18-34 years	20 (40.8)	177 (24.0)
35-44 years	10 (20.4)	164 (22.3)
45-54 years	9 (18.4)	137 (18.6)
55-64 years	7 (14.3)	169 (22.9)
≥ 65 years	3 (6.1)	90 (12.2)
Race		
Non-Hispanic, White	38 (79.2)	608 (83.1)
Non-Hispanic, Black	2 (4.2)	54 (7.4)
Hispanic	6 (12.5)	34 (4.6)
Other	2 (4.2)	36 (4.9)
Household Annual Income		
<$25,000	7 (14.3)	98 (13.3)
$25,000-$49,999	12 (24.5)	176 (24.0)
$50,000-$74,999	12 (25.5)	170 (23.1)
$75,000-$99,999	10 (20.4)	132 (18.0)
≥ $100,000	8 (16.3)	159 (21.6)
Highest Level of Education		
Less Than High School/GED	1 (2.0)	9 (1.2)
High School Degree	14 (28.6)	140 (19.1)
At Least Some College	14 (28.6)	238 (32.4)
Bachelor's Degree	11 (22.5)	219 (29.8)
At Least Some Post-Graduate	9 (18.4)	129 (17.6)
Marital Status		
Never Married	12 (24.5)	161 (22.0)
Married	33 (67.4)	463 (63.2)
Separated/Divorced/Widowed	4 (8.2)	109 (14.9)
Region of Residence		
Northeast	17 (35.4)	217 (29.5)
Midwest	10 (20.8)	186 (25.3)
South	12 (25.0)	250 (34.0)
West	9 (18.8)	83 (11.3)

[a] $p < 0.05$

Table 12. Characteristics of Those Who Failed the Dominant Scenario, Continued

Baseline Characteristics	Failed Dominant Scenario, n (%)	Study Respondents, n (%)
Urbanicity[a]		
Urban	22 (44.9)	184 (24.9)
Suburban	21 (42.9)	348 (47.2)
Small Town	4 (8.2)	79 (10.7)
Rural	2 (4.1)	127 (17.2)
Health Literacy		
Inadequate	5 (10.2)	45 (6.1)
Self-Perceived Health		
Excellent	14 (28.6)	120 (16.3)
Very Good	12 (24.5)	285 (38.6)
Good	17 (34.7)	230 (31.2)
Fair	5 (10.2)	84 (11.4)
Poor	1 (2.0)	19 (2.6)
No. of Chronic Medications		
Self, mean (SD)	2.77 (2.4)	2.74 (3.32)
Care Recipients, mean(SD)	1.96 (2.2)	2.03 (3.56)
Type of Pharmacy		
Chain	27 (55.1)	379 (51.5)
Independent	7(14.3)	81 (11.0)
Grocery	3 (6.1)	106 (14.4)
Mass Merchandiser	11 (22.5)	126 (17.1)
Mail Order	1 (2.0)	44 (6.0)
I Know My Pharmacist's Name[a]		
Yes	30 (61.2)	263 (35.5)
No/Unsure/No Regular Pharmacist	19 (38.8)	478 (64.5)
Health Confidence		
Mean (SD)[a]	7.98 (2.7)	8.56 (2.0)
High (≥7)	38 (77.6)	628 (84.8)

[a] $p < 0.05$

4.3 Main Model Results

The log likelihood for the conditional (CL) logit model was -3136.5, and the chi-square value for the difference between the full and null model was 3999.5. At nine degrees of freedom, this value is statistically significant at a level of $p < 0.001$. The utility values and attribute importance values from the main model are presented in Tables 13 and 14, respectively. The preference estimates had the anticipated directions. Expanded hours, pharmacist effort to establish a patient-pharmacist relationship, and improved communication, quality, and friendliness were all significantly associated with increased utility.

Overall, study participants expressed the strongest preferences for quality-related pharmacy attributes. The attribute importance value (AIV) was highest for the specific, drug-drug interaction quality measure presented as, "Pharmacy ensured there were no patients who were dispensed two medications that can cause harm when taken together" (40.3). The overall pharmacy quality measure yielded the second-highest AIV (31.3). Patients, on average, expressed weaker preferences for pharmacy hours of operation (AIV: 9.6), staff friendliness/courtesy (7.6), pharmacist communication (5.1), and pharmacist efforts to get to know them (6.1).

In addition to examining the direction of the model's utility values and the proportion of participants selecting the dominant alternative, the validity of this discrete choice experiment was further assessed by analyzing the results of the fixed, holdout scenario. First, the individual utility values calculated through Sawtooth's Hierarchical Bayes estimation function were used to predict responses to the holdout scenario.[262] Accurate predictions were made for 62.6% of participants. Then, the Sawooth Software

Market Research Tool (SMRT) was used to predict, on a group level, the proportion of participants expected to select each alternative in the fixed scenario. SMRT predicted that 59.1% of participants would choose the first alternative; in practice, 65.3% of patients selected that alternative.

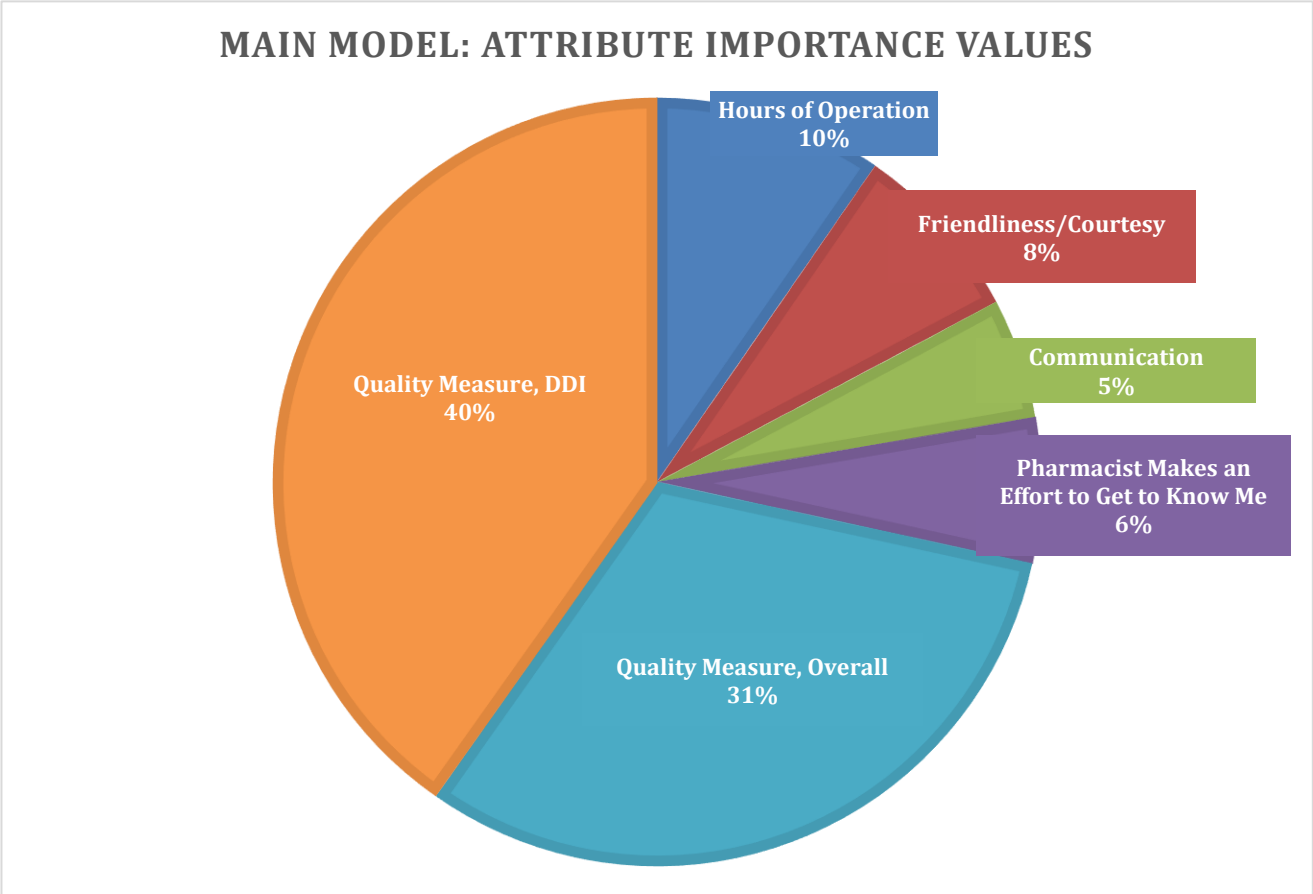
Table 13. Main Model Results, Utility Values

Quality Dimension	Attribute	Levels	Utility	SE
Access	Pharmacy Hours of Operation	8am-6pm Weekdays; 10am-3pm Saturday; Closed Sunday	-0.23150	0.02600
		9am-9pm Weekdays; 9am-7pm Saturday; 10am-6pm Sunday	0.08449	0.02635
		8am-10pm 7 days/week	0.14701	0.02685
Courtesy	Staff Friendliness/Courtesy	Sometimes	-0.15092	0.01613
		Always	0.15092	0.01613
Communication	Pharmacist Communication	Sometimes	-0.10049	0.01631
		Always	0.10049	0.01631
Understanding/ Knowing the Customer	The Pharmacist Makes an Effort to Get to Know Me	No	-0.12117	0.01618
		Yes	0.12117	0.01618
Competence	Quality Measure, Overall	★	-0.65055	0.03323
		★★★	0.06208	0.02623
		★★★★★	0.58847	0.03264
Safety	Quality Measure, DDI	★	-0.82821	0.03385
		★★★	0.06647	0.02619
		★★★★★	0.76174	0.03317

Table 14. Main Model Results, Attribute Importance Values

Quality Dimension	Attribute	Mean Importance Value	Rank
Access	Pharmacy Hours of Operation	9.61	3
Courtesy	Staff Friendliness/Courtesy	7.61	4
Communication	Pharmacist Communication	5.09	6
Knowing the Customer	Pharmacist Makes an Effort to Get to Know Me	6.10	5
Competence	Quality Measure, Overall	31.34	2
Safety	Quality Measure, DDI	40.25	1

Figure 3. Main Model Attribute Importance Values



4.3. Subgroup Results

Comparisons of the zero-centered Hierarchical Bayes individual utility estimates across demographic and health characteristics suggest that a number of these traits are associated with patient preferences for community pharmacy attributes. The utility values and attribute importance values of demographic and health characteristic-based subgroups are presented in Tables 15-39.

The utility values of both the overall and drug-drug interaction (DDI)-specific quality metrics varied across several demographic subgroups. When utilities were compared by sex, women had higher utilities for five star ratings on the overall quality metric (83.0) and the drug-drug interaction (DDI)-specific metric (103.8) than their male counterparts (76.2 and 94.5, respectively). The utility values ascribed to a five-star rating on the DDI metric were also higher among white, non-Hispanic respondents compared to those who identified as a member of an "other" race (101.1 vs. 69.5). Patients who indicated that they do not know their pharmacist's name, were unsure, or reported that they did not regularly interact with the same pharmacist more strongly preferred a 5-star score on the DDI metric (100.8) than those who did know their pharmacist's name (96.6).Finally, excellent (102.5) and very good health (106.7) were associated with stronger preferences for 5-star scores on the DDI metric than good (92.2), fair (90.5), and poor self-reported health (92.7), though only the difference between those with very good and good health was significant in pairwise comparisons.

The utility values associated with pharmacists' efforts to get to know their patients also varied significantly across different populations, including residence-, health status- and health literacy-based subgroups. Rural (20.6) patients more strongly preferred this

attribute than those in suburban areas (14.1), and utility values were higher among those with inadequate health literacy (26.0) than for their higher literacy counterparts (16.3). The utility ascribed to pharmacist effort to establish a patient-pharmacist relationship was also higher in those who reported being in good health (19.9) compared to those with very good (13.6) health. However, the effect of self-perceived health status on strength of respondents' preferences for this attribute was not consistent, as the utilities among those with excellent (18.3) and poor health (20.0) were not significantly different.

Few subgroup differences were seen in the utility ascribed to the friendliness/courtesy, communication, and hours of operation attributes. The utility values of friendliness/courtesy varied significantly only across residence-based subgroups, with rural and small town respondents expressing stronger preferences than their suburban and urban counterparts for friendliness and courtesy (small town: 23.7; urban: 16.4). The comparison of utilities by race revealed that white, non-Hispanic respondents had, on average, a lower utility value for pharmacist communication (13.6) than participants who identified as members of an "other" race (23.8). Patients who knew their pharmacist's name also assigned higher utility to pharmacist communication (16.7) than those without a patient-pharmacist relationship (13.4). Finally, only the number of chronic medications was associated with a difference in the strength of respondent preferences for the most extended pharmacy hours ("chain hours"; 8am-10pm 7 days/week). Those who reported that they or their direct care recipient take at least 11 different prescription medications were the only subgroups for whom the utility of the second most extensive hours ("grocery hours"; 9am-9pm Weekdays, 9am-7pm Saturday, 10am-6pm Sunday) was negative (-5.2 and -0.47, respectively). Consequently, in increase in utility when moving from "grocery" to

"chain" hours was much larger among the highest medication users (>11 medications, 32.0) than for those reporting use of fewer than 11 medications (8.5-19.5).

Utility values did not significantly vary by age, income level, highest level of education attained, or level of health confidence. However, a number of trends were identified in the comparison of these subgroups. The importance of a patient-pharmacist relationship declined as education increased, decreasing from 25.4 and 19.9 for those with less than a high school education and a high school degree, respectively, to 14.1 and 15.8 among those with a bachelor's degree and at least some post-graduate education. Additionally, the utility value of the most extended pharmacy hours presented ("chain hours"; 8am-10pm 7 days/week) was 1.9 among those with less than a high school education, far lower than the 14.8-22.8 among those with higher levels of education. The utility of chain pharmacy hours was also higher among survey respondents in the Northeast (24.4) and West (26.3) than in the Midwest (19.9) and South (16.4).

Table 15. Subgroup Results, Utilities, by Sex

		Sex	
		Male	Female
Attribute	**Levels**	**Utility**	**Utility**
Hours of Operation	8am-6pm Weekdays; 10am-3pm Saturday; Closed Sunday	-27.9 (48.8)	-25.7 (47.0)
	9am-9pm Weekdays; 9am-7pm Saturday; 10am-6pm Sunday	5.7 (30.9)	7.2 (28.6)
	8am-10pm 7 days/week	22.2 (42.5)	18.6 (38.4)
Friendliness/Courtesy	Sometimes	-19.7 (21.2)	-19.2 (19.8)
	Always	19.7 (21.2)	19.2 (19.8)
Communication	Sometimes	-15.4 (16.1)	-13.8 (19.4)
	Always	15.4 (16.1)	13.8 (19.4)
Pharmacist Knows Me	No	-16.0 (22.4)	-17.6 (22.7)
	Yes	16.0 (22.4)	17.6 (22.7)
Overall Quality	★	-88.2 (37.5)	-93.3 (36.3)
	★★★	12.0 (18.2)	10.3 (16.5)
	★★★★★ [a]	76.2 (41.7)	83.0 (38.4)
DDI Quality	★	-106.9 (64.8)	-114.4 (54.1)
	★★★	12.4 (17.3)	10.6 (14.9)
	★★★★★ [a]	94.5 (64.0)	103.8 (51.0)

[a] $p < 0.05$

Table 16. Subgroup Results, Utilities, by Urbanicity

		Urbanicity			
		Urban	**Suburban**	**Small Town**	**Rural**
Attribute	**Levels**	**Utility**	**Utility**	**Utility**	**Utility**
Hours of Operation	8am-6pm Weekdays; 10am-3pm Saturday; Closed Sunday	-23.2 (50.5)	-27.8 (46.7)	-29.0 (48.6)	-27.6 (46.7)
	9am-9pm Weekdays; 9am-7pm Saturday; 10am-6pm Sunday	4.8 (29.0)	5.6 (28.4)	13.2 (34.1)	7.5 (30.3)
	8am-10pm 7 days/week	18.4 (41.8)	22.2 (41.0)	15.8 (41.8)	20.1 (35.2)
Friendliness/Courtesy	Sometimes	-16.4 (22.1)	-19.0 (18.4)	-23.7 (20.3)	-22.6 (22.8)
	Always [a]	16.4 (22.1)	19.0 (18.4)	23.7 (20.3)	22.6 (22.8)
Communication	Sometimes	-16.1 (18.3)	-13.3 (17.4)	-14.1 (20.1)	15.6 (17.6)
	Always	16.1 (18.3)	13.3 (17.4)	14.1 (20.1)	15.6 (17.6)
Pharmacist Knows Me	No	-17.9 (25.0)	-14.1 (20.3)	-20.6 (20.4)	-20.6 (25.0)
	Yes	17.9 (25.0)	14.1 (20.3)	20.6 (20.4)	20.6 (25.0)
Overall Quality	★	-89.9 (37.2)	-91.1 (39.3)	-89.9 (36.0)	-92.4 (31.2)
	★★★	11.3 (21.4)	11.1 (16.8)	9.4 (13.1)	11.3 (16.1)
	★★★★★	78.6 (40.9)	80.0 (42.9)	80.5 (35.8)	81.2 (32.0)
DDI Quality	★	-102.8 (67.8)	-117.3 (55.0)	-102.0 (62.6)	-109.8 (57.4)
	★★★	10.3 (17.1)	11.2 (16.0)	13.8 (14.4)	11.9 (16.1)
	★★★★★	92.5 (64.7)	105.9 (52.8)	88.2 (63.6)	97.9 (55.3)

[a] $p < 0.05$

Table 17. Subgroup Results, Utilities, by Age

		Age				
		Age 18-34	**Age 35-44**	**Age 45-54**	**Age 55-64**	**Age ≥65**
Attribute	**Levels**	**Utility**	**Utility**	**Utility**	**Utility**	**Utility**
Hours of Operation	8am-6pm Weekdays; 10am-3pm Saturday; Closed Sunday	-26.6 (54.6)	-28.3 (46.7)	-22.3 (35.7)	-24.7 (47.2)	-35.1 (52.8)
	9am-9pm Weekdays; 9am-7pm Saturday; 10am-6pm Sunday	5.5 (29.9)	5.7 (29.0)	7.4 (29.2)	5.0 (29.1)	11.8 (31.6)
	8am-10pm 7 days/week	21.1 (45.8)	22.6 (37.4)	15.0 (34.5)	19.7 (40.1)	23.3 (43.0)
Friendliness/Courtesy	Sometimes	-21.8 (25.1)	-19.9 (18.9)	-17.9 (20.0)	-18.8 (16.8)	-17.2 (19.5)
	Always	21.8 (25.1)	19.9 (18.9)	17.9 (20.0)	18.8 (16.8)	17.2 (19.5)
Communication	Sometimes	-14.3 (17.6)	-17.2 (18.5)	-13.3 (20.8)	-12.4 (14.2)	-15.9 (19.1)
	Always	14.3 (17.6)	17.2 (18.5)	13.3 (20.8)	12.4 (14.2)	15.9 (19.1)
Pharmacist Knows Me	No	-15.5 (21.3)	-16.0 (21.9)	-16.8 (22.6)	-19.5 (24.7)	-16.5 (22.0)
	Yes	15.5 (21.3)	16.0 (21.9)	16.8 (22.6)	19.5 (24.7)	16.5 (22.0)
Overall Quality	★	-88.9 (41.4)	-89.0 (36.8)	-96.9 (32.6)	-92.5 (34.6)	-87.5 (37.5)
	★★★	10.7 (16.9)	13.2 (21.1)	11.9 (17.6)	8.9 (14.7)	11.0 (13.9)
	★★★★★	78.2 (42.6)	75.8 (40.7)	85.0 (39.5)	83.6 (37.9)	76.5 (36.9)
DDI Quality	★	-108.2 (59.0)	-110.1 (61.6)	-109.2 (62.3)	-115.6 (54.7)	-112.4 (58.6)
	★★★	11.2 (16.8)	11.4 (15.7)	10.5 (17.3)	13.3 (14.7)	9.9 (15.8)
	★★★★★	96.9 (56.2)	98.7 (61.7)	98.7 (59.4)	102.3 (54.3)	102.6 (54.0)

Table 18. Subgroup Results, Utilities, by Race

		Race			
		White, Non-Hispanic	Black, Non-Hispanic	Hispanic	Other
Attribute	**Levels**	**Coeff.**	**Coeff.**	**Coeff.**	**Coeff.**
Hours of Operation	8am-6pm Weekdays; 10am-3pm Saturday; Closed Sunday	-28.4 (47.4)	-28.5 (56.8)	-10.0 (46.5)	-13.8 (42.5)
	9am-9pm Weekdays; 9am-7pm Saturday; 10am-6pm Sunday	7.6 (30.0)	2.3 (25.4)	-0.4 (28.2)	2.8 (30.1)
	8am-10pm 7 days/week	20.8 (40.1)	26.3 (48.0)	10.4 (36.4)	10.9 (36.0)
Friendliness/Courtesy	Sometimes	-18.9 (20.0)	-20.7 (20.4)	-26.7 (27.3)	-20.3 (21.1)
	Always	18.9 (20.0)	20.7 (20.4)	26.7 (27.3)	20.3 (21.1)
Communication	Sometimes	-13.6 (17.5)	-17.0 (18.0)	-18.2 (17.5)	-23.8 (23.6)
	Always [c]	13.6 (17.5)	17.0 (18.0)	18.2 (17.5)	23.8 (23.6)
Pharmacist Knows Me	No	-16.7 (22.6)	-14.6 (19.7)	-19.1 (11.8)	-18.5 (29.7)
	Yes	16.7 (22.6)	14.6 (19.7)	19.1 (11.8)	18.5 (29.7)
Overall Quality	★	-91.9 (35.5)	-88.0 (38.2)	-90.1 (44.5)	-82.0 (49.2)
	★★★	11.1 (17.2)	12.8 (15.7)	10.6 (15.8)	11.0 (21.7)
	★★★★★ [a]	80.8 (38.0)	75.2 (43.7)	79.5 (43.9)	71.0 (59.6)
DDI Quality	★	-112.7 (56.8)	-110.7 (66.6)	-111.2 (58.0)	-80.7 (81.5)
	★★★	11.6 (15.7)	10.2 (16.8)	9.6 (15.3)	11.2 (22.3)
	★★★★★	101.1 (55.6)	100.6 (60.7)	101.6 (55.5)	69.5 (76.7)

[a] $p < 0.05$; [c] $p < 0.001$

Table 19. Subgroup Results, Utilities, by Annual Household Income

		Income				
		<$25,000	**$25,000-$49,999**	**$50,000-$74,999**	**$75,000-$99,999**	**≥$100,000**
Attribute	**Levels**	**Utility**	**Utility**	**Utility**	**Utility**	**Utility**
Hours of Operation	8am-6pm Weekdays; 10am-3pm Saturday; Closed Sunday	-21.6 (57.4)	-24.2 (43.8)	-30.7 (45.5)	-27.9 (50.8)	-27.0 (44.6)
	9am-9pm Weekdays; 9am-7pm Saturday; 10am-6pm Sunday	3.5 (31.1)	5.6 (27.5)	9.9 (29.7)	2.4 (26.1)	8.8 (32.7)
	8am-10pm 7 days/week	18.1 (48.0)	18.6 (39.5)	20.8 (37.2)	25.5 (43.6)	18.2 (36.2)
Friendliness/Courtesy	Sometimes	-22.6 (22.7)	-19.7 (19.0)	-18.0 (20.5)	-20.7 (24.4)	-17.5 (15.9)
	Always	22.6 (22.7)	19.7 (19.0)	18.0 (20.5)	20.7 (24.4)	17.5 (15.9)
Communication	Sometimes	-14.3 (19.2)	-16.0 (21.4)	-12.8 (16.5)	-15.6 (15.5)	-14.0 (16.6)
	Always	14.3 (19.2)	16.0 (21.4)	12.8 (16.5)	15.6 (15.5)	14.0 (16.6)
Pharmacist Knows Me	No	-16.6 (23.2)	-19.6 (23.1)	-17.5 (25.8)	-16.6 (23.6)	-13.6 (15.9)
	Yes	16.6 (23.2)	19.6 (23.1)	17.5 (25.8)	16.6 (23.6)	13.6 (15.9)
Overall Quality	★	-89.8 (38.0)	-90.7 (36.6)	-92.1 (32.6)	-87.4 (40.8)	-94.3 (37.6)
	★★★	11.8 (16.9)	10.5 (14.8)	13.5 (19.0)	8.9 (20.5)	10.8 (14.9)
	★★★★★	78.0 (39.5)	80.2 (38.8)	78.7 (39.6)	78.5 (40.4)	83.5 (41.9)
DDI Quality	★	-99.6 (65.2)	-113.8 (56.0)	-110.6 (59.3)	-113.3 (55.9)	-114.4 (60.5)
	★★★	11.3 (19.3)	11.6 (16.1)	10.9 (16.3)	13.2 (13.6)	10.7 (15.4)
	★★★★★	88.3 (63.4)	102.2 (54.7)	99.7 (56.0)	100.1 (57.3)	103.7 (57.5)

Table 20. Subgroup Results, Utilities, by Education Level

		Highest Level of Education Attained				
		Less Than High School	**High School Degree**	**Some College**	**Bachelor's Degree**	**At Least Some Post-Graduate**
Attribute	**Levels**	**Utility**	**Utility**	**Utility**	**Utility**	**Utility**
Hours of Operation	8am-6pm Weekdays; 10am-3pm Saturday; Closed Sunday	-2.1 (78.3)	-24.5 (46.8)	-27.1 (50.1)	-29.4 (49.7)	-25.1 (37.0)
	9am-9pm Weekdays; 9am-7pm Saturday; 10am-6pm Sunday	0.2 (34.3)	9.7 (33.2)	4.3 (24.8)	6.2 (28.6)	7.9 (34.2)
	8am-10pm 7 days/week	1.9 (58.3)	14.8 (43.5)	22.7 (41.6)	23.2 (37.6)	17.2 (37.0)
Friendliness/Courtesy	Sometimes	-12.8 (21.4)	-20.2 (19.7)	-21.4 (21.6)	-18.9 (21.0)	-16.8 (18.0)
	Always	12.8 (21.4)	20.2 (19.7)	21.4 (21.6)	18.9 (21.0)	16.8 (18.0)
Communication	Sometimes	-26.7 (15.1)	-12.2 (17.8)	-15.0 (16.0)	-14.4 (19.4)	-15.8 (18.8)
	Always	26.7 (15.1)	12.2 (17.8)	15.0 (16.0)	14.4 (19.4)	15.8 (18.8)
Pharmacist Knows Me	No	-25.4 (34.6)	-19.9 (28.6)	-17.8 (22.5)	-14.2 (16.8)	-15.8 (22.4)
	Yes [a]	25.4 (34.6)	19.9 (28.6)	17.8 (22.5)	14.2 (16.8)	15.8 (22.4)
Overall Quality	★	-99.3 (46.6)	-86.8 (38.3)	-91.2 (33.9)	-91.8 (36.8)	-93.4 (40.0)
	★★★	16.1 (13.4)	8.2 (18.3)	11.9 (17.2)	12.3 (17.1)	10.0 (18.5)
	★★★★★	83.2 (42.8)	78.6 (40.4)	79.3 (37.3)	79.5 (41.0)	83.4 (41.9)
DDI Quality	★	-78.0 (59.3)	-104.7 (64.8)	-111.2 (57.5)	-117.3 (55.3)	-108.1 (63.7)
	★★★	6.5 (18.3)	11.6 (19.3)	11.2 (15.4)	12.4 (15.8)	10.0 (13.9)
	★★★★★	71.5 (54.2)	93.1 (63.7)	100.0 (55.1)	105.0 (53.1)	98.1 (61.7)

[a] $p < 0.05$

Table 21. Subgroup Results, Utilities, by Marital Status

		Marital Status		
		Never Married	Married	Separated/Divorced Widowed
Attribute	**Levels**	**Utility**	**Utility**	**Utility**
Hours of Operation	8am-6pm Weekdays; 10am-3pm Saturday; Closed Sunday	-25.0 (44.1)	-28.7 (49.6)	-22.2 (45.9)
	9am-9pm Weekdays; 9am-7pm Saturday; 10am-6pm Sunday	0.6 (24.8)	8.8 (31.8)	5.8 (25.5)
	8am-10pm 7 days/week	24.4 (41.1)	19.9 (40.3)	16.4 (39.1)
Friendliness/Courtesy	Sometimes	-19.0 (20.7)	-20.0 (21.5)	-18.3 (15.4)
	Always	19.0 (20.7)	20.0 (21.5)	18.3 (15.4)
Communication	Sometimes	-14.9 (17.3)	-14.4 (16.8)	-14.5 (23.4)
	Always	14.9 (17.3)	14.4 (16.8)	14.5 (23.4)
Pharmacist Knows Me	No	-13.5 (17.4)	-17.5 (23.1)	-19.1 (26.4)
	Yes[a]	13.5 (17.4)	17.5 (23.1)	19.1 (26.4)
Overall Quality	★	-95.0 (33.7)	-88.7 (38.0)	-92.8 (37.8)
	★★★	10.8 (14.3)	11.1 (18.4)	10.6 (19.1)
	★★★★★	84.2 (35.3)	77.6 (41.4)	82.3 (40.2)
DDI Quality	★	-117.2 (52.3)	-108.7 (62.4)	-109.4 (58.6)
	★★★	12.9 (15.0)	10.5 (16.2)	13.3 (17.1)
	★★★★★	104.3 (50.8)	98.2 (59.9)	96.1 (58.8)

[a] $p < 0.05$

Table 22. Subgroup Results, Utilities, by Census Region of Residence

		US Census Region of Residence			
		Northeast	**Midwest**	**South**	**West**
Attribute	**Levels**	**Utility**	**Utility**	**Utility**	**Utility**
Hours of Operation	8am-6pm Weekdays; 10am-3pm Saturday; Closed Sunday	-27.2 (42.6)	-29.5 (54.5)	-24.2 (45.2)	-27.9 (52.7)
	9am-9pm Weekdays; 9am-7pm Saturday; 10am-6pm Sunday[b]	9.9 (32.0)	8.2 (28.1)	4.3 (28.6)	1.7 (28.3)
	8am-10pm 7 days/week	17.3 (39.5)	21.2 (44.4)	19.9 (35.7)	26.3 (46.0)
Friendliness/Courtesy	Sometimes	-20.2 (22.7)	-19.1 (20.6)	-19.0 (17.9)	-18.6 (18.9)
	Always	20.2 (22.7)	19.1 (20.6)	19.0 (17.9)	18.6 (18.9)
Communication	Sometimes	-12.4 (17.3)	-14.6 (18.6)	-15.4 (18.3)	-17.6 (17.0)
	Always[a]	12.4 (17.3)	14.6 (18.6)	15.4 (18.3)	17.6 (17.0)
Pharmacist Knows Me	No	-18.8 (22.9)	-16.0 (21.2)	-15.1 (21.1)	-19.0 (28.1)
	Yes	18.8 (22.9)	16.0 (21.2)	15.1 (21.1)	19.0 (28.1)
Overall Quality	★	-90.9 (37.9)	-92.7 (35.3)	-92.1 (35.6)	-83.7 (42.8)
	★★★	12.3 (17.5)	10.2 (16.3)	11.0 (17.3)	9.5 (21.4)
	★★★★★	78.6 (40.7)	82.6 (38.0)	81.1 (38.0)	74.2 (47.6)
DDI Quality	★	-110.4 (57.1)	-109.3 (59.9)	-113.9 (60.2)	-104.6 (66.6)
	★★★	11.4 (15.9)	11.1 (16.9)	11.5 (15.1)	11.5 (18.3)
	★★★★★	99.1 (56.1)	98.2 (58.5)	102.4 (57.2)	93.1 (63.4)

[a] $p < 0.05$; [b] $p < 0.01$

Table 23. Subgroup Results, Utilities, by Health Literacy and Pharmacist Relationship

		Health Literacy		Pharmacist Relationship	
		Adequate Health Literacy	**Inadequate Health Literacy**	**I Know My Pharmacist's Name**	**I Don't Know My Pharmacist's Name/Unsure/No Regular Pharmacist**
Attribute	**Levels**	**Utility**	**Utility**	**Utility**	**Utility**
Hours of Operation	8am-6pm Weekdays; 10am-3pm Saturday; Closed Sunday	-26.5 (47.9)	-31.4 (46.8)	-25.8 (46.1)	-27.2 (48.7)
	9am-9pm Weekdays; 9am-7pm Saturday; 10am-6pm Sunday	6.4 (29.5)	9.0 (30.8)	5.7 (29.0)	7.0 (29.8)
	8am-10pm 7 days/week	20.1 (40.6)	22.4 (36.5)	20.1 (38.1)	20.2 (41.5)
Friendliness/Courtesy	Sometimes	-19.5 (20.4)	-18.6 (21.3)	-22.0 (20.9)[a]	-18.1 (20.1)[a]
	Always	19.5 (20.4)	18.6 (21.3)	22.0 (20.9)[a]	18.1 (20.1)[a]
Communication	Sometimes	-14.5 (17.7)	-14.8 (22.0)	-16.7 (20.0)	-13.4 (16.7)
	Always	14.5 (17.7)	14.8 (22.0)	16.7 (20.0)	13.4 (16.7)
Pharmacist Knows Me	No	-16.3 (21.0)[b]	-26.0 (38.5)[b]	-18.5 (23.4)[b]	-15.9 (22.0)[b]
	Yes	16.3 (21.0)[b]	26.0 (38.5)[b]	18.5 (23.4)[b]	15.9 (22.0)[b]
Overall Quality	★	-91.3 (36.7)	-84.8 (43.4)	-90.9 (36.1)	-90.9 (37.7)
	★★★	11.1 (17.5)	9.2 (18.5)	11.1 (18.9)	10.8 (16.9)
	★★★★★	80.2 (39.4)	75.6 (48.3)	79.6 (37.8)	80.2 (41.1)
DDI Quality	★	-111.1 (59.8)	-103.1 (61.6)	-107.4 (57.2)	-112.5 (61.2)
	★★★	11.2 (15.8)	13.6 (20.6)	10.8 (16.6)	11.7 (15.8)
	★★★★★	99.9 (57.7)	89.5 (60.4)	96.6 (56.6)	100.8 (58.4)

[a] $p < 0.05$; [b] $p < 0.01$

Table 24. Subgroup Results, Utilities, by Self-Perceived Health Status

		Self-Perceived Health Status				
		Excellent	**Very Good**	**Good**	**Fair**	**Poor**
Attribute	**Levels**	**Utility**	**Utility**	**Utility**	**Utility**	**Utility**
Hours of Operation	8am-6pm Weekdays; 10am-3pm Saturday; Closed Sunday	-22.5 (43.0)	-26.5 (47.5)	-28.0 (46.1)	-28.9 (59.4)	-33.6 (47.4)
	9am-9pm Weekdays; 9am-7pm Saturday; 10am-6pm Sunday	4.9 (27.5)	4.7 (28.2)	9.7 (32.4)	5.5 (26.7)	11.8 (36.8)
	8am-10pm 7 days/week	17.6 (34.7)	21.8 (39.1)	18.2 (41.7)	23.5 (48.0)	21.8 (39.6)
Friendliness/Courtesy	Sometimes	-20.0 (19.3)	-18.3 (19.5)	-21.2 (22.1)	-18.5 (20.6)	-17.4 (21.1)
	Always	20.0 (19.3)	18.3 (19.5)	21.2 (22.1)	18.5 (20.6)	17.4 (21.1)
Communication	Sometimes	-15.4 (18.3)	-14.7 (18.4)	-14.6 (17.9)	-13.2 (16.8)	-11.3 (15.7)
	Always	15.4 (18.3)	14.7 (18.4)	14.6 (17.9)	13.2 (16.8)	11.3 (15.7)
Pharmacist Knows Me	No	-18.4 (23.1)	-13.6 (17.7)	-19.9 (25.0)	-16.8 (22.4)	-20.0 (41.5)
	Yes	18.4 (23.1)	13.6 (17.7)	19.9 (25.0)	16.8 (22.4)	20.0 (41.5)
Overall Quality	★	-87.2 (37.5)	-94.2 (34.6)	-88.9 (39.4)	-91.5 (38.7)	-87.1 (34.7)
	★★★	11.4 (17.3)	10.6 (18.7)	11.2 (17.3)	9.8 (14.4)	15.9 (20.1)
	★★★★★	75.9 (41.7)	83.5 (37.8)	77.7 (41.4)	81.7 (39.0)	71.2 (44.7)
DDI Quality	★	-113.3 (61.2)	-117.6 (55.3)	-103.9 (64.0)	-102.2 (61.0)	-109.2 (53.7)
	★★★	10.7 (15.4)	11.0 (16.2)	11.7 (15.6)	11.7 (13.9)	16.5 (29.3)
	★★★★★[a]	102.5 (60.8)	106.7 (51.4)	92.2 (62.0)	90.5 (60.9)	92.7 (54.8)

[a] $p < 0.05$

Table 25. Subgroup Results, Utilities, by Number of Chronic Medications, Self

		Number of Chronic Medications, Self				
		Zero	**1-3**	**4-7**	**8-11**	**≥11**
Attribute	**Levels**	**Utility**	**Utility**	**Utility**	**Utility**	**Utility**
Hours of Operation	8am-6pm Weekdays; 10am-3pm Saturday; Closed Sunday	-21.6 (53.3)	-26.5 (46.1)	-32.3 (49.2)	-23.9 (54.4)	-21.7 (24.3)
	9am-9pm Weekdays; 9am-7pm Saturday; 10am-6pm Sunday	3.7 (31.8)	6.2 (28.7)	11.9 (31.9)	2.2 (22.9)	-5.2 (15.7)
	8am-10pm 7 days/week	18.0 (41.2)	20.3 (39.3)	20.4 (42.9)	21.7 (46.8)	26.8 (27.2)
Friendliness/Courtesy	Sometimes	-20.7 (25.9)	-18.7 (18.8)	-20.3 (21.7)	-20.9 (16.3)	-21.9 (18.3)
	Always	20.7 (25.9)	18.7 (18.8)	20.3 (21.7)	20.9 (16.3)	21.9 (18.3)
Communication	Sometimes	-12.5 (18.9)	-14.6 (18.0)	-16.5 (18.9)	-13.0 (10.3)	-13.9 (11.7)
	Always	12.5 (18.9)	14.6 (18.0)	16.5 (18.9)	13.0 (10.3)	13.9 (11.7)
Pharmacist Knows Me	No	-14.6 (18.6)	-16.7 (21.9)	-19.8 (26.3)	-18.0 (25.7)	-6.6 (13.8)
	Yes	14.6 (18.6)	16.7 (21.9)	19.8 (26.3)	18.0 (25.7)	6.6 (13.8)
Overall Quality	★	-87.4 (41.6)	-91.3 (36.6)	-91.1 (36.7)	-93.4 (34.1)	-99.3 (29.5)
	★★★	9.2 (21.2)	11.6 (17.8)	10.6 (14.9)	10.4 (17.8)	9.2 (8.9)
	★★★★★	78.0 (44.6)	79.7 (40.4)	80.5 (36.4)	83.0 (39.0)	90.0 (29.4)
DDI Quality	★	-107.0 (65.5)	-113.9 (56.9)	-101.5 (63.2)	-109.5 (72.7)	-133.7 (22.8)
	★★★	7.8 (17.7)	12.2 (15.5)	10.9 (17.8)	13.1 (8.1)	13.6 (11.9)
	★★★★★	99.2 (60.1)	101.7 (55.3)	90.6 (62.4)	96.4 (71.6)	120.1 (24.9)

Table 26. Subgroup Results, Utilities, by Number of Chronic Medications, Care Recipient

		Number of Chronic Medications, Care Recipient				
		Zero	**1-3**	**4-7**	**8-11**	**≥11**
Attribute	**Levels**	**Utility**	**Utility**	**Utility**	**Utility**	**Utility**
Hours of Operation	8am-6pm Weekdays; 10am-3pm Saturday; Closed Sunday	-32.3 (52.2)	-23.1 (41.4)	-26.4 (44.9)	-20.5 (41.7)	-12.8 (60.4)
	9am-9pm Weekdays; 9am-7pm Saturday; 10am-6pm Sunday	6.8 (30.8)	5.7 (28.4)	11.1 (30.4)	1.9 (21.3)	-0.47 (27.4)
	8am-10pm 7 days/week [a]	25.5 (43.4)	17.4 (35.5)	15.2 (38.6)	18.6 (38.7)	13.3 (49.4)
Friendliness/Courtesy	Sometimes	-18.6 (21.2)	-20.5 (19.5)	-19.8 (20.8)	-18.9 (23.0)	-19.1 (20.6)
	Always	18.6 (21.2)	20.5 (19.5)	19.8 (20.8)	18.9 (23.0)	19.1 (20.6)
Communication	Sometimes	-14.1 (16.1)	-14.2 (18.9)	-15.4 (17.7)	-18.1 (22.1)	-17.2 (23.7)
	Always	14.1 (16.1)	14.2 (18.9)	15.4 (17.7)	18.1 (22.1)	17.2 (23.7)
Pharmacist Knows Me	No	-15.8 (20.6)	-18.3 (25.7)	-17.1 (20.0)	-15.2 (19.3)	-14.4 (20.1)
	Yes	15.8 (20.6)	18.3 (25.7)	17.1 (20.0)	15.2 (19.3)	14.4 (20.1)
Overall Quality	★	-87.7 (39.1)	-93.2 (34.4)	-94.7 (36.1)	-95.4 (38.9)	-87.3 (41.3)
	★★★	10.5 (17.4)	11.5 (19.5)	10.1 (13.9)	15.0 (17.9)	9.7 (13.3)
	★★★★★	77.2 (41.3)	81.7 (39.1)	84.6 (36.1)	80.3 (44.1)	77.6 (42.3)
DDI Quality	★	-115.4 (55.4)	-107.9 (62.7)	-107.4 (61.3)	-114.1 (58.8)	-100.1 (67.9)
	★★★	11.1 (15.5)	12.4 (17.3)	9.2 (14.7)	11.8 (9.8)	11.1 (18.4)
	★★★★★	104.3 (52.5)	95.4 (61.1)	98.3 (59.7)	102.3 (57.6)	89.0 (67.3)

[a] $p < 0.05$

Table 27. Subgroup Results, Utilities, by Pharmacy Patronage

		Pharmacy Patronage				
		Chain	**Independent**	**Grocery**	**Mass Merchandiser**	**Mail Order**
Attribute	**Levels**	**Utility**	**Utility**	**Utility**	**Utility**	**Utility**
Hours of Operation	8am-6pm Weekdays; 10am-3pm Saturday; Closed Sunday	-31.4 (53.0)	-19.1 (39.0)	-25.1 (45.0)	-21.5 (42.3)	-21.4 (32.8)
	9am-9pm Weekdays; 9am-7pm Saturday; 10am-6pm Sunday	7.3 (30.0)	6.4 (31.0)	3.3 (25.1)	7.7 (32.9)	4.4 (23.6)
	8am-10pm 7 days/week[a]	24.1 (42.5)	12.6 (34.8)	21.8 (38.6)	13.8 (39.3)	17.0 (34.7)
Friendliness/Courtesy	Sometimes	-20.0 (22.2)	-16.4 (23.1)	-18.3 (16.7)	-21.1 (17.8)	-17.5 (14.0)
	Always	20.0 (22.2)	16.4 (23.1)	18.3 (16.7)	21.1 (17.8)	17.5 (14.0)
Communication	Sometimes	-13.6 (15.3)	-15.7 (20.6)	-13.9 (16.1)	-17.2 (23.7)	-15.8 (15.5)
	Always	13.6 (15.3)	15.7 (20.6)	13.9 (16.1)	17.2 (23.7)	15.8 (15.5)
Pharmacist Knows Me	No	-15.5 (22.3)	-19.3 (25.0)	-17.7 (20.7)	-18.4 (21.8)	-18.2 (25.8)
	Yes	15.5 (22.3)	19.3 (25.0)	17.7 (20.7)	18.4 (21.8)	18.2 (25.8)
Overall Quality	★	-89.2 (39.8)	-98.5 (31.9)	-91.3 (32.8)	-89.7 (36.2)	-96.6 (28.4)
	★★★ [a]	10.8 (16.4)	17.0 (22.5)	9.5 (12.6)	10.3 (20.0)	9.3 (13.4)
	★★★★★	78.3 (42.9)	81.6 (39.5)	81.8 (32.9)	79.4 (40.8)	87.3 (25.3)
DDI Quality	★	-113.8 (52.8)	-100.2 (62.6)	-118.1 (59.7)	-103.8 (69.2)	-114.1 (64.9)
	★★★ [a]	9.9 (15.9)	11.7 (17.2)	15.0 (16.0)	13.4 (17.4)	9.8 (8.8)
	★★★★★	104.0 (48.8)	88.5 (60.6)	103.1 (63.3)	90.5 (67.0)	104.3 (64.0)

[a] $p < 0.01$

Table 28. Subgroup Results, Utilities, by Level of Health Confidence

		Health Confidence	
		Low Health Confidence	High Health Confidence
Attribute	**Levels**	**Utility**	**Utility**
Hours of Operation	8am-6pm Weekdays; 10am-3pm Saturday; Closed Sunday	-24.8 (50.4)	-27.1 (47.3)
	9am-9pm Weekdays; 9am-7pm Saturday; 10am-6pm Sunday	7.0 (28.7)	6.5 (29.7)
	8am-10pm 7 days/week	17.9 (41.7)	20.6 (40.0)
Friendliness/Courtesy	Sometimes	-18.5 (21.5)	-19.7 (20.3)
	Always	18.5 (21.5)	19.7 (20.3)
Communication	Sometimes	-13.8 (18.9)	-14.7 (17.8)
	Always	13.8 (18.9)	14.7 (17.8)
Pharmacist Knows Me	No	-17.7 (30.9)	-16.6 (20.7)
	Yes	17.7 (30.9)	16.6 (20.7)
Overall Quality	★	-88.8 (42.1)	-91.3 (36.2)
	★★★	12.6 (23.7)	10.6 (16.3)
	★★★★★	76.2 (46.4)	80.7 (38.7)
DDI Quality	★	-101.8 (65.3)	-112.3 (58.7)
	★★★	11.2 (20.9)	11.4 (15.1)
	★★★★★	90.6 (58.8)	100.9 (57.5)

Table 29. Subgroup Results, Attribute Importance Values, by Sex

	Sex	
	Male	**Female**
Attribute	**Mean (SD)**	**Mean (SD)**
Hours of Operation	14.1 (12.7)	13.1 (11.9)
Friendliness/Courtesy	7.3 (5.4)	6.9 (5.2)
Communication	5.4 (4.3)	5.3 (5.2)
Pharmacist Knows Me	6.1 (6.0)	6.1 (6.5)
Overall Quality	29.2 (9.6)	30.6 (9.6)
DDI Quality	38.0 (12.6)	38.1 (13.7)

Table 30. Subgroup Results, Attribute Importance Values, by Urbanicity

	Urbanicity			
	Urban	**Suburban**	**Small Town**	**Rural**
Attribute	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**
Hours of Operation	14.0 (12.0)	13.2 (12.5)	14.0 (12.8)	13.4 (11.7)
Friendliness/Courtesy	7.0 (5.0)	6.7 (4.9)	7.8 (5.9)	7.8 (6.4)
Communication	5.8 (4.7)	4.9 (4.8)	6.1 (4.5)	5.3 (5.0)
Pharmacist Knows Me[b]	6.6 (6.8)	5.3 (5.6)	6.8 (6.1)	7.1 (7.1)
Overall Quality	29.6 (10.0)	30.4 (9.6)	29.4 (9.8)	29.7 (9.0)
DDI Quality[a]	37.0 (13.7)	39.5 (12.2)	35.9 (13.1)	36.6 (14.7)

[a] $p < 0.05$; [b] $p < 0.01$

Table 31. Subgroup Results, Attribute Importance Values, by Age

	Age				
	Age 18-34	**Age 35-54**	**Age 55-64**	**Age 65-74**	**Age ≥75**
Attribute	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**
Hours of Operation	14.5 (13.8)	13.7 (11.6)	12.4 (8.8)	12.8 (12.5)	14.7 (14.4)
Friendliness/Courtesy	7.8 (7.0)	7.1 (4.8)	6.7 (5.0)	6.6 (4.3)	6.9 (4.3)
Communication	5.4 (4.5)	5.6 (5.3)	5.1 (5.8)	4.9 (3.2)	5.6 (5.3)
Pharmacist Knows Me[b]	5.9 (5.6)	6.0 (5.8)	6.0 (6.4)	6.5 (7.3)	6.1 (6.1)
Overall Quality	29.5 (10.4)	29.3 (9.7)	31.7 (8.5)	30.4 (9.6)	28.8 (9.3)
DDI Quality[a]	36.9 (13.7)	38.3 (13.1)	38.0 (13.3)	38.8 (12.3)	37.9 (14.0)

[a] $p < 0.05$; [b] $p < 0.01$

Table 32. Subgroup Results, Attribute Importance Values, by Race

	Race			
	White, Non-Hispanic	**Black, Non-Hispanic**	**Hispanic**	**Other**
Attribute	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**
Hours of Operation	13.7 (12.4)	14.3 (14.7)	11.4 (11.0)	13.1 (8.5)
Friendliness/Courtesy	7.0 (5.1)	6.8 (5.9)	8.7 (8.5)	7.5 (5.0)
Communication[a]	5.1 (4.6)	5.6 (5.0)	6.0 (5.0)	7.6 (6.9)
Pharmacist Knows Me	6.0 (6.3)	5.2 (5.4)	6.0 (3.6)	7.7 (7.7)
Overall Quality	30.1 (9.5)	29.0 (10.1)	30.4 (10.1)	29.4 (10.6)
DDI Quality	38.1 (13.3)	39.0 (12.9)	37.6 (13.9)	34.7 (11.7)

[a] $p < 0.05$

Table 33. Subgroup Results, Attribute Importance Values, by Household Income

	Annual Household Income				
	≤25,000	$25,001-$50,000	$50,001-$100,000	$100,001-$150,000	>$150,000
Attribute	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**
Hours of Operation	15.4 (13.2)	12.9 (11.2)	13.6 (12.0)	13.8 (13.3)	12.8 (12.0)
Friendliness/Courtesy	7.7 (6.4)	6.8 (5.3)	7.1 (4.7)	7.7 (6.6)	6.4 (3.7)
Communication	5.8 (4.5)	5.6 (6.2)	5.0 (4.0)	5.2 (4.4)	5.1 (4.3)
Pharmacist Knows Me	6.2 (6.3)	6.5 (6.8)	6.7 (7.0)	6.1 (6.6)	4.9 (4.3)
Overall Quality	29.3 (10.2)	30.0 (8.8)	30.0 (9.3)	29.0 (11.0)	31.2 (9.3)
DDI Quality	35.6 (13.6)	38.2 (13.7)	37.6 (13.4)	38.2 (13.2)	39.6 (11.9)

Table 34. Subgroup Results, Attribute Importance Values, by Education Level

	Highest Level of Education Attained				
	Less Than High School	High School Degree	Some College	Bachelor's Degree	At Least Some Post-Graduate
Attribute	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**
Hours of Operation	19.4 (14.0)	14.2 (11.9)	13.7 (12.6)	13.2 (12.9)	12.7 (10.7)
Friendliness/Courtesy	6.8 (3.0)	7.1 (5.1)	7.4 (6.1)	7.1 (5.4)	6.6 (3.8)
Communication	8.2 (4.6)	5.2 (4.1)	5.2 (4.4)	5.3 (5.4)	5.6 (5.2)
Pharmacist Knows Me[a]	7.9 (10.9)	7.1 (8.2)	6.5 (6.1)	5.1 (4.6)	5.9 (6.2)
Overall Quality	31.1 (12.8)	29.3 (9.3)	29.6 (9.6)	30.1 (9.6)	31.1 (9.8)
DDI Quality	26.6 (16.6)	37.2 (13.5)	37.7 (13.1)	39.2 (12.9)	38.1 (13.0)

[a] $p < 0.05$

Table 35. Subgroup Results, Attribute Importance Values, by Marital Status

	Marital Status		
	Never Married	Married	Separated/Divorced/ Widowed
Attribute	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**
Hours of Operation	13.2 (11.4)	13.8 (13.0)	13.3 (10.5)
Friendliness/Courtesy	6.8 (5.5)	7.4 (5.5)	6.2 (4.2)
Communication	5.3 (4.6)	5.3 (4.4)	5.7 (6.5)
Pharmacist Knows Me	5.1 (4.5)	6.3 (6.5)	6.7 (7.6)
Overall Quality	30.7 (9.5)	29.5 (9.6)	30.6 (9.6)
DDI Quality	38.9 (12.5)	37.8 (13.5)	37.5 (12.7)

Table 36. Subgroup Results, Attribute Importance Values, by US Census Region of Residence

	US Census Region of Residence			
	Northeast	Midwest	South	West
Attribute	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**
Hours of Operation	13.7 (11.3)	14.2 (14.0)	12.7 (11.1)	14.1 (14.2)
Friendliness/Courtesy	7.4 (6.0)	6.9 (5.4)	6.8 (4.4)	6.9 (4.6)
Communication	5.0 (4.3)	5.4 (4.9)	5.3 (5.2)	5.9 (4.7)
Pharmacist Knows Me	6.5 (6.6)	5.6 (6.1)	5.8 (5.5)	7.2 (7.9)
Overall Quality	29.7 (10.2)	30.3 (9.6)	30.4 (8.9)	28.9 (10.1)
DDI Quality	37.8 (12.5)	37.5 (13.8)	39.0 (12.9)	36.9 (14.5)

Table 37. Subgroup Results, Attribute Importance Values, by Health Literacy and Pharmacist Relationship

	Health Literacy		Pharmacist Relationship	
	Adequate	Inadequate	I Know My Pharmacist's Name	I Don't Know My Pharmacist's Name/Unsure/No Regular Pharmacist
Attribute	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**
Hours of Operation	13.5 (12.3)[b]	14.1 (12.0)[b]	13.6 (11.2)	13.5 (12.8)
Friendliness/Courtesy	7.1 (5.3)	6.9 (5.5)	7.7 (5.6)	6.8 (5.2)
Communication	5.2 (4.8)	6.5 (5.0)	5.8 (5.7)	5.1 (4.2)
Pharmacist Knows Me	5.9 (5.7)	8.7 (11.6)	6.7 (6.4)	5.7 (6.2)
Overall Quality	30.0 (9.6)	29.2 (10.1)	29.8 (9.8)	30.1 (9.5)
DDI Quality	38.2 (12.9)	34.6 (16.4)	36.4 (13.9)	38.9 (12.7)[b]

[b] $p < 0.01$

Table 38. Subgroup Results, Attribute Importance Values, by Self-Perceived Health Status

	Self-Perceived Health Status				
	Excellent	Very Good	Good	Fair	Poor
Attribute	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**
Hours of Operation	12.8 (9.9)	12.6 (12.8)	13.8 (12.4)	16.5 (13.2)	16.5 (11.0)
Friendliness/Courtesy	7.2 (4.9)	6.7 (5.0)	7.6 (5.9)	6.7 (5.5)	6.8 (4.8)
Communication	5.3 (5.2)	5.3 (5.1)	5.5 (4.6)	5.2 (4.1)	4.8 (3.3)
Pharmacist Knows Me[b]	6.5 (6.4)	5.0 (4.8)	7.0 (7.1)	6.4 (5.9)	7.7 (11.7)
Overall Quality	29.0 (9.7)	30.8 (9.3)	29.6 (9.8)	30.0 (10.0)	28.4 (9.5)
DDI Quality[a]	39.2 (12.7)	39.5 (12.7)	36.6 (13.4)	35.3 (14.0)	35.7 (15.0)

[a] $p < 0.05$; [b] $p < 0.01$

Table 39. Subgroup Results, Attribute Importance Values, by Number of Chronic Medications, Self

	Number of Chronic Medications, Self				
	None	1-3	4-7	8-11	≥11
Attribute	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**
Hours of Operation	14.0 (12.6)	13.1 (12.0)	14.7 (13.0)	13.0 (14.4)	11.0 (6.1)
Friendliness/Courtesy	7.7 (6.8)	6.8 (4.8)	7.4 (5.7)	6.9 (4.8)	7.0 (5.5)
Communication	5.3 (4.4)	5.3 (5.0)	5.8 (5.0)	4.3 (2.9)	4.3 (3.6)
Pharmacist Knows Me	5.5 (4.8)	6.1 (6.0)	6.9 (7.6)	5.8 (8.2)	3.6 (3.0)
Overall Quality	29.4 (10.3)	30.2 (9.2)	29.6 (10.2)	30.4 (9.6)	31.6 (9.3)
DDI Quality	38.0 (13.2)	38.5 (12.9)	35.6 (14.2)	39.6 (13.2)	42.4 (7.1)

Table 40. Subgroup Results, Attribute Importance Values, by Number of Chronic Medications, Care Recipient(s)

	Number of Chronic Medications, Care Recipient(s)				
	None	1-3	4-7	8-11	≥11
Attribute	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**
Hours of Operation	14.3 (14.1)	12.7 (10.1)	13.3 (11.7)	10.7 (11.4)	15.4 (13.0)
Friendliness/Courtesy	6.9 (5.6)	7.3 (5.0)	7.0 (5.6)	7.6 (5.5)	7.3 (4.8)
Communication	5.2 (4.1)	5.2 (5.3)	5.7 (4.4)	6.1 (6.2)	6.3 (6.5)
Pharmacist Knows Me	5.7 (5.7)	6.6 (7.3)	5.9 (5.8)	6.1 (4.6)	5.7 (5.1)
Overall Quality	29.2 (9.8)	30.6 (9.1)	30.6 (10.2)	31.1 (10.8)	29.2 (9.8)
DDI Quality	38.8 (13.0)	37.6 (13.3)	37.4 (13.2)	38.4 (14.2)	36.1 (14.0)

Table 41. Subgroup Results, Attribute Importance Values, by Pharmacy Patronage

	Pharmacy Patronage				
	Chain	**Independent**	**Grocery**	**Mass Merchandiser**	**Mail Order**
Attribute	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**
Hours of Operation	14.6 (13.6)	12.7 (9.1)	12.5 (11.9)	12.8 (11.1)	11.4 (8.8)
Friendliness/Courtesy	7.2 (6.0)	7.1 (5.2)	6.4 (4.3)	7.4 (4.5)	6.2 (3.3)
Communication[b]	4.9 (4.0)	6.1 (5.2)	4.8 (4.5)	6.5 (6.4)	4.9 (4.7)
Pharmacist Knows Me	5.8 (6.2)	7.3 (6.5)	6.2 (5.8)	6.3 (6.2)	6.2 (7.7)
Overall Quality	29.6 (10.4)	31.6 (8.5)	29.8 (8.4)	29.8 (9.3)	31.2 (8.3)
DDI Quality	38.0 (12.9)	35.2 (13.7)	40.3 (12.5)	37.2 (14.3)	40.0 (12.5)

[b] $p < 0.01$

Table 42. Subgroup Results, Attribute Importance Values, by Health Confidence

	Health Confidence	
	Low Health Confidence	**High Health Confidence**
Attribute	**Mean (SD)**	**Mean (SD)**
Hours of Operation	14.4 (11.9)	13.4 (12.3)
Friendliness/Courtesy	7.0 (5.4)	7.1 (5.3)
Communication	5.4 (4.7)	5.3 (4.8)
Pharmacist Knows Me[a]	7.3 (8.2)	5.9 (5.8)
Overall Quality	30.0 (9.9)	30.0 (9.6)
DDI Quality	35.9 (13.5)	38.4 (13.1)

[a] $p < 0.05$

4.4. Segmentation Analysis Results

The Consistent Aikaike Information Criterion (CAIC) values were compared between latent class solutions with two to five groups. The CAIC was lower for the three-class solution (5698.589) than for the solutions with two (5706.163), four (5741.502), and five solutions (5806.839). All of these CAIC values were lower than that of the CL analysis (6362.10), suggesting that respondent preferences for community pharmacy attributes were indeed heterogeneous. The three-class solution, selected based on its CAIC value, converged after 39 iterations. Furthermore, the average maximum membership probability of the three-class solution was 0.9445, similar to that of the two class (0.9460), and higher than that of the four (0.8092) and five (0.7596) class solutions.

The utility values for each of the three identified classes are presented in Table 40. Based on the revealed preferences of the respondents in each class, the three classes were termed the "Quality Class," the "Relationship Class," and the "Convenience Class." The probability of respondents belonging to the Quality Class was highest (67.6%), followed by the Relationship Class (28.3%), and the Convenience Class (4.2%). The attribute importance values (AIV)and relative importance of each attribute within each class are presented in Table 41 and Figures 4-5.

The Quality Class was defined primarily by strong expressed preferences for the DDI (utility: 129.9, AIV: 45.5) and the overall (mean utility: 95.0, mean AIV: 33.3) quality measures. Differences in these two attributes combined could therefore account for nearly 80% of the difference in the utility of two pharmacy alternatives. The mean AIV of hours of operation, the third most strongly preferred attribute among members of the Quality Class), was only 7.9. In the Relationship Class, the quality measures were still the most strongly

preferred attributes, with AIVs of 24.7 for overall quality and 22.6 for DDI-specific quality. Notably, although these quality attributes were the most important attributes relative to the other attributes, they accounted for only 48% of the difference in the utility of two pharmacy alternatives, compared to the 78% seen in the Quality Class. The AIVs for friendliness/courtesy, communication, and pharmacist effort to get to know their patients (10.8, 9.0, and 11.5, respectively) were two to three times as high as those seen in the Convenience and Quality Classes. Finally, the smallest class, the convenience class, was distinct in its high utility ascribed to the pharmacy hours of operation, for which the AIV exceeded 50% (50.3). In that class, the quality metrics accounted for only a third of utility differences (33.7).

Significant differences in utility values were seen between at least two of the groups for all six attributes. The utilities of pharmacist effort to get to know their patients and friendliness/courtesy were significantly higher in the Relationship Class than the other two segments. The Quality Class significantly differed from the other two class in having a lower utility associated with pharmacist communication and higher utilities ascribed to five star ratings on either quality metric. Finally, the differences in the utility values for the most extended pharmacy hours were significant in the pairwise comparisons between the Convenience Class and the other two classes.

Though the four-class solution was not selected due to its higher CAIC and lower maximum membership probability compared to the three-class solution, the difference between the solutions is of interest. The four-class solution resulted in similar probabilities of membership in a Relationship Class (26.4%), Service Class (3.9%), or Quality-Focused Class (69.7%); the difference between the three and four group solutions was that the

Quality Class seen in the three-class solution was separated in the four-class solution into a Drug-Drug Interaction (DDI) -Specific Quality Class (37.0%) and an Overall Quality Class (32.7%). In the Drug-Drug Interaction (DDI) -Specific Quality Class, the attribute importance value for the DDI quality measure was much higher (53.9) than that for the Overall quality measure (16.0). The strength of these preferences was reversed (26.7 vs. 51.0) in the Overall Quality Class. While this was a weaker class solution than that with three classes, it still suggests that underlying preference heterogeneity may exist within the Quality Class.

Among the demographic and health characteristics gathered, only knowing one's pharmacist's name was significantly associated with class membership (Table 42), with those assigned to the Relationship Class were more likely to know their pharmacist's name (42.9) than those in the Convenience (29.0) or Quality (32.67) Classes ($p = 0.026$). The ability to detect additional, significant demographic differences between segments was likely limited by the small size of the Convenience Class. Though not significant, members of the Relationship Class tended to be more urban (31.58% vs. 25.8% and 22.0% in the Convenience and Quality Classes, respectively) ($p = 0.051$) and less confident in their ability to manage their health conditions (prevalence of low health confidence: 20% vs. 12.9% and 13.4%) ($p = 0.074$) than those in other segments. Additionally, women comprised 59.0% of those in the Quality Class but only 48.4% and 49.8% in the Convenience and Relationship Classes, respectively ($p = 0.054$).

Table 43. Main Latent Class Analysis Results, Utilities, by Segment

		Rescaled Utilities (Standard Error)		
		Segment 1	**Segment 2**	**Segment 3**
Attribute	**Levels**	**Relationship Class**	**Convenience Class**	**Quality Class**
Hours of Operation	8am-6pm Weekdays; 10am-3pm Saturday; Closed Sunday	-47.75 (10.68)	-206.85 (40.99)	-15.65 (4.15)
	9am-9pm Weekdays; 9am-7pm Saturday; 10am-6pm Sunday	43.25 (10.69)	34.79 (11.63)	-2.42 (4.31)
	8am-10pm 7 days/week	4.50 (10.74)	172.06 (36.14)	18.06 (4.15)
Friendliness/Courtesy	Sometimes	-39.27(6.58)	0.40 (8.07)	-15.18 (2.49)
	Always	39.27 (6.58)	-0.40 (8.07)	15.18 (2.49)
Communication	Sometimes	-35.85 (6.56)	-11.60 (7.34)	-11.09 (2.70)
	Always	35.85 (6.56)	11.60 (7.34)	11.09 (2.70)
Pharmacist Knows Me	No	-49.14 (6.57)	-13.71 (6.91)	-11.63 (2.53)
	Yes	49.14 (6.57)	13.71 (6.91)	11.63 (2.53)
Overall Quality	★	-101.36 (14.48)	-54.50 (24.21)	-113.00 (5.83)
	★★★	20.37 (10.74)	-14.70 (13.30)	17.37 (4.80)
	★★★★★	80.99 (14.53)	69.20 (28.82)	95.63 (4.69)
DDI Quality	★	-41.69 (14.34)	-19.04 (16.05)	-150.93 (5.13)
	★★★	5.24 (11.04)	-7.90 (12.07)	20.00 (4.81)
	★★★★★	36.44 (14.14)	26.94 (16.84)	130.93 (5.13)

Table 44. Latent Class Analysis Results, Attribute Importance Values, by Segment

	Segment 1		Segment 2		Segment 3	
	Relationship Class		Convenience Class		Quality Class	
Attribute	**Rank**	**Mean**	**Rank**	**Mean**	**Rank**	**Mean**
Hours of Operation	2	15.17	1	63.15	3	5.62
Friendliness/Courtesy	4	13.09	6	0.13	4	5.06
Communication	6	11.95	5	3.87	6	3.70
Pharmacist Knows Me	3	16.38	4	4.57	5	3.88
Overall Quality	1	30.39	2	20.62	2	34.77
DDI Quality	5	13.02	3	7.66	1	46.98

Figure 4. Latent Class Analysis Results, Attribute Importance Scores, by Segment

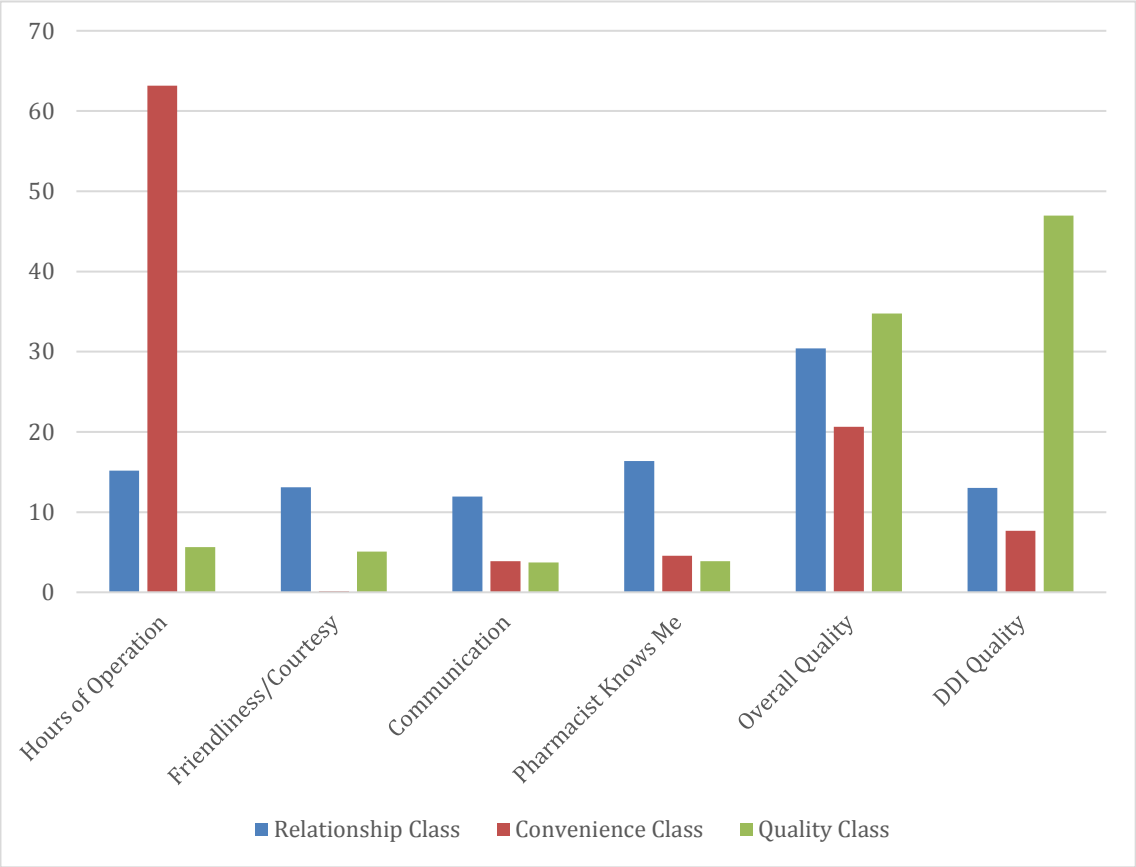


Figure 5. Latent Class Analysis Results, Attribute Importance Scores, by Segment

Table 45. Sociodemographic and Health Characteristics, by Segment

	Number (%), by Segment		
	Relationship Class	**Convenience Class**	**Quality Class**
Size	210 (28.3)	31 (4.2)	500 (67.5)
Sociodemographic and Health Characteristics			
Male Sex	104 (50.2)	16 (51.6)	205 (41.2)
Age			
18-34 years	48 (23.1)	10 (32.3)	119 (23.9)
35-44 years	52 (25.0)	4 (12.9)	108 (21.7)
45-54 years	41 (19.7)	2 (6.5)	94 (18.9)
55-64 years	44 (21.2)	9 (29.0)	116 (23.3)
≥ 65 years	23 (11.1)	6 (19.4)	61 (12.3)
Race			
Non-Hispanic, White	166 (80.2)	27 (87.1)	415 (84.0)
Non-Hispanic, Black	14 (6.8)	3 (9.7)	37 (7.5)
Hispanic	11 (5.3)	1 (3.2)	22 (4.5)
Other	16 (7.7)	0 (0)	20 (4.1)
Household Annual Income			
<$25,000	39 (18.9)	4 (12.9)	55 (11.0)
$25,000-$49,999	43 (20.9)	6 (19.4)	127 (25.5)
$50,000-$74,999	49(23.8)	7 (22.6)	114 (22.9)
$75,000-$99,999	36 (17.5)	9 (29.0)	87 (17.5)
≥$100,0009	39 (18.9)	6 (16.1)	115 (23.1)
Highest Level of Education			
Less Than High School/GED	4 (1.9)	1 (3.2)	4 (0.8)
High School Degree	47 (22.6)	5 (16.1)	88 (17.7)
At Least Some College	69 (33.2)	13 (41.9)	156 (31.5)
Bachelor's Degree	50 (24.0)	8 (25.8)	161 (32.5)
At Least Some Graduate School	38 (18.3)	4 (12.9)	87 (17.5)
Marital Status			
Never Married	38 (18.3)	6 (19.4)	117 (23.7)
Married	135 (64.9)	23 (74.2)	305 (61.7)
Separated/Divorced/Widowed	35 (16.8)	2 (6.5)	72 (14.6)

Table 45. Sociodemographic and Health Characteristics, by Segment, continued

	Number (%), by Segment		
	Relationship Class	**Convenience Class**	**Quality Class**
US Census Region of Residence			
Northeast	66 (31.7)	7 (22.6)	144 (29.0)
Midwest	48 (23.1)	11 (35.5)	127 (25.6)
South	66 (31.7)	8 (25.8)	176 (35.4)
West	28 (13.5)	5 (16.1)	50 (10.1)
Urbanicity			
Urban	66 (31.6)	8 (25.8)	110 (22.1)
Suburban	79 (37.8)	14 (45.2)	255 (51.2)
Small Town	26 (12.4)	4 (12.9)	49 (9.8)
Rural	38 (18.2)	5 (16.1)	84 (16.9)
Health Literacy			
Adequate	193 (92.3)	30 (96.8)	470 (94.4)
Self-Perceived Health Status			
Excellent	31 (14.8)	5 (16.1)	84 (16.9)
Very Good	66 (31.6)	11 (35.5)	208 (41.8)
Good	76 (36.4)	11 (35.5)	143 (28.7)
Fair	29 (13.9)	3 (9.7)	52 (10.4)
Poor	7 (3.4)	1 (3.2)	11 (2.2)
Number of Chronic Medications, Self	2.7 (2.3)	2.5 (2.1)	2.8 (3.7)
Number of Chronic Medications, Care Recipients	2.2 (3.5)	1.7 (2.9)	2.0 (3.6)
Type of Pharmacy			
Chain	102 (49.3)	22 (71.0)	255 (51.2)
Independent	29 (14.0)	2 (6.5)	50 (10.0)
Grocery	29(14.0)	3 (9.7)	74 (14.9)
Mass Merchandiser	38 (18.4)	2 (6.5)	86 (17.3)
Mail Order	9 (4.4)	2 (6.5)	33 (6.6)
I Know My Pharmacist's Name			
Yes[a]	90 (42.9)	9 (29.0)	164 (32.8)
Health Confidence			
Mean (SD)	8.3 (2.3)	8.8 (2.2)	8.6 (1.9)
High (≥7)	168 (80.0)	27 (87.1)	433 (86.6)

[a] $p < 0.05$

Chapter 5: Discussion

5.1 Survey Responses and National Representativeness

The Qualtrics Panel Study Population

The demographics and health characteristics of the sample yielded by the Qualtrics survey panel for this study are relevant to an ongoing discussion about the use of easily and inexpensively accessible online study panels for research purposes. Opt-out study panels generated through random sampling may provide nationally representative samples but, at a cost of up to ten times that of opt-in panels, are often cost prohibitive for academic researchers. Comparisons between the participants in this survey and the US population as a whole may provide insights that inform the use of opt-in panels for healthcare research.

Compared to the US population, the respondents of this survey were more commonly female, middle-aged, and residents of the Northeast. Participants also reported, on average, higher levels of education and annual household income than the US population as a whole. Furthermore, the prevalence of inadequate health literacy in the study population, 6.1%, was considerably lower than the pooled estimate of a 26% prevalence of limited health literacy in the US.[263] Older age, black race, and lower levels of education are strongly associated with low health literacy, suggesting that the demographics of the study population likely played a significant role in the low level of inadequate health literacy observed in this survey. [263] However, the distribution of self-reported health status[264] and the proportions of respondents patronizing chain and independent pharmacies[265] were similar to reports from nationally representative samples.

Finally, the proportion of participants who reported any use of a chronic medication (85.1%) exceeded that reported in a study of nationally representative data from the

National Health and Nutrition Examination Study (NHANES) (59%)[250] and in an analysis of population-based drug prescription records in Minnesota (68%).[266] This difference is likely a function of the screening question used in this study, "Have you filled a prescription at a pharmacy, other than a mail-order pharmacy, within the last 12 months," which likely screened out many of the lowest drug utilizers. The prevalence of polypharmacy, as defined by the use of at least 5 prescription drugs, in this study (19.3%) was consistent with that in the NHANES (15%)[250] and Minnesota studies (21.2%). [266]

The generalizability and external validity of results obtained by opt-in and crowdsourced panels, particularly relative to nationally representative panels, have been explored by researchers in numerous social science fields. A group of researchers compared the average treatment effects of 20 social science experiments that were conducted twice, once among a nationally representative GfK sample and again with Amazon's MTurk participants.[267] They reported that the treatment effects in the two populations showed "considerable similarity."[267] Participants of MTurk or other opt-in panels have also responded similarly to those recruited through nationally representative samples or in-person convenience samples in other sociology,[268,269] psychology[270–272], and political science[273] studies. However, several studies of internet behavior[274] and political preferences[275,276] have reported divergence between MTurk and census-representative web panel participants.

Studies comparing the health beliefs, behaviors, and preferences reported by opt-in panel samples to those of nationally representative samples are much more limited. While this study does not compare the preferences of multiple samples, it does report the health characteristics, including chronic medication use, pharmacy patronage, and health literacy

and confidence, of an opt-in Qualtrics panel. The distribution of most health characteristics surveyed closely mirrored patterns obtained in nationally representative studies, though the low prevalence of health literacy among panel participants was notable. Together, these findings suggest that the Qualtrics panel may be a relatively inexpensive method for recruiting a study panel with nationally representative patterns of self-reported health, pharmacy patronage, and medication use. However, research into the complex causes and effects of health literacy[277] may require a different source of study participants or the use of more restrictive inclusion criteria and quotas. Future research comparing the community pharmacy preferences of this or other opt-in survey panel participants (e.g. MTurk) to nationally representative samples could further inform the generalizability and validity of using these samples for pharmacy research.

The Quality of Survey Responses

The quality of the survey responses, as assessed by average time per task, the proportion of participants failing the dominant scenario, and the number of respondents always selecting the left or right alternatives, was acceptable and consistent with previously reported findings. Two studies assessing choice behavior in discrete choice experiments reported that 0.0%-13.3% of participants in a series of experiments always selected a right or left alternative, consistent with the 0.2%-1.3% reported in this study.[199,201] Additionally, the median response time per choice task was consistent with those reported in the literature.[278–280] The proportion of patients failing the dominant scenario, 5.6%, was consistent with the 5%-10%[154,281–284] commonly reported in healthcare-related discrete choice experiments. The current ISPOR guidelines for conjoint analysis applications in health do not recommend a specific mode of administration for

DCEs,[166]but the use of computers for DCE administration has increased substantially over the last 20 years.[213] The high quality of survey responses gathered in this study provides evidence supporting the acceptability of online survey administration for DCEs.

5.2 Demographics and Service Utilization by Current Pharmacy Patronage

The demographic and health characteristics of respondents varied between patrons of different pharmacy settings and differed somewhat from past studies on pharmacy patronage. The majority of patients under the age of 45 years patronized chain pharmacies, but these patients were also overrepresented in the group of patients reporting use of independent pharmacies. In contrast, Franic et al. reported in 2008 that the average age of patrons of independent and chain pharmacy settings was nine to twelve years higher than that of grocery and discount store patrons.[12] The increased use of mail order pharmacies with age reported in this study is, however, consistent with past reports of high utilization of mail order pharmacies among those over 65 years of age,[104] often due to insurance plan requirements or price incentives. [104,106] Also consistent with previously published literature was this study's finding that the likelihood of mail-order pharmacy use increased with the number of prescription drugs taken.[106]

It is not immediately evident why chain and independent pharmacy use was higher among the younger participants in this study than has been reported in past studies. While independent and chain pharmacy patrons in this study prioritized pharmacist-patient relationships and extended hours, respectively, younger respondents did not consistently ascribe stronger preferences to these attributes than their older counterparts. Few studies have specifically examined the pharmacy preferences of the millennial generation. A recent Accenture study on millennial shoppers found that, contrary to popular perceptions that

millennials prefer online shopping, 91% prefer brick-and-mortar shopping for drugstores, a higher proportion than for consumer electronics (68%), discount stores (83%), and department stores (84%).[285] Millennials commonly distrust big business and favor niche and local retailers,[286,287] perhaps contributing to their patronage of independent pharmacies relative to their non-millennial counterparts. At the same time, the convenience of non-pharmacy purchases at chain pharmacies and rewards programs have been cited as drivers for millennial patronage.[288]Given that the vast majority of younger participants in this study reported use of chronic medications, future research is warranted to more comprehensively explore the motivations that are driving millennial shoppers to chain and independent pharmacies.

Patient pharmacy experiences and service utilization also different by pharmacy setting. Independent pharmacy patrons were nearly twice as likely as those who patronize other types of pharmacies to report that they knew their pharmacist's name. Similarly, in the 2008 Franic study of determinant attributes during pharmacy selection, patients at independent pharmacies were more likely to know their pharmacists' names than patients at grocery, chain, and discount store pharmacies.[12] These results suggest that patient-pharmacist relationships may be more common in independent pharmacy settings, a finding echoed in industry surveys and reports. A 2015 J.D. Power survey reported that patient satisfaction with and loyalty to their pharmacy was strongly related to speaking with a pharmacist, and the pharmacies with the highest overall satisfaction ratings were locally owned chains, including Good Neighbor Pharmacy, Health Mart, and The Medicine Shoppe Pharmacy.[289] Articles by Consumer Reports and Pharmacy Times have also stressed the strength of pharmacist-patient relationships at independent pharmacies.[290,291]

The proportions of patients using a number of pharmacy services, including appointment-based medication synchronization (ABMS), adherence packaging, and home delivery were also higher among patrons of independent pharmacies than other types of brick and mortar pharmacies. Both ABMS[292,293] and adherence packaging[294] are associated with increased medication adherence, as is having a pharmacist who "knows you pretty well."[295] While numerous studies have examined the effect of mail order pharmacy use on medication adherence,[296,297] few studies have specifically compared medication adherence across brick-and-mortar pharmacy types. Future research is needed to explore the impact of pharmacy patronage and the utilization of different combinations of pharmacy services on adherence. Such research is particularly pertinent given the growth of PBM-defined pharmacy networks and concerns about the systematic exclusion of independent pharmacies from these networks.

Other pharmacy services, included automatic refill programs, technology-based reminders, and smartphone apps were more commonly utilized by patrons of chain pharmacies than those patronizing other types of pharmacies. These differences were likely driven by the overrepresentation of millennials among chain pharmacy patrons. While not statistically significant, millennials were more likely than their older counterparts to report use of technology-based reminders (42% vs. 36%) and smartphone apps (14% vs. 9%). did not exceed that of older patrons. In fact, the use of smart phone apps was higher (13.6%) among older respondents than millennials (9.5%), though this difference was not statistically significant. In the discrete choice experiment, millennials, who have been termed the "convenience generation,"[298] commonly patronized chain pharmacies but did not exhibit strong preferences for extended pharmacy hours, a proxy

for convenience. This finding suggests that younger patients may feel that technology-based programs do more to increase pharmacy-related convenience more than extended hours.

Finally, the similar levels of automatic refill utilization among patrons of grocery, chain, and mail order pharmacies was notable given differences in pharmacy practices surrounding automatic refills. Mail order pharmacies, either in accordance with internal policies or the policies of plan sponsors, often provide opt-out framing for automatic refill systems, requiring patients to actively decide against the service. In contrast, opt-in systems are generally used to enroll patients in automatic refill programs at brick-and-mortar pharmacies. Given the documented impact of opt-out defaults on enrollment behavior,[299,300] this finding may warrant additional research surrounding the current choice architecture frameworks for pharmacy services at different pharmacy types and their impact on service utilization and adherence.

5.3 Patient Preferences for Quality-Related Attributes

The participants in this discrete choice experiment exhibited strong preferences for quality-related attributes during pharmacy selection. This finding was somewhat contrary to expectations based on published pharmacy quality-centered focus groups and the feedback received in the pilot testing of this DCE. Specifically, participants in focus groups conducted by Shiyanbola et al. generally did not define pharmacy quality in terms of outcomes[14] and were reluctant to use quality information to switch pharmacies.[15] Similarly, in pilot testing, participants repeatedly stressed that their expectation of a pharmacy was to receive the correct medication in a prompt and convenient manner.

Several factors may have contributed to the high attribute importance values of the quality metrics used in this study: the scenario in which participants were asked to make their decisions, the use of a quality metric that may have been more closely aligned with participant expectations for community pharmacists, and the framing of the drug-drug interaction quality metric. These factors are discussed in more detail below.

The Scenario Presented to DCE Participants

In this discrete choice experiment, participants were asked to consider the scenario in which they had moved to a new town and needed to select a new pharmacy. This scenario was used to control for the =status quo bias previously observed during pharmacy selection.[15,170] The absence of attributes related to subjective personal experiences or the recommendations of friends and family may have increased the strength of patient preferences for the objective quality attributes.

Consistency Between Patient Preferences and Expectations for Community Pharmacies

As discussed in the literature review above, several theories posited in marketing literature emphasize the complex interplay between preferences, expectations, and satisfaction.[110–112] Consistent with these theories, the patient preferences expressed in this discrete choice experiment are likely closely associated with their expectations for community pharmacists. Past studies have demonstrated that patient expectations for community pharmacies are primarily product-focused and centered on dispensing roles. Patients are far more familiar with the dispensing role of pharmacists than more clinical roles[13] and generally do not expect that pharmacists counsel them on their medications[136]

or be involved in medication management.[28] Furthermore, when dispensing prescriptions, pharmacists are expected to protect patient safety by ensuring that medications are accurately filled. When asked about whether he or she would use quality information to select a pharmacy, one focus group participant noted, "if it's something kind of serious like they've been dispensing the wrong drugs or something, then I would definitely go to a different one."[15] Another participant echoed that sentiment, saying, "if they are giving the wrong prescriptions, I don't want to take that chance with me."[15] In another series of focus groups, participants said they wanted pharmacists to "serve me right" and "check to see if there's any drug interactions with other things I'm taking."[28] Taken together, these findings suggest that the pharmacist's role is primarily seen as one that promotes the *safety* of medication therapy rather than its *effectiveness*.

Many of the PQA quality metrics studied in past focus groups,[14,15] including those focused on medication use, dosing, and adherence, reflect pharmacists' involvement in improving the therapeutic effectiveness of patients' medication regimens. However, the role presented to patients through the specific quality metric used in this study – that pharmacists screen for drug-drug interactions – predominately reflects pharmacist involvement in the safe delivery of medication therapy. The strong preferences for quality metrics seen in this DCE may therefore reflect congruence between the DDI-specific quality metric and patient expectations that pharmacists ensure the safety, but not the effectiveness, of their medications.

The interpretation that the strong observed patient preferences for high quality pharmacies reflect limited expectations for pharmacist roles tampers the potentially over-optimistic interpretation of this study's results as validation that patients recognize the

positive contributions of pharmacists to pharmacotherapy management. That is, it is unlikely that patients who selected the higher quality pharmacies in this DCE made their selections based on a perception that higher-quality pharmacies are associated with improved pharmacotherapy management and health outcomes. Rather, patients likely perceived higher quality pharmacies to be those that improve patient safety. Educational efforts that inform patients about the full scope of pharmacist expertise and scope of practice should continue, perhaps drawing upon patient expectations that pharmacists promote patient safety by presenting evidence of the association between pharmacist participation on the healthcare team and reductions in long-term harms associated with chronic conditions.[301,302]

Risk Aversion and The Loss Framing of the DDI Quality Metric

The strong patient preferences for the DDI quality metric in this study may also reflect the wording of this attribute and the aversions to risk and loss that have been well documented in behavioral economics and social psychology.[303] Specifically, loss aversion is defined as an emotional response or decision heuristic that occurs when the decision-maker is more sensitive to a loss than to the equivalent gain.[303] Consequently, decision-makers are as much as two times more likely to select an alternative that will avoid a loss than will create a gain.[304] Sensitivity to loss may be a consequence of systematically underestimating one's ability to rationalize loss while overestimating the future time spent dwelling on that loss.[303]

The DDI quality metric used in this study was phrased using a loss framework, "The pharmacy ensured that there were no patients who were dispensed two medications that

could cause harm when taken together."[15] Specifically, this wording frames the metric as a loss (i.e., patients at low quality pharmacies may experience harm) rather than as a gain (i.e. patients at high quality pharmacies may experience improved health). A review of loss framing versus gain framing in healthcare decision-making reported 3likely because loss framing triggers the large behavioral response associated with loss aversion.[304] Furthermore, loss-framed metrics on mock report cards were more important to patients in a study on health plan selection than gain-framed metrics.[305] Reframing the DDI metric in a more gain-framed manner (e.g., "the pharmacy ensured that patients on multiple medications only took those drugs that are safe and effective when taken together") may have decreased the perceived importance of the measure.

The risk aversion explanation for the strength of observed participant preferences for the DDI quality metric in this DCE may offer insight into how to effectively promote patient use of quality information during healthcare decision-making by altering the presentation of quality data. Loss-framed quality metrics may resonate more strongly with patients and therefore be more likely to be prioritized during provider and facility selection. Future studies can, and should, explore the impact of loss and gain framing on patient preferences for pharmacy and healthcare quality information to gain a better understanding of how changes in the presentation of quality information may promote its use among patients during real-world decision-making.

5.4 Patient Preferences for Non-Quality Attributes

Although several past studies reported that patients see value in friendly, relationship-oriented pharmacies and pharmacists,[12,13,28] the utility values for attributes related to functional quality in this study were low relative to those of the technical quality metrics. Several factors may have contributed to this finding. First, as previously discussed, patient preferences for the technical quality metrics were high in this study. Given that preferences for attributes in discrete choice experiments are, by definition, relative to one another, strong preferences for some attributes necessarily require that preferences for other attributes be relatively weak. Thus, obtaining relatively weak preferences for functional quality-related attributes does not necessarily mean that participants have absolutely weak preferences for pharmacist friendliness and communication. If the relatively low utilities for these functional quality-related attributes do indeed reflect low absolute preferences, this finding may reflect the role of functional quality as a "deal breaker" rather than a "deal maker" and/or limited patient expectations for pharmacists outside of safe dispensing.

The Kano Model of Customer Satisfaction posits that the most basic of customer needs and expectations for a service may be regarded as prerequisites such that if met, they are taken for granted, but if not met, will be deal-breakers for a customer.[306] For example, when asked about grocery store preferences, one focus group participant remarked, "it works in reverse. I won't come to a store for good assistants, but poor service/bad assistants will mean that I won't go there."[102] The relatively weak utilities for the attributes related to functional quality in this study may reflect patient perceptions that pharmacy customer service is a deal-breaker rather than a deal-maker. In focus groups conducted by Shiyanbola, Mott, and Croes, a participant stated, "It [choice of pharmacy] has

a lot to do with that [pharmacy staff], because the first one that I was going to, to get my prescriptions, it was because of convenience. But then the staff wasn't as friendly and they didn't ask you questions, and then somebody recommended someplace else but it was inconvenient. But it turned out to be worth the inconvenience."[28] In a broader study of customer switching, service encounter failures, including encounters with uncaring, impolite, or unresponsive employees, were second only to core service failures – mistakes, billing errors, and severe catastrophes – as the reason for service switching.[307] Taken together, these findings suggest that pharmacy resources dedicated to customer service may, for many pharmacies, be most efficiently allocated to avoiding service mistakes rather than providing service far above patient expectations.

Finally, the relatively weak preferences for relationship- and communication-oriented attributes seen in this DCE may reflect limited patient expectations for pharmacists outside of safe dispensing. As previously discussed, patient expectations for pharmacists are predominately dispensing-based,[13,28] and few patients expect that pharmacists show an interest in working with patients to meet their healthcare needs[135] or provide counseling on a medication's indication.[136] Patients who do not expect pharmacists to be friendly, communicate well, or show a willingness to get to know them would be unlikely to have strong preferences for pharmacies scoring well on these attributes in the DCE, resulting in the low attribute importance values found in this study.

The alignment of patient expectations for healthcare providers and their relative preferences for those providers' technical or interpersonal skills has been previously documented. In a study of patient preferences for physicians, the relative importance that patients placed on interpersonal communication-related factors and clinical competence-

related attributes was different for obstetrician-gynecologists (OBGYNs) and family physicians than for surgeons.[86] Study participants reported that expertise was equally as important as or more important than interpersonal communication skills and bedside manner for surgeons,[86] a finding echoed in two other studies of patient preferences for surgeons.[87,88] In contrast, communication factors, including 'listens to me,' 'explains things clearly,' 'respectful,' 'easy to talk to,' and 'caring,' were rated more highly than expertise when patients were considering OBGYN and family physicians.[86]

In conclusion, the low preferences for non-quality attributes in this study may provide further evidence that patients perceive the role of a pharmacist as primarily focused on accurately performing technical, episodic care (i.e. dispensing) rather than the type of ongoing, relationship-centered care they expect of primary care physicians. However, ongoing, patient-centered alliances between patients and pharmacists have consistently been associated with improved adherence[308] and self-efficacy.[309,310] Continued efforts may therefore be required to promote the role of the pharmacist as a long-term partner in the management of chronic conditions.

5.5 Demographic Differences in Community Pharmacy Preferences

Several demographic differences in community pharmacy preferences were revealed in this discrete choice experiment. First, the utility values for five stars on both the overall quality and drug-drug interaction-specific quality metrics were higher among women than men. The existing literature on gender differences in the relative importance of technical and function quality in healthcare is limited. One study on consumer trust in physician quality information reported that men had higher levels of trust in expert sources of information about healthcare providers than their female counterparts.[73] Another reported that few women prioritize

quality metrics when selecting a hospital for labor and delivery.[311] The higher importance ascribed to quality metrics among the women in this study may reflect their higher degree of risk aversion.[312] Notably, however, the overall attribute importance value for the quality metrics were not significantly different between men and women. Additionally, the utility ascribed to a three-star rating was higher among men, though this difference was not statistically significant. These findings suggest that both men and women prioritized quality during pharmacy selection but that men were more likely than women to perceive three stars as adequate. Future research that gathers qualitative information on gender differences in the interpretation of the quality metrics and assesses patient preferences for gain-framed quality metrics would provide additional insights on the gender differences observed in this experiment.

The utility values obtained in this discrete choice experiment did not vary by age. This finding was unexpected given consistent reports that younger patients better understand quality data.[58,63,64] Past literature also suggests that older patients ascribe more value to the communication skills of physicians[86] and less value to the convenience of grocery stores than their younger counterparts.[101] The lack of age differences in the utility values obtained in this study may reflect the competing effects of age and education on patient preferences for healthcare providers. Higher education is associated with improved comprehension of quality information,[70] increased trust in institutional sources of information,[73] and decreased importance ascribed to communication-related attributes when selecting a physician.[86] The older participants (≥65 years) in this study were highly educated; a significantly higher proportion of older adults had at least some graduate education (26.7%) than those aged 55-64 years (14.8%), 45-54 years (11.0%), 35-44 years

(22.7%), and 18-34 years (15.8%). They were also less likely (18.9%) than those aged 55-64 (24.9%) and 45-54 (24.1%) to report a high school education or less. These differences in educational attainment may have confounded the effect of age on quality metric comprehension and preferences during healthcare provider selection.

Patient preferences for pharmacy attributes differed by urbanicity. Specifically, the utilities of the friendliness/courtesy and patient-pharmacist relationship attributes were highest among small town and rural respondents, consistent with past reports patients living in rural areas maintain high levels of pharmacy loyalty because of established personal relationships with their pharmacists.[15] These findings add to the discussion of dual relationships with patients and overlapping roles for clinicians as community members as notable aspects of healthcare provision in rural settings.[313–315]

The utility values for friendliness/courtesy, pharmacist effort to establish a relationship, and communication were higher among survey respondents who had an existing relationship with a pharmacist, as indicated by responding "yes" to the statement "I know my pharmacist's name," than those who did not. The directionality of this association cannot be determined from the data. That is, patients who prioritize communication and relationships may be more likely to know their pharmacist's name because they either choose a relationship-oriented pharmacy or initiate a relationship with the pharmacist. Conversely, patients who know their pharmacist's name may be satisfied with this relationship or feel that it adds to the quality of their care and therefore more strongly prefer relationship-oriented attributes when choosing future pharmacies than those who have not experienced a personal pharmacist-patient relationship. The latter

explanation would suggest that, by making an effort to get to know their patients, pharmacists can effectively market the value of ongoing pharmacist-patient relationships.

5.6 Community Pharmacy Market Segmentation

The results of the latent class analysis suggested that patient preferences for community pharmacy attributes were heterogeneous and that this heterogeneity was best represented with a three-class model. Approximately two-thirds of patients belonged to the largest segment, the "Quality Class." Members of the quality class displayed strong preferences for quality metrics, with mean attribute importance values (AIV) for the drug-drug interaction (DDI)-specific quality metric and the overall quality metric of 45.5 and 33.3, respectively. In that class, no other attribute had a mean attribute importance value over five. The second largest segment, to which 28.3% of patients belonged, was labeled the "Relationship Class." As in Quality Class, the attributes with the highest utility values in the Relationship Class were the quality metrics. However, the attribute importance values of the friendliness/courtesy, communication, and patient-pharmacist relationship attributes (9.0-11.5) were approximately twice as large in the Relationship Class than they were in the other classes (3.8-6.2). Finally, members of the Convenience Class, who comprised only 4.2% of all respondents, strongly preferred pharmacies with extended hours of operation.

There were few statistically significant differences in demographic and health characteristics between the segments, though the lack of statistical significance may reflect the small size of the convenience class. Notably, a significantly higher proportion of patients in the Relationship Class reported that they know their pharmacist's name

(42.3%) than members of the convenience (29.0%) and quality classes (32.3%). As discussed above, this may suggest that patients with established patient-pharmacist relationships ascribe more value to relationship-oriented attributes because of positive experiences with personalized pharmacy care. The age distributions of class members also differed by segment. Members of the Convenience Class were predominantly members of the youngest (18-24 years, 32.3%) and oldest (≥ 55 years, 48.4%) age groups surveyed. Members of the middle age groups (25-54 years) were underrepresented in the Convenience Class despite the growing time demands on middle-aged adults "sandwiched" between caring for both their children and their aging parents.[316]

The overrepresentation of the oldest survey participants in the Convenience Class was unexpected given the drop in labor force participation with age.[317] However, several retired, older adults in the pilot testing for this experiment had referenced prioritizing extended pharmacy hours not for everyday accessibility but "in case" something urgent comes up. The degree to which older adult membership in the convenience class reflects concerns about accessibility in urgent situations could be explored in future research. If this concern is widespread, pharmacies with more limited hours may find that offering after hours and emergency services for loyal customers, as do many independent pharmacies, may prove valuable for recruiting and retaining baby boomers.

5.7 Limitations and Future Research

5.7.1 Limitations – Methodological Considerations

The attribute selection process is a critical component of any discrete choice analysis, and despite attempts to methodically and transparently select the most appropriate attributes for this DCE, certain limitations were introduced by the process. First, cost and location were held constant across all pharmacy alternatives. The rationale behind this decision is discussed in detail in the methods section and included a desire to avoid introducing dominating attributes and a recognition that similar medication costs and locations across multiple pharmacies are indeed realistic for a substantial portion of the US population. However, preferred pharmacy networks introduce differential pricing dependent upon pharmacy selection for many insured adults, particularly those with one of the 85% of Medicare Part D plans with preferred pharmacy networks in 2017.[318] Because cost was held constant in this study, its results cannot be generalized to populations with insurance plans that introduce substantial price incentives for patronage at an in-network pharmacy.

The omission of potentially important attributes presents an additional methodological limitation. This limitation is intrinsic to the use of DCEs to elicit participant preferences, as the number of attributes is necessarily limited by the need to minimize the cognitive burden for participants. A number of efforts were made to minimize omitted variable bias in this study, including the inclusion of attributes that would be relevant to the majority of patients,[164] the inclusion of participants who failed the dominant scenario,[214] and the use of unlabeled alternatives. [214] Still, some participants may have felt that the included attributes did not adequately reflect those that would be influential during real-life decision-making. For example, several rural participants in focus groups

noted that their pharmacy selection processes were largely dependent upon personal or community relationships with local pharmacy owners.[15] Additionally, feedback received during the attribute selection process for this DCE suggested that the presence of a pharmacy drive-through and the availability of specialized services like compounding and home delivery drive pharmacy patronage decisions in select patients. Future studies conducted in targeted patient populations could include different pharmacy attributes that are salient to specific populations, though such an approach would considerably limit comparability between studies.

The instructions for this discrete choice experiment outlined a specific scenario for study participants, namely, that they were to consider the scenario in which they had recently moved to a new town and needed to find a new pharmacy. This scenario, which occurs for the estimated 11.5% of the US population that moves each year,[319] was used to make clear to participants that a status quo option of remaining at their current pharmacy would not be an option in the experiment. The omission of a status quo option allowed this experiment to assess patient preferences in the absence of status quo bias and pharmacy loyalty, known to be dominating factors in pharmacy selection.[15,170] However, this omission also constrains the generalizability of this study to those patients who are choosing to select a new pharmacy. If pharmacy-related quality metrics were to become publicly available, the likelihood that patients would change pharmacies to one more consistent with their stated preferences is not known but is likely small given the documented impact of status quo bias.

The demographic and health characteristics collected at the end of this discrete choice experiment were selected based on published literature but were not exhaustive.

Participant characteristics that were not collected may have impacted preferences during community pharmacy selection in meaningful ways. For example, while limited information on caregiving was collected, the specific nature of the caregiving relationship was not obtained, and the preferences of caregivers of children, able-bodied spouses, and ailing spouses or parents may systematically differ. Employment status, mental health, and the use of high-risk or narrow-therapeutic index medications may also influence preferences. However, the number of questionnaire items, which exceeded that of most health-care related DCEs, was necessarily limited by the cognitive burden of the preceding DCE and concerns about participant attrition as that burden was increased.

Conditional logit (CL), the most commonly used model in the analysis of healthcare-related DCEs,[213] was used in the analysis of the first study aim. CL does not and cannot account for systematic preference heterogeneity between respondents, introducing the potential for biased estimates. Recognizing the limitation imposed by the assumption of CL that preferences are homogenous, a latent class analysis - which models preference heterogeneity across a discrete number of groups – was conducted alongside the CL. Additionally, the Hierarchical Bayes model used Study Aim 2 accounts for preference variation by estimating individual-level utility values. The results of all three models were presented here, consistent with the way in which many published studies that estimate both CL and latent class models report the results of both.[209,320,321]

Finally, this study design employed a main-effects model only. This design is the most commonly used design in healthcare-related DCEs[213] and the use of a main-effects model minimizes the number of choice tasks per person required for an efficient design. However, the main effects model makes the assumption that interactions are statistically

significantly different from zero.[180] In this study, pilot testing was used to identify attributes that were seen as highly correlated, and redundant attributes were removed. The final attribute list included two quality metrics, an overall and a specific measure. Though participants in the pilot test and published focus groups[14,71] and surveys[67] tended to view overall and specific scores as distinct, with different types of measures appealing to different subpopulations, the possibility of bias introduced by interattribute correlation cannot be excluded.

5.7.2 Limitations – The External Validity of Discrete Choice Experiments

Stated preference techniques, including discrete choice experiments, have a number of inherent limitations in their ability to accurately predict real life decision-making, and analyses of the external validity of healthcare-related discrete choice experiments are notably limited.[322] However, stated preference techniques provide an opportunity to assess participant preferences for attributes or attribute levels that do not currently exist, allowing decision-makers to gain insights into the possible impact of introducing a new attribute – here, publicly available pharmacy-level quality metrics – into the marketplace. Should pharmacy-level quality metrics become publicly available, additional research should explore the convergence between the results of this and future pharmacy quality-related discrete choice experiments with real life patient decisions in the community pharmacy market.

The external validity of this DCE may be limited by the easy accessibility of the quality information in the experiment. Studies on patient awareness of healthcare quality metrics report very low levels of awareness of publicly available hospital quality

metrics,[50,51] particularly those available through governmental outlets. [54] If pharmacy quality metrics were publicly available, patient awareness of those metrics is likely to be similarly low, thus limiting the degree to which the metrics would be used during pharmacy selection. Furthermore, this experiment presented the quality information as "expert-assessed," reflecting that the metrics presented were those that have been developed by the non-governmental, multi-stakeholder Pharmacy Quality Alliance. If the PQA metrics were presented through a .gov website, the metrics may be perceived as less trustworthy by patients, who have previously reported moderate to low degrees of trust in CAHPS, HEDIS, and Medicare performance data. [74,75] The effect of presenting pharmacy quality information through a government-related channel on patient preferences for the quality metrics is not known but could be explored in future research.

Finally, limits on this study's generalizability are relevant to a discussion of its external validity. The population of respondents yielded from the Qualtrics study panel was not nationally representative and therefore are not generalizable to the entire US population . The preferences calculated and discussed in this study may best reflect the preferences of middle aged Americans with above-average levels of education and income. Future research should explore the community pharmacy preferences of populations underrepresented in this study population, particularly older adults and those with low levels of education and health literacy.

5.7.3 Future Research

As this was the first quantitative study on patient preferences for community pharmacy attributes, its results raise numerous questions and hypotheses to be explored in

future research. First, the study results generated a hypothesis that patient preferences for the drug-drug interaction metric reflect an underlying risk aversion common among both patients and clinicians. Future research is needed to explore the validity of this hypothesis and may include additional discrete choice experiments testing the impact of loss- and gain-framing on patient preferences for high-quality pharmacies. This hypothesis could also be extended to research on quality metrics in other aspects of healthcare, including hospitals and physicians. Hospitalcompare.gov currently presents predominantly gain-framed quality metrics, most often in terms of the proportions of patients who receive appropriate care. The impact of loss-framing on increased patient utilization of these metrics remains to be studied and would add to the body literature on the optimal presentation of quality information. The vast majority of studies on the impact of presentation on patient comprehension and use of quality data focus on the presentation of the data itself, including the amount and format of data presentation. Few, if any, studies have investigated the effect of the wording of the quality measure itself on perceived importance and relevance of the measure.

Secondly, as discussed above, older adults, particularly those above 75 years of age, were underrepresented in this study population. The number of older adults and the proportion of the population over 65 years is expected to rise considerably in the next 30 years.[323] Polypharmacy is increasingly common in older adults[248] and has documented associations with numerous adverse health outcomes.[324] Community pharmacists are in a position to identify and limit polypharmacy and its adverse effects;[325] thus, the ways to best nudge older adults towards high quality pharmacies that are proactively involved with pharmacotherapy management warrant further exploration.

Finally, as noted above, the external validity of healthcare-related discrete choice experiments has not been extensively studied.[322] The pharmacy choices made in this DCE cannot currently be compared to those made in real life because pharmacy quality metrics are not yet publicly available. Furthermore, "soft" attributes like pharmacist communication and friendliness would be difficult to quantify across a large array of pharmacies, complicating an analysis of real-life patient decision-making. However, the preferences calculated from this DCE could be compared to those estimated from alternative preference elicitation methods. For example, the utilities generated from a DCE can be compared to those generated from a best-worst scaling exercise. These types of empirical comparisons have been encouraged for healthcare-related choice experiments, particularly in light of conflicting findings reported by studies comparing the two.[326–328]

5.8 Conclusion

In conclusion, this study explored patient preferences for six community pharmacy attributes: two quality metrics, hours of operation, pharmacist friendliness, pharmacist communication, and pharmacist effort to establish a pharmacist-patient relationship. The participants in this discrete choice experiment exhibited strong preferences for pharmacies with high star ratings on a specific quality metric, "Pharmacy ensured there were no patients who were dispensed two medications that can cause harm when taken together." This finding may reflect patient expectations of community pharmacists, namely that pharmacists ensure that patients are not harmed by the medications filled at their pharmacies. Latent class analysis revealed underlying preference heterogeneity and identified three classes, including a Quality Class, a Relationship Class, and a Convenience

Class. The role of community pharmacists has expanded considerably in past decades and will likely continue to change with the changing healthcare environment and efforts to gain provider status. Future research on patient expectations of and preferences for community pharmacies will be needed to assess the degree to which patients buy-in to expanding pharmacist roles and the most effective ways to encourage patients to actively engage with their pharmacists to improve health outcomes.

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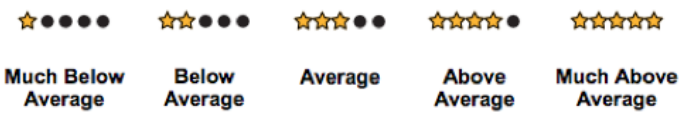
Appendix 1: Sawtooth Survey Screens

On the following pages, you will be presented with descriptions of two pharmacies. You will be asked to **select which of the two pharmacies you would choose**, assuming that you had recently moved and needed to select a new pharmacy.

The pharmacies that are presented to you will be described based on a number of characteristics. These characteristics include pharmacy quality ratings. For the purposes of this exercise, assume that the pharmacy quality ratings have been assessed and **published by pharmacy experts**.

An overall rating is computed based on a number of scores on specific aspects of pharmacy practice. Accordingly, an overall quality rating **may differ** from any single, specific rating.

The ratings will appear on a scale of one to five stars, where **more stars are better.** Stars will be presented along with written quality ratings from "much below average" to "much above average." The full scale of expert-assessed pharmacy quality ratings is depicted below.



Example Choice Task

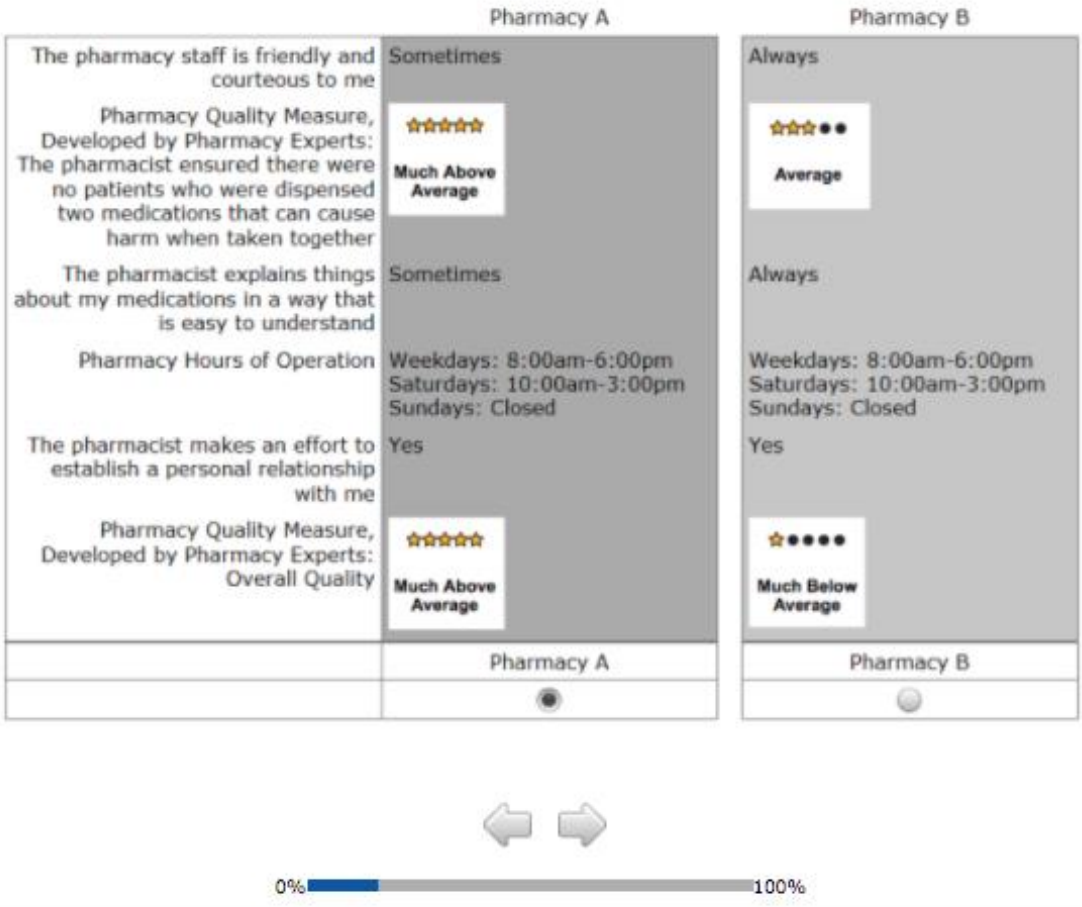
Below is an example of the type of choice that you will be asked to make in the forthcoming experiment. Imagine you have moved to a new town and must select a new pharmacy to fill your prescription(s). Assume that:

1) Both pharmacies are in the same location, and

2) Your out-of-pocket cost for your prescription(s) are the same for both pharmacies

Two pharmacy options are presented below. The pharmacies are labeled "Pharmacy A" and "Pharmacy B." Their characteristics are described side-by-side in the column underneath the pharmacy labels.

Note that in the example task, the participant has selected Pharmacy "A" as her preferred choice.



Pharmacy Choice Task (1 of 12)

Imagine you have moved to a new town and must select a new pharmacy to fill your prescription(s). Assume that:

1) Both pharmacies are in the same location, and

2) Your out-of-pocket cost for your prescription(s) are the same for both pharmacies

Two pharmacy options are presented below. The pharmacies are labeled "Pharmacy A" and "Pharmacy B." Their characteristics are described side-by-side in the column underneath the pharmacy labels.

Of the two presented pharmacy options, which would you select as your new pharmacy to fill your prescriptions?

Indicate your selection by clicking the button at the bottom of your preferred pharmacy's column