EXAMINING THE RELATIONSHIP BETWEEN THE "REAL WORLD" ADOPTION OF DIGITAL HEALTH TOOLS AND PRIMARY CARE EXPERIENCE

EXAMINING THE RELATIONSHIP BETWEEN THE "REAL WORLD" ADOPTION OF DIGITAL HEALTH TOOLS AND PRIMARY CARE EXPERIENCE

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LAY ABSTRACT

Patient outcomes such as experience and timeliness of care are frequently viewed as aims of quality health care. Although past studies indicate digital health supports quality care, the real-world effectiveness of digital health is underexplored in Ontario. This thesis aimed to explore relationships between real-world use of digital health in Ontario and primary care experience and access using survey data. This study found very few survey respondents used digital health before the COVID-19 pandemic. The primary care experience and access to care of adults who did use digital health did not differ very much from adults who did not use the technology. Some outcomes differed in adults who booked their primary care appointment online compared to those who did not; however, the study could not conclude on the relationship. Other personal factors such as age and residence area impacted the quality of primary care. This study was limited due to the lack of digital health users. Future studies should explore digital health's impact on patient outcomes beyond the pandemic.

ABSTRACT

Background: Patient experience is a crucial measure of patient-centeredness and quality care delivery. Digital health may contribute to patient experience by offering tailored and accessible avenues of care.

Purpose: I explored how access to digital health, including telehealth, electronic health records, and online booking, may be associated with improved primary care experience for Ontario adults.

Methods: This cross-sectional study included Ontario adults (16 years or older) who responded to waves 27 to 29 of the Health Care Experience Survey (HCES) between May 2019 and February 2020. Adults who did not see their primary care provider within the past 12 months or did not have a primary care provider were excluded. Outcomes included a summed patient experience score derived from five HCES experience-related questions and time to appointment for a health concern. Associations between outcomes and digital health interventions were tested through chi-square tests and logistic regression while adjusting for confounders and stratifying by health care utilization.

Results: 3,700 participants met the inclusion criteria, where 2204 remotely communicated with their primary care provider (59.6%), 98 digitally accessed health records (2.6%), and 120 booked an appointment online (3.2%). We observed no significant associations between digital health tools and patient experience or time to appointments through chi-square tests. Participants with over three primary care visits in the past year who accessed online booking were 84% less likely to report poorer experience scores than participants without online booking access [Adjusted OR 0.16, 95% CI 0.02 – 0.56, $p < 0.05$]. Participants with three or fewer primary care encounters who accessed online booking, compared to the same reference group, were 72% less likely to report having a same or next day appointment with their primary care provider [Adjusted OR 0.25, 95% CI 0.08 – 0.64, $p < 0.01$]. Significant associations were observed between other sociodemographic factors and patient experience and access to care outcomes.

Interpretation: The associations between digital health access and patient experience and access to care were inconsistent across different analyses. Despite experimental studies observing the benefits of digital health adoption in primary care, the effect is unclear in the real-world context. Furthermore, drawing conclusions on the relationship between digital health and quality care outcomes was limited due to the lack of adoption of digital health before the COVID-19 pandemic. As digital health adoption grows, future research should utilize the availability of further data to evaluate the effectiveness of digital health in Ontario primary care.

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Contents

Appendices

Abbreviations and Symbols

i. ACO - Accountable care organization
ii. ADG - Aggregated Diagnoses Groups
iii. ASTHMA - Ontario Asthma dataset
iv. AUC - Area under ROC curve
v. CAHPS - Consumer Assessment of Healthcare Providers and Systems
vi. CAPE - Client Agency Program Enrolment
vii. CCPAEHR - Canadian Committee for Patient Accessible Electronic Health Records
viii. CHF - Congestive Heart Failure
ix. CI - Confidence interval
x. CIHI - Canadian Institute for Health Information
xi. COMP-PC - Comparison of Models of Primary Care Study
xii. COPD - Chronic Obstructive Pulmonary Disease
xiii. CPDB - Corporate Provider Database
xiv. CSE-PHC 2007 - Canadian Survey of Experiences with Primary Health Care
xv. DA - Dissemination area
xvi. DAD - Discharge Abstract Database DAD
xvii. DEMENTIA - Ontario Dementia Database
xviii. DHEF - Digital Health Equity Framework
xix. ECFAA - Excellent Care for All Act
xx. EHR - Electronic health record
xxi. EMR - Electronic medical record
xxii. FFS - Fee-for-service
xxiii. FHG - Family Health Group
xxiv. FHO - Family Health Organization
xxv. FHT - Family Health Team
xxvi. FSA - Forward sortation area
xxvii. GP - General practitioner
xxviii. GVIF - Generalized variance inflation factor
xxix. HCES - Health Care Experience Survey
xxx. HIMSS - Healthcare Information and Management Systems Society
xxxi. HIV - Ontario HIV Database
xxxii. HQO - Health Quality Ontario
xxxiii. HYPER - Ontario Hypertension dataset
xxxiv. ICC - Intraclass correlation coefficient
xxxv. ICES - Institute for Clinical Evaluative Sciences
xxxvi. IOM - Institute of Medicine
xxxvii. IPDB - ICES Physician Database
xxxviii. IQR - Inter-quartile range
xxxix. LHIN - Local Health Integration Networks
xl. MLTC - Ministry of Long-Term Care
xli. MOH - Ministry of Health

xlii. NACRS - National Ambulatory Care Reporting System
xliii. OCCC - Ontario Crohn's and Colitis Cohort dataset
xliv. ODD - Ontario Diabetes Dataset
xlv. OHIP - Ontario Health Insurance Plan
xlvi. ONMARG - Ontario Marginalization Index
xlvii. OR - Odds ratio
xlviii. ORAD - Ontario Rheumatoid Arthritis Database
xlix. OTN - Ontario Telemedicine Network
l. PHIPA - Personal Health Information Act
li. PHR - Personal health record
lii. RCT - Randomized control trial
liii. ROC - Receiving operating characteristic
liv. RPDB - Registered Persons Database
lv. SD - Standard deviation

CHAPTER 1: INTRODUCTION

1 | Background

1.1 | Shift in Patient Experience and Access to Primary Care

1.1.1 | Primary Care in Canada and Ontario

Primary care is often the first contact for Canadian patients (Crampton et al. 2022). Canadian primary care differs across provinces and territories due to much of the governance and distribution of hospital and medical plan funding relying on provincial governments (Marchildon 2018). In Ontario, primary care continues to change with new models introduced, including Family Health Groups (2003), Family Health Teams (2005), and Family Health Organizations (2007). Most providers no longer provide care in solo practices but coordinate care among an interdisciplinary team (Marchildon 2018) (Hutchinson et al. 2011). In addition, performance-based remuneration of physicians is widely accepted among primary care physicians, where less than a quarter of physicians were paid via fee-for-service (FFS) in 2015, compared to nearly all physicians in 2002 (92%) (Marchildon and Hutchison 2016). FFS is associated with more frequent visits and greater continuity of care. At the same time, capitation resulted in improved patient satisfaction with access to care compared to FFS (Gosden et al. 2000).

Despite the primary care reform and strategies to improve the quality of care, Canada performs behind other countries in primary care outcomes. Canadians are less likely to access same- or next-day appointments with their health care provider compared to France and the United States, while also having the lowest after-hours care access in 2014 (Osborn et al. 2014). These deficiencies in the Canadian health care system exacerbate

when accounting for socioeconomic status. Canada had the highest rate of lower-income patients without a regular doctor among 12 countries in 2021. Only 40% of low-income Canadians could get a same- or next-day appointment with their provider compared to Germany, where 74% of low-income patients had timely access to their provider (Doty et al. 2021). Careful evaluation of the health care system is necessary to support policies and primary care programs.

1.1.2 | Evaluation of Primary Care

Frameworks such as The Triple Aim seek to better the patient care experience, improve the health of populations, and reduce costs (Berwick, Nolan, and Whittington 2008). The Quadruple and Quintuple Aim frameworks emerged from the Triple Aim, respectively incorporating the well-being of health care providers and health equity as targets of quality care improvement (Arnetz et al. 2020; Nundy, Cooper, and Mate 2022). However, many indicators of the Triple Aim are based on feasibility, costs, and availability. Evaluations replaced complex constructs such as patient experience with the quality of care or satisfaction, and per capita costs were reported in resource allocation and cost avoidance (Obucina et al. 2018).

Evaluation of primary care in Ontario is particularly challenging as changes are frequently not linked to performance measures, requiring external bodies such as researchers and third-party organizations to evaluate the healthcare reform (Marchildon and Hutchison 2016).

The Excellent Care for All Act (ECFAA) (2010) helped Ontario better define the quality of care as health care that is "accessible, appropriate, effective, efficient, equitable, integrated, patient-centered, population health focussed, and safe" (Government of Ontario 2010). Health Quality Ontario had committed to establishing quality measures for primary care by creating the Primary Care Performance Measurement Framework for Ontario. This framework contains 12 system-level and 18 practice-level measures across nine domains found valuable for improving primary care, including access, integration, efficiency, effectiveness, focus on population health, safety, patient-centeredness, appropriate resources, and equity. However, gaps within the data were prevalent across several categories, including access to care and patient-centeredness (Hutchison et al. 2020). Like other international health systems, Health Quality Ontario later adopted the domains of quality proposed by the Institute of Medicine through the Quality Matters Framework. This framework creates benchmark indicators to measure the quality of care across six dimensions (safe, effective, patient-centered, efficient, timely, and equitable) (Quality Matters: Realizing Excellent Care for All 2015).

1.1.3 | Patient Experience, Satisfaction, and Centeredness of Care

The provision of healthcare is shifting beyond only measuring clinical outcomes, where a greater emphasis on patients' experiences at each instance of care (Quality Matters: Realizing Excellent Care for All 2015). Health care experience measures patient-centeredness of care, an essential aim of quality care (Browne et al. 2010). Patient experience is a personalized, multidimensional concept referring to all patient interactions with a health system across the continuum of care which may influence their perception

(Ahmed, Burt, and Roland 2014; Defining Patient Experience n.d.; Wolf et al. 2014, 2021). Experience varies from person to person, influenced by patients' expectations and perceptions of care (Wolf et al. 2014, 2021).

The patient experience differs from satisfaction, typically measured through survey formats and refers to their perception at points in time (Wolf et al. 2021). Satisfaction is often a poor indicator of patient-centeredness due to patients misreporting their perception of care (Beattie et al. 2015). Patient experience, however, is a key measure of patient-centeredness, where customized care meets the personal needs of the empowered patient (Castro et al. 2016; Luxford, Safran, and Delbanco 2011; Wolf et al. 2014). Improving patient experience and, consequently, patient-centeredness requires patient participation in decision making, coordinated care, sharing of information, and better access to care (Castro et al. 2016; NHS Patient Experience Framework n.d.).

1.1.4 | Evaluating Patient Experience

Hospitals have shifted towards measuring patient experiences through many different means to improve patient perceptions of care (Luxford, Safran, and Delbanco 2011). The Consumer Assessment of Healthcare Providers and Systems (CAHPS) survey is the most widely accepted patient experience survey used in the United States among health institutions in various contexts (Browne et al. 2010; Holt 2019). Numerous primary care experience surveys are available in the Canadian and Ontario contexts, including the Canadian Survey of Experiences with Primary Health Care 2007 (CSE-PHC 2007) and The Ontario Primary Care Access Survey (Wong and Haggerty 2013).

The Health Care Experience Survey (HCES) is a telephone survey randomly distributed to Ontarians 16 years of age or older since 2012 through the Institute for Social Research (ISR) at York University. The Ministry of Health and Long-Term Care use survey findings to steer decision-making on health policies and programs for Ontarians (Haj-Ali et al. 2021; Health Care Experience Survey (HCES) n.d.; The Health Care Experience Survey n.d.). Participants answer several questions, including their perceptions and experiences with the Ontario healthcare system, access to care, health conditions, childcare, and demographic questions (The Health Care Experience Survey n.d.). Survey waves occur every three months (Haj-Ali et al. 2021).

1.1.5 | Area of Improvement: Digital Health

Digital health may further support the delivery of quality care to Canadians. Following many high-performing health care organizations (accountable care organizations [ACOs]) such as Kaiser Permanente, several academics have suggested incorporating information systems and telehealth into health care (Bergevin et al. 2016). These technologies support providers and patients and provide coordinated, patient-centered care (Bergevin et al. 2016; Cason 2015; Quality Matters: Realizing Excellent Care for All 2015).

1.2 | Digital Health

1.2.1 | Context of Digital Health

Digital health refers to numerous tools which can improve health and wellness and health care through communication technology (Kostkova 2015). The Healthcare Information and Management Systems Society (HIMSS) notes digital health seeks to use technology and connected care between care teams to support patient empowerment and

the management of their health conditions (HIMSS Defines Digital Health for the Global Healthcare Industry 2022). As these technologies continue to mature, the scope of digital health expands, ranging from telehealth, digital access to health records, and patient portals (Lupton 2013). Digital health may support preventative care, emphasizing wellness, improving population health, and reducing healthcare utilization, proving to be a long-term strategy that continues to develop with the evolution of technology and its potential in the healthcare industry (O'Connor et al. 2016; Zanaboni et al. 2018).

1.2.2| Telehealth Access

Telemedicine and telehealth are the remote delivery of health care services using internet technology between patients and health providers. Telehealth also has numerous modalities, including device-based, telephone, mobile, video, and web-based monitoring used to care for different patient groups such as those with diabetes, heart failure, and mental health conditions (Doraiswamy et al. 2020; Peters et al. 2021; Zerna, Jeerakathil, and Hill 2018). In addition, telehealth supports triage, diagnosis, and treatment (Doraiswamy et al. 2020). Prior studies have observed that patients and providers preferred telehealth over traditional in-person consults, resulting in improved communication, access to care, and reduced health care utilization and hospitalizations (Agha et al. 2009; Kruse et al. 2017). Furthermore, telehealth improves self-management of illnesses and maintains patient-centeredness and clinical competence compared to in-person consultations (Agha et al. 2009; Kruse et al. 2017; Peters et al. 2021).

Various jurisdictions across Canada, such as Ontario, Newfoundland and Labrador, Saskatchewan, and the northern Nunavut, have piloted telehealth to connect patients with

their doctors and avoid travel time (Appireddy et al. 2019; Jong, Mendez, and Jong 2019). For example, telehealth programs are expanding in Ontario, where from 2008/2009 to 2013/2014, 336,570 Ontario Telemedicine Network (OTN) visits occurred with patients residing in Southern Ontario and 283,253 visits in Northern Ontario. In addition, the OTN visit rate has increased in Southern and Northern Ontario, with the utilization rate per 1000 people also increasing (O'Gorman, Hogenbirk, and Warry 2015).

1.2.3 | Digital Health Record Access

Electronic health records (EHRs) refer to information systems that give providers and patients digitized access to a person's medical history, compiling records from different providers within the circle of care. Systems that rely on patient-side data entry are referred to as personal health records (PHRs) and enable patients to individually store and manage information related to their health and care (Tang et al. 2006; Urowitz et al. 2008). Providing patients with electronic access to health records benefits patient satisfaction, assists patients in recalling information from past visits, and reminds them of upcoming appointments. Electronic access to health records also enables information sharing within the circle of care to support continuity of care and improves patient awareness of managing their health condition (Woods et al. 2013; Zanaboni et al. 2018). Patients were also more involved in their care, contacting providers when finding inconsistencies in their health records, sharing questions regarding lab results and medications, and being more involved in care (Woods et al. 2013).

In 2019 eHealth Ontario, reported the slow yet growing adoption of electronic health records across Ontario, with 98% of hospitals and 100% of home and community

centres connected to eHealth Ontario resources, while 85% of family physicians adopting certified electronic medical records (EMR) systems (Progress Report 2019). In addition, the Canadian Committee for Patient Accessible Electronic Health Records (CCPAEHR) found that over half of Canadian hospitals were using EHRs. However, providing patients access to these records was difficult due to tight financial resources, patient literacy, and clinical buy-in (Urowitz et al. 2008).

1.2.4 | Online Booking Access

Appointments are traditionally booked by faxing, phoning a primary care clinic, or visiting in person. These booking methods are associated with longer wait times and patient dissatisfaction (Samadbeik et al. 2018). Nevertheless, these methods are widely accepted and used, often slowing the implementation of booking systems due to the resources required to change pre-existing workflows. Online booking systems allow patients to access and book into their primary care provider's schedule at their convenience, improving the time saved by the patient and their perceived satisfaction with the booking process (Samadbeik et al. 2018).

Online appointment booking allows patients to book with a desired primary provider at the desired time, allowing patients to practice greater freedom of choice. These are not unique to the Canadian context, with prior systems, including ZorgDomein in the Netherlands and "Choose and Book" from England, serving as opportunities for patients to choose the desired appointment time and the preferred provider (Dixon, Robertson, and Bal 2010). These online appointment booking systems can be synchronous, where patients can automatically book into their provider's schedule, or asynchronous, where a patient requests

a particular time, and a scheduler manually enters the patient into the health provider's calendar. Online appointment booking systems are associated with patient-centeredness, reduced no-shows, and lower wait times as patients can book any time slot (Zhao et al. 2017).

1.3 | Digital Health Adoption

1.3.1 | Motivation

The diffusion of digital health technologies into the health care sector is driven by the consumer approach in other industries such as banking and airlines (Kagan Trenchard, Semlies, and Gierlinger 2019). In addition to the growing need for partnership between patients and providers and patient-centered care, this has resulted in consumers demanding digital solutions to how care is provided (Kagan Trenchard, Semlies, and Gierlinger 2019). In Canada and Ontario, several professional groups supported by federal and provincial governments guide the implementation of digital health programs.

1.3.2 | Digital Health Adoption in Canada and Ontario

1.3.2.1 | Ontario Digital First for Health Strategy

The Digital First for Health strategy proposed by the Ontario government in 2019 aims to improve patient care through digital health in five areas. Patients will have greater access to schedule virtual consultations with their healthcare providers through different virtual tools, including video to secure messaging. Ontario seeks to give patients greater access to online appointment booking and convenient digital access to their personal health information. Providers will also have digital access to their patient's health records to allow for informed decision-making and integrated predictive analytics to support the

management of chronic conditions (Ontario Expanding Digital and Virtual Health Care 2019).

1.3.2.2| Advocating Bodies and Expert Groups

Canada Health Infoway

Canada Health Infoway is a federally funded agency established in 2001 to move Canada forward in developing a national interoperable electronic health record system (Gray et al. 2016; Rozenblum et al. 2011). Canada Health Infoway works with multiple Canadian healthcare stakeholders across many disciplines, including clinicians, academics, and technology vendors, to move Canada towards a national standard in electronic medical records. The goal is to allow patients to access their digital health information, schedule appointments online, and order prescriptions, allowing for convenience and greater accessibility despite distances (2020-2021 Annual Report 2021; Rozenblum et al. 2011).

Health Ontario/eHealth Ontario

eHealth Ontario, established in 2008, guides the implementation of electronic medical records on a provincial level (Gray et al. 2016). eHealth Ontario continues to work to enable Ontarians to access their health records online among a team of other agencies under the super-agency responsible for Ontario's healthcare system, Ontario Health (Crawley and Janus 2019).

Ontario Telemedicine Network

The Ontario Telemedicine Network (OTN) is a non-profit group supported by the government of Ontario to cultivate telemedicine solutions that would improve patient care

access. OTN was a product of a merger that occurred in 2006 and now serves as the largest telemedicine provider in Ontario. OTN aids clinicians in telemedicine through supporting adoption and planning, provides the technological infrastructure to conduct remote visits, and trains providers on using telemedicine in their practice (Brown 2013; Gray et al. 2016; O'Gorman, Hogenbirk, and Warry 2016).

1.4 | Objectives

Most studies regarding digital health tools are randomized control trials (RCTs) that do not effectively address real-world adoption of digital health, considering barriers and costs associated with these programs (O'Connor et al. 2016). Digital health studies in Ontario do not address real-world access to these tools. The HCES provided real-world digital health access data before the COVID-19 pandemic, which would otherwise not be readily available (Crampton et al. 2022). However, the HCES is vastly unexplored, with a gap in how digital health influences patient outcomes for Ontario adults accessing primary care.

The following chapters intend to examine how digital health tools may be associated with patient experience and access to primary care in Ontario with primary care. Chapter one hypothesizes that access to telehealth, digital health records, and online booking is associated with a positive patient experience, as these technologies may improve patient-provider relationships and involve patients in decision-making. Chapter two hypothesizes that access to telehealth, digital health records, and online booking is associated with same- or next-day appointments, enabling better freedom of choice, access, and convenience of care.

CHAPTER 2: ASSOCIATIONS WITH PATIENT EXPERIENCE AND DIGITAL HEALTH ACCESS

2.1 | Introduction

2.1.1 | Importance of Patient Experience and Digital Health

Health organizations call for greater patient-centeredness of care to improve primary care (Hutchinson et al. 2011; Quality Matters: Realizing Excellent Care for All 2015; World Health Organization (WHO) 2016). Patient experience is a key measure of patient-centeredness where customized care meets the personal needs of the empowered patient (Browne et al. 2010; Castro et al. 2016; Luxford, Safran, and Delbanco 2011; Wolf et al. 2014). Digital health tools have improved patient experience, empowering patients in communicating with their health care providers (De Lusignan et al. 2014).

2.1.2 | Gaps in Literature

Past literature indicates the potential for digital health to improve user satisfaction and patient-provider communication (Zanaboni et al. 2018). Despite many researchers using survey and quantitative interview data (Huang, Gibson, and Terry 2018), a gap exists in how different digital health tools may influence primary care experience in the Ontario primary care setting. Evaluation of digital health tools has been experimental and has not considered the everyday use of technologies such as telehealth, digital health records, and online appointment booking. For example, a past study using Ontario Health Insurance Plan (OHIP) OTN billing data examined the utilization of telehealth but without any further outcomes concerning experience, satisfaction, or patient-centeredness (O'Gorman, Hogenbirk, and Warry 2016).

2.1.3 | Objective

The HCES allows evaluating patient experience while measuring everyday digital health use in Ontario. Therefore, this exploratory cross-sectional cohort study explores how access to digital health tools, including telehealth, electronic health records, and online booking, may improve the primary care experience for Ontario adults. I hypothesize that digital health access improves Ontario adults' primary care experience.

2.2 | Methods

2.2.1 | Study Design

A cross-sectional retrospective cohort study was conducted to quantitatively evaluate how digital health tools are associated with poor patient experience.

2.2.2 | Setting

The cohort was created using the Health Care Experience Survey (HCES), which captures health experience data in Ontario. The wave 27 pilot, 28, and 29, which occurred from May 2019 to February 2020, were included in the study. The HCES is equally sampled from the 14 Local Health Integration Networks (LHINs) in Ontario, Canada.

2.2.3 | Participants

The cohort was derived from the HCES. The sampling frame of the HCES uses the Registered Persons Database (RPDB) to randomly select households of Ontario adults 16 years of age or older. Potential survey respondents are first given a notification letter ahead of the survey date. Participants then respond to the survey by telephone through the number

provided by RPDB. HCES excludes individuals without an Ontario health card and does not capture the information of households without a landline or cellphone.

2.2.4 | Variables

The primary outcome is a continuous sum of experience-related variables in the HCES. These variables include the patient-reported likelihood their primary care provider knows the participant's medical history, gives the participant opportunity to ask questions, spends adequate time with the participant, involves the participant in decision-making regarding their care, and communicates with the participant in a way that is easy to understand. Each potential response was recoded into a numerical value from 1-5 (always [5], often [4], sometimes [3], rarely [2], never [1]). Variables were then summed to provide a cumulative value indicating a participant's overall experience with their primary care provider. Summed scales have been used in past research using patient experience surveys and provide the opportunity to capture complex concepts with several dimensions, such as patient experience (Lyratzopoulos et al. 2012; Pettersen et al. 2004).

Dependent variables are outlined in Appendix A. Primary study exposures are digital health tools, including participants' online appointment booking access through a provider's website or health portal, telehealth access with their provider, and digital access to medical records. Confounders explored include participants' sex, overall perceived health, Aggregated Diagnoses Groups (ADG) score, level of education, financial situation, language spoken, remuneration type, Rurality Index of Ontario (RIO), and the number of years knowing the primary care provider. In addition, the material deprivation, dependency, ethnic concentration, and residential instability factor Ontario Marginalization Index

(ONMARG) scores are considered potential confounders of the outcome. Finally, potential effect modifiers that will be explored include participants' age and rate of primary care visits over the last 12 and 24 months.

2.2.5 | Data Sources/Measurement

The Institute for Clinical Evaluative Sciences (ICES) provided all linked participant data. Participants who responded to HCES waves 27-29 were linked to other databases to explore potential confounders and effect modifiers. Digital health factors, confounders, effect modifiers, and primary outcomes were available through the HCES. The list of variables and their corresponding datasets are provided in Appendix A.

Participant diagnoses were linked through other ICES data sets. For example, a diagnosis of asthma was obtained through the Ontario Asthma dataset (ASTHMA), congestive heart failure (CHF) through the CHF database, chronic obstructive pulmonary disease through the Chronic Obstructive Pulmonary Disease (COPD) database, and dementia diagnosis through the Ontario Dementia Database (DEMENTIA). An HIV diagnosis was available through the Ontario HIV Database (HIV), hypertension diagnosis through the Ontario Hypertension dataset (HYPER), diabetes diagnosis through the DIABETES database, and diagnosis for rheumatoid arthritis through the Ontario Rheumatoid Arthritis Database (ORAD). Diagnoses for Crohn's disease and ulcerative colitis were collected through the Ontario Crohn's and Colitis Cohort dataset (OCCC). Reported heart attacks were collected through ICD-9 and ICD-10 diagnostic codes and obtained through the Discharge Abstract Database (DAD), National Ambulatory Care

Reporting System (NACRS), and OHIP databases. Aggregate Diagnosis Groups (ADGs) were obtained through the Johns Hopkins ACG® System Version 10.

Age, sex, rurality, and forward sortation area (FSA) were obtained through the RPDB. ONMARG provided factor scores for material deprivation, dependency, ethnic concentration, and residential instability. Client Agency Program Enrolment (CAPE) was used to identify participants' rostered primary care providers. If the participant was not rostered to any physician under CAPE, OHIP billings during a 2-year lookback period were used to identify which physician had the most recurring billings with the patient. CPDB and IPDB were also used to identify physicians who were members of family health teams (FHTs).

2.2.6 | Bias

Considering the cohort was derived from the HCES, the sampling method to distribute the survey influences the demographic of the cohort. These include participants requiring a valid house address in RPDB and can communicate in English and French. In addition, surveys were distributed within time frames independent of when a participant saw their provider, leading to recall bias toward self-reported experiences with primary care (Haj-Ali et al. 2021). I addressed this by ensuring participants did have a primary care encounter within the past 12 months before the survey, as several HCES questions were framed within 12 months. Finally, the population-based survey is delivered over the phone, which may indirectly contribute to participants being more comfortable with phone calls than with newer technologies.

2.2.7 | Study Size

The initial sample included all adults who have completed the HCES from waves 27 to 29 and have agreed to have their responses linked with other databases available through the ICES. Participants were then linked to a primary care provider through CAPE and OHIP claims data. If the participant was deemed not to have a primary care provider, they were excluded from the sample to ensure outcome responses were about experiences with primary care. Participants were further excluded from the study if they self-reported not having a family doctor, general practitioner or GP, family physician, or nurse practitioner they see for check-ups and health concerns on the HCES. Participants were observed for the number of primary care encounters based on OHIP claims, where if the patient had no claims over the past 12 months from the interview date, they were excluded from the study. The reason for excluding these participants was that many digital health access questions used a 12-month timeframe before the survey. The sample was narrowed by only including participants from the waves 27 pilot, 28, and 29, occurring from May 2019 and February 2020, as the digital health access questions were introduced from the wave 27 pilot onwards. The final sample was cleaned by removing cases of missing observations.

2.2.8 | Quantitative Variables

The primary predictors, *telehealth* and *digital access to health records*, are grouped nominal variables consisting of HCES variables to allow for improved sample size and balance between digital health users and non-users. Responding “yes” to any of the grouped questions indicates the participant accessed telehealth or digital health records 12 months

before the survey date. *Telehealth access* consists of the responses to the following questions: (1) In the last 12 months have you emailed your provider with a medical question? (2) In the last 12 months have you asked your provider a medical question online, such as through a website or portal? (3) In the last 12 months have you asked your provider a medical [question] using video, for example a telemedicine appointment through OTN? (4) In the last 12 months have you communicated with your provider about your medical care using electronic messaging, such as text or instant messaging? (5) Other than the methods we have already asked you about, in the last 12 months, have you communicated with your provider using any other online or digital tools? (6) Not including visits that we have already asked about, in the last 12 months have you received medical care online or through a digital tool from a physician other than your own without having to make an in-person visit? (7) Have you called or tried to call your provider's office with a medical question or concern during the day on a Monday to Friday in the last 12 months?

Digital access to health records consists of the responses to the following questions: (1) In the last 12 months, have you looked at your medical records using an online system or digital tool? (2) In the last 12 months, have you looked at your medical records using online systems or digital tools that are designed for people with specific health conditions? An example of this type of tool is NED or Medly. (3) In the last 12 months, have you used any online system or digital tool that keeps track of ALL your health records in one place? This would include records from your [family doctor], any specialists you have seen, lab results, immunizations, etc.? Examples of this type of tool are Dot Health or MedChart.

Access to online appointment booking consists of nominal responses to only one question: (1) in the last 12 months have you emailed or visited a website to set up an appointment with your provider?

Many digital health access responses were missing when receiving the cohort data. Missing digital health responses were explored by conducting chi-square tests of demographic data of participants who did and did not respond to the digital health access questions mentioned above. Some significance was observed in specific demographics between respondents and non-respondents (See Appendix B). After speaking to representatives from the Ministry of Health and Long-Term Care and the Institute for Social Research, I concluded that missing observations regarding the digital health questions mentioned above were "no access" responses and were recoded accordingly.

The primary outcome is patient experience, a multidimensional concept defining all patient interactions with their health care provider (Castro et al. 2016). The HCES (waves 27 – 29) has a dedicated list of questions that falls into the category "Patient experience." These questions include: (1) When you see your provider or someone else in their office, how often do they know important information about your medical history? (2) When you see your provider or someone else in their office, how often do they give you an opportunity to ask questions about recommended treatment? (3) When you see your provider or someone else in their office, how often do they spend enough time with you? (4) When you see your provider or someone else in their office, how often do they involve you as much as you want to be in decisions about your care and treatment? (5) When you see your provider or someone else in their office, how often do they explain things in a way that is

easy to understand? Each of the questions uses a similar set of ordinal responses: “Always,” “Often,” “Sometimes,” “Rarely,” and “Never.” Other possible responses which were excluded from the analysis due to a lack of context necessary to derive inferences include “[Participant] volunteers it depends who they see/what they are there for,” “Not applicable,” “Don’t know,” and “Refused.” The responses were first recoded into a 5-point score, with “Always” recoded as 5, “Often” recoded as 4, “Sometimes” recoded as 3, “Rarely” recoded as 2, and “Never” recoded as 1. Distributions of each question were then examined, with a large majority of participants providing positive feedback regarding their experience with their primary care provider. Each question was included in a correlation matrix using Spearman’s rho and Kendall’s tau to accommodate the negatively skewed distributions. The coefficients were similar between both tests among the experience questions and suggested some correlations among questions to address the concept of patient experience. However, there were no strong correlations (> 0.70) among any patient experience variables, suggesting no redundancies (Appendix C).

I chose to sum up patient experience responses, considering the lack of strong correlation, the use of the same ordinal scale across interval experience questions, past patient experience surveys (Lyratzopoulos et al. 2012; Pettersen et al. 2004), and the overall complexity of measuring patient experience. The maximum value of the summed score was 25, while the lowest possible score was 5. Most participants scored an experience score of 25; therefore, I examined the lower end tail of patient experience, identifying participants with poorer experiences as those within the 20% quantile and below (Appendix D). This

cut-point ensures ample observations to predict rare cases of poorer experience through regression analysis.

2.2.9 | Statistical Methods

Descriptive statistics (mean, SD, median, IQR, and frequencies) were reported for the cohort. Minor instances of missing data were omitted from the analysis. Chi-square association tests were conducted between patient experience coded as a binary outcome of poor or positive, telehealth access, digital health record access, and online booking access. Multivariable logistic regression provided adjusted odds ratios. The assumption of independence was evaluated by creating null models with (1) no random effects, (2) random effects by physician number, (3) random effects by FSA, and (4) random effects by Local Health Integration Network (LHIN). There were no significant changes in deviance between these models. Each provider was responsible for 1-2 patients in the cohort, indicating a lack of data to report random effects concerning the health provider. In addition, the intraclass correlation coefficients were very low (Appendix E). These findings concluded that the random effects did not contribute to the model and would only result in further complexities. Therefore, the random effects were not included in the final models.

A hierarchical model building approach was used to first model digital health tools, patient characteristics including demographics and health, provider variables, and geographic factors such as RIO and ONMARG. Dissemination area (DA) ONMARG quintiles were incorporated into the model to minimize measurement error. Changes in residual deviance between models were observed through chi-square tests (Appendix F). Factors relating to health conditions such as COPD and dementia obtained through linked

datasets did not provide any changes to deviance and therefore were not included in the final model. The financial situation was chosen in the final model compared to imputed income categories as the subjective measure provided an improved reduction in residual deviance and was used in past studies using the HCES (Kiran et al. 2020). Practice type was not included in the final model due to a lack of observations in categories and did not provide any significant reduction in deviance. Multicollinearity was assessed through correlation matrices among predictors and generalized variance inflation factors (GVIFs). Factors with GVIFs which exceeded a value of 5 were removed from the model. The remaining dependant variables within the final models did not have a GVIF that exceeded approximately a value of 3 (Appendix G).

A significant interaction was observed between online booking use and the number of primary care encounters over the past month. Final models were stratified by fewer than or equal to three encounters and greater than three encounters to observe differences in odds ratios between the health care system's least and most frequent users. Influential observations were identified through Cook's distance values which exceeded $4/n$ and were removed from the final model. Receiving Operating Characteristic (ROC) curves were used to assess the predictive ability of each of the stratified models. Hosmer Lemeshow's goodness of fit tests did not indicate significant evidence of poor fit in stratified models (Appendix H).

A sensitivity analysis was conducted by running multivariable logistic regression models while adjusting for all previously included confounders with each of the items of the summed patient experience scores. Potential responses were combined into two groups

for each question: “Always/Often” or “Sometimes/Rarely/Never” to allow for balance in responses to HCES experience items. Changes in residual deviance were examined through chi-square tests (Appendix I), and multicollinearity was avoided by not including factors exceeding a GVIF of 5 (Appendix J). Again, influential outliers identified through Cook’s distance were excluded from the final models. Models were stratified after observing significant interactions in age and number of primary care encounters over the past 12 months. ROC curves were used to test the predictive ability of the models. Hosmer Lemeshow’s goodness of fit tests did identify evidence of poor fit in the model (Appendix H). However, these were unexplored as the study's objective was to investigate associations through simpler models with greater interpretability rather than pursuing more complex model building.

2.2.10 | Ethics Approval

This research project falls under section 45 of Ontario’s Personal Health Information Protection Act (PHIPA), which does not require a Research Ethics Board review.

2.3| Results

2.3.1 | Participants

Appendix K provides a flow diagram of the sample size. After inclusion and exclusion criteria, the total cohort with missing observations included 3,700 participants. After removing missing responses, the sample size was 2,792 participants.

2.3.2 | Descriptive Statistics

Descriptive statistics are provided in Appendix L. In comparison to digital health record access (2.6%) and online appointment booking access (3.6%), telehealth access was more prominent in the study sample (63.0%), primarily attributed to telephone-based access. 39.5% of participants were 65 years or older, and most were female (60.7%). More than half of participants self-reported being in a comfortable financial situation (61.8%), with few reporting being either in a tight, very tight, or poor financial situation (19.0%). Most participants primarily spoke English at home (87.4%). Most participants completed a college or university degree (52.4%), followed by participants with a high school degree or less (25.6%). Most participants lived in large urban areas (39.5%), followed by urban areas (26.5%), with few residing in rural areas (9.8%).

Participants primarily reported being healthy, having very good (34.1%) or good (32.8%) health, while very few reported having poor health (4.8%). Participants mainly attended primary care physicians reimbursed primarily through capitation (71.4%), followed by FFS (26.6%). The median number of primary care visits over the past 12 months was three claims (IQR 2-5).

2.3.3 | Outcome Data

After omitting missing observations, the median overall experience score was 24 out of the potential 25 (IQR 22-25), where most of the sample reported overwhelmingly positive patient experience. By converting overall patient experience into a binary outcome, 625 participants (23.2%) were categorized to have poorer primary care experience (1st quintile and below [score $\leq$ 21]), while 2067 participants (76.8%) had positive primary care

experiences (remaining sample [score > 21]). Appendix D provides the distribution of patient experience scores.

2.3.4 | Main Results

Bivariate chi-square tests of association between patient experience and telehealth access ($p = 0.448$), digital health record access ($p = 1.000$), and online booking access ($p = 0.459$) indicated no significant association between the variables (Appendix M & Appendix N).

Some associations between factors and poor patient experience were observed through multivariable logistic regression. Appendices O and P provide odds ratios and 95% confidence intervals for unstratified and stratified models by three or fewer encounters and greater than three encounters over the past 12 months. Appendix Q provides ROC curves. Remote communication access (OR 1.00, 95% CI 0.77 – 1.28, $p = 0.976$), digital health record access (OR 0.97, 95% CI 0.41 – 2.10, $p = 0.933$), and online appointment booking access (OR 1.07, 95% CI 0.57 – 1.93, $p = 0.838$) were not significantly associated with poor experience in participants with three or fewer encounters. In those with over three encounters over the past 12 months, participants were 85% less likely to report poor experience than those with no online booking access over the past 12 months (OR 0.16, 95% CI 0.02 – 0.56, $p < 0.05$). However, remote communication access (OR 0.83, 95% CI 0.59 – 1.17, $p = 0.284$) and digital health record access (OR 0.82, 95% CI 0.31 – 1.92, $p = 0.661$) were not observed to be significant in the same subgroup.

Personal factors provided some significant associations between both stratified models. In participants with three or fewer encounters, those aged 45-64 years were 41% less likely to report poor primary care experience than those aged 16-44 years (OR 0.59, 95% CI 0.44 – 0.80, $p < 0.001$). Participants in the oldest age group, 65 years or older, were 56% less likely to report poor primary care experience than the same reference group (OR 0.44, 95% CI 0.31 – 0.62, $p < 0.001$). Similarly, in those with more than three encounters over the past 12 months, patients aged 45-64 years were 51% less likely to report poor experience than those aged 16-44 years (OR 0.49, 95% CI 0.31 – 0.75, $p < 0.01$). Older participants 65 years or older were 68% less likely to report poor experience than the same reference group (OR 0.32, 95% CI 0.20 – 0.51, $p < 0.001$). Financial situation significantly predicted patient experience, where participants with three or fewer encounters reporting tight, very tight, or poor financial situations were 61% more likely to have poor experience compared to those with very comfortable financial situations (OR 1.61, 95% CI 1.07 – 2.45, $p < 0.05$). However, no significant differences were observed in participants reporting comfortable financial situations compared to the same reference. There were no significant associations among any groups in participants with greater than three encounters.

Limited time knowing the primary care provider significantly predicted a poor experience. Participants with three or fewer encounters knowing their provider for 10-19 years were 32% less likely to report poor experience than those knowing a primary care provider for fewer than four years (OR 0.68 95% CI 0.48 – 0.96, $p < 0.05$). Participants who knew their provider for 20 or more years were 30% less likely to report poor experience than the same reference group (OR 0.70 95% CI 0.50 – 0.98, $p < 0.05$).

However, no significant differences were observed in participants who knew their provider for 4-9 years compared to the same reference group. In addition, no significant differences between poor experience and time knowing a provider were observed in patients with greater than three encounters.

Some associations were observed between poor patient experience and ONMARG quintiles. Participants with greater than three encounters and who fell into the 3rd dependency quintile were 2.4 times more likely to report poor experience than those least marginalized (OR 2.44, 95% CI 1.43 – 4.21, $p < 0.01$). No other dependency quintiles were significant in participants with greater than three encounters. There were no significant associations between poor experience and dependency in participants with three or fewer encounters. Similarly, participants with greater than three encounters who fell into the 3rd quintile of material deprivation were 41% less likely to report poor experience than those least marginalized (OR 0.59, 95% CI 0.35 – 0.99, $p < 0.05$). No other material deprivation quintiles were significant in participants with greater than three encounters. No significant associations between poor experience and material deprivation were observed in participants with three or fewer encounters. Participants with three or fewer encounters who were most marginalized in ethnic concentration were 68% more likely to report poor experiences than those least marginalized (OR 1.68, 95% CI 1.00 – 2.81, $P < 0.05$). No other quintiles of ethnic concentration were significant in participants with three or fewer encounters. There were no significant associations between poor experience and ethnic concentration in participants with greater than three encounters.

Self-perceived health significantly reduced residual deviance in the unstratified model ($p < 0.05$), however, no significant differences were observed in the models. The primary language spoken at home also significantly reduced residual deviance ($p < 0.001$). When unstratified, participants primarily speaking languages other than English in their households were 49% more likely to report poor experience than English speakers (OR 1.49 95% CI 1.12 – 1.95, $p < 0.01$). No significant associations were observed in sex, educational attainment, ADG score, program type, and RIO categories.

2.3.5 | Sensitivity Analysis

Appendix R provides ROC curves for all models, where AUCs varied from 0.68 to 0.76. Participants who accessed health records electronically were 65% less likely to report their primary care provider sometimes, rarely, or never being aware of details of their medical history compared to those without access (OR 0.35, 95% CI 0.11 – 0.88, $p < 0.05$). Participants with greater than three encounters over the past 12 months who used telehealth were observed to be 37% less likely to report their primary care provider sometimes, rarely, or never providing the opportunity to ask questions compared to those without access (OR 0.63, 95% CI 0.41 – 0.96, $p < 0.05$). Older adults over 60 who accessed telehealth were also 33% less likely to report their provider sometimes, rarely, or never spent enough time with them compared to the same reference group (OR 0.67, 95% CI 0.46 – 0.98, $p < 0.05$). No other significant associations were observed between digital health tools and poor responses of individual HCES experience items. However, significant associations were observed among experience items and confounders (Appendix S).

2.4 | Discussion

2.4.1 | Interpretation

There is mixed evidence to suggest access to online booking was significantly associated with better patient experience in participants who frequently see their primary care provider. However, this should be considered carefully due to the limited proportion of digital health users. Other factors also contributed to positive patient experience, such as age, consistent in stratified and unstratified models. Participants with less favourable financial situations and fewer interactions with their doctors had poorer experiences with primary care. Provider level characteristics such as remuneration type were not significant. However, the number of years knowing a provider was associated with outcomes, indicating long-standing relationships between patients and their providers improve the overall experience. The association between language and primary care experience needs further exploration due to mixed findings after being stratified by primary care use. Geographic and marginalization scores provided mixed results in their associations with primary care experience.

2.4.2 | Strengths and Limitations

Strengths of this study include providing the real-world context to digital health adoption and associations with improved primary care experience before the COVID-19 pandemic, telehealth billing codes, and greater adoption of virtual care (Crampton et al. 2022). Doing so also allows future research to examine pre- versus post-pandemic adoption of digital health in Ontario and the effectiveness of these technologies in improving patient outcomes. Regression analyses were also stratified by low- and high-frequency users as

determined by OHIP claims over the past 12 months, identifying Ontario adults frequently and less frequently interacting with their primary care provider.

The sample was biased to older adults, resulting in most study participants being older, unlike Ontario's age profile, where 16.7% of Ontarians are 65 years or older (Statistics Canada 2021). The older demographic may limit the number of individuals in the cohort who have adopted digital health, as prior studies have indicated slower adoption in older groups (Ganguli et al. 2020). The older demographic would also bias the sample toward adults who may be higher health system users and have longer-term relationships with their primary care providers than younger adults (Muggah et al. 2012). Due to HCES sampling methods, the cohort failed to include Ontarians without a health card or no provided phone number. These Ontarians may have different experiences with primary care, which cannot be measured using the HCES. AUCs for created models were somewhat low despite accounting for the patient, provider, and geographic confounders. Inclusion of other variables may support predictive ability; however, patient experience may also be a subjective measure whose definition varies from participant to participant and relies on expectations of care (Wolf et al. 2021).

Additionally, patient experience is frequently addressed across all encounters, including in this survey, and may be best measured longitudinally (Wolf et al. 2021); however, I could not capture experience over time due to not having repeat observations within the cohort. No clustering was used due to models not converging and providers only having one to two patients. However, random effects did not contribute much to the model. Mixed-effects models had a singular fit, encouraging excluding random effects as they were

too complex to be supported by the data. Finally, the Hosmer Lemeshow test for the unstratified model and a few sensitivity models indicated significant evidence of poor fit.

2.4.3 | Relation to Prior Work

The findings of this study were inconsistent with prior research addressing telehealth access and experience; patients who accessed telehealth through different modalities, including phone and video, reported primarily similar or improved experiences versus in-person appointments, with the majority of experiences being very positive (Androga et al. 2022; Appireddy et al. 2019; Stamenova et al. 2020). In addition, contrary to study findings, past research has observed that patient access to digital health records improves patient-provider communication and overall experiences (Woods et al. 2013; Zanaboni et al. 2018).

Regarding other socio-demographic factors explored through our study, studies have observed that adults most marginalized in socioeconomic class were significantly more likely to report poor experiences (Lyratzopoulos et al. 2012). Similarly, prior studies indicate a minimal association between gender and experience. Older adults have substantially higher experience scores than younger adults (Lyratzopoulos et al. 2012). Studies have observed patient experiences to be impacted by health status; however, the association is less evident in this study (Kaplan et al. 1995; Lyratzopoulos et al. 2012). Adults with greater educational attainment were also more likely to report shared decision-making with their providers (Kaplan et al. 1995). Ethnicity and language have also played a role in the care experience, where minority non-English speaking adults are less likely to report positive experiences with their providers (Ferguson and Candib 2002). Other studies

have similarly observed long-standing patient-provider relationships to play a crucial role in shared decision-making and patient experience, where longer relationships create greater trust between patients and providers (Kaplan et al. 1995).

2.4.4 | Implications

This study observed access to digital health tools used in a real-world context before the COVID-19 pandemic was not associated with the experience and access to care compared to if the participant relied on interacting with primary care through traditional means. Experimental studies show that there could be a benefit in improving patient experience through enhanced communication and patient-provider relationships (Kelley et al. 2020; De Lusignan et al. 2014); however, in the real-world case, the effect is unknown. These differences may be due to participants' limited adoption of digital health before the COVID-19 pandemic. Additionally, participants may access different technologies through different vendors, which may have various usability features, impacting patient experience differently. These differences in usability are evident in digital health domains such as telehealth. Despite comprising numerous care modalities, including telephone, video-conferencing, and online messaging, past literature suggests patients prefer secure messaging (Zanaboni et al. 2018). The HCES provides modality-specific data; however, due to an observed lack of video visits or messaging adoption, differences between these modalities cannot be investigated with this cohort.

This area of research has tremendously shifted beyond the COVID-19 pandemic, which catalyzed the widespread adoption of digital health across Ontario and many other regions and countries as health institutions explored approaches to maintaining access to

care while meeting social distancing mandates (Crampton et al. 2022; Nouri et al. 2020; Zheng Wong et al. 2021). Ontario's response to the pandemic has also introduced billing codes for telehealth appointments in Ontario, allowing further digital health and primary care experience research with more significant proportions of digital health adoption (Crampton et al. 2022). Digital health needs to be coupled with evidence and monitored for its influence on patient outcomes as it continues to be adopted in response to the COVID-19 pandemic and other strategies, such as Ontario's Digital Health Playbook (Ontario Ministry of Health 2022). Ongoing evaluation of primary care reform and strategy is necessary to ensure that changes are cost-effective and result in positive patient outcomes while avoiding adverse consequences (Bergevin et al. 2016). This notion applies to strategies of digital health innovation, where despite the perceived benefits of digital health, revaluation of these tools are necessary as technology continues to mature to ensure alignment with quality care (Crampton et al. 2022).

Adoption of digital health should also consider socio-demographic factors to avoid further contributing to the digital divide. Some patients may struggle to access digital health, resulting in adverse outcomes. Online activities have been primarily accessed by younger, financially well-off Ontarians with completed degrees residing in urban areas (Haight, Quan-Haase, and Corbett 2014). Therefore, health organizations must provide digital health services with different methods to support access, such as peer support (Davis, Shore, and Lu 2016), or provide other care modalities to accommodate patients' needs.

2.5 | Acknowledgments

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The Johns Hopkins ACG® System Version 10 was used to provide Aggregated Diagnosis Groups (ADGs).

We thank the Toronto Community Health Profiles Partnership for providing access to the Ontario Marginalization Index.

CHAPTER 3: ASSOCIATIONS WITH TIMELY ACCESS TO CARE AND DIGITAL HEALTH ACCESS

3.1 | Introduction

3.1.1 | Access to Care

Access to timely care is a crucial measure of the quality of a health system proposed by the Institute of Medicine (IOM) (Quality Matters: Realizing Excellent Care for All 2015). Ontario adults greatly value convenient access to care despite the purpose of seeing their family physician (Oliver et al. 2019). Yet, despite its importance in judging the quality of care, according to a CIHI 2016 report, Canada underperformed compared to 11 other commonwealth countries concerning access to care, where only 43% of Canadians reported seeing their health provider on the same- or next-day (Canadian Institute for Health Information 2017).

Digital health tools can further support timely access to care, with technologies including virtual care providing convenient and remote access to health providers. Telehealth offers the potential to be the first point of contact for patients, allowing health providers to triage them depending on urgency resulting in timelier care (Anderson and Ganguli 2019; Bunn, Byrne, and Kendall 2004). Health organizations with digital health record capabilities have reported more convenient access to care (Buntin et al. 2011; Frimpong et al. 2013). Freedom to book enabled through online appointment booking allows patients to freely choose what time they wish to see their provider (Samadbeik et al. 2018; Zhao et al. 2017).

3.1.2 | Gaps in Literature

Past HCES studies have examined access to primary care and some aspects of telehealth, including phone access (Kiran et al. 2020). However, although observing access to care when sick, after-hour clinic access, and telephone access, digital health's role in improving access to care was not explored, creating a gap in how digital health before the COVID-19 pandemic has supported timely access to primary care. Most studies have investigated how digital health has improved access during the pandemic (Fagherazzi et al. 2020). A comprehensive review of telehealth for triaging in-person access was prepared in 2004. Although proving its effectiveness, it relies on telephone communication rather than newer technologies such as video visits and instant messaging (Bunn, Byrne, and Kendall 2004). Therefore, a gap in the literature exists examining how access to real-world digital health tools may support same- or next-day in-person access to primary care.

3.1.3 | Objective

The HCES provides the opportunity to evaluate timely access to care while measuring everyday digital health use in Ontario. Therefore, this exploratory cross-sectional cohort study explores how access to digital health tools, including telehealth, electronic health records, and online booking, may improve timely primary care access for Ontario adults. I hypothesize that access to digital health improves primary care access for Ontario adults.

3.2 | Methods

3.2.1 | Study Design

An exploratory cross-sectional retrospective cohort study was conducted to quantitatively evaluate how digital health tools are associated with same- or next-day primary care access.

3.2.2 | Setting

Please refer to Setting in Chapter 2 (Section 2.2.2).

3.2.3 | Participants

Please refer to Participants in Chapter 2 (Section 2.2.3).

3.2.4 | Variables

The primary outcome is a binary outcome of same/next day access or later day primary care access derived from an interval value available in the HCES. Responses ranged from zero implying same-day access, to 20, representing 20 or more days from initially contacting the primary care provider. The interval scale was reduced to a binary outcome, similar to past HCES studies relating to the timeliness of care (Kiran et al. 2020).

Please refer to Variables in Chapter 2 (Section 2.2.4) for dependant variables.

3.2.5 | Data Sources/Measurement

Please refer to Data Sources/Measurement in Chapter 2 (Section 2.2.5).

3.2.6 | Bias

Please refer to Bias in Chapter 2 (Section 2.2.6).

3.2.7 | Study Size

Please refer to Study Size in Chapter 2 (Section 2.2.7).

3.2.8 | Quantitative Variables

Please refer to Quantitative Variables in Chapter 2 (Section 2.2.8) for dependant variables.

The primary outcome is time to appointment, derived from answers to the question: How many days did it take from when you first tried to see your provider to when you saw him/her or someone else in the office? Values of 0 and 1 were categorized into "same/next day," while all other responses ranging from 2 to 20 were categorized into "later-day." Responses of "Don't know" or "Refused" were recoded to missing values and excluded from the cohort (Appendix T).

3.2.9 | Statistical Methods

Descriptive statistics (mean, SD, median, IQR, and frequencies) were reported for the cohort. Minor instances of missing data were omitted from the analysis. Chi-square association tests were conducted between access to care coded as a binary outcome and telehealth access, digital health record access, and online booking access. Multivariable logistic regression provided adjusted odds ratios. The assumption of independence was evaluated by creating null models with (1) no random effects, (2) random effects by physician number, (3) random effects by FSA, and (4) random effects by Local Health Integration Network (LHIN). There were no significant changes in deviance between these models. Each provider was responsible for 1-2 patients in the cohort, indicating a lack of

data to report random effects concerning the health provider. In addition, the intraclass correlation coefficients were very low. These findings concluded that the random effects did not contribute to the model and would only result in further complexities. Therefore, clustering by LHIN was investigated as a sensitivity analysis.

Multivariable logistic regression was then conducted to model associations between access to care and digital health, personal, and health utilization factors. Please refer to Statistical Methods in Chapter 2 (Section 2.2.9) for the model building process. Appendix U provides changes in residual deviance, and Appendix V provides generalized variance inflation factors.

A significant interaction in both outcomes was observed between online booking use and the number of primary care encounters over the past month. Final models were stratified by fewer than or equal to three encounters and greater than three encounters to observe differences in odds ratios between less and more frequent health care system users. Influential observations were identified through Cook's distance values which exceeded $4/n$ and were excluded from the final model. Receiving Operating Characteristic (ROC) curves were used to assess the predictive ability of each of the final stratified models. Hosmer Lemeshow's goodness of fit tests did not indicate significant evidence of poor fit in unstratified and stratified models (Appendix H).

This study also observed the association between the patient experience score used in the previous chapter and our access to care outcome using a chi-square test.

3.2.10 | Ethics Approval

Please refer to Ethics Approval in Chapter 2 (Section 2.2.10).

3.3 | Results

3.3.1 | Participants

Appendix W provides a flow diagram of the sample size. After inclusion and exclusion criteria, the total cohort with missing observations included 3,700 participants. After removing missing observations, the sample size was 1,685 participants.

3.3.2 | Descriptive Statistics

Descriptive statistics are provided in Appendix X. Telehealth use was prominent in the cohort (69.6%) compared to limited access to digital health records (3.6%) and online appointment booking (4.0%). 38.6% of participants were 45-64 years old, while 37.3% were 65 or older. Respondents were primarily female (63.6%). More than half of the participants (63.6%) reported being in a comfortable financial situation, while 20.% responding having a tight, very tight, or poor financial situation. Few participants reported speaking languages other than English at home (13.1%). 54.1% of participants had a college or university degree, followed by 23.3% of individuals who have only completed high school or less. 39.1% of participants resided in large urban areas, while only 9.7% resided in rural areas. Participants primarily reported having very good (23.6%) or good health (34.1%), with only 5.0% reporting having poor health. Primary care practices attended by study participants were reimbursed primarily through capitation (70.9%), followed by enhanced FFS (27.0%). The median number of primary care visits over the past 12 months before the interview was three (IQR 2-5).

3.3.3 | Outcome Data

After omitting missing observations, 637 participants (37.8%) had a same or next day appointment with their primary care provider, while 1048 participants (62.2%) had a later appointment. Appendix T provides the distribution of time to visit.

3.3.4 | Main Results

Bivariate chi-square tests of association between patient experience and telehealth access ($p = 0.329$), digital health record access ($p = 0.388$), and online booking access ($p = 0.134$) indicated no significant association between the variables (Appendix Y & Appendix Z).

Appendix AA and Appendix AB provide odds ratios and 95% confidence intervals for unstratified and stratified models by three or fewer encounters and greater than three encounters over the past 12 months. Appendix AC provides ROC curves. After adjusting for personal, health, provider, and geographic factors, a significant association was observed between online booking access and same- or next-day appointments. Participants with three or fewer encounters over the past 12 months who accessed online appointment booking were 75% less likely to report having a same- or next-day appointment compared to those who did not access online appointment booking (OR 0.25, 95% CI 0.08 – 0.64, $p < 0.01$). However, this association was absent in participants with greater than three encounters (OR 1.26, 95% CI 0.56 – 2.82, $p = 0.575$). No significant associations with same/next day visits were observed in participants who accessed telehealth (≤ 3 encounters: OR 1.07, 95% CI 0.78 – 1.48, $p = 0.663$; > 3 encounters: OR 0.80. 95% CI 0.57 – 1.13, p

= 0.210) or digitally accessed their health records (≤ 3 encounters: OR 0.97, 95% CI 0.38 – 2.28, p = 0.938; > 3 encounters: OR 0.68, 95% CI 0.30 – 1.49, p = 0.345).

Rurality categories derived from the RIO significantly reduced the deviance in the unstratified model ($p < 0.001$). Participants with three or fewer encounters over the past 12 months residing in rural areas were 67% less likely to have a same or next-day appointment than participants living in large urban areas (OR 0.33 95% CI 0.16 – 0.64, $p < 0.01$). No other RIO categories were significant in participants with three or fewer encounters. Participants with more than three encounters residing in urban areas were 55% more likely to have a same- or next-day appointment with their primary care provider than those living in large urban areas (OR 1.66, 95% CI 1.13 – 2.44, $p < 0.05$). However, no other categories were significant for this subset.

Education, ethnic concentration, and residential instability were observed to have associations in some subsets despite not significantly reducing residual deviance (respectively: $p = 0.0877$, $p = 0.298$, $p = 0.396$). Participants with three or fewer encounters over the past 12 months who have completed a college or university degree were 42% less likely to have a same or next-day appointment compared to participants with a high school education or less (OR 0.58, 95% CI 0.39 – 0.85, $p < 0.01$). No other categories were significant across both subsets. Participants with greater than three encounters that fell into the 3rd quintile of ethnic concentration were 79% more likely to have a same- or next-day appointment with their primary care provider than those least marginalized (OR 1.79, 95% CI 1.01 – 3.21, $p < 0.05$). Similarly, participants within the 4th quintile were 89% more likely to have a same- or next-day appointment (OR 1.89, 95% CI 1.01 – 3.55, $p < 0.05$),

while those most marginalized were more than twice as likely compared to the same reference group (OR 2.04, 95% CI 1.04 – 4.05, $p < 0.05$). However, no other categories were significant, including those in participants with three or fewer primary care encounters in the past 12 months. Participants with three or fewer recent primary care encounters and who fell into the 4th quintile of residential instability were 41% less likely to report having a same- or next-day appointment than those least marginalized (OR 0.59, 95% CI 0.35 – 0.98, $p < 0.05$). None of the other quintiles were significant between both subsets. No significant associations were observed in age, sex, financial education, self-perceived health, ADG score, program type, and dependency and material deprivation quintiles.

3.3.5 | Sensitivity Analysis

Appendix AD provides odds ratios and confidence intervals for unstratified and stratified mixed effect models by the number of primary care encounters over the past 12 months after clustering for LHIN. Random effects explained only 2% of the variance in unstratified and stratified models by three or fewer recent encounters (ICC = 0.02) while explaining 1% of the variance in the model stratified by greater than three encounters (ICC = 0.01). 3rd (OR 1.76, 95% CI 0.98 – 3.17, $p = 0.058$) and 4th (OR 1.87, 95% CI 0.99 – 3.53, $p = 0.053$) quintiles of ethnic concentration in participants with three or fewer encounters were no longer significantly associated with same- or next-day access to primary care compared to those least marginalized. The odds ratios between fixed and mixed effect models were similar.

An association was also observed between the time to appointment and patient experience summed scores used prior ($p < 0.001$) (Appendix AE).

3.4 | Discussion

3.4.1 | Interpretation

There is mixed evidence to suggest access to online booking was significantly associated with later-day appointments with primary care providers. No evidence was found to indicate access to telehealth or digital health records before the COVID-19 pandemic was associated with same- or next-day appointments for Ontario adults with their primary care provider. However, this should be considered carefully due to the sample's limited proportion of digital health users. Patient experience scores used in past chapters were also associated with timely access to care. Participants reporting same- or next-day appointments were also more likely to report positive primary care experiences. These quality indicators are related, where improving upon some areas of quality may consequently improve others.

3.4.2 | Strengths and Limitations

Like past chapters, this study stratified relationships by low- and high-frequency users of Ontario primary care, measuring differences in associations between the groups. Evaluation of real-world adoption of digital health before the COVID-19 pandemic is lacking. This study provides a basis for future HCES studies exploring patient outcomes associated with real-world adoption of digital health beyond the pandemic.

The limitation of skewed age was consistent with chapter two (please refer to Strengths and Limitations in Chapter 2 (Section 2.4.2)). Additionally, although the study did examine the time to in-person appointment, which was typically the modality a patient interacts with their primary care provider before the COVID-19 pandemic, it was not

possible to evaluate if virtual interactions were timelier than traditional in-person interactions. Time to a virtual appointment was left uninvestigated due to the lack of overall adoption of virtual care before the pandemic (Appendix AF). The sample size of the cohort was also substantially smaller compared to previous chapters, with much of the decrease in sample size due to missing observations in the outcome. The smaller cohort can be partially attributed to survey logic. Only participants who self-reported seeing their primary care provider due to illness answered whether they were seen at the same-/next-day.

3.4.3 | Relation to Prior Work

Timely access to primary care for one-third of the original cohort was consistent compared to past CIHI reports indicating infrequent same- or next-day access to primary care for Ontarians (Canadian Institute for Health Information 2017).

Unlike past studies, no differences in access to care were observed in this study between digital health adopters and non-adopters. Past literature observed practices that used electronic health records were more likely to provide timely access (Buntin et al. 2011; Frimpong et al. 2013). In addition, past studies have indicated phone calls addressed at least 50% of patients' concerns, preventing further unnecessary in-person visits (Bunn, Byrne, and Kendall 2004). However, it was impossible to measure how telehealth prevented in-person visits using the HCES data. Similar to the findings of this study, access to online appointment booking was associated with longer wait times between when the appointment is scheduled and when it occurs (Ganguli et al. 2020). Delayed access to care may be due to some online appointment booking systems failing to support same- or next-

day booking. Yet, the observed association should be considered carefully due to the cohort's lack of overall adopters of online appointment booking.

Past HCES studies did observe an association between less timely access to care in participants with providers compensated primarily by capitation; however, the evidence was inconsistent (Kiran et al. 2020). The current study did not observe significant associations; however, prior studies used different cohorts, including HCES respondents from waves 2 – 16 (Kiran et al. 2020). The current study did observe those most marginalized in ethnic concentration to have greater access to care. However, this was only evident infrequent users and was not consistent across categories. For example, past studies using Comparison of Models of Primary Care Study (COMP-PC) data found no differences in access for immigrants compared to Canadian-born citizens but relatively more frequent access to primary care in Ontario (Muggah, Dahrouge, and Hogg 2012). Consistent with the current study's findings, Ontario patients in rural areas report long wait times to see their providers for routine visits (Thind et al. 2007).

3.4.4 | Implications

Like implications posed by the previous chapter (Chapter 2.4.4), this study observed that digital health tools adopted before the COVID-19 pandemic did not provide real-world benefits to timely in-person primary care. It is important to note that digital health's purpose is not limited to improving access to in-person visits but also convenience and time savings by allowing patients timelier virtual access (Cheema 2015; Kelley et al. 2020). However, a lack of data was present to test differences in timeliness between virtual and in-person visits. This notion of convenience extends to other digital health tools aside from telehealth,

where online appointment booking may not lead to timelier care, yet, it empowers patients to decide on appointment times that best fit their schedules (Samadbeik et al. 2018). The association between convenient access and patient experience scores suggests that improving domains of primary care such as access may result in enhanced quality in other areas such as centeredness of care, or vice versa.

Future research can observe digital health tools impacting access to care for populations that face barriers to accessing care. For example, telehealth can provide remote health care for patients residing in rural areas, improving access to care (Goodridge and Marciniuk 2016). In addition, mobile health (mHealth) technologies have supported patients living in rural areas to schedule appointments, access health information, and message providers (Mallow et al. 2014). With greater adoption of digital health beyond the COVID-19 pandemic, real-world access to digital health must be studied to ensure improved access to care, especially for underserved or remote populations.

3.5 | Acknowledgments

Please refer to Acknowledgments in Chapter 2 (Section 2.5).

CHAPTER 4: DISCUSSION

4.1 | Summary of Findings

Past chapters did not observe any clear associations between real-world digital health tools adopted in Ontario and patient experience and timeliness of care outcomes before the COVID-19 pandemic in Ontario. Associations were observed in the use of online booking, but the overall adoption of the intervention was limited. When observing HCES experience items individually, chapter two observed different participant groups that accessed telehealth reported more favourable communication. Providers were more likely to spend enough time with participants using telehealth or allow them to ask questions regarding treatment, allowing for greater management of health conditions. In addition, participants accessing health records digitally were more likely to report their primary care provider recollecting essential information regarding the participants' medical history. However, this association should be considered cautiously due to the lack of adopters of digital health records before the COVID-19 pandemic.

Some personal, health and healthcare, and geographic factors were significantly associated with the study outcomes despite lower AUC values among models. Overall experience scores were more favourable among older compared to younger adults. Other associations observed with poorer experience despite not being consistent across subgroups include poorer financial situations, participants primarily speaking languages other than English at home, fewer years knowing a primary care provider, and some quintiles of marginalization. Same- or next-day appointments were associated with very few factors within subgroups. These include college or university graduates or rural residents being

less likely to report same- or next-day appointments, while those residing in ethnically marginalized communities report timelier access. These should be explored further with a larger cohort to understand how they impact primary care experience in Ontario.

Past chapters observed odds ratios to be significantly different depending on the number of encounters a participant has had over the past 12 months with their primary care provider. Effect modifiers suggest that associations in experience and access to care may differ depending on less- versus more-frequent primary care users. Age was also a significant effect modifier across all individual HCES patient experience items, indicating age may have a similar role to frequent primary care use, affecting experience differently based on participant profile. Interactions should be considered carefully due to limited adopters in subgroups; however, they also suggest personal, health and care-related, and geographic factors may influence the effectiveness of digital health on patient outcomes.

4.2| Strengths and Limitations

The low adoption rate of digital health within the cohort is related to several factors, including low real-world adoption of digital health before the COVID-19 pandemic. In addition, the study consists primarily of older adults, which literature has previously observed to be more reluctant to adopt the technology (Ganguli et al. 2020). Finally, billing codes for telehealth visits in Ontario were also not readily available before the COVID-19 pandemic. Therefore, incorporating data related to digital health access was a strength of the study, but the imbalance in adopters compared to non-adopters impacted the generalizability of findings. Regardless, this study provides an opportunity for further Ontario studies using HCES data or other sources to explore the impacts of digital health

on patient outcomes beyond the COVID-19 pandemic response and the release of the Digital Health Playbook.

Overall, the models used in both chapters provided low predictive accuracy, as evident in AUC values ranging from 0.60 to 0.70. However, predictive ability was not a significant concern. This exploratory study aimed to test associations with factors and the outcomes rather than building a parsimonious model. Low predictive ability in the time-to-appointment model may be attributed to differences between primary care providers, which would otherwise be impossible to measure with our data, considering the limited study size.

Additionally, although the HCES does capture data on specific technology access such as messaging and telehealth, the usability between technologies will vary by vendor. The heterogeneity of different technologies in Ontario leads to further difficulty in measuring effectiveness (Desveaux et al. 2019). Interpretability was further affected by grouping technologies into categories such as telehealth and digital health records to balance primary predictors. Therefore, although this study did not observe any differences among digital health tools, differences in patient outcomes may exist between vendors; overall, no significant impacts were observed on patient experience and timeliness of in-person care.

4.3 | Implications

4.3.1 | Health Care Experience Survey

The HCES provides a unique opportunity to observe patient outcomes on a provincial scale. Experience is otherwise poorly collected as health institutions rely on

satisfaction surveys. The HCES allows the government to access patient-centered outcomes on a larger scale, creating policy based on evidence (Haj-Ali et al. 2021; Health Care Experience Survey (HCES) n.d.; The Health Care Experience Survey n.d.). Researchers in digital health and patient-centered research should continue incorporating the HCES into their analyses to continue exploring patient outcomes in the Ontario context.

Further, the HCES should continue expanding upon digital health areas following the COVID-19 pandemic, possibly extending to accommodate further digital health definitions, the form, functionality, and usability of these digital health tools, or patients' perceived comfort with technology.

4.3.2 | Supporting the Adoption of Digital Health

Real-world adoption is necessary for future studies to understand its impacts on patient outcomes in primary care. Barriers to adopting digital health into primary care in Ontario are visible and occur on all levels, including the patient, clinician, health organizations, and policy. Many digital health tools are not feasible to go beyond pilot stages despite their perceived benefit to patient outcomes (Desveaux et al. 2019). Patient barriers are prevalent throughout literature and real-world adoption, where underserved populations may have socio-demographic factors affecting the accessibility or affordability of telehealth or internet technology, as well as personal determinants such as language or digital literacy barriers (Haight, Quan-Haase, and Corbett 2014; Nouri et al. 2020; Westby et al. 2021). Providers also face numerous obstacles, including concerns with reimbursement of digital health services, overall perceptions of digital health, and discomfort with change (Westby et al. 2021). These concerns carry into policy, where

organizations frequently lack the leadership, organization, and funding to support broader implementation (Desveaux et al. 2019). Despite numerous professional groups and strategies aiming to digitize primary care in Ontario, the adoption of future digital health must address these barriers to avoid siloed efforts to digital primary care.

4.3.3 | Closing the Digital Divide

In response to patient barriers to implementing digital health, numerous frameworks, including the Digital Health Equity Framework (DHEF), are used to support policy decisions. Acknowledging the social determinants of health, health care, and digital health access and equity as intersectional factors proposed by such frameworks and developing strategies is necessary to avoid patients falling through the gaps in care (Crawford and Serhal 2020). Incorporating an equity lens in digital health adoption is essential in Ontario, considering the diverse population of various ethnicities, socio-demographic characteristics, and living conditions. These factors were present in this study, as different patient groups were at higher risk of poorer patient outcomes based on socio-economic status and living conditions.

The COVID-19 pandemic has provided numerous strategies to ensure underserved populations at greater risk of limited access to digital health do not fall through the gaps in care. For example, outreach programs allow screening of high-risk individuals and providing patient training to ensure they are well prepared for an appointment (Davis, Shore, and Lu 2016; Nouri et al. 2020). Other suggestions include involving family members and language interpreters during appointments to communicate health concerns while assisting with connectivity. In addition, policy- and practice-level supports such as

low-cost internet and federally funded digital health tools implemented in primary care can further enable digital health access for disadvantaged patients (Nouri et al. 2020). Therefore, strategies to further implement digital health among underserved patients require cooperation from patients and their families, primary care providers, and health institutions to ensure equitable access. Nevertheless, different modalities must be provided along with digital health to reduce the risk of unanticipated poor patient outcomes while also granting patients greater freedom of choice on how they choose to interact with their primary care provider.

4.3.3 | Future Trends in Digital Health

The future of digital health strives to improve upon the Quintuple Aim, reducing the costs of traditional care pathways while empowering patients in their care. Digital health tools, including personal health records, have benefited through greater productivity and reduction of primary, community, and hospital-based care in Canada, resulting in cost savings estimated between CAD 119 million to CAD 150 million. Projected cost savings will continue to grow as these technologies become more ubiquitous (Hackett et al. 2019).

Digitization of health care is anticipated as health care institutions explore strategies to negate increasing costs. Technology will also continue to mature, with the connected patient at the digital ecosystem's center. Finally, patients will demand digital health as they experience the digitization of society in other industries. This study failed to observe any real-world association between digital health and patient experience and timeliness of care up until the COVID-19 pandemic. The lack of association may be due to the adoption of digital health before the pandemic was likely piecemeal and selective. As these systems

continue to be intertwined and better integrated across the continuity of care, digital health will only reinforce patient outcomes such as experience, as patients find convenient ways to interact with their health providers and are further involved in care (Pillay 2020). Therefore, further adoption of digital health must be supported by innovative technologies while also integrated adequately into health care policies and practices (Hackett et al. 2019).

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APPENDICES

Appendix A: Summary of coding done on dependant and independent variables.

Database	Variable	Additional coding	Responses
		Dependant Variables	
HCES	Summed patient experience score	Coded ordinal to interval scale ("Always" = 5, ""Often" = 4, "Sometimes" = 3, "Rarely" = 2, "Never" = 1). Coded responses of "Volunteers it depends who they see/what they are there for", "Not Applicable", "Don't know", and "Refused" as NA: • When you see your provider or someone else in their office, how often do they know important information about your medical history? • When you see your provider or someone else in their office, how often do they give you an opportunity to ask questions about recommended treatment? • When you see your provider or someone else in their office, how often do they spend enough time with you? • When you see your provider or someone else in their office, how often do they involve you as much as you want to be in decisions about your care and treatment? • When you see your provider or someone else in their office, how often do they explain things in a way that is easy to understand? Summed interval values across all items to provide summed score. Categorized "poor experience" as 1st quintile (score ≤ 21) and "positive experience" as remaining quintiles.	Poor experience, Positive experience
HCES	Doctor/office: Knows important information about medical history	Combined "Sometimes", "Rarely", and "Never" into category: "Poor experience" Combined "Always", and "Often", into category: "Positive experience"	Poor experience, Positive experience
HCES	Doctor/office: Opportunity to ask questions	Combined "Sometimes", "Rarely", and "Never" into category: "Poor experience" Combined "Always", and "Often", into category: "Positive experience"	Poor experience, Positive experience

HCES	Doctor/office: Spend enough time with you	Combined "Sometimes", "Rarely", and "Never" into category: "Poor experience" Combined "Always", and "Often", into category: "Positive experience"	Poor experience, Positive experience
HCES	Doctor/office: Involve you in decisions about your care and treatment	Combined "Sometimes", "Rarely", and "Never" into category: "Poor experience" Combined "Always", and "Often", into category: "Positive experience"	Poor experience, Positive experience
HCES	Doctor/office: Explain things in easy to understand terms	Combined "Sometimes", "Rarely", and "Never" into category: "Poor experience" Combined "Always", and "Often", into category: "Positive experience"	Poor experience, Positive experience
HCES	Same day/next day	Combined values ≤ 1: "Same-/Next-day visit" Combined values > 1: "Later visit"	Same/next-day, Later
		Independent Variables	
HCES	Remote communication access	If *yes* to any of the following questions: • In the last 12 months have you emailed your provider with a medical question? • In the last 12 months have you asked your provider a medical question online, such as through a website or portal? • In the last 12 months have you asked your provider a medical using video, for example a telemedicine appointment through OTN? • In the last 12 months have you communicated with your provider about your medical care using electronic messaging, such as text or instant messaging? • Other than the methods we have already asked you about, in the last 12 months, have you communicated with your provider using any other online or digital tools? • Not including visits that we have already asked about, in the last 12 months have you received medical care online or through a digital tool from a physician other than your	Yes, No

		own without having to make an in-person visit? Interviewer if required: Examples of this type of care include Appletree, Akira, DermaGo, GOeVisit and Maple.	
HCES	Digital health record access	If *yes* to any of the following questions: • In the last 12 months, have you looked at your medical records using an online system or digital tool? • In the last 12 months, have you looked at your medical records using online systems or digital tools that are designed for people with specific health conditions? An example of this type of tool is NED or Medly. • In the last 12 months, have you used any online system or digital tool that keeps track of ALL your health records in one place? This would include records from your fd_type, any specialists you have seen, lab results, immunizations, etc.? Examples of this type of tool are Dot Health or MedChart.	Yes, No
HCES	Online booking access	In the last 12 months have you emailed or visited a website to set up an appointment with your provider?	Yes, No
RPDB	Age	Recoded continuous variable into 3 categories	16-44, 45-64, 65+
RPDB	Sex	No additional coding	Female, Male
HCES	Financial situation	Combined "Tight", "Poor", and "Very Poor" into a single category: "Tight/Poor/Very Poor"	Very Comfortable, Comfortable, Tight/Poor/Very Poor
HCES	Primary language spoken	Combined all languages other than English into a single category: "Other"	English, Other
HCES	Educational attainment	Combined "Less than high school", "Some high school", and "High school graduate or equivalent" into category: "High school or less". Combined "Some community college, technical, trade, or vocational college" and "Some university but no degree" into category: "Some college/university". Combined "Completed community college, technical, trade, or vocational college" and "Completed bachelor's degree (Arts, Science, Eng, etc.)" into category: "Completed college/university".	High school or less, Some college/university, completed college/university, Post-graduate/professional degree

		Combined "Post graduate training: MA, MSc, MLS, MSW, MBA, etc.", "Post graduate training: PhD, 'Doctorate'", and Professional degree (Law, Medicine, Dentistry)" into category: "Post-graduate/professional degree".	
RPDB	Rurality categories	Categorized Rurality Index of Ontario (RIO) scores into ordinal categories. • RIO scores equal to 0: "Large urban" • RIO scores ≥ 1 and less than 10: "Urban" • RIO scores ≥ 10 and less than 40: "Small urban" • RIO scores ≥ 40: "Rural"	Large urban, Urban, Small urban, Rural
		Combined	
HCES	Self-reported health	No additional coding	Poor, Fair, Good, Very good, Excellent
Johns Hopkins ACG® Version 10	ADG Scores	Combined into categories: < 3, 3 – 4, 5 – 6, 7 – 8, ≥ 9	< 3, 3 – 4, 5 – 6, 7 – 8, ≥ 9
OHIP	Primary care encounters over past 12 months	Divided numeric variable into two categorized by median (3 encounters).	≤ 3 encounters, > 3 encounters
ONMARG	Dependency	Used quintiles of the DA score.	1st quintile (least marginalized), 2nd quintile, 3rd quintile, 4th quintile, 5th quintile (most marginilized)
ONMARG	Material deprivation	Used quintiles of the DA score.	1st quintile (least marginalized), 2nd quintile, 3rd quintile, 4th quintile, 5th quintile (most marginilized)
ONMARG	Ethnic concentration	Used quintiles of the DA score.	1st quintile (least marginalized), 2nd quintile, 3rd quintile, 4th quintile, 5th quintile (most marginilized)
ONMARG	Residential instability	Used quintiles of the DA score.	1st quintile (least marginalized), 2nd quintile, 3rd quintile, 4th quintile, 5th quintile (most marginilized)

CAPE, CPDB, IPDB	Program type	Combined primary care payment models provided by the Ontario Ministry of Health	Enhanced FFS, Capitation, Other
		Combined "Comprehensive Care Model (CCM)" and Family Health Group (FHG) responses into category: "Enhanced Fee-for-Service"	
		Combined "Family Health Network (FHN)" and "Family Health Organization (FHO)" into category: "Capitation"	
		Combined all other responses into category: "Other"	
HCES	Number of years with provider	Combined into 4 categories: < 3, 4 – 9, 10 – 19, ≥ 20	Less than 3, 4-9, 10-19, 20 or more
OHIP	Number of encounters/past 12 months	Combined into 2 categories: ≤ 3 encounters, > 3 encounters	≤ 3 encounters, > 3 encounters

Appendix B: Tests of association between observed missingness.

Table 1: Chi-square and Kruskal Wallis tests between missing and available health record responses and outcomes.

Factor		**Not Missing**	**Missing**	**p**
Primary outcomes				
Summed patient experience score	Mean (SD)	22.7 (3.4)	22.6 (3.4)	0.947
Doctor knows medical history	Mean (SD)	4.4 (0.9)	4.5 (0.9)	0.826
Doctor gives opportunity to ask questions	Mean (SD)	4.6 (0.9)	4.5 (1.0)	0.073
Doctor spends enough time with patient	Mean (SD)	4.4 (1.0)	4.4 (1.0)	0.391
Doctor involves patient in decision-making	Mean (SD)	4.5 (0.9)	4.5 (0.9)	0.362
Doctor explains in understandable way	Mean (SD)	4.6 (0.8)	4.7 (0.7)	0.297
Secondary Outcomes				
Time to routine visit	% (n)			0.302
Next day		18.1 (108)	81.9 (490)	
2-6 days		16.8 (125)	83.2 (621)	
1 or more weeks		21.0 (57)	79.0 (215)	
Time to urgent visit	% (n)			0.538
Same day		13.5 (102)	86.5 (625)	
Next day		13.8 (68)	86.5 (425)	
2-6 days		15.5 (179)	979 (84.5)	
1 or more weeks		15.5 (150)	84.5 (816)	

Table 2: Chi-square and Kruskal Wallis tests between missing and available health record responses and primary predictors.

Factor		Not Missing	Missing	p
Communication with doctor	% (n)			< 0.001
Yes		53.7 (181)	46.3 (156)	
No		76.1 (289)	23.9 (91)	
Email access	% (n)			< 0.001
Yes		46.1 (111)	53.9 (130)	
No		24.6 (557)	75.4 (1707)	
Internet access	% (n)			0.170
Yes		84.1 (53)	15.9 (10)	
No		75.6 (479)	24.4 (155)	
Video access	% (n)			0.098
Yes		68.0 (17)	32.0 (8)	
No		49.2 (451)	50.8 (466)	
Messaging access	% (n)			0.094
Yes		64.1 (2)	35.9 (14)	
No		49.1 (448)	50.9 (465)	
Virtual care with other provider (ex. Maple)	% (n)			0.465
Yes		84.0 (21)	16.0 (4)	
No		75.6 (760)	24.4 (245)	
Online appointment booking	% (n)			0.863
Yes		76.5 (114)	23.5 (35)	
No		75.4 (355)	24.6 (116)	

Table 3: Chi-square and Kruskal Wallis tests between missing and available health record responses and sociodemographic confounders and effect modifiers.

Factor		Not Missing	Missing	p
Age (years)	Mean (SD)	55.6 (16.0)	56.6 (17.3)	0.152
Sex	% (n)			0.712
Female		11.9 (466)	88.1 (3462)	
Male		11.5 (316)	88.5 (2423)	
Education	% (n)			< 0.001
Less than high school		6.4 (11)	93.6 (162)	
Some high school		4.9 (19)	95.1 (372)	
High school or equivalent		9.7 (124)	90.3 (1150)	

Some community, vocational, trade, or technical college		10.9 (37)	89.1 (301)	
Completed community, vocational, trade, or technical college		11.2 (177)	88.8 (1400)	
Some university		15.1 (36)	84.9 (202)	
Completed bachelor's degree		14.0 (243)	86.0 (1498)	
Post graduate training		13.9 (89)	86.1 (549)	
Post graduate doctorate training		16.2 (18)	83.8 (93)	
Post graduate professional training		16.8 (21)	83.2 (104)	
Income (imputed) (n)	% (n)			0.601
< $20,000		9.8 (41)	90.2 (376)	
$20,000 - < $30,000		10.5 (56)	89.5 (477)	
$30,000 - < $40,000		10.3 (52)	89.7 (453)	
$40,000 - < $50,000		10.8 (63)	89.2 (522)	
$50,000 - < $60,000		11.1 (57)	88.9 (455)	
$60,000 - < $70,000		11.2 (55)	88.8 (438)	
$70,000 - < $80,000		13.9 (64)	86.1 (397)	
$80,000 - < $90,000		11.1 (46)	88.9 (368)	
$90,000 - < $100,000		11.8 (37)	88.2 (277)	
$100,000 - < $120,000		12.4 (85)	87.6 (601)	
$120,000 - < $150,000		12.5 (71)	87.5 (499)	
> $150,000		13.2 (155)	86.8 (1022)	
Marginalization				
Dependency	% (n)			0.084
1st quintile (low)		12.7 (181)	87.3 (1244)	
2nd quintile		11.7 (143)	88.3 (1076)	
3rd quintile		12.0 (147)	88.0 (1082)	
4th quintile		12.0 (144)	88.0 (1054)	
5th quintile (high)		10.1 (156)	89.9 (1384)	
Missing (NA)		21.2 (11)	78.8 (41)	
Deprivation	% (n)			< 0.001
1st quintile (low)		13.7 (219)	86.3 (1384)	
2nd quintile		13.2 (192)	86.8 (1263)	
3rd quintile		10.9 (141)	89.1 (1157)	
4th quintile		9.6 (98)	90.2 (1118)	
5th quintile (high)		9.6 (98)	90.4 (922)	
Missing (NA)		21.1 (11)	78.8 (41)	
Ethnic concentration	% (n)			0.002
1st quintile (low)		9.5 (136)	90.5 (1301)	
2nd quintile		11.6 (151)	88.4 (1155)	
3rd quintile		13.9 (175)	86.1 (1087)	

4th quintile		12.8 (161)	87.2 (1095)	
5th quintile (high)		10.9 (148)	89.1 (1206)	
Missing (NA)		21.2 (11)	78.8 (41)	
Instability	% (n)			0.320
1st quintile (low)		11.5 (153)	88.5 (1172)	
2nd quintile		12.5 (165)	87.5 (1156)	
3rd quintile		11.2 (142)	88.8 (1121)	
4th quintile		11.2 (141)	88.8 (1117)	
5th quintile (high)		11.7 (170)	88.3 (1278)	
Missing (NA)		21.2 (11)	41 (78.8)	
Rurality Index of Ontario*	% (n)			0.012
Large urban (0)		13.3 (334)	86.7 (2182)	
Urban (1-9)		11.0 (196)	89.0 (1581)	
Small urban (10-39)		10.3 (166)	89.7 (1438)	
Rural (>39)		10.3 (71)	89.7 (617)	

Table 4: Chi-square and Kruskal Wallis tests between missing and available health record responses and clinical/health care utilization factors.

Factor		Not Missing	Missing	p
Perceived health	% (n)			< 0.001
Excellent		8.4 (85)	91.6 (929)	
Very good		11.6 (268)	88.4 (2051)	
Good		11.8 (246)	88.2 (1836)	
Fair		13.0 (116)	87.0 (773)	
Poor		18.8 (61)	81.2 (263)	
Asthma	% (n)			0.443
Yes		9.1 (11)	90.9 (110)	
No		11.8 (771)	88.2 (5775)	
CHF	% (n)			0.120
Yes		8.1 (17)	91.9 (193)	
No		11.8 (765)	88.2 (5692)	
COPD	% (n)			0.060
Yes		9.6 (76)	90.4 (712)	
No		12.0 (706)	88.0 (5173)	
Dementia	% (n)			1.000
Yes		11.7 (7)	88.3 (53)	
No		11.7 (775)	88.3 (5832)	
HIV*	% (n)			0.796
Yes		11.7 (782)	88.3 (5879)	
No		< 6	6	
Hypertension	% (n)			0.567
Yes		11.4 (290)	88.6 (2249)	
No		11.9 (492)	88.1 (3636)	
Diabetes	% (n)			0.659
Yes		133 (12.2)	960 (87.8)	
No		11.6 (649)	88.4 (4925)	
Rheumatoid arthritis	% (n)			0.627
Yes		11.7 (763)	88.3 (5762)	
No		13.4 (19)	86.6 (123)	
Crohn's disease*	**% (n)**			**0.105**
Yes		21.6 (8)	78.4 (29)	
No		11.7 (774)	88.3 (5856)	
Ulcerative colitis	% (n)			0.015
Yes		24.2 (11)	75.6 (34)	
No		11.6 (771)	88.4 (5851)	
Heart attack	% (n)			0.591
Yes		12.8 (43)	87.2 (293)	
No		11.7 (739)	88.3 (5592)	
Cancer	% (n)			0.009

Yes		14.9 (103)	85.1 (490)	
No		11.4 (677)	88.6 (5271)	
Comorbidities	% (n)			< 0.001
No chronic condition		10.7 (340)	89.3 (2847)	
1 chronic condition		14.1 (264)	85.9 (1606)	
2 comorbidities		12.3 (129)	87.7 (923)	
3 comorbidities		8.8 (47)	91.2 (485)	
Program type*	% (n)			0.062
FHO		12.3 (500)	87.7 (3552)	
FHN		11.7 (20)	88.3 (151)	
FHG		10.1 (144)	89.9 (1279)	
CCM		12.0 (19)	88.0 (139)	
GHC		26.7 (12)	73.3 (33)	
Other		9.5 (12)	90.5 (114)	
Primary care visits over past year	Mean (SD)	3.2 (4.3)	2.8 (3.2)	< 0.001
Primary care visits over past 2 years	Mean (SD)	6.2 (8.3)	5.4 (5.7)	< 0.001

Table 5: Chi-square and Kruskal Wallis tests between missing and available health record responses and waves.

Factor		**Not Missing**	**Missing**	**p**
Wave	% (n)			< 0.001
27		3.0 (66)	97.0 (2137)	
28		14.8 (327)	85.2 (1876)	
29		17.2 (389)	82.8 (1872)	

Table 6: Chi-square and Kruskal Wallis tests between missing and available online booking responses and outcomes.

Factor		Not Missing	Missing	p
Primary outcomes				
Summed patient experience score	Mean (SD)	22.8 (3.2)	22.6 (3.4)	0.150
Doctor knows medical history	Mean (SD)	4.5 (0.9)	4.5 (0.9)	0.828
Doctor gives opportunity to ask questions	Mean (SD)	4.6 (0.9)	4.5 (1.0)	0.030
Doctor spends enough time with patient	Mean (SD)	4.5 (0.9)	4.4 (1.0)	0.149
Doctor involves patient in decision-making	Mean (SD)	4.6 (0.8)	4.5 (0.9)	0.014
Doctor explains in understandable way	Mean (SD)	4.7 (0.7)	4.7 (0.7)	0.152
Secondary Outcomes				
Time to routine visit	% (n)			0.330
Next day		12.4 (74)	87.6 (524)	
2-6 days		11.3 (84)	88.7 (662)	
1 or more weeks		14.7 (40)	85.3 (232)	
Time to urgent visit	% (n)			0.220
Same day		9.4 (71)	90.6 (683)	
Next day		10.3 (51)	89.7 (442)	
2-6 days		12.3 (143)	87.7 (1015)	
1 or more weeks		10.7 (103)	89.3 (863)	

Table 7: Chi-square and Kruskal Wallis tests between missing and available online booking responses and primary predictors.

Factor		Not Missing	Missing	p
Communication with doctor	% (n)			< 0.001
Yes		48.7 (164)	51.3 (173)	
No		20.0 (76)	90.0 (304)	
Email access	% (n)			< 0.001
Yes		41.9 (101)	58.1 (140)	
No		16.6 (376)	83.4 (1888)	
Internet access	% (n)			< 0.001
Yes		76.2 (48)	23.8 (15)	
No		39.7 (252)	60.3 (382)	
Video access	% (n)			0.046
Yes		44.0 (11)	56.0 (14)	
No		24.4 (224)	75.6 (693)	
Messaging access	% (n)			< 0.001
Yes		61.5 (24)	38.5 (15)	
No		23.2 (212)	76.8 (701)	
Virtual care with other provider (ex. Maple)	% (n)			0.153
Yes		76.0 (19)	(< 6)	
No		59.8 (601)	40.2 (404)	
Digital health record access	% (n)			0.639
Yes		62.3 (76)	37.7 (46)	
No		59.5 (393)	40.5 (267)	
Digital generic health record access	% (n)			0.866
Yes		57.7 (61)	41.3 (43)	
No		60.0 (550)	40.0 (366)	
Digital health record access specific to condition	% (n)			
Yes		57.1 (8)	42.9 (6)	1.000
No		60.1 (449)	39.9 (298)	
Digital comprehensive health record access	% (n)			0.039
Yes		78.8 (26)	21.2 (7)	
No		59.4 (590)	404 (40.6)	

Table 8: Chi-square and Kruskal Wallis tests between missing and available online booking responses and sociodemographic confounders and effect modifiers.

Factor		**Not Missing**	**Missing**	**p**
Age (years)	Mean (SD)	530 (16.2)	56.8 (17.2)	< 0.001
Sex	% (n)			0.355
Female		9.0 (394)	91.0 (3547)	
Male		9.7 (266)	90.3 (2473)	
Education	% (n)			< 0.001
Less than high school		(< 4)	(169)	
Some high school		3.6 (14)	96.4 (377)	
High school or equivalent		6.4 (82)	93.6 (1192)	
Some community, vocational, trade, or technical college		6.8 (23)	93.2 (315)	
Completed community, vocational, trade, or technical college		8.2 (130)	91.8 (1447)	
Some university		8.8 (21)	91.2 (217)	
Completed bachelor's degree		12.7 (221)	87.3 (1520)	
Post graduate training		14.4 (92)	85.6 (546)	
Post graduate doctorate training		11.7 (13)	88.3 (98)	
Post graduate professional training		12.0 (15)	88.0 (110)	
Income (imputed) (n)	% (n)			< 0.001
< $20,000		6.5 (27)	93.5 (390)	
$20,000 - < $30,000		5.8 (31)	94.2 (502)	
$30,000 - < $40,000		6.9 (35)	93.1 (470)	
$40,000 - < $50,000		6.7 (39)	93.3 (546)	
$50,000 - < $60,000		8.8 (45)	91.2 (467)	
$60,000 - < $70,000		8.3 (41)	91.7 (452)	
$70,000 - < $80,000		11.1 (51)	88.9 (410)	
$80,000 - < $90,000		9.9 (41)	90.1 (373)	
$90,000 - < $100,000		9.2 (29)	90.8 (285)	
$100,000 - < $120,000		10.2 (70)	89.8 (616)	
$120,000 - < $150,000		9.8 (56)	90.2 (514)	
> $150,000		13.2 (155)	86.8 (1022)	
Marginalization				
Dependency*	% (n)			< 0.001
1st quintile (low)		11.8 (168)	88.2 (1257)	
2nd quintile		9.8 (120)	90.2 (1099)	

3rd quintile		9.7 (119)	90.3 (1110)	
4th quintile		8.7 (104)	91.3 (1098)	
5th quintile (high)		6.7 (103)	93.3 (1437)	
Missing (NA)		11.5 (6)	88.5 (46)	
Deprivation*	% (n)			< 0.001
1st quintile (low)		11.2 (178)	88.8 (1424)	
2nd quintile		11.3 (165)	88.7 (1290)	
3rd quintile		8.8 (114)	91.2 (1184)	
4th quintile		7.3 (90)	92.7 (1149)	
5th quintile (high)		6.5 (66)	93.5 (954)	
Missing (NA)		11.5 (6)	88.5 (46)	
Ethnic concentration*	% (n)			0.009
1st quintile (low)		7.0 (110)	93.0 (1337)	
2nd quintile		8.7 (114)	91.3 (1192)	
3rd quintile		10.4 (131)	89.6 (1131)	
4th quintile		10.6 (133)	89.4 (1123)	
5th quintile (high)		10.0 (136)	90.0 (1218)	
Missing (NA)		11.5 (6)	88.5 (46)	
Instability*	% (n)			0.811
1st quintile (low)		9.9 (131)	90.1 (1194)	
2nd quintile		9.6 (127)	90.4 (1194)	
3rd quintile		9.0 (114)	91.0 (1149)	
4th quintile		8.4 (106)	91.6 (1152)	
5th quintile (high)		9.4 (136)	90.2 (1312)	
Missing (NA)		11.5 (6)	88.5 (46)	
Rurality Index of Ontario*	% (n)			0.001
Large urban (0)		11.0 (276)	89.0 (2240)	
Urban (1-9)		9.2 (163)	90.8 (1614)	
Small urban (10-39)		7.3 (117)	92.7 (1487)	
Rural (>39)		8.0 (55)	92.0 (633)	

Table 9: Chi-square and Kruskal Wallis tests between missing and available online booking responses and clinical/health care utilization factors.

Factors		Not Missing	Missing	p
Perceived health	% (n)			0.051
Excellent		10.4 (105)	89.6 (909)	
Very good		9.8 (227)	90.2 (2092)	
Good		8.1 (168)	91.9 (1914)	
Fair		8.4 (75)	91.6 (814)	
Poor		12.0 (39)	88.0 (285)	
Asthma	% (n)			0.236
Yes		5.8 (7)	94.3 (114)	
No		9.4 (613)	90.6 (5933)	
CHF	% (n)			0.015
Yes		4.3 (9)	95.7 (201)	
No		9.5 (611)	90.5 (5846)	
COPD	% (n)			0.001
Yes		6.1 (48)	93.9 (740)	
No		9.7 (572)	90.3 (5307)	
Dementia	% (n)			0.972
Yes		(<6)	(55)	
No		9.3 (615)	90.7 (5992)	
HIV*	% (n)			0.935
Yes		(<6)	(6)	
No		9.3 (620)	90.7 (6041)	
Hypertension	% (n)			0.001
Yes		7.7 (196)	92.3 (2343)	
No		10.3 (424)	89.7 (3704)	
Diabetes	% (n)			0.012
Yes		7.2 (79)	92.8 (1014)	
No		9.7 (541)	90.3 (5033	
Rheumatoid arthritis	% (n)			1.000
Yes		9.2 (13)	90.8 (129)	
No		9.3 (607)	90.7 (5918)	
Crohn's disease*	% (n)			0.548
Yes		(<6)	(32)	
No		9.3 (615)	90.7 (6015)	
Ulcerative colitis*	% (n)			0.088
Yes		17.8 (8)	82.2 (37)	
No		9.2 (612)	90.8 (6010)	
Heart attack	% (n)			0.664
Yes		10.1 (34)	89.9 (302)	
No		9.3 (586)	90.7 (5745)	
Cancer	% (n)			0.903

Yes		9.1 (6.3)	90.9 (630)	
No		9.3 (554)	90.7 (5394)	
Comorbidities	% (n)			0.001
No chronic condition		10.3 (329)	89.7 (2858)	
1 chronic condition		9.6 (180)	90.4 (1690)	
2 comorbidities		7.5 (79)	973 (92.5)	
3 comorbidities		5.5 (29)	94.5 (503)	
Program type*	% (n)			0.715
FHO		9.7 (395)	90.3 (3657)	
FHN		8.8 (15)	91.2 (156)	
FHG		8.9 (127)	91.1 (1296)	
CCM		8.2 (13)	91.8 (145)	
GHC		17.8 (8)	82.2 (37)	
Other		7.2 (9)	92.8 (116)	
Primary care visits over past year	Mean (SD)	2.9 (4.4)	2.8 (3.2)	0.371
Primary care visits over past 2 years	Mean (SD)	5.6 (8.7)	5.5 (5.7)	0.585

Table 10: Chi-square and Kruskal Wallis tests between missing and available online booking responses and waves.

Factor		**Not Missing**	**Missing**	**p**
Wave	% (n)			< 0.001
27		0.5 (12)	99.5 (2191)	
28		4.9 (107)	95.1 (2096)	
29		22.2 (501)	77.8 (1760)	

Table 11: Chi-square and Kruskal Wallis tests between missing and available remote communication responses and outcomes.

Factor		Not Missing	Missing	p
Primary outcomes				
Summed patient experience score	Mean (SD)	22.7 (3.4)	22.6 (3.4)	0.792
Doctor knows medical history	Mean (SD)	4.4 (0.9)	4.5 (0.9)	0.531
Doctor gives opportunity to ask questions	Mean (SD)	4.6 (0.9)	4.5 (1.0)	0.238
Doctor spends enough time with patient	Mean (SD)	4.4 (1.0)	4.4 (1.0)	0.841
Doctor involves patient in decision-making	Mean (SD)	4.5 (0.8)	4.5 (0.9)	0.377
Doctor explains in understandable way	Mean (SD)	4.7 (0.7)	4.7 (0.7)	0.824
Secondary Outcomes				
Time to routine visit	% (n)			0.973
Next day		13.5 (81)	86.5 (517)	
2-6 days		13.4 (100)	86.6 (646)	
1 or more weeks		14.0 (38)	86.0 (234)	
Time to urgent visit	% (n)			0.296
Same day		13.1 (99)	86.9 (655)	
Next day		12.4 (61)	87.6 (432)	
2-6 days		15.5 (179)	84.5 (979)	
1 or more weeks		13.7 (132)	86.3 (834)	

Table 12: Chi-square and Kruskal Wallis tests between missing and available remote communication responses and primary predictors.

Factor		Not Missing	Missing	p
Digital health record access	% (n)			0.025
Yes		69.7 (85)	30.3 (37)	
No		58.3 (285)	41.7 (275)	
Digital generic health record access	% (n)			0.006
Yes		72.1 (75)	27.9 (29)	
No		57.5 (527)	42.5 (389)	
Digital health record access specific to condition	% (n)			0.919
Yes		(9)	(< 6)	

No		59.3 (443)	40.7 (304)	
Digital comprehensive health record access	% (n)			0.726
Yes		54.5 (18)	45.5 (15)	
No		59.2 (588)	406 (40.8)	
Online appointment booking	% (n)			< 0.001
Yes		67.8 (101)	48 (32.2)	
No		29.5 (139)	70.5 (332)	

Table 13: Chi-square and Kruskal Wallis tests between missing and available remote communication responses and sociodemographic confounders and effect modifiers.

Factor		**Not Missing**	**Missing**	**P**
Age (years)	Mean (SD)	52.9 (16.0)	56.9 (17.3)	< 0.001
Sex	% (n)			0.197
Female		11.2 (439)	88.8 (3489)	
Male		10.1 (278)	89.9 (2461)	
Education	% (n)			< 0.001
Less than high school		4.6 (8)	95.4 (165)	
Some high school		3.3 (13)	96.7 (378)	
High school or equivalent		8.2 (104)	91.8 (1170)	
Some community, vocational, trade, or technical college		8.6 (29)	91.4 (309)	
Completed community, vocational, trade, or technical college		10.9 (172)	89.1 (1405)	
Some university		10.9 (26)	89.1 (212)	
Completed bachelor's degree		12.7 (221)	87.3 (1520)	
Post graduate training		16.0 (102)	84.0 (536)	
Post graduate doctorate training		13.5 (15)	86.5 (96)	
Post graduate professional training		16.0 (20)	84.0 (105)	
Income (imputed) (n)	% (n)			0.006
< $20,000		11.5 (48)	88.5 (369)	
$20,000 - < $30,000		8.4 (45)	91.6 (488)	
$30,000 - < $40,000		7.3 (37)	92.7 (468)	
$40,000 - < $50,000		9.9 (58)	90.1 (527)	
$50,000 - < $60,000		9.6 (49)	90.4 (463)	
$60,000 - < $70,000		10.5 (52)	89.5 (441)	
$70,000 - < $80,000		10.0 (46)	90.0 (415)	

$80,000 - < $90,000		8.9 (37)	91.1 (377)	
$90,000 - < $100,000		12.7 (40)	87.3 (274)	
$100,000 - < $120,000		10.3 (71)	89.7 (615)	
$120,000 - < $150,000		13.2 (75)	86.8 (495)	
> $150,000		13.5 (159)	86.5 (1018)	
Marginalization				
Dependency*	% (n)			0.011
1st quintile (low)		12.6 (180)	87.4 (1245)	
2nd quintile		11.2 (137)	88.8 (1082)	
3rd quintile		10.7 (131)	89.3 (1098)	
4th quintile		9.0 (108)	91.0 (1094)	
5th quintile (high)		9.8 (151)	90.2 (1389)	
Missing (NA)		19.2 (10)	80.8 (42)	
Deprivation	% (n)			< 0.001
1st quintile (low)		13.8 (222)	86.2 (1381)	
2nd quintile		11.5 (167)	88.5 (1288)	
3rd quintile		8.7 (113)	91.3 (1185)	
4th quintile		8.9 (11)	91.1 (1129)	
5th quintile (high)		9.3 (95)	90.7 (925)	
Missing (NA)		19.2 (10)	90.7 (925)	
Ethnic concentration	% (n)			< 0.001
1st quintile (low)		8.3 (119)	91.7 (1318)	
2nd quintile		9.6 (126)	90.4 (1180)	
3rd quintile		13.8 (174)	86.2 (1088)	
4th quintile		11.1 (139)	88.9 (1117)	
5th quintile (high)		11.0 (149)	89.0 (1205)	
Missing (NA)		19.2 (10)	80.8 (42)	
Instability	% (n)			0.152
1st quintile (low)		11.5 (153)	88.5 (1172)	
2nd quintile		10.5 (139)	89.5 (1182)	
3rd quintile		10.1 (127)	89.9 (1136)	
4th quintile		9.6 (121)	90.4 (1137)	
5th quintile (high)		11.5 (167)	88.5 (1281)	
Missing (NA)		19.2 (10)	42 (80.8)	
Rurality Index of Ontario	% (n)			< 0.001
Large urban (0)		12.9 (325)	87.1 (2191)	
Urban (1-9)		10.1 (179)	89.9 (1598)	
Small urban (10-39)		8.9 (143)	91.1 (1461)	
Rural (>39)		8.1 (56)	91.1 (1461)	

Table 14: Chi-square and Kruskal Wallis tests between missing and available remote communication responses and clinical/health care utilization factors.

Factors		Not Missing	Missing	p
Perceived health	% (n)			0.004
Excellent		11.4 (116)	88.6 (898)	
Very good		11.3 (261)	88.7 (2058)	
Good		9.5 (197)	90.5 (1885)	
Fair		9.7 (86)	90.3 (803)	
Poor		16.0 (52)	84.0 (272)	
Asthma	% (n)			0.298
Yes		7.4 (9)	92.6 (112)	
No		10.8 (708)	89.2 (5838)	
CHF	% (n)			0.485
Yes		9.0 (19)	91.0 (191)	
No		10.8 (698)	89.2 (5759)	
COPD	% (n)			< 0.001
Yes		6.9 (54)	93.1 (734)	
No		11.3 (663)	88.7 (5217)	
Dementia	% (n)			1.000
Yes		10.0 (6)	90.0 (54)	
No		10.8 (711)	89.2 (5896)	
HIV*	% (n)			1.000
Yes		(<6)	(<6)	
No		10.7 (716)	89.3 (5945)	
Hypertension	% (n)			< 0.001
Yes		8.5 (217)	91.5 (2322)	
No		12.1 (500)	87.9 (3628)	
Diabetes	% (n)			0.019
Yes		8.7 (95)	91.3 (998)	
No		11.2 (622)	88.8 (4952)	
Rheumatoid arthritis	% (n)			0.448
Yes		8.5 (12)	91.5 (130)	
No		10.8 (705)	89.2 (5820)	
Crohn's disease*	% (n)			0.061
Yes		21.6 (8)	78.4 (29)	
No		10.7 (709)	5921 (89.3)	
Ulcerative colitis*	% (n)			0.199
Yes		17.8 (8)	82.2 (37)	
No		10.7 (709)	5913 (89.3)	
Heart attack	% (n)			0.231
Yes		8.6 (29)	91.4 (307)	
No		10.9 (688)	89.1 (5643)	
Cancer	% (n)			0.454

Yes		11.7 (81)	88.3 (612)	
No		10.7 (635)	89.3 (5313)	
Comorbidities	% (n)			0.001
No chronic condition		12.2 (389)	87.8 (2798)	
1 chronic condition		10.3 (192)	89.7 (1678)	
2 comorbidities		9.0 (95)	91.0 (957)	
3 comorbidities		7.5 (40)	92.5 (492)	
Program type*	% (n)			0.001
FHO		11.9 (483)	88.1 (3569)	
FHN		9.4 (16)	90.6 (155)	
FHG		8.4 (119)	91.6 (1304)	
CCM		7.6 (12)	92.4 (146)	
GHC		24.4 (11)	75.6 (34)	
Other		7.9 (10)	92.1 (116)	
Primary care visits over past year	Mean (SD)	2.8 (3.0)	2.8 (3.4)	0.791
Primary care visits over past 2 years	Mean (SD)	5.4 (5.4)	5.5 (6.1)	0.813

Table 15: Chi-square and Kruskal Wallis tests between missing and available remote communication responses and waves.

Factor		**Not Missing**	**Missing**	**p**
Wave	% (n)			< 0.001
27		9.0 (198)	91.0 (2005)	
28		18.0 (397)	82.0 (1806)	
29		5.4 (122)	94.6 (2139)	

Appendix C: Correlation among HCES experience sub-scores

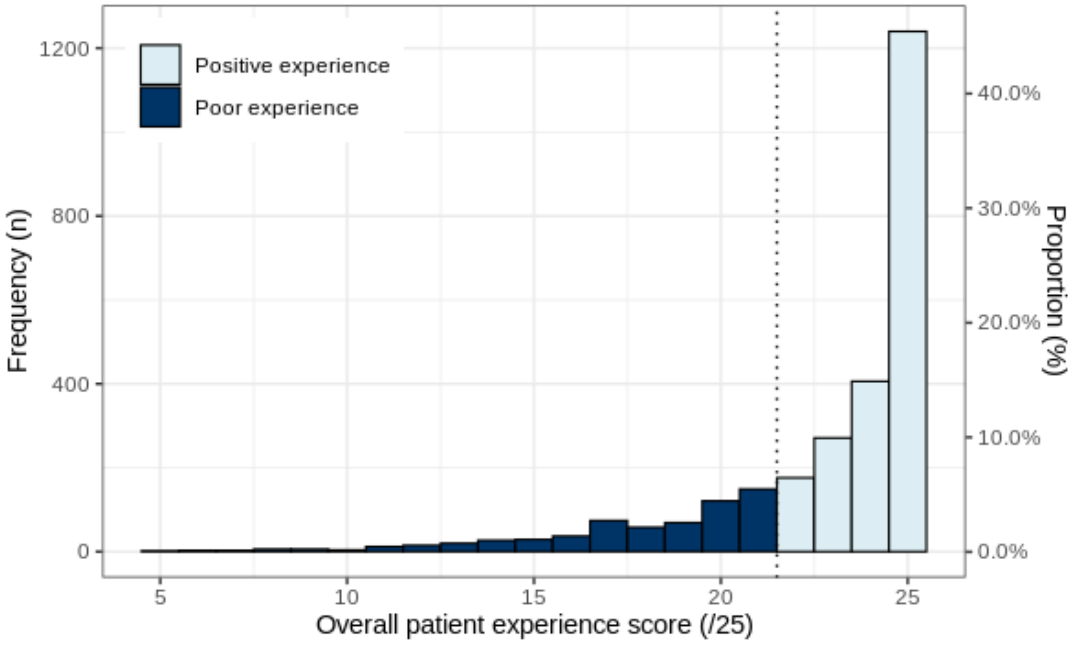
Figure 2: Kendall's Tau among experience questions.

	Exp_1	Exp_2	Exp_3	Exp_4	Exp_5
Exp_1	1.00	0.42	0.39	0.39	0.38
Exp_2	0.42	1.00	0.54	0.52	0.48
Exp_3	0.39	0.54	1.00	0.55	0.48
Exp_4	0.39	0.52	0.55	1.00	0.56
Exp_5	0.38	0.48	0.48	0.56	1.00

Figure 3: Spearman's rho among experience questions.

	Exp_1	Exp_2	Exp_3	Exp_4	Exp_5
Exp_1	1	0.45	0.42	0.42	0.39
Exp_2	0.45	1	0.57	0.55	0.49
Exp_3	0.42	0.57	1	0.58	0.51
Exp_4	0.42	0.55	0.58	1	0.57
Exp_5	0.39	0.49	0.51	0.57	1

Appendix D: Histogram of patient experience scores with binary groupings.



Appendix E: Mixed effect patient experience model clustered by LHIN

Predictors	Full Model, N = 2,687		≤ 3 encounters, N = 1,647		> 3 encounters, N = 1,038	
	Odds Ratios	CI (95%)	Odds Ratios	CI (95%)	Odds Ratios	CI (95%)
Intercept	0.57	0.24 – 1.32	0.63	0.20 – 2.02	0.93	0.20 – 4.38
Remote communication access	0.94	0.77 – 1.14	1.00	0.77 – 1.28	0.83	0.59 – 1.16
Health record access	0.90	0.50 – 1.64	0.97	0.43 – 2.18	0.82	0.33 – 2.01
Online booking access	0.69	0.40 – 1.19	1.07	0.58 – 1.98	0.16	0.04 – 0.70*
Age (years)						
16-44	Reference					
45-64	0.57	0.45 – 0.73***	0.59	0.44 – 0.80**	0.49	0.31 – 0.75**
65+	0.40	0.31 – 0.53***	0.44	0.31 – 0.62***	0.32	0.20 – 0.51***
Sex						
Female	Reference					
Male	0.88	0.73 – 1.07	0.87	0.68 – 1.12	0.91	0.65 – 1.27
Financial Situation						
Very comfortable	Reference					
Comfortable	1.07	0.82 – 1.39	1.05	0.75 – 1.48	1.08	0.70 – 1.68
Tight/Very tight/Poor	1.49	1.09 – 2.04*	1.61	1.06 – 2.43*	1.34	0.80 – 2.25
Educational Attainment						
High school or less	Reference					
Some college/university	0.89	0.61 – 1.30	0.74	0.45 – 1.23	1.07	0.58 – 1.96
Completed college/university	0.96	0.76 – 1.22	1.01	0.74 – 1.38	0.89	0.60 – 1.31
Post-graduate/professional degree	0.82	0.58 – 1.15	0.74	0.47 – 1.16	0.96	0.55 – 1.67
Primary language spoken						
English	Reference					
Other	1.49	1.13 – 1.96**	1.42	0.98 – 2.07	1.53	0.98 – 2.39
Self-perceived health						
Poor	Reference					
Fair	1.23	0.75 – 2.00	1.03	0.48 – 2.23	1.27	0.66 – 2.44
Good	1.14	0.72 – 1.82	1.00	0.49 – 2.07	1.17	0.66 – 2.22
Very good	0.93	0.58 – 1.50	0.74	0.36 – 1.53	1.00	0.50 – 1.97
Excellent	0.65	0.38 – 1.10	0.48	0.22 – 1.05	0.90	0.38 – 2.11
ADG Score						
< 3	Reference					
3 – 4	1.13	0.79 – 1.61	1.20	0.82 – 1.76	0.58	0.20 – 1.74
5 – 6	0.89	0.62 – 1.28	0.86	0.57 – 1.29	0.75	0.27 – 2.07
7 – 8	0.92	0.63 – 1.34	1.10	0.70 – 1.71	0.62	0.23 – 1.72
≥ 9	1.17	0.81 – 1.70	1.29	0.80 – 2.09	0.97	0.36 – 2.61
Program type						
Enhanced FFS	Reference					
Capitation	0.85	0.68 – 1.06	0.81	0.59 – 1.11	0.80	0.57 – 1.14
Other	0.70	0.32 – 1.53	0.58	0.20 – 1.66	1.12	0.34 – 3.71
Years with provider						
< 4	Reference					
4 – 9	0.73	0.56 – 0.95*	0.72	0.52 – 1.01	0.73	0.46 – 1.16

10 – 19	0.81	0.62 – 1.06	0.68	0.48 – 0.96*	1.08	0.64 – 1.79
≥ 20	0.68	0.52 – 0.89**	0.70	0.50 – 0.98*	0.67	0.43 – 1.05
RIO category						
Large urban	Reference					
Urban	0.93	0.74 – 1.19	0.92	0.65 – 1.31	0.93	0.63 – 1.38
Small urban	1.10	0.81 – 1.48	1.07	0.71 – 1.61	1.08	0.64 – 1.79
Rural	1.07	0.70 – 1.64	1.21	0.72 – 2.04	0.79	0.36 – 1.71
Dependency						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.16	0.86 – 1.57	1.17	0.80 – 1.70	1.28	0.76 – 2.18
3rd quintile	1.14	0.83 – 1.55	0.76	0.51 – 1.13	2.44	1.42 – 4.18**
4th quintile	1.13	0.82 – 1.57	0.94	0.62 – 1.43	1.68	0.96 – 2.94
5th quintile *(most marginalized)*	0.95	0.68 – 1.34	0.78	0.50 – 1.21	1.42	0.80 – 2.51
Material Deprivation						
1st quintile *(least marginalized)*	Reference					
2nd quintile	0.87	0.66 – 1.15	0.87	0.62 – 1.23	0.82	0.51 – 1.32
3rd quintile	0.85	0.63 – 1.14	0.98	0.68 – 1.42	0.59	0.35 – 0.99*
4th quintile	0.92	0.67 – 1.26	1.02	0.67 – 1.54	0.74	0.44 – 1.24
5th quintile *(most marginalized)*	0.70	0.49 – 0.99*	0.71	0.44 – 1.14	0.68	0.39 – 1.20
Ethnic Concentration						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.10	0.80 – 1.51	1.33	0.89 – 1.98	0.81	0.46 – 1.42
3rd quintile	1.01	0.71 – 1.43	1.22	0.78 – 1.90	0.68	0.37 – 1.23
4th quintile	1.39	0.95 – 2.02	1.50	0.93 – 2.43	1.16	0.62 – 2.16
5th quintile *(most marginalized)*	1.43	0.95 – 2.14	1.66	0.98 – 2.81	1.00	0.51 – 1.97
Residential Instability						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.16	0.86 – 1.56	1.22	0.83 – 1.79	1.09	0.65 – 1.82
3rd quintile	1.00	0.73 – 1.37	1.11	0.74 – 1.65	0.85	0.49 – 1.48
4th quintile	1.22	0.89 – 1.69	1.37	0.90 – 2.09	1.09	0.64 – 1.86
5th quintile *(most marginalized)*	1.18	0.85 – 1.63	1.19	0.77 – 1.84	1.11	0.65 – 1.89
Random Effects						
σ2	3.29		3.29		3.29	
τ00 lhin	0.00		0.01		0.00	
ICC	N/A		0.00		N/A	
N lhin 14	14		14		14	

Appendix F: Chi-square test of reduction in summed experience model deviance

Chi-square test

Analysis of Deviance Table

Model: binomial, link: logit

Response: expb2.

Terms added sequentially (first to last)

	Df	Deviance	Resid. Df	Resid. Dev	Pr(>Chi)	
NULL			2691	2917.5		
Telehealth access	1	0.648	2690	2916.9	0.4209930	
Health record access	1	0.012	2689	2916.8	0.9122077	
Booking access	1	0.700	2688	2916.2	0.4027818	
Age	1	73.733	2687	2842.4	< 2.2e-16	***
Sex.	1	1.641	2686	2840.8	0.2001375	
Financial status	2	15.893	2684	2824.9	0.0003539	***
Education	3	0.818	2681	2824.1	0.8452748	
Satisfaction	3	127.470	2678	2696.6	< 2.2e-16	***
Language	1	13.965	2677	2682.6	0.0001862	***
Self-reported health	4	10.710	2673	2671.9	0.0300289	*
ADG.	4	5.394	2669	2666.5	0.2492276	
Number of encounters	1	3.051	2668	2663.5	0.0807108	.
Program type	2	4.292	2666	2659.2	0.1169739	
Practice type	1	0.250	2665	2658.9	0.6173995	
Years with provider	3	9.364	2662	2649.6	0.0248236	*
Rurality	3	3.102	2659	2646.5	0.3761265	
dependency.	4	2.369	2655	2644.1	0.6681767	
deprivation.	4	2.549	2651	2641.6	0.6359516	
ethnic.	4	7.164	2647	2634.4	0.1274484	
instability.	4	4.237	2643	2630.1	0.3748621	

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Appendix G: GVIFs for Summed Experience Models

Unstratified Model

	GVIF	Df	GVIF^(1/(2*Df))
Telehealth access	1.079490	1	1.038985
Health record access	1.033749	1	1.016735
Booking access	1.050157	1	1.024772
Age	1.365370	2	1.080967
Sex.	1.059548	1	1.029343
Financial status	1.166931	2	1.039349
Education	1.235875	3	1.035927
Language	1.210175	1	1.100080
Self-reported health	1.309509	4	1.034281
ADG.	1.272257	4	1.030557
Program type	1.262988	2	1.060107
Years with provider	1.113226	3	1.018038
Rurality	2.087114	3	1.130467
dependency.	1.665968	4	1.065880
deprivation.	1.565752	4	1.057646
ethnic.	2.782561	4	1.136464
instability.	1.721973	4	1.070295

≤ 3 primary care encounters over the past 12 months.

	GVIF	Df	GVIF^(1/(2*Df))
Telehealth access	1.142246	1	1.068759
Health record access	1.042237	1	1.020900
Booking access	1.030793	1	1.015280
Age	1.525330	2	1.111325
Sex.	1.125118	1	1.060716
Financial status	1.254726	2	1.058369
Education	1.460156	3	1.065123
Language	1.365633	1	1.168603
Self-reported health	1.426590	4	1.045412
ADG.	1.319354	4	1.035250
Program type	1.350963	2	1.078104
Years with provider	1.237971	3	1.036219
Rurality	2.326951	3	1.151148
dependency.	1.865417	4	1.081053
deprivation.	1.763387	4	1.073479
ethnic.	3.139884	4	1.153757
instability.	1.808704	4	1.076889

> 3 primary care encounters over the past 12 months.

	GVIF	Df	GVIF^(1/(2*Df))
Telehealth access	1.142246	1	1.068759
Health record access	1.042237	1	1.020900
Booking access	1.030793	1	1.015280
Age	1.525330	2	1.111325
Sex.	1.125118	1	1.060716
Financial status	1.254726	2	1.058369
Education	1.460156	3	1.065123
Language	1.365633	1	1.168603
Self-reported health	1.426590	4	1.045412
ADG.	1.319354	4	1.035250
Program type	1.350963	2	1.078104
Years with provider	1.237971	3	1.036219
Rurality	2.326951	3	1.151148
dependency.	1.865417	4	1.081053
deprivation.	1.763387	4	1.073479
ethnic.	3.139884	4	1.153757
instability.	1.808704	4	1.076889

Appendix H: Hosmer Lemeshow test for experience models

Outcome	Models				
	Unstratified	**≤ 60 years**	**> 60 years**	**≤ 3 visits**	**>3 visits**
Summed patient experience score	0.03963*			0.74	0.5707
Knows medical history	0.6009	0.292	0.7137	0.7162	0.7044
Gives opportunity to ask questions	0.5827	0.3031	0.04466*	0.3366	0.8598
Spends enough time with patient	0.6104	0.7042	0.4797	0.2129	0.3004
Involves patient in decision-making	0.06787	0.05792	0.4289	0.8708	0.722
Explains in a way easy to understand	0.09738	0.7368	0.8673	0.03497*	0.8808
Time to appointment	0.262			0.8606	0.8403

Appendix I: Changes in residual deviance for models of independent HCES experience items.

Doctor/office: Knows important information about medical history

Analysis of Deviance Table

Model: binomial, link: logit

Response: exp1.

Terms added sequentially (first to last)

	Df	Deviance	Resid. Df	Resid. Dev	Pr(>Chi)	
NULL			2691	1991.2		
Telehealth access	1	1.7541	2690	1989.5	0.185368	
Health record access	1	3.3607	2689	1986.1	0.066769	.
Booking access	1	1.7157	2688	1984.4	0.190244	
Sex.	1	0.8656	2687	1983.5	0.352163	
Financial status	2	10.0433	2685	1973.5	0.006594	**
Education	3	9.0850	2682	1964.4	0.028182	*
Language	1	18.1871	2681	1946.2	2.002e-05	***
Self-reported health	4	4.4088	2677	1941.8	0.353499	
ADG.	4	3.0551	2673	1938.8	0.548645	
Program type	2	6.0448	2671	1932.7	0.048685	*
Years with provider	3	24.1089	2668	1908.6	2.371e-05	***
Rurality	3	2.8680	2665	1905.8	0.412425	
dependency.	4	5.8061	2661	1900.0	0.214101	
deprivation.	4	5.9997	2657	1894.0	0.199172	
ethnic.	4	3.2159	2653	1890.7	0.522372	
instability.	4	5.5847	2649	1885.2	0.232380	

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Doctor/office: Opportunity to ask questions

Analysis of Deviance Table

Model: binomial, link: logit

Response: exp2.

Terms added sequentially (first to last)

	Df	Deviance	Resid. Df	Resid. Dev	Pr(>Chi)	
NULL			2691	1923.0		
Telehealth access	1	3.1063	2690	1919.8	0.0779884	.
Health record access	1	2.7814	2689	1917.1	0.0953658	.
Booking access	1	0.0079	2688	1917.1	0.9292689	
Sex.	1	2.0279	2687	1915.0	0.1544366	
Financial status	2	9.6953	2685	1905.3	0.0078467	**
Education	3	1.6032	2682	1903.7	0.6586745	
Language	1	14.3564	2681	1889.4	0.0001513	***
Self-reported health	4	1.7295	2677	1887.7	0.7853443	
ADG.	4	4.1229	2673	1883.5	0.3896317	
Program type	2	6.5915	2671	1876.9	0.0370399	*
Years with provider	3	0.1337	2668	1876.8	0.9875035	
Rurality	3	4.3929	2665	1872.4	0.2220456	
dependency.	4	7.0577	2661	1865.3	0.1328679	
deprivation.	4	4.6892	2657	1860.7	0.3207027	
ethnic.	4	4.4909	2653	1856.2	0.3436310	
instability.	4	2.0703	2649	1854.1	0.7228216	

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Doctor/office: Spend enough time with you

Analysis of Deviance Table

Model: binomial, link: logit

Response: exp3.

Terms added sequentially (first to last)

	Df	Deviance	Resid. Df	Resid. Dev	Pr(>Chi)	
NULL			2691	2252.1		
Telehealth access	1	2.4479	2690	2249.7	0.117686	
Health record access	1	0.3206	2689	2249.4	0.571276	
Booking access	1	0.1606	2688	2249.2	0.688593	
Sex.	1	2.7358	2687	2246.5	0.098119	.
Financial status	2	12.4177	2685	2234.1	0.002012	**
Education	3	3.6716	2682	2230.4	0.299179	
Language	1	22.1031	2681	2208.3	2.584e-06	***
Self-reported health	4	4.5829	2677	2203.7	0.332832	
ADG.	4	3.8208	2673	2199.9	0.430794	
Program type	2	8.0260	2671	2191.8	0.018079	*
Years with provider	3	9.4984	2668	2182.3	0.023348	*
Rurality	3	4.6720	2665	2177.7	0.197452	
dependency.	4	4.1846	2661	2173.5	0.381600	
deprivation.	4	3.3050	2657	2170.2	0.508134	
ethnic.	4	1.3849	2653	2168.8	0.846821	
instability.	4	1.3132	2649	2167.5	0.859136	

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Doctor/office: Involve you in decisions about your care and treatment

Analysis of Deviance Table

Model: binomial, link: logit

Response: exp4.

Terms added sequentially (first to last)

	Df	Deviance	Resid. Df	Resid. Dev	Pr(>Chi)	
NULL			2691	1906.6		
Telehealth access	1	2.9170	2690	1903.7	0.087653	.
Health record access	1	0.5961	2689	1903.1	0.440057	
Booking access	1	0.1431	2688	1902.9	0.705233	
Sex.	1	0.3747	2687	1902.5	0.540436	
Financial status	2	11.6889	2685	1890.9	0.002896	**
Education	3	2.6437	2682	1888.2	0.449875	
Language	1	15.2985	2681	1872.9	9.179e-05	***
Self-reported health	4	8.8736	2677	1864.0	0.064338	.
ADG.	4	5.2154	2673	1858.8	0.265903	
Program type	2	4.2397	2671	1854.6	0.120050	
Years with provider	3	4.1448	2668	1850.5	0.246243	
Rurality	3	5.0585	2665	1845.4	0.167560	
dependency.	4	12.0752	2661	1833.3	0.016801	*
deprivation.	4	2.6114	2657	1830.7	0.624799	
ethnic.	4	4.9195	2653	1825.8	0.295662	
instability.	4	1.6945	2649	1824.1	0.791719	

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Doctor/office: Explain things in easy to understand terms

Analysis of Deviance Table

Model: binomial, link: logit

Response: exp5.

Terms added sequentially (first to last)

	Df	Deviance	Resid. Df	Resid. Dev	Pr(>Chi)	
NULL			2691	1219.1		
Telehealth access	1	0.0039	2690	1219.1	0.95002	
Health record access	1	0.4393	2689	1218.7	0.50745	
Booking access	1	0.5571	2688	1218.1	0.45545	
Sex.	1	0.5453	2687	1217.6	0.46023	
Financial status	2	4.9639	2685	1212.6	0.08358	.
Education	3	0.8260	2682	1211.8	0.84325	
Language	1	20.1536	2681	1191.6	7.146e-06	***
Self-reported health	4	11.2203	2677	1180.4	0.02420	*
ADG.	4	2.5690	2673	1177.8	0.63232	
Program type	2	3.9629	2671	1173.9	0.13787	
Years with provider	3	2.2382	2668	1171.7	0.52446	
Rurality	3	0.5931	2665	1171.1	0.89800	
dependency.	4	2.4877	2661	1168.6	0.64685	
deprivation.	4	6.3072	2657	1162.3	0.17735	
ethnic.	4	10.0217	2653	1152.2	0.04006	*
instability.	4	1.4460	2649	1150.8	0.83617	

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Appendix J: GVIFs for models of independent HCES experience items.

Doctor/office: Knows important information about medical history

Unstratified Model

	GVIF	Df	GVIF^(1/(2*Df))
Telehealth access	1.072646	1	1.035686
Health record access	1.021762	1	1.010822
Booking access	1.052806	1	1.026063
Sex.	1.051947	1	1.025644
Financial status	1.144097	2	1.034227
Education	1.171330	3	1.026707
Language	1.243667	1	1.115198
Self-reported health	1.258281	4	1.029135
ADG.	1.229104	4	1.026121
Program type	1.280853	2	1.063836
Years with provider	1.081260	3	1.013106
Rurality	2.079583	3	1.129786
dependency.	1.573311	4	1.058283
deprivation.	1.594889	4	1.060087
ethnic.	2.786894	4	1.136685
instability.	1.712720	4	1.069574

≤ 60 years old

	GVIF	Df	GVIF^(1/(2*Df))
Telehealth access	1.099248	1	1.048450
Health record access	1.027298	1	1.013557
Booking access	1.085413	1	1.041832
Sex.	1.109186	1	1.053179
Financial status	1.199048	2	1.046427
Education	1.210566	3	1.032361
Language	1.276045	1	1.129622
Self-reported health	1.251961	4	1.028487
ADG.	1.283648	4	1.031705
Program type	1.380996	2	1.084047
Years with provider	1.164096	3	1.025648
Rurality	1.984700	3	1.121026
dependency.	1.626548	4	1.062694
deprivation.	1.792418	4	1.075672
ethnic.	2.817052	4	1.138215
instability.	1.899538	4	1.083505

> 60 years old

	GVIF	Df	GVIF^(1/(2*Df))
Telehealth access	1.096736	1	1.047252
Health record access	1.072956	1	1.035836
Booking access	1.096209	1	1.047000
Sex.	1.094284	1	1.046080
Financial status	1.252624	2	1.057926
Education	1.256941	3	1.038849
Language	1.217616	1	1.103456
Self-reported health	1.365254	4	1.039685
ADG.	1.392389	4	1.042246
Program type	1.213410	2	1.049547
Years with provider	1.132421	3	1.020943
Rurality	2.515308	3	1.166179
dependency.	1.577945	4	1.058672
deprivation.	1.601121	4	1.060603
ethnic.	3.149949	4	1.154218
instability.	1.737575	4	1.071502

≤ 3 primary care encounters over the past 12 months

	GVIF	Df	GVIF^(1/(2*Df))
Telehealth access	1.071765	1	1.035261
Health record access	1.031615	1	1.015684
Booking access	1.071875	1	1.035314
Sex.	1.068534	1	1.033699
Financial status	1.146409	2	1.034749
Education	1.181045	3	1.028121
Language	1.196761	1	1.093966
Self-reported health	1.223538	4	1.025539
ADG.	1.221710	4	1.025347
Program type	1.271827	2	1.061957
Years with provider	1.128845	3	1.020405
Rurality	2.013696	3	1.123740
dependency.	1.698273	4	1.068442
deprivation.	1.651813	4	1.064744
ethnic.	2.757539	4	1.135181
instability.	1.842681	4	1.079397

> 3 primary care encounters over the past 12 months

	GVIF	Df	GVIF^(1/(2*Df))
Telehealth access	1.139213	1	1.067339
Health record access	1.022617	1	1.011245
Booking access	1.070095	1	1.034454
Sex.	1.099458	1	1.048551
Financial status	1.253937	2	1.058203
Education	1.414980	3	1.059559
Language	1.366025	1	1.168771
Self-reported health	1.421716	4	1.044965
ADG.	1.315879	4	1.034909
Program type	1.378216	2	1.083501
Years with provider	1.217792	3	1.033385
Rurality	2.357579	3	1.153660
dependency.	1.727301	4	1.070708
deprivation.	1.772990	4	1.074208
ethnic.	3.061193	4	1.150102
instability.	1.801414	4	1.076345

Doctor/office: Opportunity to ask questions

Unstratified Model

	GVIF	Df	GVIF^(1/(2*Df))
Telehealth access	1.075780	1	1.037198
Health record access	1.020351	1	1.010124
Booking access	1.049691	1	1.024544
Sex.	1.048717	1	1.024069
Financial status	1.163476	2	1.038579
Education	1.180666	3	1.028066
Language	1.224503	1	1.106573
Self-reported health	1.273214	4	1.030653
ADG.	1.229220	4	1.026133
Program type	1.251860	2	1.057764
Years with provider	1.092025	3	1.014780
Rurality	2.035109	3	1.125722
dependency.	1.602641	4	1.060729
deprivation.	1.561068	4	1.057250
ethnic.	2.673779	4	1.130813
instability.	1.753439	4	1.072720

≤ 60 years old

	GVIF	Df	GVIF^(1/(2*Df))
Telehealth access	1.103362	1	1.050410
Health record access	1.025857	1	1.012846
Booking access	1.080332	1	1.039390
Sex.	1.091460	1	1.044730
Financial status	1.240769	2	1.055414
Education	1.210744	3	1.032386
Language	1.259935	1	1.122468
Self-reported health	1.287435	4	1.032085
ADG.	1.305018	4	1.033837
Program type	1.343634	2	1.076639
Years with provider	1.182470	3	1.028328
Rurality	2.131012	3	1.134395
dependency.	1.649398	4	1.064549
deprivation.	1.772250	4	1.074152
ethnic.	2.838511	4	1.139295
instability.	1.934011	4	1.085944

> 60 years old

	GVIF	Df	GVIF^(1/(2*Df))
Telehealth access	1.088108	1	1.043124
Health record access	1.053349	1	1.026328
Booking access	1.048060	1	1.023748
Sex.	1.074113	1	1.036394
Financial status	1.262116	2	1.059924
Education	1.203719	3	1.031385
Language	1.161079	1	1.077534
Self-reported health	1.408673	4	1.043762
ADG.	1.320738	4	1.035386
Program type	1.227515	2	1.052584
Years with provider	1.128439	3	1.020343
Rurality	2.256575	3	1.145271
dependency.	1.574407	4	1.058375
deprivation.	1.569053	4	1.057925
ethnic.	2.669276	4	1.130575
instability.	1.822861	4	1.077939

≤ 3 primary care encounters over the past 12 months

	GVIF	Df	GVIF^(1/(2*Df))
Telehealth access	1.075668	1	1.037144
Health record access	1.015299	1	1.007621
Booking access	1.064676	1	1.031831
Sex.	1.068842	1	1.033848
Financial status	1.186278	2	1.043630
Education	1.192881	3	1.029831
Language	1.180520	1	1.086517
Self-reported health	1.251948	4	1.028486
ADG.	1.218560	4	1.025017
Program type	1.250055	2	1.057383
Years with provider	1.144696	3	1.022779
Rurality	2.025672	3	1.124851
dependency.	1.673288	4	1.066464
deprivation.	1.671818	4	1.066347
ethnic.	2.709169	4	1.132673
instability.	1.869676	4	1.081361

> 3 primary care encounters over the past 12 months

	GVIF	Df	GVIF^(1/(2*Df))
Telehealth access	1.145660	1	1.070355
Health record access	1.035335	1	1.017514
Booking access	1.059375	1	1.029260
Sex.	1.096906	1	1.047333
Financial status	1.249788	2	1.057326
Education	1.422047	3	1.060439
Language	1.356540	1	1.164706
Self-reported health	1.398278	4	1.042796
ADG.	1.294557	4	1.032797
Program type	1.352439	2	1.078399
Years with provider	1.201240	3	1.031031
Rurality	2.351760	3	1.153185
dependency.	1.798628	4	1.076137
deprivation.	1.739025	4	1.071614
ethnic.	3.090891	4	1.151491
instability.	1.898824	4	1.083454

Doctor/office: Spend enough time with you

Unstratified Model

	GVIF	Df	GVIF^(1/(2*Df))
Telehealth access	1.073827	1	1.036256
Health record access	1.042564	1	1.021060
Booking access	1.054070	1	1.026679
Sex.	1.050785	1	1.025078
Financial status	1.154326	2	1.036531
Education	1.175801	3	1.027359
Language	1.231129	1	1.109563
Self-reported health	1.278774	4	1.031215
ADG.	1.233596	4	1.026589
Program type	1.250848	2	1.057551
Years with provider	1.081470	3	1.013139
Rurality	1.996885	3	1.122170
dependency.	1.601058	4	1.060598
deprivation.	1.548643	4	1.056194
ethnic.	2.691846	4	1.131765
instability.	1.711730	4	1.069497

≤ 60 years old

	GVIF	Df	GVIF^(1/(2*Df))
Telehealth access	1.111844	1	1.054440
Health record access	1.047664	1	1.023555
Booking access	1.065832	1	1.032392
Sex.	1.103849	1	1.050642
Financial status	1.208117	2	1.048401
Education	1.207328	3	1.031900
Language	1.270618	1	1.127217
Self-reported health	1.278373	4	1.031175
ADG.	1.288989	4	1.032241
Program type	1.355663	2	1.079041
Years with provider	1.166056	3	1.025935
Rurality	2.090602	3	1.130781
dependency.	1.659776	4	1.065384
deprivation.	1.717817	4	1.069971
ethnic.	2.889797	4	1.141848
instability.	1.868196	4	1.081254

> 60 years old

	GVIF	Df	GVIF^(1/(2*Df))
Telehealth access	1.083291	1	1.040813
Health record access	1.093153	1	1.045540
Booking access	1.106506	1	1.051906
Sex.	1.082843	1	1.040597
Financial status	1.228203	2	1.052731
Education	1.215727	3	1.033093
Language	1.140091	1	1.067751
Self-reported health	1.339486	4	1.037211
ADG.	1.310602	4	1.034389
Program type	1.184156	2	1.043163
Years with provider	1.118502	3	1.018840
Rurality	2.124221	3	1.133792
dependency.	1.581678	4	1.058985
deprivation.	1.574113	4	1.058350
ethnic.	2.568840	4	1.125167
instability.	1.801160	4	1.076327

≤ 3 primary care encounters over the past 12 months

	GVIF	Df	GVIF^(1/(2*Df))
Telehealth access	1.072411	1	1.035573
Health record access	1.063304	1	1.031166
Booking access	1.071027	1	1.034905
Sex.	1.061608	1	1.030344
Financial status	1.173281	2	1.040760
Education	1.193003	3	1.029849
Language	1.179427	1	1.086014
Self-reported health	1.252624	4	1.028555
ADG.	1.212367	4	1.024364
Program type	1.243474	2	1.055989
Years with provider	1.131265	3	1.020769
Rurality	1.975498	3	1.120158
dependency.	1.697863	4	1.068410
deprivation.	1.612157	4	1.061514
ethnic.	2.704401	4	1.132424
instability.	1.820002	4	1.077728

> 3 primary care encounters over the past 12 months

	GVIF	Df	GVIF^(1/(2*Df))
Telehealth access	1.145097	1	1.070092
Health record access	1.056534	1	1.027878
Booking access	1.058538	1	1.028853
Sex.	1.098664	1	1.048172
Financial status	1.239490	2	1.055142
Education	1.374936	3	1.054501
Language	1.381641	1	1.175432
Self-reported health	1.388768	4	1.041906
ADG.	1.259977	4	1.029308
Program type	1.338167	2	1.075543
Years with provider	1.193239	3	1.029883
Rurality	2.262957	3	1.145810
dependency.	1.736730	4	1.071437
deprivation.	1.738921	4	1.071606
ethnic.	3.150944	4	1.154264
instability.	1.815191	4	1.077371

Doctor/office: Involve you in decisions about your care and treatment

Unstratified Model

	GVIF	Df	GVIF^(1/(2*Df))
Telehealth access	1.070303	1	1.034554
Health record access	1.045227	1	1.022364
Booking access	1.056428	1	1.027827
Sex.	1.049542	1	1.024472
Financial status	1.157000	2	1.037130
Education	1.175619	3	1.027333
Language	1.236158	1	1.111827
Self-reported health	1.281462	4	1.031486
ADG.	1.242514	4	1.027514
Program type	1.248754	2	1.057108
Years with provider	1.087183	3	1.014029
Rurality	2.009038	3	1.123306
dependency.	1.542261	4	1.055650
deprivation.	1.564032	4	1.057501
ethnic.	2.677527	4	1.131011
instability.	1.697073	4	1.068348

≤ 60 years old

	GVIF	Df	GVIF^(1/(2*Df))
Telehealth access	1.107255	1	1.052262
Health record access	1.060268	1	1.029693
Booking access	1.088702	1	1.043409
Sex.	1.088237	1	1.043186
Financial status	1.246901	2	1.056715
Education	1.219632	3	1.033645
Language	1.276071	1	1.129633
Self-reported health	1.288711	4	1.032213
ADG.	1.302830	4	1.033620
Program type	1.354283	2	1.078766
Years with provider	1.187502	3	1.029056
Rurality	2.007109	3	1.123126
dependency.	1.587608	4	1.059480
deprivation.	1.784963	4	1.075112
ethnic.	2.779558	4	1.136310
instability.	1.839316	4	1.079151

> 60 years old

	GVIF	Df	GVIF^(1/(2*Df))
Telehealth access	1.075321	1	1.036977
Health record access	1.133909	1	1.064852
Booking access	1.067752	1	1.033321
Sex.	1.098698	1	1.048188
Financial status	1.208213	2	1.048421
Education	1.249318	3	1.037796
Language	1.147751	1	1.071331
Self-reported health	1.383466	4	1.041408
ADG.	1.339550	4	1.037218
Program type	1.211241	2	1.049078
Years with provider	1.137640	3	1.021725
Rurality	2.321653	3	1.150711
dependency.	1.602373	4	1.060707
deprivation.	1.573031	4	1.058259
ethnic.	2.854739	4	1.140107
instability.	1.847149	4	1.079724

≤ 3 primary care encounters over the past 12 months

	GVIF	Df	GVIF^(1/(2*Df))
Telehealth access	1.074441	1	1.036553
Health record access	1.081310	1	1.039860
Booking access	1.091766	1	1.044876
Sex.	1.062541	1	1.030796
Financial status	1.176832	2	1.041546
Education	1.206833	3	1.031829
Language	1.181327	1	1.086889
Self-reported health	1.272126	4	1.030543
ADG.	1.236334	4	1.026874
Program type	1.249132	2	1.057188
Years with provider	1.136763	3	1.021594
Rurality	2.013822	3	1.123751
dependency.	1.635141	4	1.063394
deprivation.	1.643444	4	1.064068
ethnic.	2.711931	4	1.132817
instability.	1.817496	4	1.077542

> 3 primary care encounters over the past 12 months

	GVIF	Df	GVIF^(1/(2*Df))
Telehealth access	1.143883	1	1.069525
Health record access	1.037214	1	1.018437
Booking access	1.027307	1	1.013561
Sex.	1.104996	1	1.051188
Financial status	1.227108	2	1.052497
Education	1.386646	3	1.055993
Language	1.379048	1	1.174329
Self-reported health	1.403285	4	1.043262
ADG.	1.318836	4	1.035199
Program type	1.337033	2	1.075315
Years with provider	1.200651	3	1.030947
Rurality	2.209472	3	1.141252
dependency.	1.743892	4	1.071988
deprivation.	1.739556	4	1.071655
ethnic.	2.971654	4	1.145842
instability.	1.791879	4	1.075632

Doctor/office: Explain things in easy to understand terms

Unstratified Model

	GVIF	Df	GVIF^(1/(2*Df))
Telehealth access	1.078136	1	1.038333
Health record access	1.025558	1	1.012698
Booking access	1.042596	1	1.021076
Sex.	1.041908	1	1.020739
Financial status	1.171273	2	1.040314
Education	1.188372	3	1.029182
Language	1.264159	1	1.124348
Self-reported health	1.312177	4	1.034544
ADG.	1.267181	4	1.030042
Program type	1.285027	2	1.064702
Years with provider	1.084944	3	1.013681
Rurality	2.259061	3	1.145481
dependency.	1.628455	4	1.062850
deprivation.	1.543090	4	1.055720
ethnic.	2.952033	4	1.144894
instability.	1.714971	4	1.069750

≤ 60 years old

	GVIF	Df	GVIF^(1/(2*Df))
Telehealth access	1.126646	1	1.061436
Health record access	1.021641	1	1.010762
Booking access	1.068001	1	1.033441
Sex.	1.081845	1	1.040118
Financial status	1.249690	2	1.057306
Education	1.227921	3	1.034813
Language	1.321676	1	1.149642
Self-reported health	1.331515	4	1.036438
ADG.	1.348306	4	1.038063
Program type	1.420855	2	1.091786
Years with provider	1.227530	3	1.034758
Rurality	2.298845	3	1.148819
dependency.	1.697646	4	1.068393
deprivation.	1.757832	4	1.073055
ethnic.	3.026690	4	1.148474
instability.	1.882328	4	1.082273

> 60 years old

	GVIF	Df	GVIF^(1/(2*Df))
Telehealth access	1.086723	1	1.042460
Health record access	1.143953	1	1.069557
Booking access	1.090695	1	1.044364
Sex.	1.089676	1	1.043876
Financial status	1.271165	2	1.061819
Education	1.276960	3	1.041589
Language	1.164211	1	1.078986
Self-reported health	1.399792	4	1.042937
ADG.	1.406400	4	1.043551
Program type	1.217719	2	1.050477
Years with provider	1.155470	3	1.024377
Rurality	2.362202	3	1.154036
dependency.	1.484046	4	1.050584
deprivation.	1.637205	4	1.063562
ethnic.	2.846049	4	1.139673
instability.	1.807603	4	1.076807

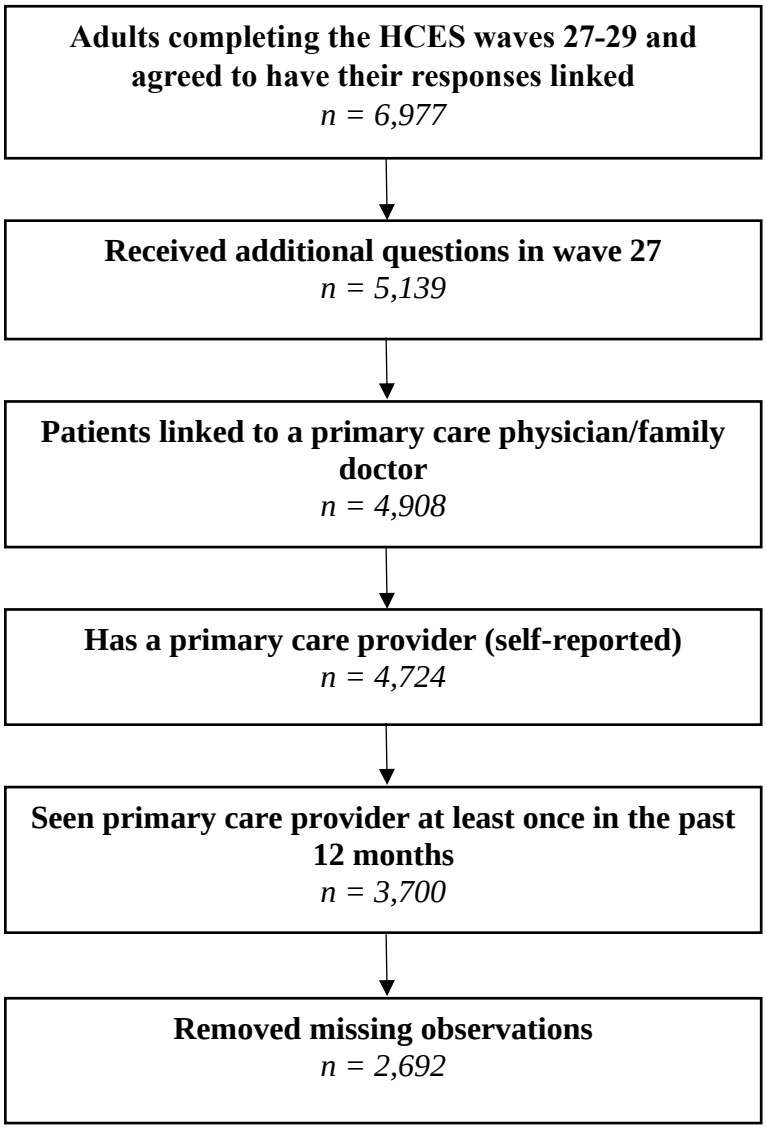
≤ 3 primary care encounters over the past 12 months

	GVIF	Df	GVIF^(1/(2*Df))
Telehealth access	1.079313	1	1.038900
Health record access	1.054822	1	1.027045
Booking access	1.071348	1	1.035060
Sex.	1.070258	1	1.034533
Financial status	1.187987	2	1.044006
Education	1.220605	3	1.033783
Language	1.243420	1	1.115087
Self-reported health	1.316458	4	1.034965
ADG.	1.281721	4	1.031512
Program type	1.309721	2	1.069781
Years with provider	1.133458	3	1.021098
Rurality	2.249021	3	1.144631
dependency.	1.771455	4	1.074091
deprivation.	1.620051	4	1.062163
ethnic.	3.056364	4	1.149875
instability.	1.918829	4	1.084875

> 3 primary care encounters over the past 12 months

	GVIF	Df	GVIF^(1/(2*Df))
Telehealth access	1.159425	1	1.076766
Health record access	1.023127	1	1.011497
Booking access	1.089473	1	1.043778
Sex.	1.102063	1	1.049792
Financial status	1.305920	2	1.069004
Education	1.439122	3	1.062551
Language	1.412509	1	1.188490
Self-reported health	1.446130	4	1.047191
ADG.	1.370264	4	1.040161
Program type	1.383735	2	1.084584
Years with provider	1.218784	3	1.033525
Rurality	2.580978	3	1.171199
dependency.	1.808275	4	1.076857
deprivation.	1.869712	4	1.081364
ethnic.	3.367830	4	1.163908
instability.	1.851503	4	1.080042

Appendix K: Flow diagram of chapter 2 cohort



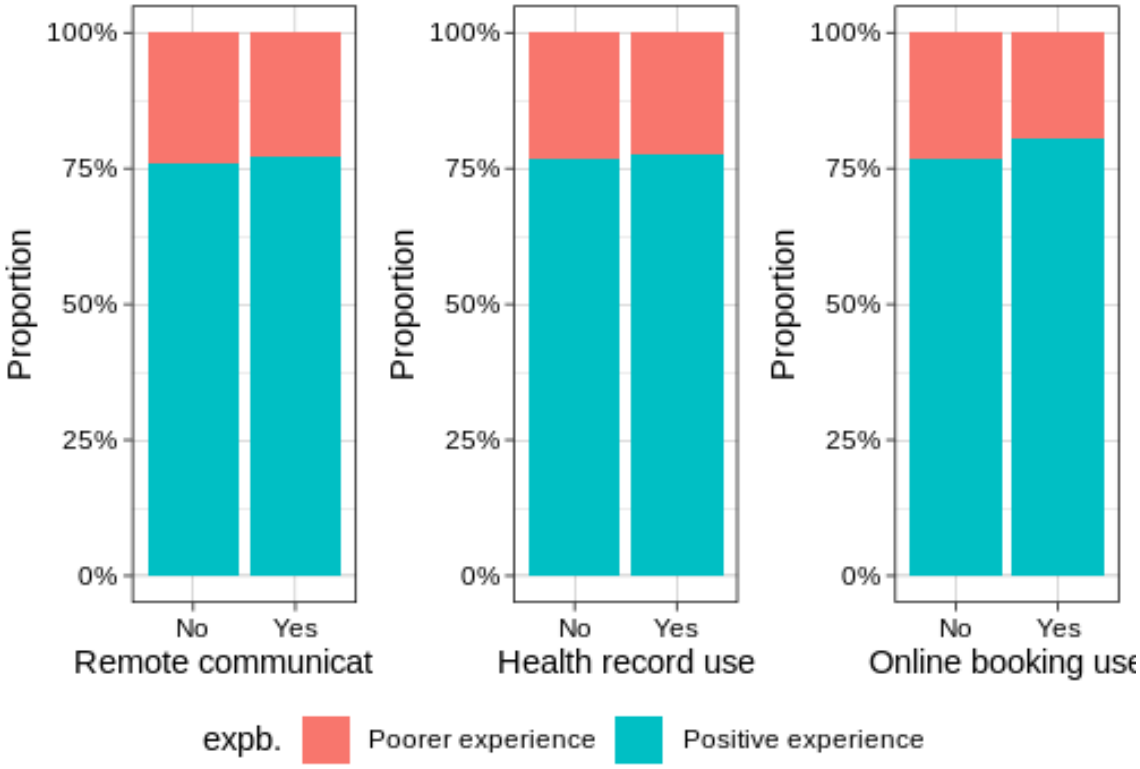
Appendix L: Descriptive statistics of chapter 2 cohort

	Cohort, n = 3,700	Primary analysis, n = 2,692
Remote communication access		
Yes	59.6% (2204)	63.0% (1695)
No	39.8% (1474)	37.0% (997)
Missing	0.6% (22)	
Health record access		
Yes	2.6% (98)	2.6% (71)
No	97.1% (3593)	97.4% (2621)
Missing	0.2% (9)	
Online booking access		
Yes	3.2% (120)	3.6% (97)
No	96.3% (3563)	96.4% (2595)
Missing	0.5% (17)	
Age (years)		
16-44	22.9% (849)	23.6% (636)
45-64	35.9% (1328)	36.9% (993)
65+	41.2% (1523)	39.5% (1063)
Sex		
Female	61.4% (2271)	60.7% (1633)
Male	38.6% (1429)	39.3% (1059)
Financial situation		
Very comfortable	17.8% (658)	19.2% (517)
Comfortable	59.2% (2192)	61.8% (1663)
Tight/Very tight/Poor	19.4% (719)	19.0% (512)
Missing	3.5% (131)	
Primary language		
English	86.0% (3182)	87.4% (2352)
Other	13.8% (511)	12.6% (340)
Missing	0.2% (7)	
Educational attainment		
High school or less	27.8% (1029)	25.6% (690)
Some college/university	8.9% (330)	8.4% (227)
Completed college/university	49.6% (1834)	52.4% (1410)
Post-graduate/professional degree	13.0% (481)	13.6% (365)
Missing	0.7% (26)	
Dependency		
1st quintile *(least marginalized)*	20.4% (755)	20.3% (546)
2nd quintile	17.9% (662)	18.5% (499)
3rd quintile	19.5% (720)	19.4% (523)
4th quintile	18.2% (675)	18.2% (489)
5th quintile *(most marginalized)*	23.4% (867)	23.6% (635)
Missing	0.6% (21)	
Material deprivation		
1st quintile *(least marginalized)*	24.2% (895)	24.8% (668)
2nd quintile	22.6% (835)	23.5% (633)
3rd quintile	19.1% (706)	19.5% (524)
4th quintile	18.2% (672)	17.4% (469)
5th quintile *(most marginalized)*	15.4% (571)	14.8% (398)
Missing	0.6% (21)	
Ethnic concentration		

1st quintile *(least marginalized)*	21.4% (793)	21.4% (575)
2nd quintile	18.8% (697)	19.2% (518)
3rd quintile	19.4% (716)	20.2% (545)
4th quintile	19.3% (714)	19.9% (535)
5th quintile *(most marginalized)*	20.5% (759)	19.3% (519)
Missing	0.6% (21)	
Residential instability		
1st quintile *(least marginalized)*	19.9% (738)	20.0% (539)
2nd quintile	19.6% (725)	19.7% (529)
3rd quintile	19.4% (719)	19.8% (532)
4th quintile	18.6% (690)	19.1% (514)
5th quintile *(most marginalized)*	21.8% (807)	21.5% (578)
Missing	0.6% (21)	
RIO category		
Large urban	39.1% (1446)	39.5% (1062)
Urban	26.7% (989)	26.5% (713)
Small urban	23.5% (868)	24.3% (654)
Rural	9.7% (360)	9.8% (263)
Missing	1.0% (37)	
Self-reported health		
Poor	5.2% (193)	4.8% (128)
Fair	15.2% (563)	14.7% (396)
Good	32.0% (1184)	32.8% (884)
Very good	33.5% (1240)	34.1% (917)
Excellent	13.5% (498)	13.6% (367)
Missing	0.6% (22)	
ADG Score		
<3	9.9% (365)	9.9% (266)
3-4	22.4% (830)	23.0% (618)
5-6	24.1% (892)	24.0% (646)
7-8	20.2% (746)	20.4% (548)
≥9	23.4% (867)	22.8% (614)
Program type		
Enhanced Fee-for-Service	24.1% (892)	26.6 (717)
Capitation	64.2% (2376)	71.4% (1923)
Other	2.0% (74)	1.9% (52)
Missing	9.7% (358)	
Number of years with provider		
Less than 3	22.8% (843)	22.0% (593)
4-9	23.5% (869)	23.8% (641)
10-19	22.5% (834)	23.3% (626)
20 or more	29.6% (1096)	30.9% (832)
Missing	1.6% (58)	
Primary care encounters over 12 months (median, IQR)	3 (2-5)	3 (2-5)

Appendix M: Proportion plot of digital health and experience

Proportion plot of proportions of Ontario patients accessing remote communication (telehealth), digital health records, and online appointment booking, and reported primary care experience.



Appendix N: Chi-square tests between digital health and summed experience

Chi-square tests of association between primary care experience and access to telehealth, digital health record access, and online appointment booking.

Summed patient experience	***Telehealth access***		***Total***
	No telehealth access	***Telehealth access***	
Positive Experience	757 (75.9%)	1310 (77.3%)	2067 (76.8%)
Poorer Experience	240 (24.1%)	385 (22.7%)	625 (23.2%)
Total	997 (100%)	1695 (100%)	2692 (100%)

$\chi2=0.576 \cdot df=1 \cdot \varphi=0.016 \cdot p=0.448$

Summed patient experience	***Digital health record access***		***Total***
	No digital health record access	***Digital health record access***	
Positive Experience	2012 (76.8%)	55 (77.5%)	2067 (76.8%)
Poorer Experience	609 (23.2%)	16 (22.5%)	625 (23.2%)
Total	2621 (100%)	71 (100%)	2692 (100%)

$\chi2=0.000 \cdot df=1 \cdot \varphi=0.003 \cdot p=1.000$

Summed patient experience	***Online booking access***		***Total***
	No online booking access	***Online booking access***	
Positive Experience	1989 (76.6%)	78 (80.4%)	2067 (76.8%)
Poorer Experience	606 (23.4%)	19 (19.6%)	625 (23.2%)
Total	2595 (100%)	97 (100%)	2692 (100%)

$\chi2=0.547 \cdot df=1 \cdot \varphi=0.017 \cdot p=0.459$

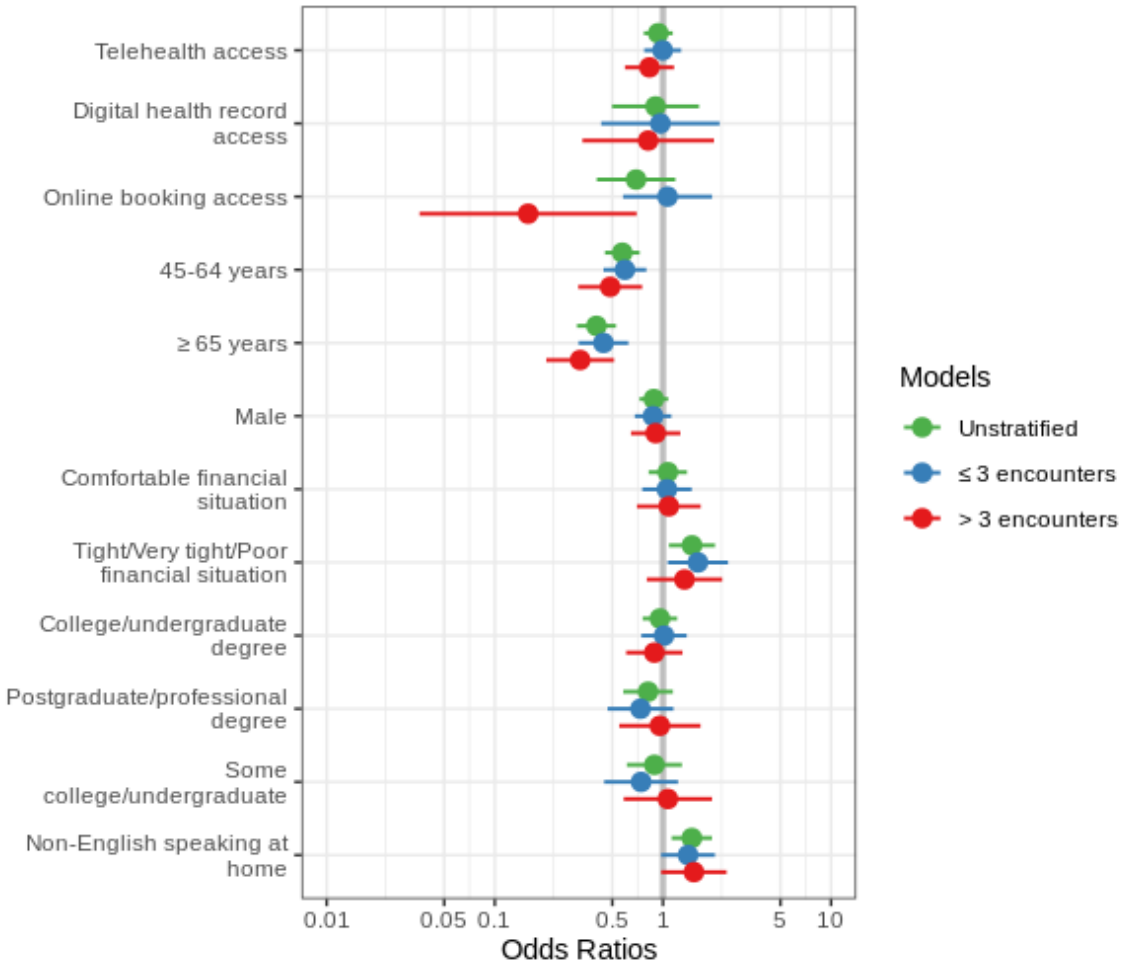
Appendix O: Odds ratios and confidence intervals for summed experience models

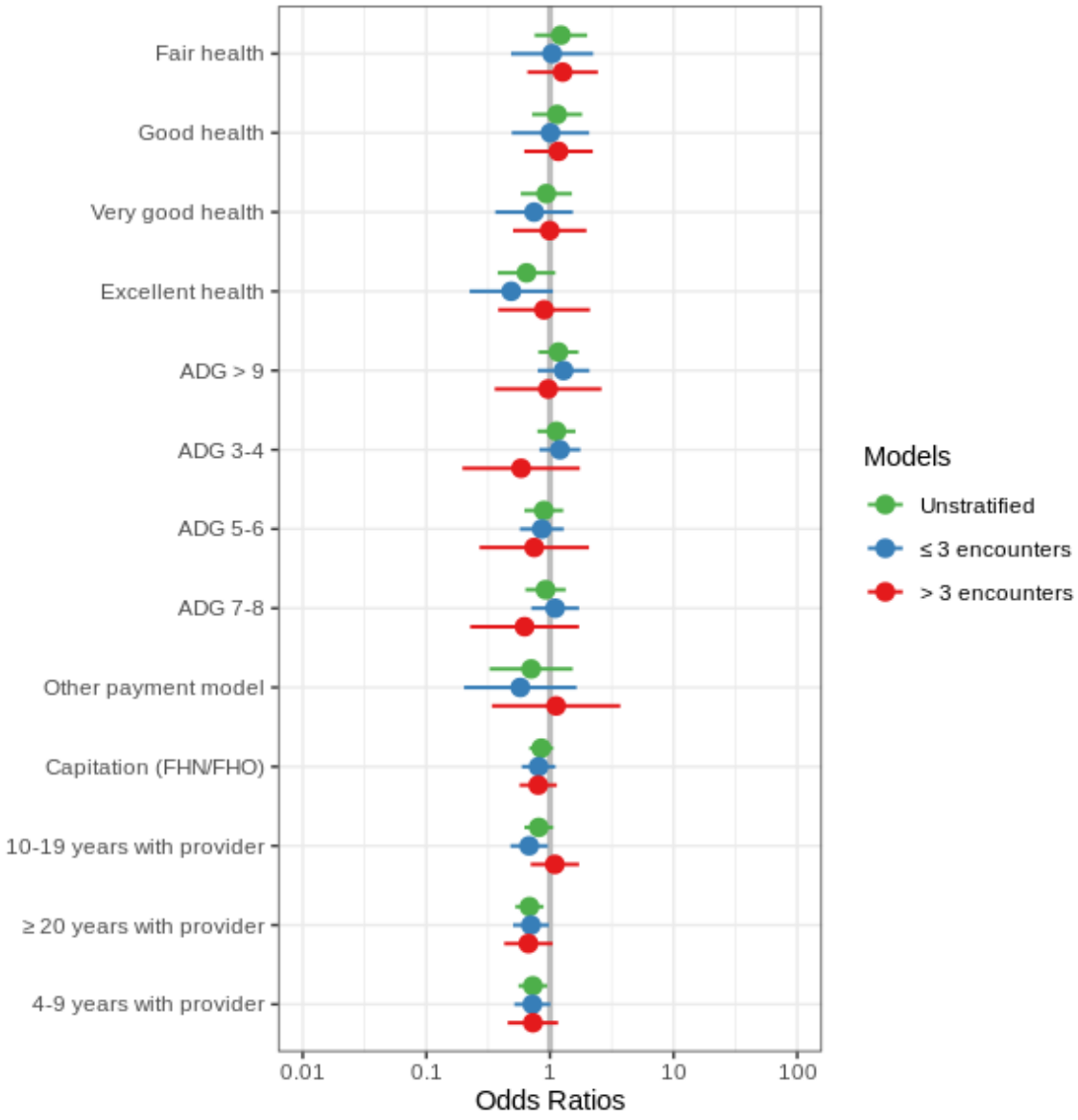
Associations between digital health, personal, healthcare, and geographic factors, and poor primary care experience.

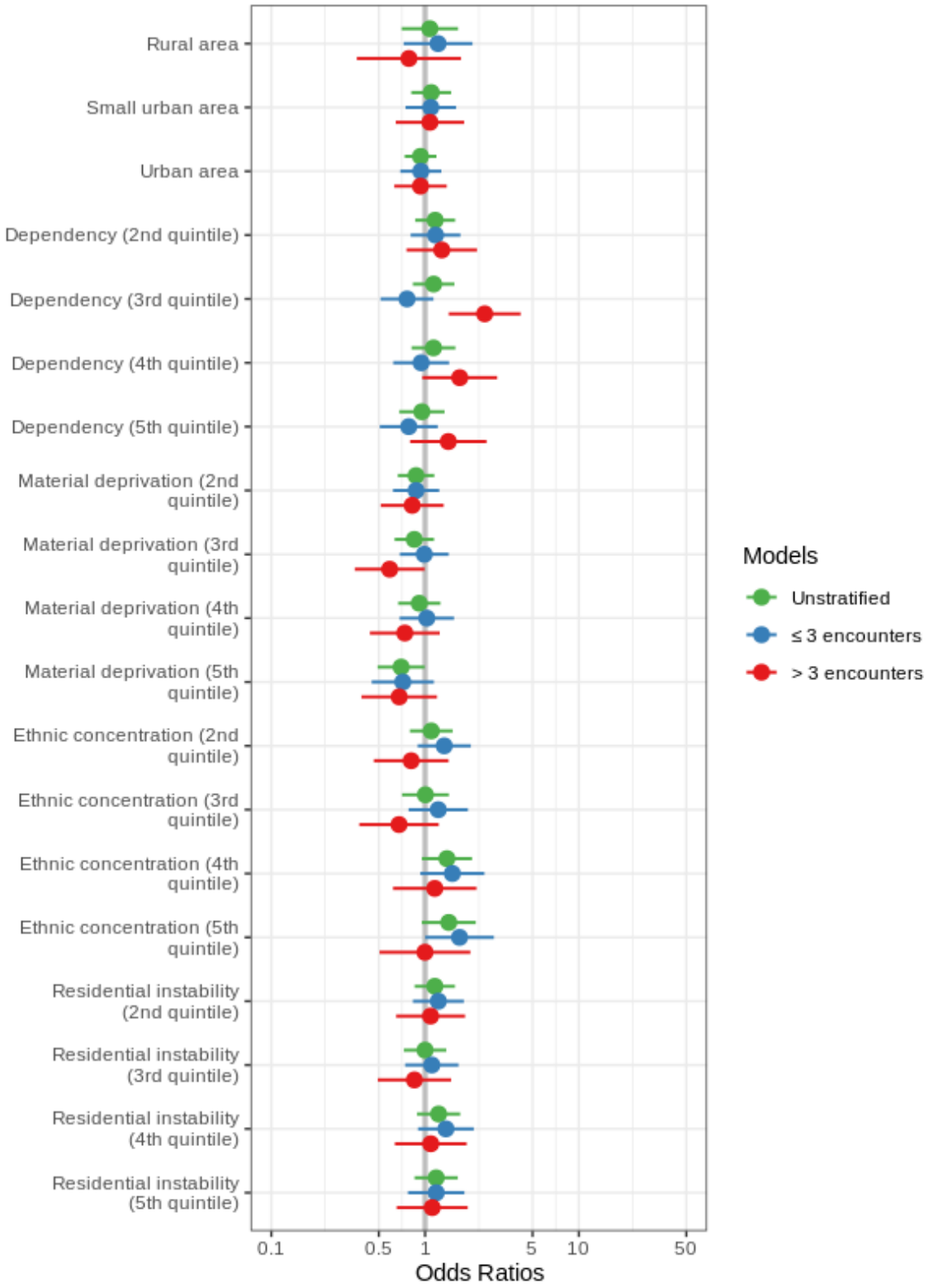
Predictors	**Full Model, N = 2,687**		**≤ 3 encounters, N = 1,647**		**> 3 encounters, N = 1,038**	
	Odds Ratios	**CI (95%)**	**Odds Ratios**	**CI (95%)**	**Odds Ratios**	**CI (95%)**
Intercept	0.57	0.24 – 1.32	0.61	0.19 – 1.90	0.93	0.19 – 4.29
Remote communication access	0.94	0.77 – 1.14	1.00	0.77 – 1.28	0.83	0.59 – 1.17
Health record access	0.90	0.48 – 1.60	0.97	0.41 – 2.10	0.82	0.31 – 1.92
Online booking access	0.69	0.39 – 1.16	1.07	0.57 – 1.93	0.16	0.02 – 0.56*
Age (years)						
16-44	Reference					
45-64	0.57	0.45 – 0.73***	0.59	0.44 – 0.80**	0.49	0.31 – 0.75**
65+	0.40	0.31 – 0.53***	0.44	0.31 – 0.62***	0.32	0.20 – 0.51***
Sex						
Female	Reference					
Male	0.88	0.72 – 1.07	0.87	0.68 – 1.12	0.91	0.64 – 1.27
Financial Situation						
Very comfortable	Reference					
Comfortable	1.07	0.83 – 1.40	1.06	0.76 – 1.49	1.08	0.71 – 1.69
Tight/Very tight/Poor	1.49	1.09 – 2.04*	1.61	1.07 – 2.45*	1.34	0.80 – 2.27
Educational Attainment						
High school or less	Reference					
Some college/university	0.89	0.61 – 1.29	0.74	0.44 – 1.22	1.07	0.58 – 1.94
Completed college/university	0.96	0.76 – 1.22	1.02	0.75 – 1.39	0.89	0.61 – 1.31
Post-graduate/professional degree	0.82	0.58 – 1.14	0.74	0.47 – 1.15	0.96	0.55 – 1.66
Primary language spoken						
English	Reference					
Other	1.49	1.12 – 1.95**	1.41	0.97 – 2.03	1.53	0.97 – 2.38
Self-perceived health						
Poor	Reference					
Fair	1.23	0.76 – 2.02	1.04	0.49 – 2.30	1.27	0.67 – 2.49
Good	1.14	0.73 – 1.85	1.01	0.50 – 2.15	1.17	0.63 – 2.27
Very good	0.93	0.59 – 1.52	0.74	0.37 – 1.59	1.00	0.51 – 2.01
Excellent	0.65	0.38 – 1.11	0.49	0.23 – 1.09	0.90	0.38 – 2.11
ADG Score						
< 3	Reference					
3 – 4	1.13	0.79 – 1.61	1.20	0.83 – 1.77	0.58	0.20 – 1.82
5 – 6	0.89	0.62 – 1.29	0.86	0.57 – 1.30	0.75	0.28 – 2.18
7 – 8	0.92	0.64 – 1.35	1.10	0.71 – 1.72	0.62	0.23 – 1.81
≥ 9	1.17	0.81 – 1.71	1.29	0.80 – 2.09	0.97	0.37 – 2.77
Program type						
Enhanced FFS	Reference					
Capitation	0.85	0.68 – 1.07	0.81	0.59 – 1.11	0.80	0.57 – 1.14
Other	0.70	0.31 – 1.47	0.58	0.18 – 1.53	1.12	0.30 – 3.43

Years with provider						
< 4	Reference					
4 – 9	0.73	0.56 – 0.95*	0.72	0.51 – 1.01	0.73	0.45 – 1.16
10 – 19	0.81	0.62 – 1.06	0.68	0.48 – 0.96*	1.09	0.70 – 1.72
≥ 20	0.68	0.52 – 0.89**	0.70	0.50 – 0.98*	0.67	0.43 – 1.05
RIO category						
Large urban	Reference					
Urban	0.93	0.74 – 1.18	0.94	0.69 – 1.27	0.93	0.63 – 1.38
Small urban	1.10	0.81 – 1.48	1.09	0.75 – 1.59	1.08	0.64 – 1.79
Rural	1.07	0.70 – 1.63	1.21	0.72 – 2.03	0.79	0.35 – 1.68
Dependency						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.16	0.86 – 1.57	1.17	0.81 – 1.70	1.28	0.76 – 2.18
3rd quintile	1.14	0.83 – 1.55	0.76	0.51 – 1.13	2.44	1.43 – 4.21**
4th quintile	1.13	0.82 – 1.57	0.94	0.62 – 1.43	1.68	0.96 – 2.95
5th quintile *(most marginalized)*	0.95	0.68 – 1.34	0.78	0.51 – 1.21	1.42	0.80 – 2.52
Material Deprivation						
1st quintile *(least marginalized)*	Reference					
2nd quintile	0.87	0.66 – 1.15	0.87	0.62 – 1.24	0.82	0.51 – 1.32
3rd quintile	0.85	0.63 – 1.14	0.99	0.68 – 1.42	0.59	0.35 – 0.99*
4th quintile	0.92	0.67 – 1.26	1.03	0.68 – 1.54	0.74	0.44 – 1.24
5th quintile *(most marginalized)*	0.70	0.49 – 0.99*	0.72	0.45 – 1.14	0.68	0.38 – 1.19
Ethnic Concentration						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.10	0.80 – 1.51	1.33	0.89 – 1.99	0.81	0.46 – 1.42
3rd quintile	1.01	0.71 – 1.43	1.22	0.78 – 1.90	0.68	0.37 – 1.23
4th quintile	1.39	0.95 – 2.02	1.50	0.93 – 2.44	1.16	0.62 – 2.17
5th quintile *(most marginalized)*	1.43	0.95 – 2.14	1.68	1.00 – 2.81*	1.00	0.51 – 1.98
Residential Instability						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.16	0.86 – 1.57	1.22	0.83 – 1.79	1.09	0.65 – 1.82
3rd quintile	1.00	0.73 – 1.37	1.11	0.74 – 1.65	0.85	0.49 – 1.47
4th quintile	1.22	0.89 – 1.69	1.37	0.90 – 2.07	1.09	0.64 – 1.87
5th quintile *(most marginalized)*	1.18	0.85 – 1.63	1.18	0.77 – 1.80	1.11	0.65 – 1.90

Appendix P: Forest plot of fixed effects in summed patient experience models.

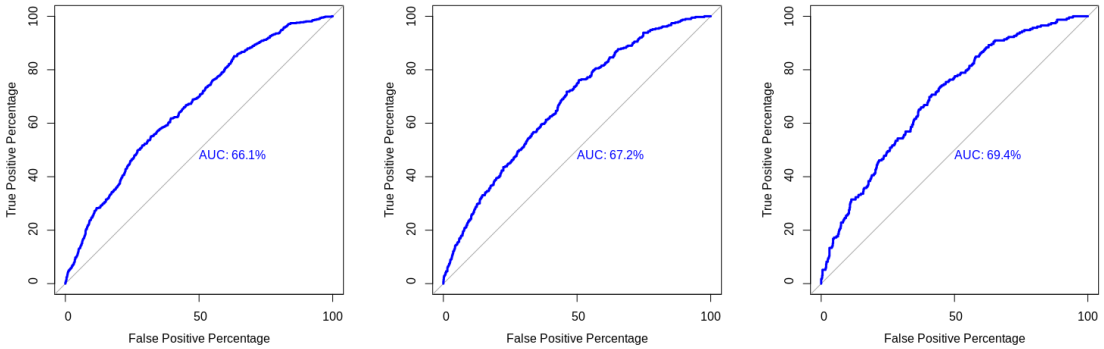



Fair health
Good health
Very good health
Excellent health
ADG > 9
ADG 3-4
ADG 5-6
ADG 7-8
Other payment model
Capitation (FHN/FHO)
10-19 years with provider
≥ 20 years with provider
4-9 years with provider
0.01
0.1
1
10
100
Odds Ratios
Models
Unstratified
≤ 3 encounters
> 3 encounters


Rural area
Small urban area
Urban area
Dependency (2nd quintile)
Dependency (3rd quintile)
Dependency (4th quintile)
Dependency (5th quintile)
Material deprivation (2nd quintile)
Material deprivation (3rd quintile)
Material deprivation (4th quintile)
Material deprivation (5th quintile)
Ethnic concentration (2nd quintile)
Ethnic concentration (3rd quintile)
Ethnic concentration (4th quintile)
Ethnic concentration (5th quintile)
Residential instability (2nd quintile)
Residential instability (3rd quintile)
Residential instability (4th quintile)
Residential instability (5th quintile)
0.1
0.5
1
5
10
50
Odds Ratios
Models
Unstratified
≤ 3 encounters
> 3 encounters

Appendix Q: ROC curves for summed patient experience model

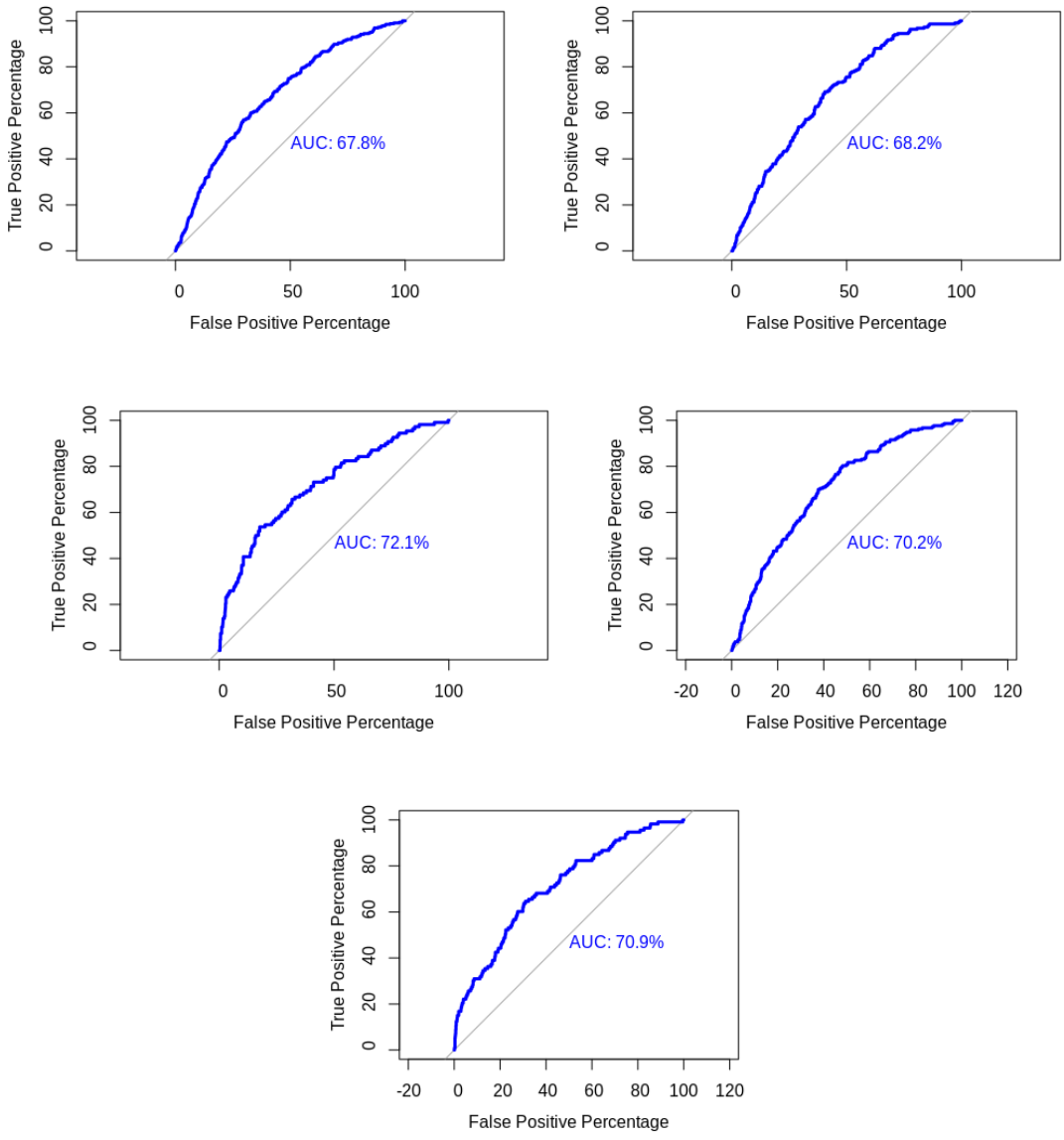
(left: unstratified; middle: ≤ 3 encounters; right: > 3 encounters)



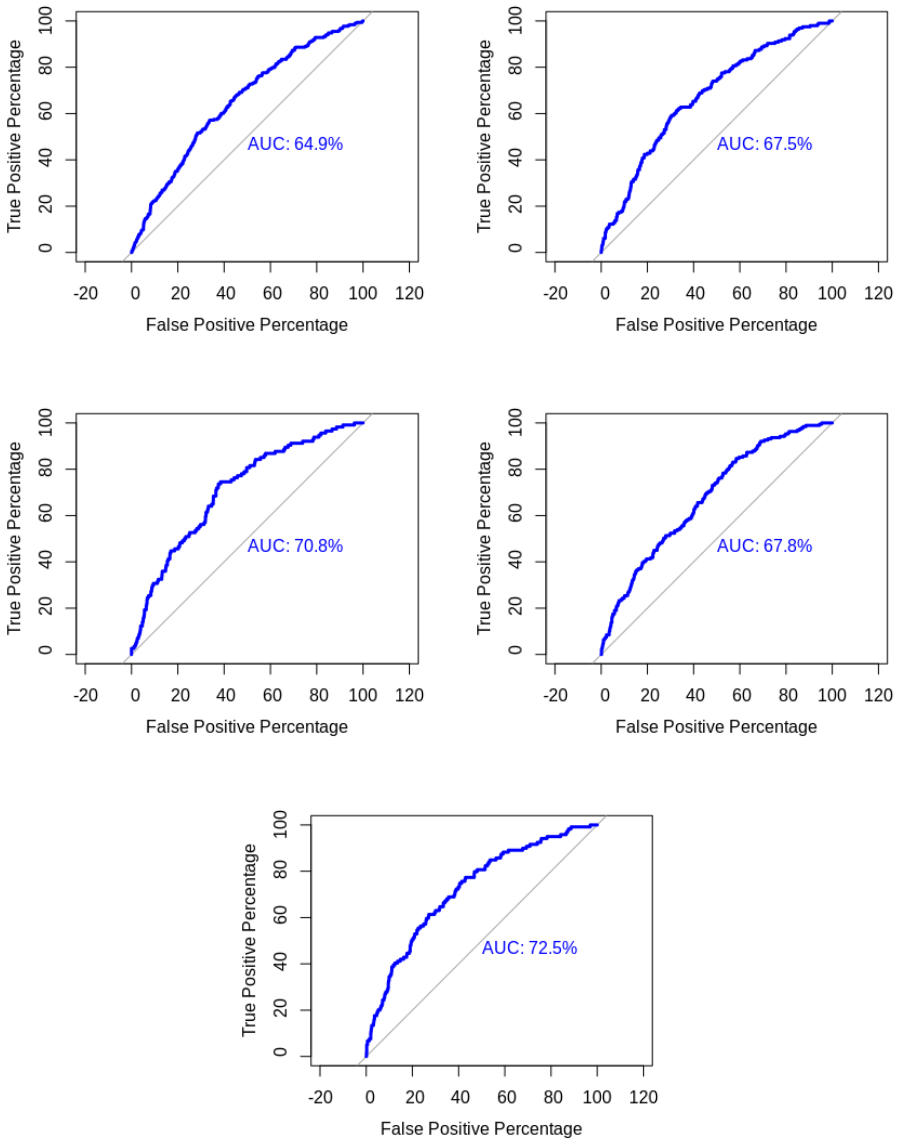
Appendix R: ROC curves for single-item patient experience models

(top left: unstratified; top right: ≤ 60 years; middle left: > 60 years; middle right: ≤ 3 encounters; bottom: > 3 encounters)

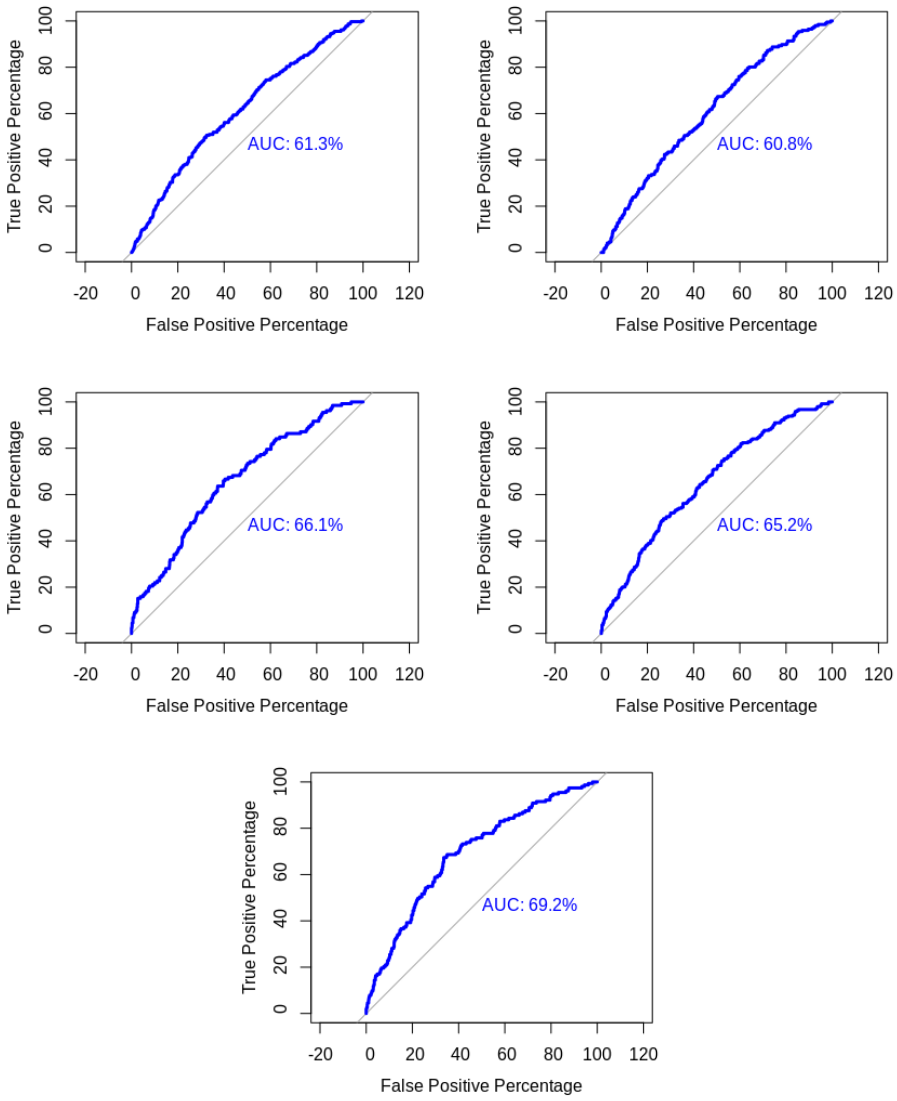
Doctor/office: Knows important information about medical history



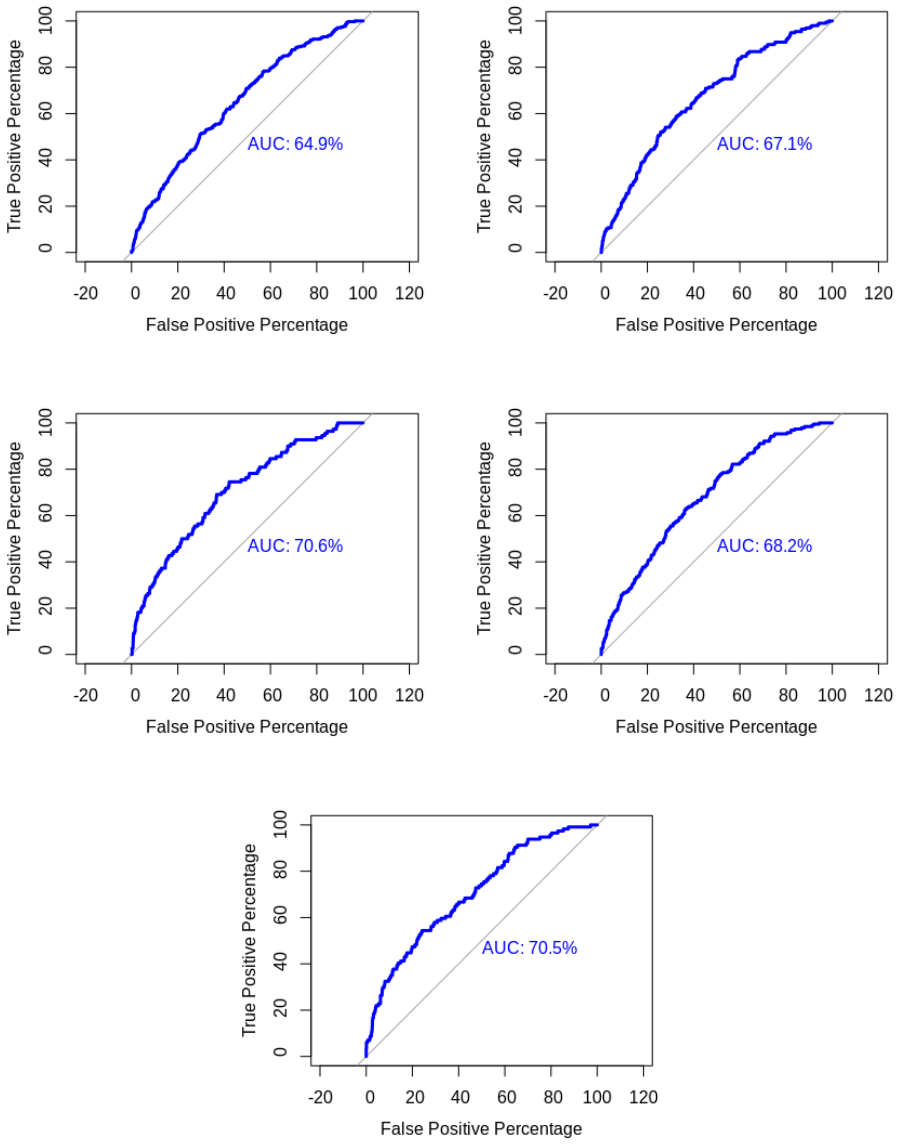
Doctor/office: Opportunity to ask questions



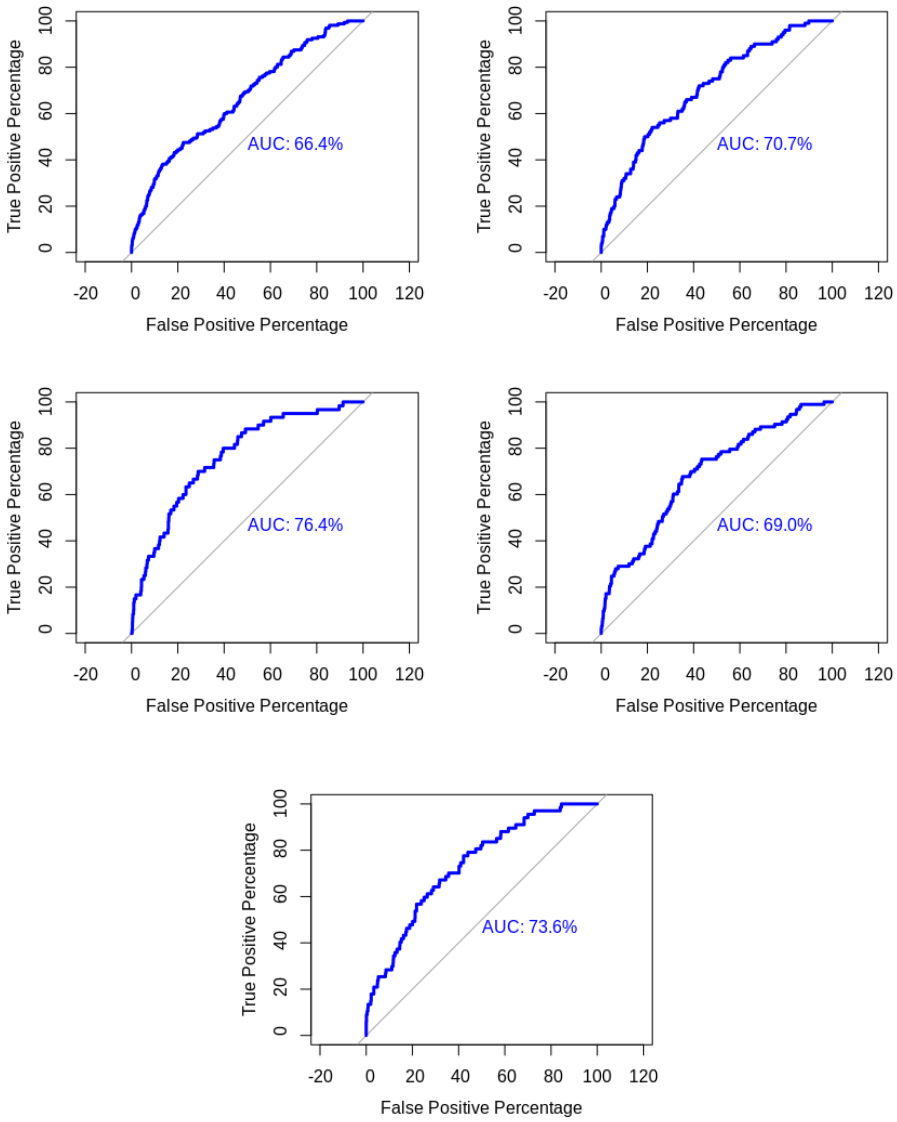
Doctor/office: Spend enough time with you



Doctor/office: Involve you in decisions about your care and treatment



Doctor/office: Explain things in easy to understand terms



Appendix S: Odds ratios and confidence intervals for single-item experience models

Associations between factors and primary care provider sometimes, rarely, or never knowing medical history, stratified by patient age.

Predictors	**Full Model, N = 2,677**		**Age ≤ 60 years, N = 1,378**		**Age > 60 years, N = 1,308**	
	Odds Ratios	**CI (95%)**	**Odds Ratios**	**CI (95%)**	**Odds Ratios**	**CI (95%)**
Intercept	0.19	0.06 – 0.52**	0.30	0.07 – 1.23	0.07	0.01 – 0.39**
Remote communication access	0.91	0.71 – 1.17	0.98	0.71 – 1.36	0.73	0.48 – 1.13
Health record access	0.35	0.11 – 0.88*	0.31	0.07 – 0.91	0.31	0.02 – 1.66
Online booking access	1.33	0.69 – 2.38	1.13	0.55 – 2.19	1.84	0.40 – 6.05
Sex						
Female	Reference					
Male	0.85	0.66 – 1.09	0.98	0.71 – 1.36	0.76	0.49 – 1.18
Financial Situation						
Very comfortable	Reference					
Comfortable	1.32	0.93 – 1.90	1.17	0.74 – 1.89	1.32	0.75 – 2.43
Tight/Very tight/Poor	1.50	0.99 – 2.29	1.35	0.80 – 2.34	1.45	0.70 – 3.03
Educational Attainment						
High school or less	Reference					
Some college/university	0.88	0.51 – 1.46	0.86	0.40 – 1.77	0.95	0.41 – 2.01
Completed college/university	1.41	1.04 – 1.93*	1.39	0.90 – 2.22	1.25	0.78 – 2.02
Post-graduate/professional degree	1.30	0.85 – 2.00	1.29	0.73 – 2.29	1.13	0.50 – 2.37
Primary language spoken						
English	Reference					
Other	1.55	1.10 – 2.16*	1.08	0.71 – 1.61	2.99	1.57 – 5.52**
Self-perceived health						
Poor	Reference					
Fair	0.77	0.43 – 1.43	0.62	0.26 – 1.58	0.89	0.39 – 2.19
Good	0.82	0.47 – 1.48	0.70	0.32 – 1.66	0.90	0.41 – 2.16
Very good	0.70	0.40 – 1.27	0.63	0.29 – 1.52	0.66	0.29 – 1.65
Excellent	0.53	0.28 – 1.03	0.44	0.19 – 1.13	0.47	0.14 – 1.48
ADG Score						
< 3	Reference					
3 – 4	0.88	0.57 – 1.38	1.10	0.66 – 1.87	0.49	0.20 – 1.26
5 – 6	0.70	0.45 – 1.11	0.84	0.49 – 1.46	0.54	0.23 – 1.35
7 – 8	0.81	0.52 – 1.29	1.24	0.71 – 2.19	0.47	0.20 – 1.18
≥ 9	0.73	0.46 – 1.17	0.82	0.45 – 1.50	0.72	0.32 – 1.76
Program type						
Enhanced FFS	Reference					
Capitation	0.76	0.57 – 1.00	0.66	0.47 – 0.95*	1.01	0.60 – 1.75
Other	0.80	0.26 – 1.98	0.84	0.18 – 2.76	0.92	0.13 – 3.82
Years with provider						
< 4	Reference					
4 – 9	0.61	0.43 – 0.84**	0.66	0.44 – 0.99*	0.45	0.23 – 0.83*
10 – 19	0.61	0.43 – 0.84**	0.53	0.34 – 0.82**	0.76	0.43 – 1.31

≥ 20	0.45	0.32 – 0.63***	0.48	0.31 – 0.75**	0.40	0.23 – 0.70**
RIO category						
Large urban	Reference					
Urban	0.91	0.67 – 1.23	0.85	0.59 – 1.23	0.87	0.48 – 1.54
Small urban	0.92	0.62 – 1.37	0.78	0.46 – 1.29	1.27	0.66 – 2.46
Rural	0.89	0.50 – 1.56	0.54	0.23 – 1.18	1.71	0.71 – 4.04
Dependency						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.00	0.69 – 1.45	0.98	0.63 – 1.51	1.52	0.69 – 3.52
3rd quintile	0.85	0.57 – 1.26	0.78	0.48 – 1.26	1.32	0.58 – 3.13
4th quintile	1.06	0.71 – 1.58	1.12	0.68 – 1.82	1.44	0.64 – 3.39
5th quintile *(most marginalized)*	0.73	0.47 – 1.12	0.60	0.32 – 1.09	1.51	0.69 – 3.51
Material Deprivation						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.22	0.85 – 1.75	1.19	0.76 – 1.86	1.45	0.77 – 2.74
3rd quintile	1.18	0.80 – 1.74	1.14	0.69 – 1.86	1.29	0.67 – 2.50
4th quintile	1.14	0.75 – 1.75	1.29	0.74 – 2.21	1.14	0.56 – 2.32
5th quintile *(most marginalized)*	1.49	0.96 – 2.32	2.03	1.17 – 3.55*	0.93	0.41 – 2.05
Ethnic Concentration						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.34	0.87 – 2.06	1.64	0.92 – 2.96	1.32	0.67 – 2.59
3rd quintile	1.21	0.75 – 1.93	1.17	0.62 – 2.22	1.48	0.72 – 3.07
4th quintile	1.26	0.77 – 2.09	0.98	0.51 – 1.91	2.13	0.93 – 4.97
5th quintile *(most marginalized)*	1.61	0.96 – 2.73	1.27	0.65 – 2.52	2.29	0.92 – 5.77
Residential Instability						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.41	0.96 – 2.09	1.13	0.69 – 1.84	2.11	1.04 – 4.43*
3rd quintile	1.13	0.74 – 1.72	1.39	0.84 – 2.30	0.75	0.32 – 1.72
4th quintile	1.45	0.95 – 2.21	0.96	0.56 – 1.65	2.46	1.21 – 5.21*
5th quintile *(most marginalized)*	1.09	0.71 – 1.67	1.17	0.70 – 1.96	0.97	0.43 – 2.20

Associations between factors and primary care provider sometimes, rarely, or never knowing medical history, stratified by number of encounters over past 12 months.

Predictors	**Full Model, N = 2,677**		**≤ 3 encounters, N = 1,648**		**> 3 encounters, N = 1,039**	
	Odds Ratios	**CI (95%)**	**Odds Ratios**	**CI (95%)**	**Odds Ratios**	**CI (95%)**
Intercept	0.19	0.06 – 0.52**	0.16	0.04 – 0.61**	0.54	0.08 – 3.25
Remote communication access	0.91	0.71 – 1.17	1.01	0.74 – 1.39	0.82	0.53 – 1.27
Health record access	0.35	0.11 – 0.88*	0.29	0.05 – 1.01	0.42	0.07 – 1.49
Online booking access	1.33	0.69 – 2.38	1.36	0.63 – 2.70	0.91	0.20 – 2.88
Sex						
Female	Reference					
Male	0.85	0.66 – 1.09	0.80	0.58 – 1.09	0.97	0.62 – 1.49
Financial Situation						
Very comfortable	Reference					
Comfortable	1.32	0.93 – 1.90	1.58	1.01 – 2.56	1.01	0.57 – 1.84
Tight/Very tight/Poor	1.50	0.99 – 2.29	1.89	1.10 – 3.30*	0.97	0.49 – 1.96
Educational Attainment						
High school or less	Reference					
Some college/university	0.88	0.51 – 1.46	0.76	0.36 – 1.50	0.98	0.40 – 2.20
Completed college/university	1.41	1.04 – 1.93*	1.63	1.10 – 2.46*	1.18	0.71 – 1.98
Post-graduate/professional degree	1.30	0.85 – 2.00	1.30	0.74 – 2.28	1.38	0.67 – 2.79
Primary language spoken						
English	Reference					
Other	1.55	1.10 – 2.16*	1.19	0.74 – 1.87	2.20	1.28 – 3.72**
Self-perceived health						
Poor	Reference					
Fair	0.77	0.43 – 1.43	0.55	0.23 – 1.40	1.01	0.44 – 2.49
Good	0.82	0.47 – 1.48	0.65	0.30 – 1.56	0.90	0.40 – 2.16
Very good	0.70	0.40 – 1.27	0.55	0.25 – 1.31	0.63	0.26 – 1.61
Excellent	0.53	0.28 – 1.03	0.30	0.12 – 0.76**	1.17	0.42 – 3.37
ADG Score						
< 3	Reference					
3 – 4	0.88	0.57 – 1.38	1.06	0.66 – 1.73	0.19	0.05 – 0.70*
5 – 6	0.70	0.45 – 1.11	0.79	0.47 – 1.33	0.30	0.10 – 0.96*
7 – 8	0.81	0.52 – 1.29	0.99	0.57 – 1.72	0.37	0.13 – 1.16
≥ 9	0.73	0.46 – 1.17	1.07	0.58 – 1.94	0.32	0.12 – 1.00*
Program type						
Enhanced FFS	Reference					
Capitation	0.76	0.57 – 1.00	0.74	0.51 – 1.10	0.63	0.40 – 1.00
Other	0.80	0.26 – 1.98	0.61	0.13 – 1.99	1.19	0.17 – 5.01
Years with provider						
< 4	Reference					
4 – 9	0.61	0.43 – 0.84**	0.66	0.44 – 0.99*	0.47	0.25 – 0.86*
10 – 19	0.61	0.43 – 0.84**	0.56	0.37 – 0.86**	0.69	0.39 – 1.23
≥ 20	0.45	0.32 – 0.63***	0.42	0.28 – 0.65***	0.49	0.27 – 0.86*
RIO category						

Large urban	Reference					
Urban	0.91	0.67 – 1.23	0.94	0.64 – 1.37	0.83	0.49 – 1.38
Small urban	0.92	0.62 – 1.37	0.92	0.57 – 1.47	0.88	0.42 – 1.79
Rural	0.89	0.50 – 1.56	0.95	0.48 – 1.82	0.71	0.22 – 2.04
Dependency						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.00	0.69 – 1.45	1.45	0.92 – 2.31	0.58	0.29 – 1.13
3rd quintile	0.85	0.57 – 1.26	0.81	0.49 – 1.34	0.98	0.50 – 1.90
4th quintile	1.06	0.71 – 1.58	1.17	0.70 – 1.96	0.96	0.48 – 1.89
5th quintile *(most marginalized)*	0.73	0.47 – 1.12	0.83	0.47 – 1.43	0.65	0.32 – 1.32
Material Deprivation						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.22	0.85 – 1.75	1.23	0.79 – 1.91	1.32	0.69 – 2.56
3rd quintile	1.18	0.80 – 1.74	1.19	0.74 – 1.92	1.16	0.57 – 2.36
4th quintile	1.14	0.75 – 1.75	1.13	0.66 – 1.92	1.12	0.54 – 2.32
5th quintile *(most marginalized)*	1.49	0.96 – 2.32	1.50	0.85 – 2.63	1.76	0.84 – 3.74
Ethnic Concentration						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.34	0.87 – 2.06	1.63	0.98 – 2.73	0.91	0.40 – 2.06
3rd quintile	1.21	0.75 – 1.93	1.46	0.83 – 2.59	0.92	0.40 – 2.14
4th quintile	1.26	0.77 – 2.09	1.15	0.61 – 2.17	1.33	0.57 – 3.20
5th quintile *(most marginalized)*	1.61	0.96 – 2.73	1.94	1.02 – 3.73*	1.15	0.47 – 2.94
Residential Instability						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.41	0.96 – 2.09	1.19	0.73 – 1.93	1.96	0.98 – 3.99
3rd quintile	1.13	0.74 – 1.72	1.06	0.63 – 1.76	1.32	0.62 – 2.81
4th quintile	1.45	0.95 – 2.21	1.41	0.84 – 2.39	1.72	0.84 – 3.59
5th quintile *(most marginalized)*	1.09	0.71 – 1.67	1.02	0.60 – 1.75	1.20	0.59 – 2.51

Associations between factors and primary care provider sometimes, rarely, or never giving the patient opportunity to ask questions, stratified by patient age.

Predictors	**Full Model, N = 2,677**		**Age ≤ 60 years, N = 1,378**		**Age > 60 years, N = 1,308**	
	Odds Ratios	**CI (95%)**	**Odds Ratios**	**CI (95%)**	**Odds Ratios**	**CI (95%)**
Intercept	0.13	0.04 – 0.37***	0.16	0.03 – 0.71*	0.08	0.01 – 0.44**
Remote communication access	0.88	0.68 – 1.14	0.91	0.65 – 1.28	0.72	0.48 – 1.10
Health record access	0.41	0.12 – 1.02	0.42	0.10 – 1.24	0.42	0.02 – 2.20
Online booking access	1.07	0.50 – 2.03	1.05	0.46 – 2.16	0.52	0.03 – 2.75
Sex						
Female	Reference					
Male	0.85	0.65 – 1.09	1.01	0.72 – 1.42	0.70	0.45 – 1.07
Financial Situation						
Very comfortable	Reference					
Comfortable	1.00	0.72 – 1.42	0.83	0.53 – 1.33	0.96	0.57 – 1.68
Tight/Very tight/Poor	1.38	0.93 – 2.08	1.31	0.78 – 2.25	1.21	0.62 – 2.39
Educational Attainment						
High school or less	Reference					
Some college/university	0.75	0.44 – 1.22	0.47	0.18 – 1.06	1.17	0.60 – 2.18
Completed college/university	0.92	0.69 – 1.24	1.23	0.79 – 1.96	0.64	0.40 – 1.01
Post-graduate/professional degree	0.78	0.50 – 1.20	1.07	0.60 – 1.93	0.55	0.23 – 1.19
Primary language spoken						
English	Reference					
Other	1.54	1.08 – 2.15*	1.29	0.85 – 1.95	1.80	0.90 – 3.42
Self-perceived health						
Poor	Reference					
Fair	1.36	0.74 – 2.62	1.81	0.71 – 5.32	0.95	0.42 – 2.33
Good	1.21	0.68 – 2.29	0.90	0.37 – 2.54	1.50	0.70 – 3.55
Very good	1.17	0.65 – 2.23	1.16	0.48 – 3.28	0.85	0.36 – 2.11
Excellent	1.01	0.52 – 2.05	0.78	0.30 – 2.30	1.11	0.37 – 3.32
ADG Score						
< 3	Reference					
3 – 4	0.94	0.60 – 1.52	1.04	0.62 – 1.81	0.67	0.26 – 1.84
5 – 6	0.77	0.48 – 1.24	0.89	0.51 – 1.56	0.56	0.22 – 1.53
7 – 8	0.81	0.50 – 1.33	0.75	0.41 – 1.39	0.88	0.36 – 2.35
≥ 9	1.09	0.69 – 1.77	0.97	0.53 – 1.78	1.33	0.58 – 3.51
Program type						
Enhanced FFS	Reference					
Capitation	0.78	0.59 – 1.03	0.76	0.53 – 1.09	0.84	0.52 – 1.38
Other	0.64	0.18 – 1.67	0.25	0.01 – 1.38	0.86	0.18 – 2.98
Years with provider						
< 4	Reference					
4 – 9	1.06	0.74 – 1.52	1.19	0.76 – 1.89	0.77	0.40 – 1.44
10 – 19	1.06	0.74 – 1.53	1.12	0.70 – 1.81	0.90	0.49 – 1.62
≥ 20	1.05	0.75 – 1.49	1.29	0.81 – 2.07	0.91	0.53 – 1.56
RIO category						

Large urban	Reference					
Urban	1.28	0.95 – 1.73	1.13	0.76 – 1.65	1.37	0.80 – 2.32
Small urban	1.04	0.70 – 1.55	1.23	0.71 – 2.09	0.93	0.49 – 1.77
Rural	0.86	0.47 – 1.52	0.64	0.25 – 1.50	1.11	0.46 – 2.59
Dependency						
1st quintile *(least marginalized)*	Reference					
2nd quintile	0.97	0.66 – 1.42	1.00	0.64 – 1.57	1.55	0.67 – 3.80
3rd quintile	1.07	0.73 – 1.58	0.89	0.54 – 1.43	2.15	0.97 – 5.21
4th quintile	0.78	0.50 – 1.19	0.69	0.40 – 1.19	1.45	0.63 – 3.61
5th quintile *(most marginalized)*	0.62	0.40 – 0.96*	0.48	0.25 – 0.90*	1.35	0.60 – 3.29
Material Deprivation						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.19	0.82 – 1.73	1.03	0.64 – 1.64	1.49	0.79 – 2.86
3rd quintile	1.18	0.80 – 1.76	0.87	0.51 – 1.47	1.75	0.92 – 3.38
4th quintile	1.34	0.88 – 2.04	1.59	0.93 – 2.72	1.17	0.57 – 2.40
5th quintile *(most marginalized)*	1.05	0.66 – 1.67	1.13	0.62 – 2.05	1.19	0.54 – 2.61
Ethnic Concentration						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.01	0.66 – 1.53	1.24	0.69 – 2.26	0.89	0.48 – 1.67
3rd quintile	0.77	0.48 – 1.22	0.63	0.32 – 1.24	0.98	0.51 – 1.90
4th quintile	0.88	0.54 – 1.45	0.91	0.47 – 1.79	0.72	0.32 – 1.60
5th quintile *(most marginalized)*	1.19	0.72 – 1.99	1.18	0.60 – 2.37	1.05	0.44 – 2.46
Residential Instability						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.13	0.75 – 1.70	1.08	0.65 – 1.77	1.27	0.61 – 2.74
3rd quintile	1.11	0.73 – 1.69	1.05	0.61 – 1.77	1.25	0.60 – 2.68
4th quintile	1.26	0.82 – 1.93	1.02	0.58 – 1.78	1.64	0.80 – 3.49
5th quintile *(most marginalized)*	1.35	0.88 – 2.06	1.47	0.87 – 2.50	1.20	0.56 – 2.67

Associations between factors and primary care provider sometimes, rarely, or never giving the patient opportunity to ask questions, stratified by number of encounters over past 12 months.

Predictors	**Full Model, N = 2,677**		**≤ 3 encounters, N = 1,648**		**> 3 encounters, N = 1,039**	
	Odds Ratios	**CI (95%)**	**Odds Ratios**	**CI (95%)**	**Odds Ratios**	**CI (95%)**
Intercept	0.13	0.04 – 0.37***	0.21	0.05 – 0.86*	0.06	0.01 – 0.38**
Remote communication access	0.88	0.68 – 1.14	1.15	0.83 – 1.61	0.63	0.41 – 0.96*
Health record access	0.41	0.12 – 1.02	0.20	0.01 – 0.99	0.83	0.19 – 2.56
Online booking access	1.07	0.50 – 2.03	1.25	0.52 – 2.65	0.53	0.08 – 1.92
Sex						
Female	Reference					
Male	0.85	0.65 – 1.09	0.96	0.69 – 1.33	0.74	0.47 – 1.15
Financial Situation						
Very comfortable	Reference					
Comfortable	1.00	0.72 – 1.42	1.01	0.66 – 1.59	1.11	0.63 – 2.01
Tight/Very tight/Poor	1.38	0.93 – 2.08	1.47	0.87 – 2.51	1.55	0.80 – 3.09
Educational Attainment						
High school or less	Reference					
Some college/university	0.75	0.44 – 1.22	0.54	0.24 – 1.08	1.03	0.47 – 2.12
Completed college/university	0.92	0.69 – 1.24	1.06	0.72 – 1.57	0.75	0.46 – 1.21
Post-graduate/professional degree	0.78	0.50 – 1.20	0.72	0.39 – 1.29	1.10	0.53 – 2.18
Primary language spoken						
English	Reference					
Other	1.54	1.08 – 2.15*	1.60	1.00 – 2.51*	1.60	0.91 – 2.76
Self-perceived health						
Poor	Reference					
Fair	1.36	0.74 – 2.62	1.38	0.54 – 4.01	1.21	0.53 – 2.97
Good	1.21	0.68 – 2.29	0.85	0.35 – 2.39	1.59	0.73 – 3.79
Very good	1.17	0.65 – 2.23	1.00	0.42 – 2.80	1.07	0.45 – 2.70
Excellent	1.01	0.52 – 2.05	0.76	0.29 – 2.24	1.23	0.40 – 3.73
ADG Score						
< 3	Reference					
3 – 4	0.94	0.60 – 1.52	1.17	0.71 – 1.97	0.25	0.06 – 1.01*
5 – 6	0.77	0.48 – 1.24	0.82	0.48 – 1.43	0.52	0.17 – 1.82
7 – 8	0.81	0.50 – 1.33	1.12	0.63 – 2.02	0.40	0.13 – 1.38
≥ 9	1.09	0.69 – 1.77	1.32	0.71 – 2.47	0.70	0.24 – 2.35
Program type						
Enhanced FFS	Reference					
Capitation	0.78	0.59 – 1.03	0.74	0.50 – 1.11	0.74	0.47 – 1.15
Other	0.64	0.18 – 1.67	0.50	0.08 – 1.87	0.80	0.12 – 3.28
Years with provider						
< 4	Reference					
4 – 9	1.06	0.74 – 1.52	0.73	0.47 – 1.14	2.39	1.18 – 5.10*
10 – 19	1.06	0.74 – 1.53	0.76	0.48 – 1.19	2.26	1.12 – 4.81*
≥ 20	1.05	0.75 – 1.49	0.69	0.44 – 1.06	2.65	1.36 – 5.53**

RIO category						
Large urban	Reference					
Urban	1.28	0.95 – 1.73	1.12	0.76 – 1.66	1.53	0.93 – 2.52
Small urban	1.04	0.70 – 1.55	0.88	0.53 – 1.47	1.20	0.60 – 2.38
Rural	0.86	0.47 – 1.52	0.81	0.39 – 1.63	0.87	0.27 – 2.46
Dependency						
1st quintile *(least marginalized)*	Reference					
2nd quintile	0.97	0.66 – 1.42	1.01	0.63 – 1.61	1.14	0.56 – 2.31
3rd quintile	1.07	0.73 – 1.58	0.72	0.43 – 1.18	2.38	1.21 – 4.74*
4th quintile	0.78	0.50 – 1.19	0.64	0.37 – 1.09	1.24	0.59 – 2.64
5th quintile *(most marginalized)*	0.62	0.40 – 0.96*	0.37	0.20 – 0.67**	1.33	0.65 – 2.78
Material Deprivation						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.19	0.82 – 1.73	0.93	0.58 – 1.49	1.73	0.91 – 3.41
3rd quintile	1.18	0.80 – 1.76	1.27	0.78 – 2.06	0.98	0.47 – 2.06
4th quintile	1.34	0.88 – 2.04	1.49	0.88 – 2.52	1.11	0.53 – 2.36
5th quintile *(most marginalized)*	1.05	0.66 – 1.67	0.77	0.40 – 1.44	1.53	0.72 – 3.32
Ethnic Concentration						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.01	0.66 – 1.53	1.08	0.64 – 1.82	0.83	0.39 – 1.73
3rd quintile	0.77	0.48 – 1.22	0.74	0.41 – 1.34	0.77	0.35 – 1.67
4th quintile	0.88	0.54 – 1.45	0.83	0.45 – 1.55	0.87	0.38 – 2.00
5th quintile *(most marginalized)*	1.19	0.72 – 1.99	1.05	0.55 – 2.03	1.38	0.59 – 3.32
Residential Instability						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.13	0.75 – 1.70	1.34	0.82 – 2.21	0.82	0.38 – 1.73
3rd quintile	1.11	0.73 – 1.69	1.00	0.58 – 1.72	1.48	0.74 – 2.99
4th quintile	1.26	0.82 – 1.93	1.54	0.89 – 2.66	1.13	0.55 – 2.33
5th quintile *(most marginalized)*	1.35	0.88 – 2.06	1.23	0.70 – 2.14	1.36	0.68 – 2.76

Associations between factors and primary care provider sometimes, rarely, or never spending enough time with patient, stratified by age.

Predictors	**Full Model, N = 2,677**		**Age ≤ 60 years, N = 1,378**		**Age > 60 years, N = 1,308**	
	Odds Ratios	**CI (95%)**	**Odds Ratios**	**CI (95%)**	**Odds Ratios**	**CI (95%)**
Intercept	0.26	0.10 – 0.68**	0.56	0.15 – 2.02	0.09	0.02 – 0.46**
Remote communication access	0.89	0.71 – 1.13	0.97	0.72 – 1.30	0.67	0.46 – 0.98*
Health record access	1.09	0.54 – 2.03	1.24	0.55 – 2.59	0.43	0.06 – 1.59
Online booking access	0.92	0.47 – 1.64	0.62	0.28 – 1.26	2.18	0.59 – 6.37
Sex						
Female	Reference					
Male	0.84	0.66 – 1.06	0.91	0.67 – 1.23	0.80	0.53 – 1.17
Financial Situation						
Very comfortable	Reference					
Comfortable	1.12	0.83 – 1.54	0.93	0.62 – 1.41	1.20	0.72 – 2.06
Tight/Very tight/Poor	1.53	1.06 – 2.22*	1.22	0.76 – 1.96	1.45	0.76 – 2.80
Educational Attainment						
High school or less	Reference					
Some college/university	0.77	0.48 – 1.21	0.72	0.38 – 1.35	0.73	0.34 – 1.43
Completed college/university	1.07	0.82 – 1.41	0.91	0.62 – 1.35	0.99	0.65 – 1.50
Post-graduate/professional degree	0.84	0.56 – 1.25	0.73	0.43 – 1.22	0.82	0.39 – 1.62
Primary language spoken						
English	Reference					
Other	1.75	1.28 – 2.38***	1.62	1.12 – 2.34*	1.47	0.75 – 2.71
Self-perceived health						
Poor	Reference					
Fair	1.21	0.71 – 2.14	1.03	0.47 – 2.38	1.35	0.64 – 3.07
Good	1.05	0.63 – 1.82	0.80	0.38 – 1.76	1.15	0.56 – 2.60
Very good	0.88	0.52 – 1.54	0.69	0.33 – 1.55	0.79	0.36 – 1.85
Excellent	0.78	0.43 – 1.44	0.64	0.29 – 1.49	0.42	0.12 – 1.32
ADG Score						
< 3	Reference					
3 – 4	1.06	0.70 – 1.64	1.09	0.68 – 1.79	1.30	0.53 – 3.71
5 – 6	0.91	0.60 – 1.42	1.05	0.64 – 1.74	0.99	0.40 – 2.83
7 – 8	0.80	0.52 – 1.27	0.94	0.55 – 1.61	0.98	0.39 – 2.81
≥ 9	1.10	0.72 – 1.72	1.12	0.66 – 1.93	1.78	0.75 – 4.94
Program type						
Enhanced FFS	Reference					
Capitation	0.75	0.59 – 0.98*	0.74	0.54 – 1.02	0.94	0.60 – 1.52
Other	0.59	0.20 – 1.44	0.62	0.14 – 2.04	0.57	0.08 – 2.20
Years with provider						
< 4	Reference					
4 – 9	0.79	0.57 – 1.08	0.72	0.49 – 1.06	0.83	0.46 – 1.49
10 – 19	0.90	0.66 – 1.23	0.82	0.56 – 1.22	1.11	0.65 – 1.92
≥ 20	0.65	0.48 – 0.89**	0.64	0.43 – 0.96*	0.78	0.47 – 1.32
RIO category						

Large urban	Reference					
Urban	0.99	0.75 – 1.31	0.98	0.70 – 1.38	0.92	0.55 – 1.50
Small urban	1.01	0.71 – 1.43	1.04	0.65 – 1.64	0.96	0.55 – 1.70
Rural	0.66	0.38 – 1.11	0.47	0.21 – 0.99	0.91	0.40 – 2.00
Dependency						
1st quintile *(least marginalized)*	Reference					
2nd quintile	0.86	0.61 – 1.22	0.87	0.58 – 1.31	1.23	0.60 – 2.60
3rd quintile	0.90	0.63 – 1.29	0.82	0.53 – 1.27	1.33	0.65 – 2.82
4th quintile	0.86	0.59 – 1.26	0.87	0.54 – 1.38	1.19	0.57 – 2.56
5th quintile *(most marginalized)*	0.69	0.47 – 1.01	0.74	0.43 – 1.24	1.10	0.54 – 2.32
Material Deprivation						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.04	0.75 – 1.43	0.89	0.59 – 1.34	1.31	0.75 – 2.29
3rd quintile	1.02	0.72 – 1.45	0.90	0.57 – 1.39	1.25	0.69 – 2.26
4th quintile	1.16	0.80 – 1.67	1.16	0.72 – 1.86	1.27	0.68 – 2.38
5th quintile *(most marginalized)*	0.82	0.53 – 1.25	0.85	0.50 – 1.44	0.69	0.31 – 1.46
Ethnic Concentration						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.01	0.69 – 1.48	0.94	0.56 – 1.57	1.25	0.70 – 2.24
3rd quintile	0.87	0.57 – 1.31	0.80	0.46 – 1.40	1.04	0.55 – 1.97
4th quintile	1.05	0.68 – 1.63	0.86	0.49 – 1.53	1.27	0.62 – 2.65
5th quintile *(most marginalized)*	1.04	0.65 – 1.67	0.89	0.49 – 1.64	1.17	0.52 – 2.65
Residential Instability						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.15	0.80 – 1.64	1.40	0.90 – 2.18	0.82	0.43 – 1.58
3rd quintile	1.10	0.76 – 1.60	1.27	0.79 – 2.04	0.97	0.52 – 1.82
4th quintile	1.23	0.84 – 1.80	1.31	0.80 – 2.13	1.15	0.61 – 2.18
5th quintile *(most marginalized)*	1.13	0.77 – 1.65	1.48	0.92 – 2.39	0.79	0.40 – 1.56

Associations between factors and primary care provider sometimes, rarely, or never spending enough time with patient, stratified by number of encounters over past 12 months.

Predictors	**Full Model, N = 2,677**		**≤ 3 encounters, N = 1,648**		**> 3 encounters, N = 1,039**	
	Odds Ratios	**CI (95%)**	**Odds Ratios**	**CI (95%)**	**Odds Ratios**	**CI (95%)**
Intercept	0.26	0.10 – 0.68**	0.36	0.10 – 1.25	0.15	0.02 – 0.91*
Remote communication access	0.89	0.71 – 1.13	0.81	0.61 – 1.09	1.06	0.72 – 1.58
Health record access	1.09	0.54 – 2.03	1.13	0.41 – 2.67	1.19	0.42 – 2.92
Online booking access	0.92	0.47 – 1.64	0.96	0.42 – 1.95	0.73	0.20 – 2.03
Sex						
Female	Reference					
Male	0.84	0.66 – 1.06	0.90	0.67 – 1.21	0.76	0.51 – 1.12
Financial Situation						
Very comfortable	Reference					
Comfortable	1.12	0.83 – 1.54	1.03	0.69 – 1.54	1.28	0.77 – 2.22
Tight/Very tight/Poor	1.53	1.06 – 2.22*	1.50	0.93 – 2.43	1.60	0.88 – 3.00
Educational Attainment						
High school or less	Reference					
Some college/university	0.77	0.48 – 1.21	0.70	0.37 – 1.27	0.89	0.41 – 1.80
Completed college/university	1.07	0.82 – 1.41	1.13	0.79 – 1.62	1.02	0.66 – 1.58
Post-graduate/professional degree	0.84	0.56 – 1.25	0.80	0.46 – 1.35	1.01	0.52 – 1.93
Primary language spoken						
English	Reference					
Other	1.75	1.28 – 2.38***	1.55	1.01 – 2.34*	1.95	1.18 – 3.17**
Self-perceived health						
Poor	Reference					
Fair	1.21	0.71 – 2.14	0.95	0.43 – 2.24	1.48	0.70 – 3.34
Good	1.05	0.63 – 1.82	0.69	0.33 – 1.58	1.56	0.76 – 3.46
Very good	0.88	0.52 – 1.54	0.63	0.30 – 1.42	1.01	0.46 – 2.36
Excellent	0.78	0.43 – 1.44	0.51	0.23 – 1.21	1.26	0.47 – 3.41
ADG Score						
< 3	Reference					
3 – 4	1.06	0.70 – 1.64	1.17	0.75 – 1.86	0.50	0.12 – 2.59
5 – 6	0.91	0.60 – 1.42	0.83	0.51 – 1.35	1.19	0.36 – 5.46
7 – 8	0.80	0.52 – 1.27	0.88	0.52 – 1.51	0.81	0.24 – 3.71
≥ 9	1.10	0.72 – 1.72	1.18	0.67 – 2.06	1.31	0.41 – 5.89
Program type						
Enhanced FFS	Reference					
Capitation	0.75	0.59 – 0.98*	0.83	0.58 – 1.19	0.58	0.39 – 0.87**
Other	0.59	0.20 – 1.44	0.61	0.14 – 1.94	0.62	0.09 – 2.46
Years with provider						
< 4	Reference					
4 – 9	0.79	0.57 – 1.08	0.80	0.54 – 1.19	0.77	0.45 – 1.33
10 – 19	0.90	0.66 – 1.23	0.80	0.53 – 1.20	1.05	0.63 – 1.76
≥ 20	0.65	0.48 – 0.89**	0.67	0.45 – 1.00*	0.63	0.38 – 1.07
RIO category						

Large urban	Reference					
Urban	0.99	0.75 – 1.31	1.03	0.72 – 1.46	0.97	0.61 – 1.52
Small urban	1.01	0.71 – 1.43	0.91	0.58 – 1.42	1.24	0.68 – 2.23
Rural	0.66	0.38 – 1.11	0.61	0.31 – 1.17	0.78	0.29 – 1.92
Dependency						
1st quintile *(least marginalized)*	Reference					
2nd quintile	0.86	0.61 – 1.22	0.73	0.47 – 1.12	1.40	0.77 – 2.57
3rd quintile	0.90	0.63 – 1.29	0.57	0.36 – 0.90*	2.20	1.20 – 4.07*
4th quintile	0.86	0.59 – 1.26	0.69	0.43 – 1.11	1.40	0.73 – 2.70
5th quintile *(most marginalized)*	0.69	0.47 – 1.01	0.61	0.37 – 1.00	0.99	0.51 – 1.93
Material Deprivation						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.04	0.75 – 1.43	1.12	0.74 – 1.68	0.93	0.54 – 1.60
3rd quintile	1.02	0.72 – 1.45	1.34	0.87 – 2.06	0.58	0.31 – 1.08
4th quintile	1.16	0.80 – 1.67	1.34	0.83 – 2.18	0.93	0.51 – 1.69
5th quintile *(most marginalized)*	0.82	0.53 – 1.25	0.83	0.46 – 1.46	0.78	0.40 – 1.50
Ethnic Concentration						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.01	0.69 – 1.48	1.29	0.80 – 2.07	0.72	0.37 – 1.39
3rd quintile	0.87	0.57 – 1.31	1.03	0.61 – 1.75	0.59	0.29 – 1.17
4th quintile	1.05	0.68 – 1.63	1.18	0.68 – 2.08	0.91	0.44 – 1.88
5th quintile *(most marginalized)*	1.04	0.65 – 1.67	1.22	0.67 – 2.24	0.87	0.40 – 1.92
Residential Instability						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.15	0.80 – 1.64	1.26	0.80 – 1.99	0.98	0.53 – 1.80
3rd quintile	1.10	0.76 – 1.60	1.24	0.78 – 1.99	0.88	0.46 – 1.64
4th quintile	1.23	0.84 – 1.80	1.43	0.87 – 2.35	1.09	0.58 – 2.02
5th quintile *(most marginalized)*	1.13	0.77 – 1.65	1.13	0.68 – 1.88	1.10	0.60 – 2.03

Associations between factors and primary care provider sometimes, rarely, or never involving patient in decision-making in treatment, stratified by patient age.

Predictors	**Full Model, N = 2,677**		**Age ≤ 60 years, N = 1,378**		**Age > 60 years, N = 1,308**	
	Odds Ratios	**CI (95%)**	**Odds Ratios**	**CI (95%)**	**Odds Ratios**	**CI (95%)**
Intercept	0.14	0.05 – 0.40***	0.29	0.07 – 1.21	0.04	0.01 – 0.24**
Remote communication access	0.87	0.67 – 1.12	0.94	0.67 – 1.32	0.66	0.43 – 1.00
Health record access	1.14	0.53 – 2.21	1.07	0.41 – 2.45	1.45	0.32 – 4.79
Online booking access	0.93	0.44 – 1.77	0.91	0.40 – 1.86	0.48	0.03 – 2.60
Sex						
Female	Reference					
Male	0.91	0.71 – 1.18	1.00	0.71 – 1.39	0.99	0.64 – 1.52
Financial Situation						
Very comfortable	Reference					
Comfortable	1.15	0.81 – 1.65	0.69	0.44 – 1.09	1.83	0.99 – 3.68
Tight/Very tight/Poor	1.55	1.03 – 2.36*	0.94	0.56 – 1.59	2.52	1.21 – 5.53*
Educational Attainment						
High school or less	Reference					
Some college/university	0.65	0.37 – 1.07	0.86	0.40 – 1.78	0.52	0.22 – 1.11
Completed college/university	0.95	0.71 – 1.28	1.21	0.77 – 1.94	0.64	0.40 – 1.01
Post-graduate/professional degree	0.84	0.54 – 1.29	1.06	0.58 – 1.92	0.53	0.23 – 1.14
Primary language spoken						
English	Reference					
Other	1.62	1.14 – 2.28**	1.42	0.93 – 2.15	1.53	0.77 – 2.88
Self-perceived health						
Poor	Reference					
Fair	0.94	0.53 – 1.73	0.64	0.27 – 1.61	1.31	0.59 – 3.15
Good	0.97	0.57 – 1.73	0.66	0.31 – 1.54	1.19	0.55 – 2.82
Very good	0.68	0.39 – 1.24	0.52	0.24 – 1.22	0.64	0.27 – 1.63
Excellent	0.56	0.29 – 1.10	0.32	0.13 – 0.81*	0.88	0.28 – 2.69
ADG Score						
< 3	Reference					
3 – 4	1.08	0.68 – 1.76	1.43	0.84 – 2.50	0.69	0.26 – 2.04
5 – 6	0.96	0.60 – 1.56	1.09	0.62 – 1.95	0.94	0.38 – 2.71
7 – 8	0.72	0.44 – 1.21	0.86	0.46 – 1.62	0.73	0.28 – 2.16
≥ 9	1.03	0.64 – 1.70	1.04	0.57 – 1.95	1.18	0.48 – 3.34
Program type						
Enhanced FFS	Reference					
Capitation	0.83	0.63 – 1.11	0.79	0.55 – 1.15	0.92	0.56 – 1.54
Other	0.69	0.20 – 1.84	0.57	0.09 – 2.24	0.66	0.10 – 2.66
Years with provider						
< 4	Reference					
4 – 9	0.93	0.64 – 1.34	1.06	0.68 – 1.68	0.66	0.33 – 1.31
10 – 19	1.23	0.86 – 1.75	1.24	0.78 – 1.96	1.21	0.67 – 2.23
≥ 20	0.95	0.67 – 1.35	1.04	0.65 – 1.67	1.01	0.58 – 1.80
RIO category						

Large urban	Reference					
Urban	0.90	0.66 – 1.22	0.71	0.48 – 1.04	1.10	0.64 – 1.89
Small urban	1.02	0.69 – 1.51	0.98	0.58 – 1.63	1.19	0.62 – 2.29
Rural	0.69	0.37 – 1.24	0.43	0.16 – 1.01	1.18	0.47 – 2.86
Dependency						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.22	0.83 – 1.80	1.22	0.77 – 1.91	1.54	0.69 – 3.56
3rd quintile	1.29	0.87 – 1.92	1.17	0.73 – 1.89	1.94	0.88 – 4.51
4th quintile	0.96	0.62 – 1.48	0.70	0.39 – 1.21	1.79	0.81 – 4.18
5th quintile *(most marginalized)*	0.68	0.43 – 1.08	0.50	0.25 – 0.95*	1.32	0.60 – 3.08
Material Deprivation						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.02	0.71 – 1.46	0.92	0.58 – 1.47	1.15	0.62 – 2.15
3rd quintile	1.01	0.69 – 1.49	0.91	0.54 – 1.51	1.16	0.61 – 2.20
4th quintile	1.09	0.72 – 1.65	1.61	0.94 – 2.74	0.71	0.34 – 1.45
5th quintile *(most marginalized)*	0.76	0.47 – 1.22	0.95	0.52 – 1.75	0.57	0.25 – 1.27
Ethnic Concentration						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.17	0.77 – 1.79	1.55	0.86 – 2.82	1.03	0.54 – 1.96
3rd quintile	0.86	0.54 – 1.38	1.01	0.53 – 1.95	0.75	0.35 – 1.57
4th quintile	1.15	0.70 – 1.90	0.88	0.45 – 1.74	1.81	0.84 – 3.98
5th quintile *(most marginalized)*	1.37	0.81 – 2.32	1.28	0.64 – 2.59		
Residential Instability						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.20	0.80 – 1.79	1.39	0.85 – 2.28	1.20	0.56 – 2.59
3rd quintile	1.23	0.81 – 1.86	1.32	0.78 – 2.23	1.30	0.62 – 2.78
4th quintile	1.26	0.82 – 1.94	1.00	0.57 – 1.74	1.89	0.92 – 4.01
5th quintile *(most marginalized)*	1.28	0.84 – 1.95	1.16	0.68 – 1.97	1.73	0.82 – 3.78

Associations between factors and primary care provider sometimes, rarely, or never involving patient in decision-making in treatment, stratified by number of encounters over past 12 months.

Predictors	**Full Model, N = 2,677**		**≤ 3 encounters, N = 1,648**		**> 3 encounters, N = 1,039**	
	Odds Ratios	**CI (95%)**	**Odds Ratios**	**CI (95%)**	**Odds Ratios**	**CI (95%)**
Intercept	0.14	0.05 – 0.40***	0.22	0.05 – 0.86*	0.15	0.02 – 0.97
Remote communication access	0.87	0.67 – 1.12	0.91	0.66 – 1.27	0.78	0.50 – 1.21
Health record access	1.14	0.53 – 2.21	1.61	0.61 – 3.76	0.73	0.17 – 2.21
Online booking access	0.93	0.44 – 1.77	1.34	0.58 – 2.79	0.28	0.02 – 1.38
Sex						
Female	Reference					
Male	0.91	0.71 – 1.18	0.91	0.65 – 1.26	0.97	0.62 – 1.49
Financial Situation						
Very comfortable	Reference					
Comfortable	1.15	0.81 – 1.65	1.14	0.73 – 1.84	1.20	0.69 – 2.21
Tight/Very tight/Poor	1.55	1.03 – 2.36*	1.89	1.12 – 3.27*	1.15	0.57 – 2.33
Educational Attainment						
High school or less	Reference					
Some college/university	0.65	0.37 – 1.07	0.49	0.23 – 0.97	0.82	0.34 – 1.81
Completed college/university	0.95	0.71 – 1.28	0.99	0.68 – 1.47	0.91	0.56 – 1.50
Post-graduate/professional degree	0.84	0.54 – 1.29	0.62	0.33 – 1.13	1.32	0.66 – 2.59
Primary language spoken						
English	Reference					
Other	1.62	1.14 – 2.28**	1.43	0.87 – 2.28	2.16	1.24 – 3.70**
Self-perceived health						
Poor	Reference					
Fair	0.94	0.53 – 1.73	1.04	0.44 – 2.70	0.74	0.33 – 1.73
Good	0.97	0.57 – 1.73	0.78	0.35 – 1.94	1.07	0.51 – 2.41
Very good	0.68	0.39 – 1.24	0.62	0.28 – 1.54	0.54	0.23 – 1.33
Excellent	0.56	0.29 – 1.10	0.40	0.16 – 1.06	0.88	0.30 – 2.50
ADG Score						
< 3	Reference					
3 – 4	1.08	0.68 – 1.76	1.11	0.67 – 1.90	0.61	0.17 – 2.52
5 – 6	0.96	0.60 – 1.56	1.03	0.61 – 1.79	0.55	0.17 – 2.13
7 – 8	0.72	0.44 – 1.21	0.94	0.51 – 1.74	0.36	0.11 – 1.40
≥ 9	1.03	0.64 – 1.70	1.31	0.70 – 2.47	0.64	0.21 – 2.43
Program type						
Enhanced FFS	Reference					
Capitation	0.83	0.63 – 1.11	0.77	0.52 – 1.15	0.85	0.54 – 1.34
Other	0.69	0.20 – 1.84	0.46	0.07 – 1.79	1.28	0.19 – 5.30
Years with provider						
< 4	Reference					
4 – 9	0.93	0.64 – 1.34	0.97	0.62 – 1.54	0.73	0.37 – 1.44
10 – 19	1.23	0.86 – 1.75	1.02	0.64 – 1.62	1.49	0.82 – 2.76
≥ 20	0.95	0.67 – 1.35	0.90	0.58 – 1.40	1.00	0.55 – 1.86

RIO category						
Large urban	Reference					
Urban	0.90	0.66 – 1.22	0.82	0.55 – 1.23	1.02	0.61 – 1.68
Small urban	1.02	0.69 – 1.51	0.97	0.60 – 1.57	1.04	0.51 – 2.08
Rural	0.69	0.37 – 1.24	0.76	0.36 – 1.52	0.49	0.13 – 1.55
Dependency						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.22	0.83 – 1.80	1.17	0.73 – 1.87	1.40	0.69 – 2.86
3rd quintile	1.29	0.87 – 1.92	0.90	0.54 – 1.48	2.56	1.28 – 5.23**
4th quintile	0.96	0.62 – 1.48	0.73	0.42 – 1.25	1.51	0.70 – 3.25
5th quintile *(most marginalized)*	0.68	0.43 – 1.08	0.45	0.24 – 0.82*	1.25	0.59 – 2.66
Material Deprivation						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.02	0.71 – 1.46	0.88	0.56 – 1.40	1.12	0.59 – 2.13
3rd quintile	1.01	0.69 – 1.49	1.20	0.75 – 1.93	0.61	0.29 – 1.25
4th quintile	1.09	0.72 – 1.65	1.24	0.73 – 2.10	0.77	0.37 – 1.57
5th quintile *(most marginalized)*	0.76	0.47 – 1.22	0.56	0.28 – 1.08	0.87	0.41 – 1.82
Ethnic Concentration						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.17	0.77 – 1.79	1.45	0.87 – 2.45	0.70	0.32 – 1.51
3rd quintile	0.86	0.54 – 1.38	0.95	0.52 – 1.74	0.64	0.28 – 1.44
4th quintile	1.15	0.70 – 1.90	1.16	0.62 – 2.19	0.99	0.44 – 2.30
5th quintile *(most marginalized)*	1.37	0.81 – 2.32	1.40	0.72 – 2.76	1.15	0.48 – 2.83
Residential Instability						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.20	0.80 – 1.79	1.20	0.73 – 1.95	1.26	0.59 – 2.69
3rd quintile	1.23	0.81 – 1.86	1.16	0.70 – 1.93	1.53	0.72 – 3.26
4th quintile	1.26	0.82 – 1.94	1.33	0.77 – 2.29	1.48	0.70 – 3.17
5th quintile *(most marginalized)*	1.28	0.84 – 1.95	0.84	0.47 – 1.47	2.31	1.15 – 4.76*

Associations between factors and primary care provider sometimes, rarely, or never explaining things in a way that is easy to understand, stratified by patient age.

Predictors	**Full Model, N = 2,677**		**Age ≤ 60 years, N = 1,378**		**Age > 60 years, N = 1,308**	
	Odds Ratios	**CI (95%)**	**Odds Ratios**	**CI (95%)**	**Odds Ratios**	**CI (95%)**
Intercept	0.11	0.03 – 0.42**	0.20	0.03 – 1.29	0.02	0.00 – 0.18**
Remote communication access	1.13	0.80 – 1.60	1.04	0.66 – 1.65	1.30	0.73 – 2.37
Health record access	0.61	0.15 – 1.73	0.22	0.01 – 1.11	1.77	0.26 – 7.23
Online booking access	0.83	0.24 – 2.10	0.69	0.16 – 2.08	1.00	0.05 – 5.65
Sex						
Female	Reference					
Male	0.84	0.59 – 1.18	0.79	0.49 – 1.25	1.17	0.66 – 2.05
Financial Situation						
Very comfortable	Reference					
Comfortable	1.09	0.69 – 1.79	1.01	0.55 – 1.98	0.97	0.47 – 2.18
Tight/Very tight/Poor	1.35	0.78 – 2.38	1.18	0.57 – 2.52	1.38	0.55 – 3.53
Educational Attainment						
High school or less	Reference					
Some college/university	0.72	0.34 – 1.39	0.62	0.19 – 1.71	0.81	0.28 – 1.97
Completed college/university	1.00	0.68 – 1.50	1.10	0.62 – 2.05	0.66	0.35 – 1.23
Post-graduate/professional degree	0.91	0.50 – 1.61	0.91	0.41 – 2.03	0.63	0.21 – 1.61
Primary language spoken						
English	Reference					
Other	1.88	1.21 – 2.88**	1.87	1.10 – 3.13*	1.28	0.47 – 3.05
Self-perceived health						
Poor	Reference					
Fair	0.89	0.45 – 1.85	0.74	0.27 – 2.19	1.07	0.40 – 3.21
Good	0.63	0.33 – 1.29	0.42	0.17 – 1.19	0.88	0.34 – 2.60
Very good	0.46	0.23 – 0.95*	0.33	0.13 – 0.95*	0.42	0.14 – 1.38
Excellent	0.47	0.20 – 1.08	0.35	0.12 – 1.08	0.30	0.04 – 1.52
ADG Score						
< 3	Reference					
3 – 4	0.65	0.35 – 1.24	0.93	0.44 – 2.06	0.28	0.09 – 0.97*
5 – 6	0.62	0.33 – 1.17	0.86	0.40 – 1.94	0.34	0.11 – 1.09
7 – 8	0.61	0.32 – 1.17	0.84	0.37 – 1.96	0.33	0.11 – 1.08
≥ 9	0.82	0.45 – 1.55	1.03	0.46 – 2.39	0.50	0.18 – 1.53
Program type						
Enhanced FFS	Reference					
Capitation	0.78	0.53 – 1.14	0.62	0.38 – 1.01	1.57	0.77 – 3.50
Other	0.59	0.09 – 2.09	0.48	0.02 – 2.81	0.82	0.04 – 5.50
Years with provider						
< 4	Reference					
4 – 9	0.93	0.56 – 1.54	0.82	0.44 – 1.56	1.21	0.48 – 3.07
10 – 19	1.22	0.75 – 1.98	1.03	0.56 – 1.93	1.79	0.79 – 4.26
≥ 20	1.07	0.67 – 1.72	1.14	0.61 – 2.14	1.39	0.63 – 3.24
RIO category						

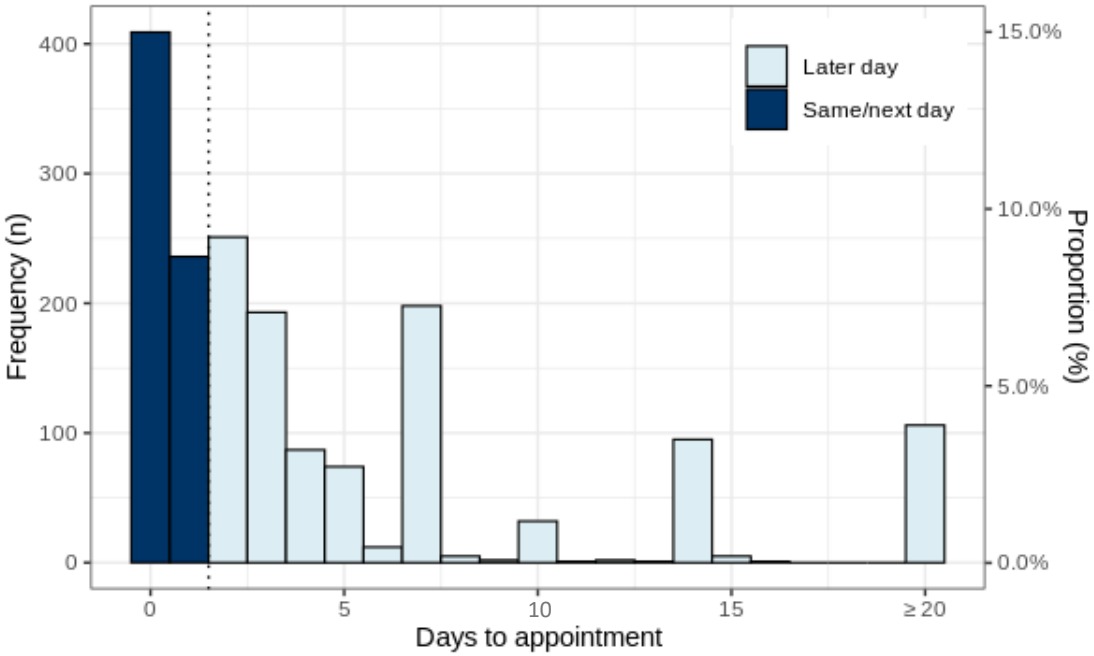
Large urban	Reference					
Urban	1.06	0.70 – 1.59	0.91	0.53 – 1.53	1.12	0.54 – 2.29
Small urban	0.99	0.56 – 1.72	1.21	0.58 – 2.50	0.63	0.25 – 1.54
Rural	1.03	0.48 – 2.15	0.91	0.53 – 1.53	1.35	0.47 – 3.80
Dependency						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.23	0.70 – 2.14	1.23	0.66 – 2.28	2.90	0.63 – 20.49
3rd quintile	1.32	0.74 – 2.35	1.11	0.55 – 2.17	4.90	1.18 – 33.49
4th quintile	1.74	0.98 – 3.11	1.24	0.60 – 2.53	8.21	2.10 – 54.93**
5th quintile *(most marginalized)*	1.54	0.86 – 2.79	0.94	0.40 – 2.12	8.10	2.12 – 53.77**
Material Deprivation						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.07	0.65 – 1.79	1.20	0.62 – 2.34	0.80	0.33 – 1.89
3rd quintile	0.98	0.56 – 1.70	1.06	0.51 – 2.18	0.76	0.31 – 1.85
4th quintile	1.48	0.86 – 2.57	1.87	0.91 – 3.90	1.12	0.47 – 2.68
5th quintile *(most marginalized)*	0.86	0.45 – 1.64	1.06	0.44 – 2.48	0.68	0.23 – 1.91
Ethnic Concentration						
1st quintile *(least marginalized)*	Reference					
2nd quintile	0.82	0.45 – 1.46	0.83	0.34 – 1.96	0.91	0.38 – 2.10
3rd quintile	0.79	0.41 – 1.49	0.97	0.40 – 2.36	0.56	0.19 – 1.54
4th quintile	1.04	0.53 – 2.03	0.78	0.31 – 2.00	1.69	0.62 – 4.67
5th quintile *(most marginalized)*	1.73	0.88 – 3.46	1.42	0.57 – 3.71	2.06	0.69 – 6.19
Residential Instability						
1st quintile *(least marginalized)*	Reference					
2nd quintile	0.76	0.44 – 1.30	0.86	0.44 – 1.66	0.73	0.26 – 2.04
3rd quintile	0.85	0.50 – 1.46	1.10	0.56 – 2.15	0.74	0.28 – 2.03
4th quintile	0.72	0.40 – 1.27	0.45	0.19 – 1.01	1.40	0.56 – 3.70
5th quintile *(most marginalized)*	0.82	0.47 – 1.41	1.07	0.54 – 2.13	0.71	0.26 – 1.98

Associations between factors and primary care provider sometimes, rarely, or never explaining things in a way that is easy to understand, stratified by number of encounters over past 12 months.

Predictors	**Full Model, N = 2,677**		**≤ 3 encounters, N = 1,648**		**> 3 encounters, N = 1,039**	
	Odds Ratios	**CI (95%)**	**Odds Ratios**	**CI (95%)**	**Odds Ratios**	**CI (95%)**
Intercept	0.11	0.03 – 0.42**	0.14	0.02 – 0.87*	0.07	0.01 – 0.71*
Remote communication access	1.13	0.80 – 1.60	1.29	0.82 – 2.07	1.08	0.62 – 1.91
Health record access	0.61	0.15 – 1.73	0.87	0.13 – 3.16	0.39	0.02 – 1.97
Online booking access	0.83	0.24 – 2.10	1.00	0.23 – 2.98	0.42	0.02 – 2.41
Sex						
Female	Reference					
Male	0.84	0.59 – 1.18	0.99	0.63 – 1.55	0.66	0.36 – 1.16
Financial Situation						
Very comfortable	Reference					
Comfortable	1.09	0.69 – 1.79	1.19	0.65 – 2.29	1.04	0.50 – 2.36
Tight/Very tight/Poor	1.35	0.78 – 2.38	1.33	0.62 – 2.88	1.69	0.72 – 4.19
Educational Attainment						
High school or less	Reference					
Some college/university	0.72	0.34 – 1.39	0.67	0.24 – 1.65	0.60	0.18 – 1.64
Completed college/university	1.00	0.68 – 1.50	1.01	0.59 – 1.77	0.95	0.52 – 1.78
Post-graduate/professional degree	0.91	0.50 – 1.61	0.98	0.44 – 2.11	1.12	0.42 – 2.81
Primary language spoken						
English	Reference					
Other	1.88	1.21 – 2.88**	2.22	1.22 – 3.94**	1.58	0.78 – 3.11
Self-perceived health						
Poor	Reference					
Fair	0.89	0.45 – 1.85	1.08	0.39 – 3.52	0.72	0.28 – 1.97
Good	0.63	0.33 – 1.29	0.40	0.15 – 1.29	0.92	0.38 – 2.39
Very good	0.46	0.23 – 0.95*	0.38	0.14 – 1.21	0.42	0.15 – 1.25
Excellent	0.47	0.20 – 1.08	0.34	0.11 – 1.20	0.65	0.15 – 2.40
ADG Score						
< 3	Reference					
3 – 4	0.65	0.35 – 1.24	0.72	0.36 – 1.48	0.32	0.06 – 1.82
5 – 6	0.62	0.33 – 1.17	0.75	0.37 – 1.57	0.33	0.08 – 1.67
7 – 8	0.61	0.32 – 1.17	0.87	0.40 – 1.91	0.28	0.07 – 1.42
≥ 9	0.82	0.45 – 1.55	0.80	0.33 – 1.87	0.58	0.16 – 2.77
Program type						
Enhanced FFS	Reference					
Capitation	0.78	0.53 – 1.14	0.83	0.48 – 1.49	0.65	0.36 – 1.15
Other	0.59	0.09 – 2.09	0.50	0.03 – 2.84	0.60	0.03 – 3.80
Years with provider						
< 4	Reference					
4 – 9	0.93	0.56 – 1.54	0.73	0.38 – 1.39	1.36	0.58 – 3.34
10 – 19	1.22	0.75 – 1.98	1.17	0.64 – 2.18	1.47	0.65 – 3.49
≥ 20	1.07	0.67 – 1.72	0.86	0.47 – 1.60	1.57	0.71 – 3.69

RIO category						
Large urban	Reference					
Urban	1.06	0.70 – 1.59	0.99	0.56 – 1.73	1.14	0.59 – 2.14
Small urban	0.99	0.56 – 1.72	1.14	0.56 – 2.31	0.83	0.30 – 2.14
Rural	1.03	0.48 – 2.15	1.01	0.38 – 2.55	1.30	0.33 – 4.54
Dependency						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.23	0.70 – 2.14	1.08	0.54 – 2.15	1.55	0.59 – 4.17
3rd quintile	1.32	0.74 – 2.35	0.76	0.35 – 1.64	3.20	1.28 – 8.42*
4th quintile	1.74	0.98 – 3.11	1.30	0.63 – 2.70	3.02	1.15 – 8.30*
5th quintile *(most marginalized)*	1.54	0.86 – 2.79	1.01	0.47 – 2.18	3.13	1.20 – 8.61*
Material Deprivation						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.07	0.65 – 1.79	0.89	0.45 – 1.76	1.41	0.62 – 3.25
3rd quintile	0.98	0.56 – 1.70	1.27	0.64 – 2.52	0.54	0.19 – 1.44
4th quintile	1.48	0.86 – 2.57	1.83	0.91 – 3.75	1.17	0.48 – 2.91
5th quintile *(most marginalized)*	0.86	0.45 – 1.64	0.68	0.26 – 1.68	0.97	0.36 – 2.60
Ethnic Concentration						
1st quintile *(least marginalized)*	Reference					
2nd quintile	0.82	0.45 – 1.46	0.81	0.39 – 1.66	0.82	0.28 – 2.33
3rd quintile	0.79	0.41 – 1.49	0.82	0.36 – 1.83	0.81	0.27 – 2.45
4th quintile	1.04	0.53 – 2.03	0.91	0.38 – 2.17	1.21	0.41 – 3.80
5th quintile *(most marginalized)*	1.73	0.88 – 3.46	1.37	0.57 – 3.39	2.82	0.92 – 9.25
Residential Instability						
1st quintile *(least marginalized)*	Reference					
2nd quintile	0.76	0.44 – 1.30	0.59	0.28 – 1.22	1.06	0.45 – 2.48
3rd quintile	0.85	0.50 – 1.46	1.01	0.51 – 2.00	0.64	0.24 – 1.62
4th quintile	0.72	0.40 – 1.27	0.67	0.30 – 1.45	0.87	0.36 – 2.12
5th quintile *(most marginalized)*	0.82	0.47 – 1.41	0.91	0.43 – 1.89	0.68	0.28 – 1.63

Appendix T: Histogram of days to appointment with binary groupings



Appendix U: Chi-square test on changes in deviance of time to appointment model

Analysis of Deviance Table

Model: binomial, link: logit

Response: urgent2.

Terms added sequentially (first to last)

	Df	Deviance	Resid. Df	Resid. Dev	Pr(>Chi)	
NULL			1684	2234.6		
Telehealth access	1	1.0604	1683	2233.6	0.3031293	
Health record access	1	0.9757	1682	2232.6	0.3232528	
Booking access	1	2.2070	1681	2230.4	0.1373882	
Age	1	0.1878	1680	2230.2	0.6647899	
Sex.	1	0.0626	1679	2230.1	0.8024742	
Financial status	2	1.8025	1677	2228.3	0.4060696	
Education	3	6.5515	1674	2221.8	0.0876550	.
Satisfaction	3	18.3197	1671	2203.5	0.0003779	***
Language	1	0.6011	1670	2202.9	0.4381619	
Self-reported health	4	1.5252	1666	2201.3	0.8221703	
ADG.	4	6.6118	1662	2194.7	0.1578780	
Number of encounters	1	21.1211	1661	2173.6	4.311e-06	***
Program type	2	4.4155	1659	2169.2	0.1099504	
Practice type	1	0.1389	1658	2169.1	0.7093294	
Years with provider	3	3.7036	1655	2165.3	0.2953006	
Rurality	3	18.4368	1652	2146.9	0.0003574	***
dependency.	4	0.6998	1648	2146.2	0.9513563	
deprivation.	4	2.2901	1644	2143.9	0.6825706	
ethnic.	4	4.8934	1640	2139.0	0.2984152	
instability.	4	4.0736	1636	2135.0	0.3961403	

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Appendix V: GVIFs for Time to Appointment Models

Unstratified Model

	GVIF	Df	GVIF^(1/(2*Df))
Telehealth access	1.077558	1	1.038055
Health record access	1.045003	1	1.022254
Booking access	1.074107	1	1.036391
Age	1.433993	2	1.094301
Sex.	1.069336	1	1.034087
Financial status	1.209651	2	1.048733
Education	1.263163	3	1.039704
Language	1.210872	1	1.100396
Self-reported health	1.374737	4	1.040585
ADG.	1.311998	4	1.034527
Program type	1.259140	2	1.059299
Years with provider	1.139747	3	1.022040
Rurality	2.032198	3	1.125454
dependency.	1.766261	4	1.073697
deprivation.	1.576641	4	1.058563
ethnic.	2.779834	4	1.136324
instability.	1.747519	4	1.072267

≤ 3 primary care encounters over the past 12 months.

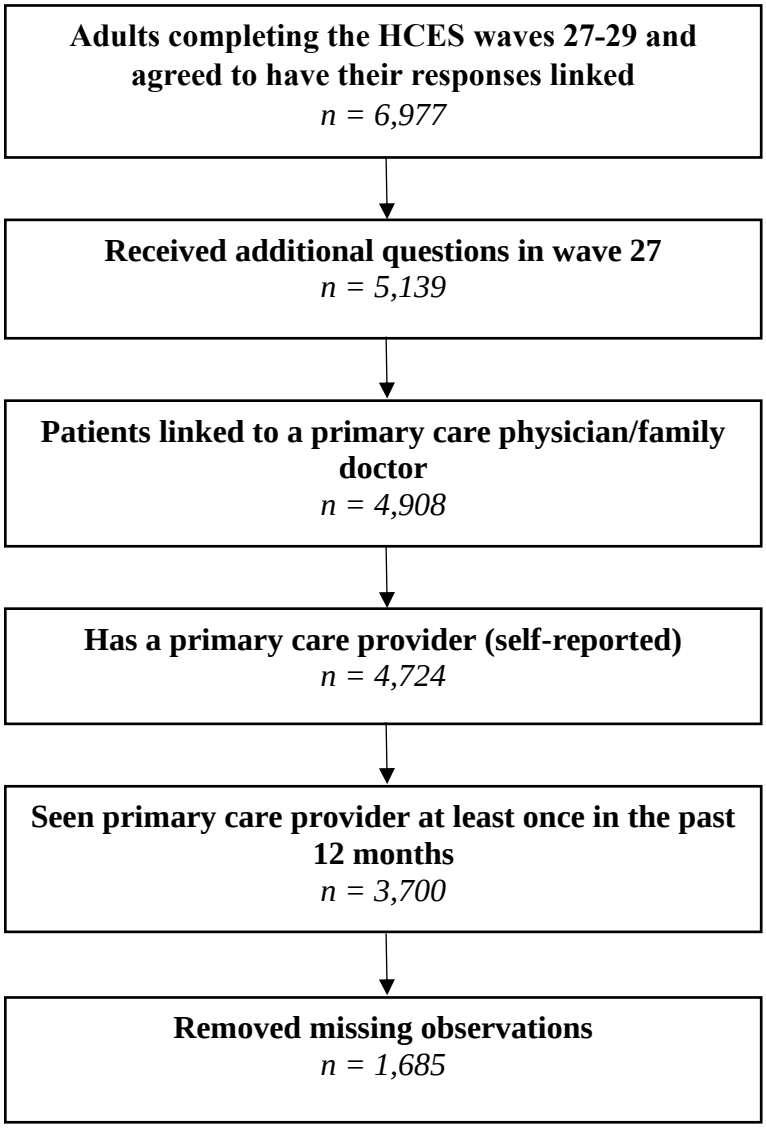
Telehealth access 1.097603 1 1.047666
Health record access 1.060905 1 1.030003
Booking access 1.066851 1 1.032885
Age 1.418153 2 1.091266
Sex. 1.089155 1 1.043626
Financial status 1.312157 2 1.070278
Education 1.330934 3 1.048800
Language 1.210376 1 1.100171
Self-reported health 1.394548 4 1.042448
ADG. 1.304471 4 1.033783
Program type 1.305091 2 1.068834
Years with provider 1.247063 3 1.037484
Rurality 2.176990 3 1.138438
dependency. 1.952761 4 1.087254
deprivation. 1.683093 4 1.067243
ethnic. 3.099606 4 1.151896
instability. 1.917903 4 1.084809

> 3 primary care encounters over the past 12 months.

GVIF Df GVIF^(1/(2*Df))

Telehealth access 1.111409 1 1.054234
Health record access 1.086661 1 1.042431
Booking access 1.132795 1 1.064329
Age 1.634944 2 1.130774
Sex. 1.147656 1 1.071287
Financial status 1.287196 2 1.065151
Education 1.493291 3 1.069114
Language 1.281445 1 1.132009
Self-reported health 1.516210 4 1.053404
ADG. 1.483171 4 1.050507
Program type 1.372015 2 1.082280
Years with provider 1.264684 3 1.039913
Rurality 2.251133 3 1.144810
dependency. 1.941867 4 1.086494
deprivation. 1.791730 4 1.075621
ethnic. 2.918888 4 1.143279
instability. 1.884891 4 1.082457

Appendix W: Flow diagram of chapter 3 cohort



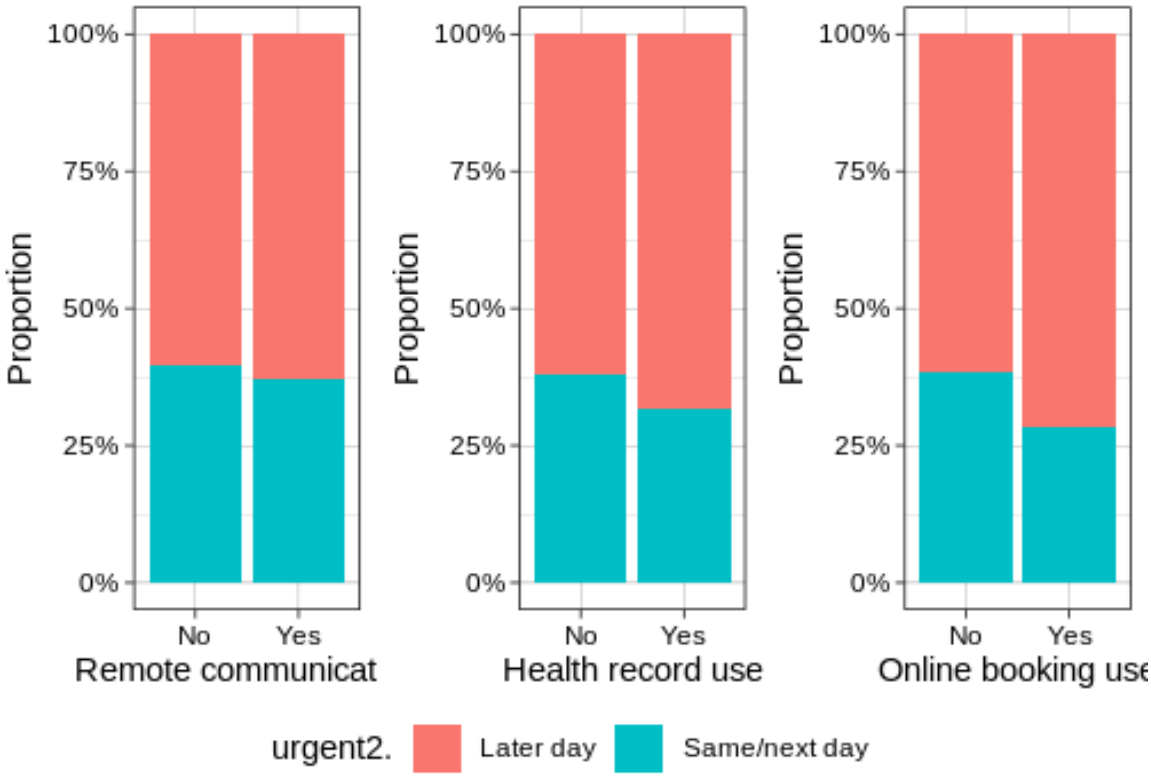
Appendix X: Descriptive statistics of chapter 3 cohort

	Cohort, n = 3,700	Primary analysis, n = 1,685
Remote communication access		
Yes	59.6% (2204)	69.6% (1173)
No	39.8% (1474)	30.4% (512)
Missing	0.6% (22)	
Health record access		
Yes	2.6% (98)	3.6% (60)
No	97.1% (3593)	96.4% (1625)
Missing	0.2% (9)	
Online booking access		
Yes	3.2% (120)	4.0% (67)
No	96.3% (3563)	96.0% (1618)
Missing	0.5% (17)	
Age (years)		
16-44	22.9% (849)	24.1% (406)
45-64	35.9% (1328)	38.6% (650)
65+	41.2% (1523)	37.3% (629)
Sex		
Female	61.4% (2271)	63.6% (1071)
Male	38.6% (1429)	36.4% (614)
Financial situation		
Very comfortable	17.8% (658)	18.8% (317)
Comfortable	59.2% (2192)	60.8% (1025)
Tight/Very tight/Poor	19.4% (719)	20.4% (343)
Missing	3.5% (131)	
Primary language		
English	86.0% (3182)	86.9% (1464)
Other	13.8% (511)	13.1% (221)
Missing	0.2% (7)	
Educational attainment		
High school or less	27.8% (1029)	23.3% (392)
Some college/university	8.9% (330)	8.6% (145)
Completed college/university	49.6% (1834)	54.1% (912)
Post-graduate/professional degree	13.0% (481)	14.0% (236)
Missing	0.7% (26)	
Dependency		
1st quintile *(least marginalized)*	20.4% (755)	21.2% (358)
2nd quintile	17.9% (662)	18.6% (313)
3rd quintile	19.5% (720)	19.6% (331)
4th quintile	18.2% (675)	18.5% (311)
5th quintile *(most marginalized)*	23.4% (867)	22.1% (372)
Missing	0.6% (21)	
Material deprivation		
1st quintile *(least marginalized)*	24.2% (895)	24.5% (413)
2nd quintile	22.6% (835)	24.4% (411)
3rd quintile	19.1% (706)	18.9% (319)
4th quintile	18.2% (672)	17.9% (302)
5th quintile *(most marginalized)*	15.4% (571)	14.2% (240)
Missing	0.6% (21)	
Ethnic concentration		

1st quintile *(least marginalized)*	21.4% (793)	21.2% (357)
2nd quintile	18.8% (697)	17.4% (294)
3rd quintile	19.4% (716)	20.2% (340)
4th quintile	19.3% (714)	21.5% (363)
5th quintile *(most marginalized)*	20.5% (759)	19.6% (331)
Missing	0.6% (21)	
Residential instability		
1st quintile *(least marginalized)*	19.9% (738)	20.5% (346)
2nd quintile	19.6% (725)	19.3% (326)
3rd quintile	19.4% (719)	19.2% (324)
4th quintile	18.6% (690)	18.5% (312)
5th quintile *(most marginalized)*	21.8% (807)	22.4% (377)
Missing	0.6% (21)	
RIO category		
Large urban	39.1% (1446)	41.0% (691)
Urban	26.7% (989)	27.4% (462)
Small urban	23.5% (868)	22.7% (383)
Rural	9.7% (360)	8.8% (149)
Missing	1.0% (37)	
Self-reported health		
Poor	5.2% (193)	5.0% (85)
Fair	15.2% (563)	16.2% (273)
Good	32.0% (1184)	34.2% (577)
Very good	33.5% (1240)	32.6% (550)
Excellent	13.5% (498)	11.9% (200)
Missing	0.6% (22)	
ADG Score		
<3	9.9% (365)	6.2% (105)
3-4	22.4% (830)	19.7% (332)
5-6	24.1% (892)	22.9% (386)
7-8	20.2% (746)	23.4% (394)
≥9	23.4% (867)	27.8% (468)
Program type		
Enhanced Fee-for-Service	24.1% (892)	27.0% (455)
Capitation	64.2% (2376)	70.9% (1195)
Other	2.0% (74)	2.1% (35)
Missing	9.7% (358)	
Number of years with provider		
Less than 3	22.8% (843)	23.7% (399)
4-9	23.5% (869)	23.5% (396)
10-19	22.5% (834)	23.1% (389)
20 or more	29.6% (1096)	29.7% (501)
Missing	1.6% (58)	
Primary care encounters over 12 months (median, IQR)	3 (2-5)	3 (2-5)

Appendix Y: Proportion plot of digital health and time to appointment

Proportion plot of proportions of Ontario patients accessing remote communication (telehealth), digital health records, and online appointment booking, and reported time to primary care appointment.



Appendix Z: Chi-square tests between digital health and time to appointment

Chi-square tests of association between primary care experience and access to telehealth, digital health record access, and online appointment booking.

Time to Urgent Appointment	***Telehealth access***		***Total***
	No telehealth access	***Telehealth access***	
Later Day	309 (60.4%)	739 (63%)	1048 (62.2%)
Same/Next Day	203 (39.6%)	434 (37%)	637 (37.8%)
Total	512 (100%)	1173 (100%)	1685 (100%)

$\chi2=0.954 \cdot df=1 \cdot \varphi=0.025 \cdot p=0.329$

Time to Urgent Appointment	***Digital health record access***		***Total***
	No digital health record access	***No digital health record access***	
Later Day	1007 (62%)	41 (68.3%)	1048 (62.2%)
Same/Next Day	618 (38%)	19 (31.7%)	637 (37.8%)
Total	1625 (100%)	60 (100%)	1685 (100%)

$\chi2=0.744 \cdot df=1 \cdot \varphi=0.024 \cdot p=0.388$

Time to Urgent Appointment	***Online booking access***		***Total***
	No online booking access	***No online booking access***	
Later Day	1000 (61.8%)	48 (71.6%)	1048 (62.2%)
Same/Next Day	618 (38.2%)	19 (28.4%)	637 (37.8%)
Total	1618 (100%)	67 (100%)	1685 (100%)

$\chi2=2.246 \cdot df=1 \cdot \varphi=0.040 \cdot p=0.134$

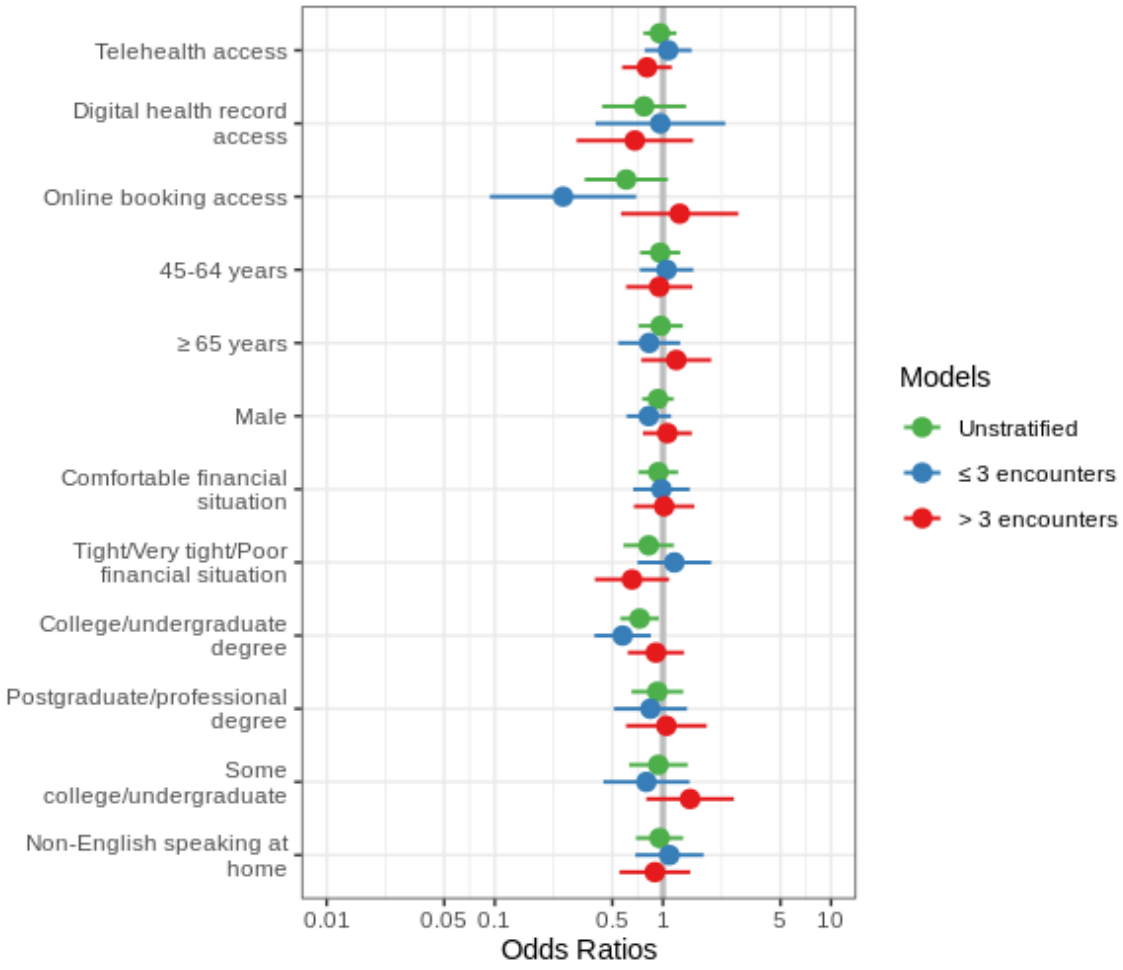
Appendix AA: Odds ratios and confidence intervals for fixed-effect time to appointment models

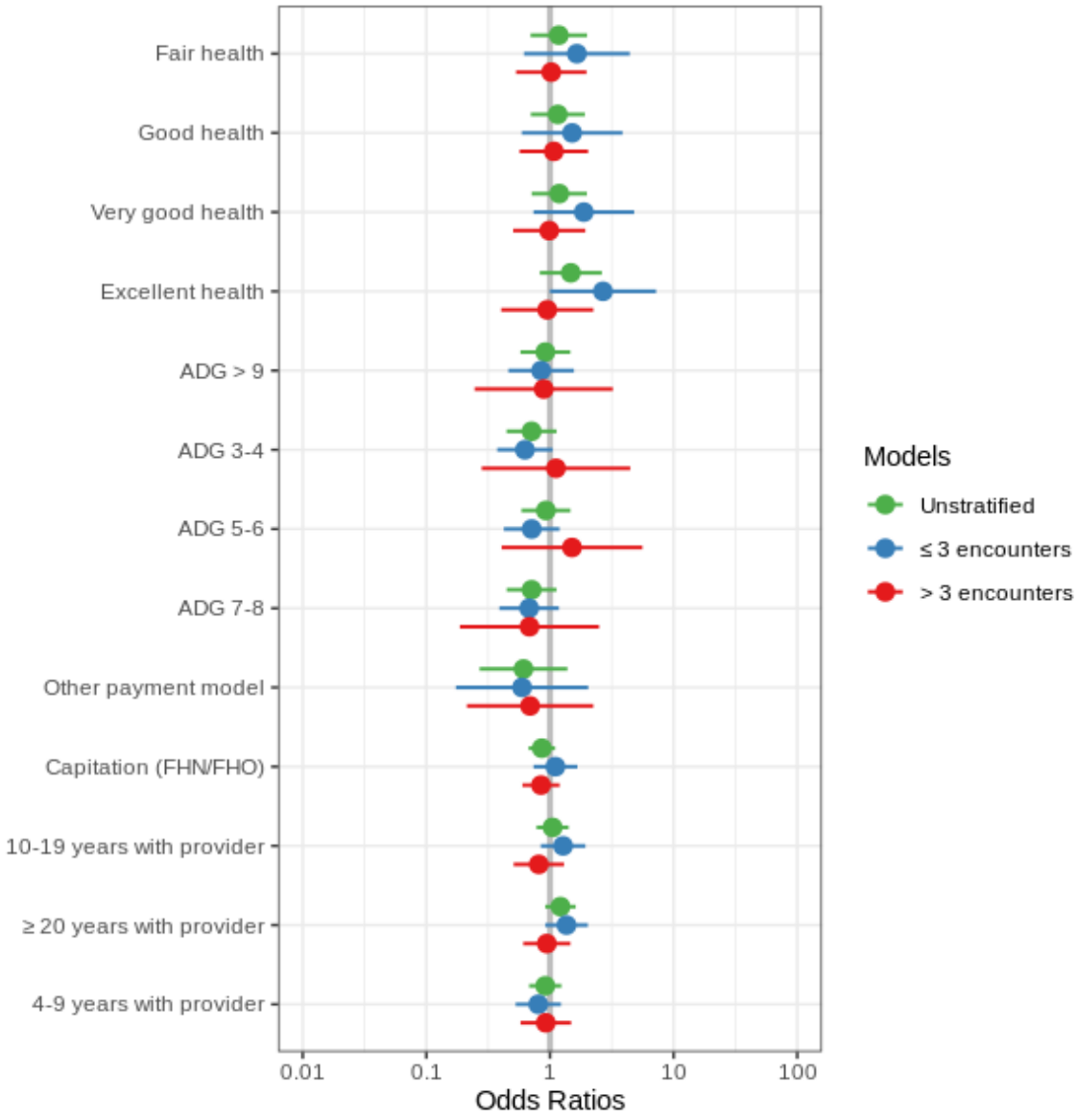
Associations between digital health, personal, healthcare, and geographic factors, and same-/next-day in-person appointment.

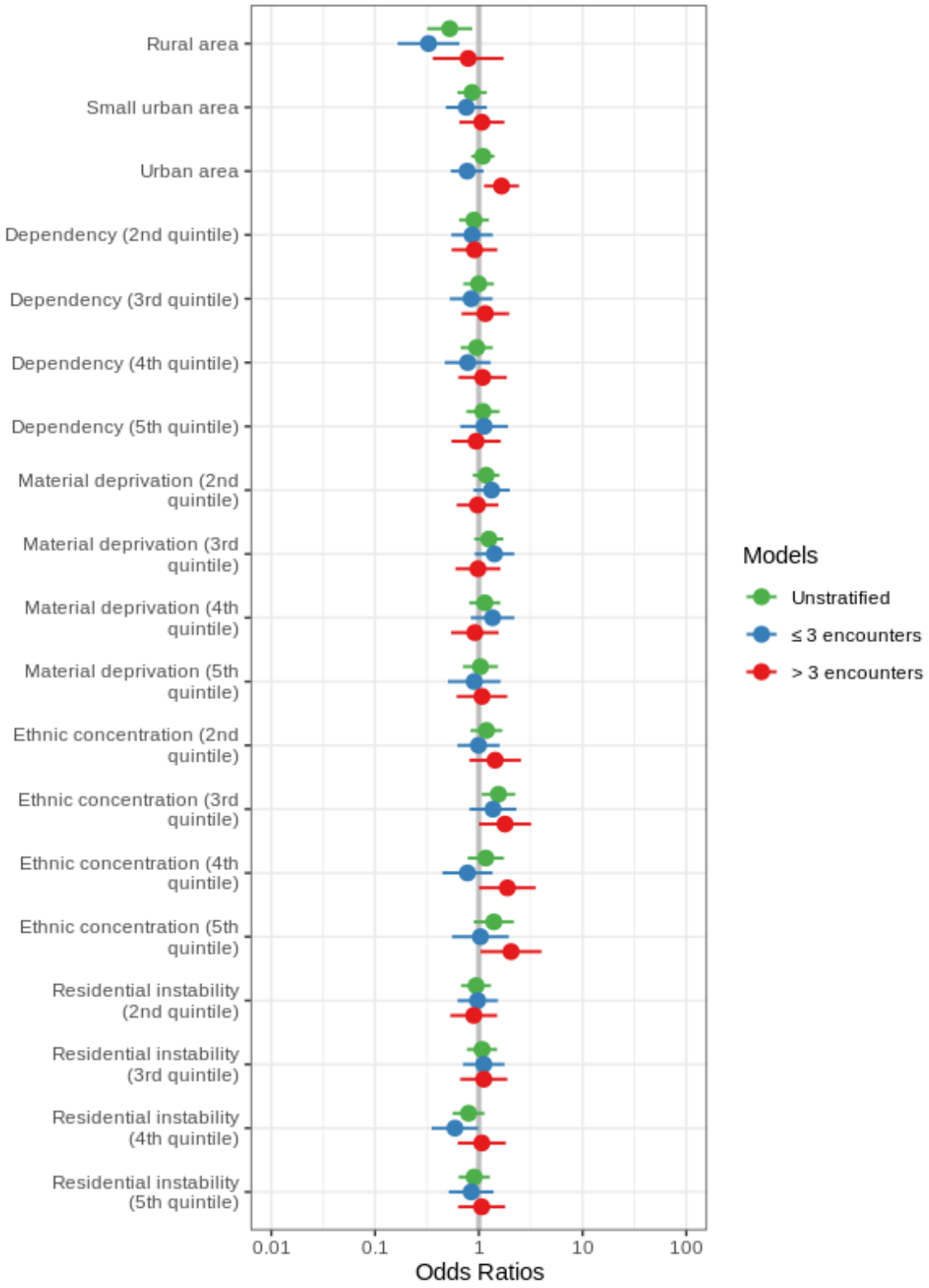
Predictors	**Full Model, N = 1685**		**≤ 3 encounters, N = 944**		**> 3 encounters, N = 741**	
	Odds Ratios	**CI (95%)**	**Odds Ratios**	**CI (95%)**	**Odds Ratios**	**CI (95%)**
Intercept	0.78	0.30 – 2.00	0.64	0.15 – 2.60	0.59	0.10 – 3.38
Remote communication access	0.96	0.77 – 1.20	1.07	0.78 – 1.48	0.80	0.57 – 1.13
Health record access	0.77	0.43 – 1.35	0.97	0.38 – 2.28	0.68	0.30 – 1.49
Online booking access	0.60	0.34 – 1.05	0.25	0.08 – 0.64**	1.26	0.56 – 2.82
Age (years)						
16-44	Reference					
45-64	0.96	0.73 – 1.27	1.05	0.73 – 1.52	0.95	0.60 – 1.50
65+	0.97	0.72 – 1.31	0.83	0.54 – 1.27	1.20	0.74 – 1.94
Sex						
Female	Reference					
Male	0.93	0.75 – 1.16	0.82	0.61 – 1.12	1.06	0.76 – 1.49
Financial Situation						
Very comfortable	Reference					
Comfortable	0.94	0.72 – 1.23	0.98	0.67 – 1.45	1.02	0.67 – 1.54
Tight/Very tight/Poor	0.82	0.58 – 1.16	1.17	0.71 – 1.94	0.65	0.39 – 1.09
Educational Attainment						
High school or less	Reference					
Some college/university	0.94	0.63 – 1.40	0.80	0.44 – 1.43	1.45	0.80 – 2.65
Completed college/university	0.73	0.56 – 0.95*	0.58	0.39 – 0.85**	0.91	0.62 – 1.33
Post-graduate/professional degree	0.93	0.65 – 1.32	0.84	0.51 – 1.39	1.05	0.60 – 1.82
Primary language spoken						
English	Reference					
Other	0.96	0.69 – 1.32	1.09	0.68 – 1.74	0.90	0.55 – 1.45
Self-perceived health						
Poor	Reference					
Fair	1.18	0.70 – 2.01	1.65	0.64 – 4.68	1.02	0.53 – 1.99
Good	1.16	0.70 – 1.93	1.51	0.62 – 4.12	1.07	0.57 – 2.05
Very good	1.19	0.72 – 2.00	1.88	0.77 – 5.12	0.99	0.51 – 1.95
Excellent	1.47	0.83 – 2.64	2.68	1.04 – 7.66	0.95	0.40 – 2.25
ADG Score						
< 3	Reference					
3 – 4	0.71	0.45 – 1.13	0.63	0.37 – 1.05	1.12	0.28 – 4.64
5 – 6	0.93	0.59 – 1.47	0.71	0.42 – 1.20	1.51	0.40 – 5.86
7 – 8	0.71	0.45 – 1.13	0.68	0.39 – 1.18	0.68	0.18 – 2.61
≥ 9	0.92	0.58 – 1.47	0.85	0.46 – 1.56	0.89	0.24 – 3.38
Program type						
Enhanced FFS	Reference					
Capitation	0.86	0.67 – 1.10	1.11	0.74 – 1.67	0.85	0.60 – 1.20

Other	0.61	0.26 – 1.34	0.59	0.15 – 1.90	0.69	0.20 – 2.17
Years with provider						
< 4	Reference					
4 – 9	0.92	0.68 – 1.24	0.80	0.53 – 1.23	0.93	0.58 – 1.48
10 – 19	1.05	0.78 – 1.42	1.28	0.84 – 1.94	0.81	0.51 – 1.30
≥ 20	1.22	0.92 – 1.62	1.36	0.92 – 2.03	0.94	0.61 – 1.46
RIO category						
Large urban	Reference					
Urban	1.09	0.85 – 1.41	0.77	0.54 – 1.11	1.66	1.13 – 2.44*
Small urban	0.86	0.62 – 1.19	0.76	0.48 – 1.19	1.07	0.65 – 1.76
Rural	0.52	0.32 – 0.86*	0.33	0.16 – 0.64**	0.79	0.35 – 1.71
Dependency						
1st quintile *(least marginalized)*	Reference					
2nd quintile	0.90	0.64 – 1.25	0.86	0.54 – 1.36	0.91	0.55 – 1.51
3rd quintile	1.00	0.71 – 1.40	0.84	0.52 – 1.35	1.15	0.68 – 1.96
4th quintile	0.95	0.67 – 1.36	0.78	0.47 – 1.30	1.09	0.64 – 1.86
5th quintile *(most marginalized)*	1.10	0.76 – 1.58	1.13	0.66 – 1.91	0.94	0.55 – 1.63
Material Deprivation						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.18	0.88 – 1.58	1.33	0.89 – 1.99	0.97	0.61 – 1.54
3rd quintile	1.25	0.91 – 1.72	1.41	0.91 – 2.20	0.98	0.59 – 1.62
4th quintile	1.14	0.81 – 1.61	1.36	0.84 – 2.20	0.92	0.54 – 1.55
5th quintile *(most marginalized)*	1.04	0.70 – 1.53	0.90	0.50 – 1.61	1.07	0.61 – 1.88
Ethnic Concentration						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.18	0.83 – 1.69	0.99	0.62 – 1.59	1.44	0.81 – 2.55
3rd quintile	1.55	1.07 – 2.25*	1.37	0.81 – 2.31	1.79	1.01 – 3.21*
4th quintile	1.17	0.78 – 1.75	0.78	0.45 – 1.36	1.89	1.01 – 3.55*
5th quintile *(most marginalized)*	1.39	0.90 – 2.18	1.04	0.55 – 1.95	2.04	1.04 – 4.05*
Residential Instability						
1st quintile *(least marginalized)*	Reference					
2nd quintile	0.94	0.68 – 1.31	0.97	0.62 – 1.53	0.89	0.53 – 1.50
3rd quintile	1.07	0.77 – 1.50	1.12	0.70 – 1.77	1.12	0.66 – 1.89
4th quintile	0.80	0.56 – 1.14	0.59	0.35 – 0.98*	1.07	0.63 – 1.82
5th quintile *(most marginalized)*	0.90	0.64 – 1.27	0.84	0.51 – 1.39	1.07	0.63 – 1.80

Appendix AB: Forest plot of fixed effects in time to appointment models

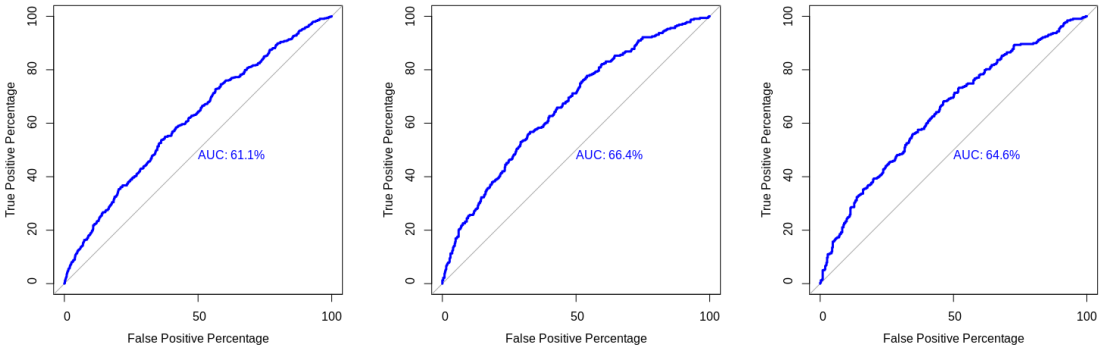



Fair health
Good health
Very good health
Excellent health
ADG > 9
ADG 3-4
ADG 5-6
ADG 7-8
Other payment model
Capitation (FHN/FHO)
10-19 years with provider
≥ 20 years with provider
4-9 years with provider
0.01
0.1
1
10
100
Odds Ratios
Models
Unstratified
≤ 3 encounters
> 3 encounters


Rural area
Small urban area
Urban area
Dependency (2nd quintile)
Dependency (3rd quintile)
Dependency (4th quintile)
Dependency (5th quintile)
Material deprivation (2nd quintile)
Material deprivation (3rd quintile)
Material deprivation (4th quintile)
Material deprivation (5th quintile)
Ethnic concentration (2nd quintile)
Ethnic concentration (3rd quintile)
Ethnic concentration (4th quintile)
Ethnic concentration (5th quintile)
Residential instability (2nd quintile)
Residential instability (3rd quintile)
Residential instability (4th quintile)
Residential instability (5th quintile)
0.01
0.1
1
10
100
Odds Ratios
Models
Unstratified
≤ 3 encounters
> 3 encounters

Appendix AC: ROC curves for fixed effect time to appointment models

(left: unstratified; middle: ≤ 3 encounters; right: > 3 encounters)



Appendix AD: Odds ratios and confidence intervals for mixed-effect time to appointment models

Associations between digital health, personal, healthcare, and geographic factors, and same-/next-day in-person appointments, clustered by LHIN.

Predictors	**Full Model, N = 1,685**		**≤ 3 encounters, N = 944**		**> 3 encounters, N = 741**	
	Odds Ratios	**CI (95%)**	**Odds Ratios**	**CI (95%)**	**Odds Ratios**	**CI (95%)**
Intercept	0.81	0.31 – 2.13	0.64	0.15 – 2.71	0.58	0.10 – 3.33
Remote communication access	0.95	0.76 – 1.20	1.07	0.78 – 1.48	0.80	0.57 – 1.13
Health record access	0.76	0.43 – 1.36	0.96	0.39 – 2.34	0.68	0.30 – 1.51
Online booking access	0.60	0.34 – 1.06	0.25	0.09 – 0.68**	1.24	0.55 – 2.79
Age (years)						
16-44	Reference					
45-64	0.96	0.73 – 1.26	1.05	0.73 – 1.52	0.95	0.60 – 1.50
65+	0.96	0.71 – 1.31	0.82	0.54 – 1.26	1.20	0.74 – 1.94
Sex						
Female	Reference					
Male	0.93	0.75 – 1.16	0.82	0.61 – 1.12	1.06	0.76 – 1.49
Financial Situation						
Very comfortable	Reference					
Comfortable	0.92	0.70 – 1.21	0.97	0.66 – 1.44	1.01	0.67 – 1.53
Tight/Very tight/Poor	0.80	0.57 – 1.14	1.16	0.70 – 1.92	0.65	0.39 – 1.09
Educational Attainment						
High school or less	Reference					
Some college/university	0.95	0.63 – 1.42	0.82	0.45 – 1.48	1.46	0.80 – 2.67
Completed college/university	0.73	0.56 – 0.95*	0.57	0.39 – 0.85**	0.91	0.62 – 1.34
Post-graduate/professional degree	0.93	0.65 – 1.32	0.83	0.50 – 1.38	1.05	0.60 – 1.82
Primary language spoken						
English	Reference					
Other	0.98	0.70 – 1.36	1.11	0.69 – 1.78	0.90	0.55 – 1.46
Self-perceived health						
Poor	Reference					
Fair	1.18	0.69 – 2.01	1.59	0.59 – 4.29	1.04	0.54 – 2.02
Good	1.15	0.69 – 1.90	1.46	0.57 – 3.76	1.10	0.57 – 2.10
Very good	1.18	0.70 – 1.97	1.83	0.71 – 4.71	1.00	0.51 – 1.99
Excellent	1.47	0.82 – 2.63	2.69	0.99 – 7.27	0.97	0.41 – 2.30
ADG Score						
< 3	Reference					
3 – 4	0.73	0.46 – 1.17	0.64	0.38 – 1.08	1.14	0.28 – 4.56
5 – 6	0.96	0.60 – 1.52	0.71	0.42 – 1.20	1.56	0.41 – 5.85
7 – 8	0.72	0.45 – 1.14	0.68	0.39 – 1.19	0.70	0.19 – 2.57
≥ 9	0.93	0.58 – 1.49	0.85	0.46 – 1.58	0.91	0.25 – 3.34
Program type						
Enhanced FFS	Reference					
Capitation	0.87	0.68 – 1.13	1.14	0.75 – 1.74	0.85	0.60 – 1.20

Other	0.68	0.29 – 1.59	0.70	0.19 – 2.54	0.69	0.21 – 2.24
Years with provider						
< 4	Reference					
4 – 9	0.92	0.68 – 1.24	0.81	0.53 – 1.24	0.93	0.58 – 1.48
10 – 19	1.05	0.77 – 1.42	1.27	0.84 – 1.94	0.81	0.50 – 1.29
≥ 20	1.22	0.92 – 1.62	1.39	0.93 – 2.07	0.94	0.60 – 1.46
RIO category						
Large urban	Reference					
Urban	1.03	0.77 – 1.38	0.75	0.50 – 1.11	1.63	1.08 – 2.45*
Small urban	0.84	0.60 – 1.19	0.77	0.48 – 1.24	1.05	0.63 – 1.76
Rural	0.55	0.33 – 0.93*	0.34	0.17 – 0.69**	0.80	0.36 – 1.78
Dependency						
1st quintile *(least marginalized)*	Reference					
2nd quintile	0.91	0.65 – 1.27	0.88	0.55 – 1.40	0.91	0.55 – 1.52
3rd quintile	1.01	0.72 – 1.42	0.84	0.52 – 1.36	1.16	0.68 – 1.97
4th quintile	0.97	0.68 – 1.39	0.78	0.46 – 1.30	1.09	0.63 – 1.87
5th quintile *(most marginalized)*	1.12	0.77 – 1.63	1.16	0.67 – 1.99	0.95	0.55 – 1.64
Material Deprivation						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.17	0.87 – 1.58	1.36	0.90 – 2.06	0.97	0.61 – 1.55
3rd quintile	1.24	0.89 – 1.71	1.44	0.92 – 2.26	0.98	0.59 – 1.62
4th quintile	1.15	0.80 – 1.63	1.42	0.86 – 2.35	0.91	0.53 – 1.55
5th quintile *(most marginalized)*	1.08	0.72 – 1.61	0.98	0.53 – 1.83	1.06	0.60 – 1.87
Ethnic Concentration						
1st quintile *(least marginalized)*	Reference					
2nd quintile	1.14	0.80 – 1.64	0.98	0.61 – 1.58	1.42	0.80 – 2.53
3rd quintile	1.44	0.97 – 2.14	1.28	0.74 – 2.21	1.76	0.98 – 3.17
4th quintile	1.06	0.68 – 1.64	0.70	0.38 – 1.28	1.87	0.99 – 3.53
5th quintile *(most marginalized)*	1.24	0.75 – 2.06	0.91	0.45 – 1.85	2.06	1.04 – 4.10*
Residential Instability						
1st quintile *(least marginalized)*	Reference					
2nd quintile	0.93	0.67 – 1.30	0.98	0.63 – 1.55	0.88	0.52 – 1.49
3rd quintile	1.05	0.75 – 1.48	1.11	0.69 – 1.76	1.11	0.65 – 1.88
4th quintile	0.78	0.54 – 1.12	0.57	0.34 – 0.97*	1.07	0.62 – 1.82
5th quintile *(most marginalized)*	0.87	0.61 – 1.25	0.80	0.47 – 1.35	1.06	0.63 – 1.80
Random Effects						
σ2	3.29		3.29		3.29	
τ00 lhin	0.05		0.06		0.02	
ICC	0.02		0.02		0.01	
N lhin 14	14		14		14	

Appendix AE: Chi-square test between primary care experience and time to appointment

Summed patient experience	***Time to Appointment***		***Total***
	Later day	***Same-/next-day***	
Poorer experience	337 (28.2%)	126 (17.5%)	463 (24.2%)
Positive experience	857 (71.8%)	594 (82.5%)	1451 (75.8%)
Total	1194 (100%)	720 (100%)	1914 (100%)

$\chi 2=27.588 \cdot df=1 \cdot \varphi=0.121 \cdot p=0.000$

Appendix AF: Digital health access compared to in-person primary care access responses

	Time to email/online response	Time to video call	Time to message response	Time to in-person appointment
About right	117	18	24	1486
Somewhat too long	19	< 6	< 6	333
Much too long	15	< 6	< 6	260
Have not received a response/Other	7	< 6	< 6	36
Don't know	46	< 6	< 6	41
Refused	< 6	< 6	< 6	< 6
Missing	3491	3680	3672	1543