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Primary care patient trade-offs between continuity and access in interprofessional teaching clinics: a cross-sectional survey using discrete choice experiment

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ABSTRACT

Objective: Timely access to care and continuity with a given provider are important determinants of patient satisfaction when booking appointments in the primary care setting. In the teaching clinic environment, there are often additional layers of complexity, as continuity with the same provider becomes an even greater challenge to deliver. This study examines trade-offs that patients are willing to make during appointment bookings for a number of key access and continuity attributes using a discrete choice experiment (DCE) method.

Design: Cross-sectional survey.

Setting : Two urban family medicine teaching clinics in Canada.

Participants: Convenience sample of 430 patients of family medicine clinics aged 18 and older.

Intervention: A discrete choice conjoint experiment survey was administered.

Primary outcome measures: Patient preferences on six attributes: appointment timing, booking method, time spent in the waiting room, appointment time convenience, familiarity of health care provider and type of health care provider. Data was analyzed by Hierarchical Bayes (HB) analysis to determine estimates of part-worth utilities for each respondent.

Results: Overall, patients rated time to appointment as the most highly valued attribute, followed by type of provider, then familiarity with the provider. Patients showed a significant preference ($p<0.02$) for their own physician for booking of routine annual

check-ups, but otherwise differences in preferences across attributes were not strongly related to the clinical scenario.

Conclusions: Patient participants showed preferences for timely access to their primary care team over all other attributes, including having continuity with the same provider. These results support the notion that advanced access booking systems seem to target issues that patients value highly.

KEY WORDS: Patient preference, family practice, choice behavior, appointments and schedules, surveys and questionnaires

ABBREVIATIONS:

HB: Hierarchical Bayesian

DCE: Discrete choice experiment

ARTICLE SUMMARY

Strengths and Limitations of this Study

- This study designed a discrete choice experiment with input from stakeholders about attributes that were important in their context
- The study was conducted in two clinics that are part of an academic family medicine department and results may not be applicable in other jurisdictions.
- The study participants were a convenience sample of patients who may have been frequent visitors to the practice and their views may not represent all patients.

Funding

This work was supported by a pilot research grant from the Department of Family Medicine, McMaster University.

Competing Interests

All authors none declared.

Ethical approval

The McMaster University Faculty of Health Sciences/Hamilton Health Sciences research ethics board approved this study.

BACKGROUND

Health policy advisors and primary health care providers seek to better understand patient preferences when it comes to accessing and utilizing primary health care services.[1–4]

There is a growing body of literature supporting the importance of increasing both continuity and faster access in practicing patient-centred primary care.[5–9] The advanced access scheduling system is designed to reduce wait times, and improve access to clinicians by limiting the proportion of pre-booked appointments and opening up time for same or next-day appointments.[10] Advanced access booking has been adopted by many primary care clinics around the world and its value has been evaluated and generally found to be positive.[11–15] However, reports indicate that Canadian patients' access to physicians for same-day appointments is poorer than the United States, United Kingdom and Australia.[16]

There are several attributes for clinics to consider in choosing an appointment scheduling model. Commonly considered aspects are speed of access to an appointment and continuity with the same clinician, which may conflict with each other.[3,11] The value of different aspects of access may differ depending on the context or reason for the patient seeking an appointment. In studies assessing the patients' preference for appointment scheduling and other aspects of primary care access, patients were willing to wait more days to see their own physician for ongoing conditions or to accommodate their work schedules, but were willing to trade off continuity for faster access for their children or for a new health issue.[17–20]

The relationship between access and continuity may be complicated in many family practice settings such as those that have interprofessional teams and in academic settings. Patients may be expected to see different types of clinician (e.g. nurse), or they may be expected to see a physician in training in academic settings. Patients' preferences about seeing a familiar or usual clinician may be a separate issue from their preference for a specific type of provider, for example for some problems they may prefer to see a physician they do not know over a nurse. In addition, the use of technology is advocated for greater efficiency and choices for patients in their interactions with health care.[21]

To understand what relative value patients place on various aspects of the clinical encounter, the "discrete choice experiment (DCE) method" has been utilized extensively in health care research.[2,22–25] In this method, respondents are presented with a questionnaire with varying combinations of different attributes of a decision and for each combination, asked to choose which of the options they prefer. The results compute a measure of importance of different attributes in relation to others, helping to uncover the respondents' highest priorities when trade-offs are required. Previous studies in family practices have used DCE examining attributes of access to primary care including speed of appointment access and continuity with the same physician, and varying the reason or urgency for the visit.[2,7,18–20,25]

Many family practice clinics provide innovative options for care to enhance functioning and the patient experience, including our academic setting, which is inter-professional, teaches residents, has implemented advanced access scheduling, and offers telephone and online appointment scheduling. The objective of this study was to use DCE in an

inter-professional academic setting to evaluate patients' preferences for various attributes of access to their family practice clinic including preferences regarding staff physician, trainee physician and allied health professionals, and method of booking (telephone versus online) across different scenarios of reasons for seeking an appointment.

METHODS

We conducted a cross-sectional survey with family practice patients, using a DCE method.

Questionnaire Development

The core of the questionnaire was comprised of a DCE. DCEs are used regularly and increasingly to study the preferences of patients and physicians for health services and products as well as preferences of consumers in general. Health applications include in-hospital patient care,[9] colorectal cancer,[26] and usage of pharmaceuticals.[27] International Society for Pharmacoeconomics and Outcomes Research guidelines[28] were followed for the design, execution, analysis and interpretations of the DCE.

An initial set of attributes was derived from the literature. To refine the attributes for relevance to the study setting, a focus group discussion was held at each participating clinic. Each group included a nurse, receptionist, a resident and a staff physician who had been involved with implementing advanced access booking. Questions pertained to describing experiences with patient booking and meeting patients' expectations for setting appointments. Expert judgment of the research team (including two physicians

involved in implementing open access) was then used to refine the six attributes of booking appointment method, length of time until the appointment, waiting time at the clinic, convenience of the appointment time, familiarity with the health care provider and the position of the health care provider. (Table 1)

Table 1: Attributes and levels that comprised the discrete choice experiment

Attribute	**Level 1**	**Level 2**	**Level 3**
I can book an appointment	On the internet, right now	Over the phone, and wait less than 1 minute	Over the phone, and wait 1 to 10 minutes until it is answered
I get to see a health care provider	On the same day	In 1 to 14 days	In more than 14 days
I will spend ___ minutes in the waiting room	Less than 15	Between 15 and 30	More than 30
The appointment time is	Exactly the time of day I want	Not exactly the time of day I want, but okay	Not a good time at all
I will see a health care provider who knows me	Well	Not very well	Not at all

The health care provider is a	Family doctor	Training doctor (resident)	Nurse/Nurse Practitioner

The fractional factorial random experiment was designed using Sawtooth Software SSI Web v7.0.26, as was the whole questionnaire. Each respondent saw a series of 12 randomly designed choice sets, each of which provided three alternative configurations of a possible scenario of waiting times and appointment encounters. Two fixed tasks were included to test internal reliability. A representative choice task is provided in Figure 1. The questionnaire began with questions about frequency of visits to the clinic and usual provider seen and self-reported health status, and ended with demographic questions after the choice sets. The questionnaire was pilot tested for clarity and time-to-complete with four staff members of the research team not familiar with the project. Minor wording changes were made. (Figure 1)

We hypothesized that patients' preferences for appointment arrangements would be related to the nature and urgency of health states for those appointments.[29] We defined six states that may motivate requests for consultations with primary health care providers. For example we hypothesized that patients would be relatively less motivated to press for quick appointments if they were seeking routine check-ups and more highly motivated if they experienced sudden pain or if a child were sick.

A random 1/6 of the sample was presented with each of these health states and asked to answer all of the DCE choice questions as if they were in that state. Each respondent

was randomly assigned one health state that was included as the reference for that appointment (Table 2).

Table 2: Six scenarios varied in the discrete choice experiment.

1. Imagine that you are in your current state of health and develop a new symptom (such as **a cold**). You are pretty sure you know what it is, and you want some medication for it.
2. Imagine that you are in your current state of health and develop a new symptom (such as **unexpected blood in stools**). You are not sure what the symptom means, and you want to consult someone to find out.
3. Imagine that you are in your current state of health and develop a new symptom (such as **sudden pain**). You want to see someone to help relieve this unpleasant feeling.
4. Imagine that you are in your current state of health and are experiencing recurring **increased anxiety** due to work or family related issues. You want to see someone to talk about these changes and how your health may be affected.
5. Imagine that you are in your current state of health. You are due for a **routine check-up** or follow-up (such as appointments for a chronic condition or a physical exam).
6. Imagine that your **child or another family member is sick**. You would like to book an appointment for them to see a health care provider.

For a DCE study, a sample size of 300 to 500 subjects is generally considered adequate.[30] The DCE data was analyzed by Hierarchical Bayesian (HB) analysis to obtain estimates of part-worth utilities for each individual respondent and also to reduce problems inherent in the multinomial logit method.[31]

Survey Participants

A convenience sample of patients was recruited in 2012 from two inter-professional family practice teaching clinics in Hamilton, Ontario, Canada. One clinic serves approximately 17,000 patients and the other 12,000. The clinics are staffed by family physicians (n=30), family medicine residents (n=70), nurse practitioners (n=10), mental health therapists (n=6), pharmacists (n=3), occupational therapists (n=2), and dieticians (n=2).

Patients aged 18 year or older and able to read English well enough to complete the questionnaire were eligible.

The questionnaire was created electronically (web-based) and self-administered. Recruitment was done by a research assistant who approached patients in the waiting room while waiting to see their health care provider, and by the clinics through email to patients who had an email on file. Patients recruited in the waiting room used the research assistant's laptop computer. For patients recruited in the waiting room, the research assistant set up the questionnaire for the patient and was available for questions.

The McMaster University Faculty of Health Sciences/Hamilton Health Sciences research ethics board approved this study.

RESULTS

The email request to complete the survey was sent to 1285 patients in the two clinics, and 378 (29.4%) completed the survey. Recruitment in the waiting room of one of the clinics took place approximately one half-day per week from February to July 2012, resulting in 52 additional completed surveys, for a total of 430 responses. Most respondents were 40-59 years of age (39%) or 60 and older (32%). The majority of respondents were female (69%). Nearly half (45%) reported having been to the clinic 3 or more times in the last six months.

The HB analysis provided the part-worth utilities and 95% confidence intervals in Figure 2. The two fixed tasks were not significantly different (Chi-square=2.86, p>0.20), supporting the internal reliability of the design and data. The relative importance of the 6 attributes is presented in Figure 3. Time to Appointment had the greatest impact on patient choices, Provider Position and Familiarity with Provider were second and third most influential and very close in impact. Appointment Convenience, Waiting room time and Booking Method followed in sequential relative impact. For booking time, the lowest utility was found for online booking.

Figure 4 shows one of several simulations conducted to investigate the sensitivity of patients' preferences for different continuity and access scenarios. In both profiles, the appointment was made by a phone call that was answered within one minute, the waiting room times was less than 15 minutes and the appointment was at the exact time

of day that the patient wanted. In one profile, the patient's appointment was scheduled for the same day and the patient would see a resident who was not known to the patient. In the second profile, the patient would have to wait one to 14 days for the appointment but would see the family doctor with whom the patient was well-familiar.

As hypothesized, most patients would like to have the continuity of seeing the family doctor for a routine check-up and would not mind waiting 1 to 14 days to see that MD. We found that 76% of those respondents who were presented with the 'routine check-up' random health state were willing to wait the 1 to 14 days to see the family doctor.

On the other hand, 64% of those who responded under the 'new sudden pain' health state wanted an appointment that same day and were willing to see a resident with whom they were not at all familiar. Close to being as insistent for quick service were those who were in the 'new cold' health state, where 61% wanted the same day appointment. Those presented with the 'anxiety', 'child/family member sick', 'blood in stools' health states would rather see their own doctor, but would not likely be as demanding for the same day appointment.

DISCUSSION

In this discrete choice experiment study of 432 patients, comparing multiple attributes of accessing the primary care clinic, we found that patient choices for appointment bookings in a primary care teaching clinic were most greatly influenced by speed of obtaining the appointment (access), followed by the profession of the health care provider (family doctor, resident or nurse/nurse practitioner) and then the patient's familiarity with the provider (continuity). These results help to demonstrate that an advanced access booking model does in fact target what many patients value most, across a number of health states – that is, timely access to their primary care team.

This study was conducted in a jurisdiction where health policy makers are currently strongly encouraging most, if not all, primary health care providers to adopt an advanced access model of appointment bookings[32]. Our results lend support to the notion that improved and timely access to primary care seems to be the leading priority for patients as well. In many scenarios tested, patients were willing to trade-off continuity with their usual provider or a lesser wait in the waiting area in order to have the offer of a same day appointment. This is the exact reality that teaching clinics and many group practices face, where clinicians are often out of the office either on other rotations, or teaching off-site or doing other clinical work in a hospital or nursing home. Each patient's usual provider will not always be available when they are needed, so other choices need to be offered. In multi-disciplinary teaching clinics, those choices are often a provider that the patient has never met, or a resident or nurse that the patient does not know well.

These trade-offs between continuity and quick access are made quite routinely when discussing access to primary care. This study shows that the only health state tested for which continuity was a significant priority over all other attributes was for the booking of a routine check-up. It seems that patients who are accustomed to receiving their care in a teaching clinic setting are willing to make trade-offs between continuity and access attributes for most health states, but prefer to see their usual physician for their annual physical exams – perhaps reassuring patients that familiar and often more experienced providers give continuous perspectives of their health needs.

The results from this study did seem to differ somewhat from other discrete choice experiments examining access to primary care [18,25]. Rubin et al[18] looked at patient preferences for booking routine appointments and described trade-offs between rapid appointment access, choice of provider and choice of time. They found that for many of their patients sampled, speed of access was not as highly valued as continuity with the same provider or a convenient appointment time. This could be due in part to our patient's having a longstanding relationship with our teaching clinic philosophy and design, where patients agree to come on board with the understanding up front that they will be seen by resident physicians who will leave after 2 years in our program. For most of the patients sampled in our study then, the expectation of continuity with the same provider is often not present from the start, and what matters most then is being seen when they need to be seen.

Of course, to suggest that only a single attribute could be most highly valued by all patients in all health states is a drastic oversimplification of the access question. Perhaps the finest aspect of the discrete choice experimental design is that once the

survey is constructed and health states defined, customized simulations can be run to help determine the best options to offer patients.

This study had some limitations. It was conducted in two clinics that are part of an academic family medicine department and results may not be applicable in other jurisdictions. We studied a convenience sample of patients who may have been more frequent visitors to the practice and their views may not represent all patients. Our results and conclusions are based on the attributes and levels included in the DCE we designed. We followed a reasonable process to determine these in terms of what is important and relevant in our context using focus groups of key informants with expert knowledge of the clinical setting as well as previous literature in similar settings, but we cannot be sure we captured all important attributes.

As primary care environments experiment with options to further improve convenience for patients such as on-line appointment bookings, the relative worth placed on this attribute was of particular interest. When looking at the method of appointment booking (on-line vs phone), there was a preference for phone booking over on-line booking. This may seem surprising given societies' general embrace of technology, but this is perhaps a reflection of people's tendencies to favour things that they have had experience with. Simply put, since patients have never had the option of on-line booking, they are less likely to appreciate the potential value, although further study will be required to understand this attribute more completely.

In conclusion, in an inter-professional teaching environment, patients were willing to have less continuity with their own physician by seeing residents for most issues, and

continuity and speed of access issues overall were more important than the process of making an appointment, convenience of the time, or wait time in the clinic. The results are encouraging for family practices that are continuing to work towards a clinic design that incorporates advanced access booking in an environment with multiple types of health care professionals and learners.

FIGURE LEGENDS

Figure 1: Example of a choice task given to participants in the questionnaire

Figure 2: Utilities for the six attributes and 95% confidence limits

Figure 3: Relative importance of the six attributes related to patient appointment preferences

Figure 4. Comparison of two scenarios for waiting for an appointment across six different health states (i.e. reasons for making an appointment)

STATEMENTS

Author Contributions

All authors contributed to conception and design of the study. DO, MH, KD, HQ contributed to data collection. KD analysed the data. DO, MH, KD wrote the initial draft of the manuscript. All authors interpreted results, critically revised the manuscript and approved the final version.

Data Sharing

Please contact corresponding author.

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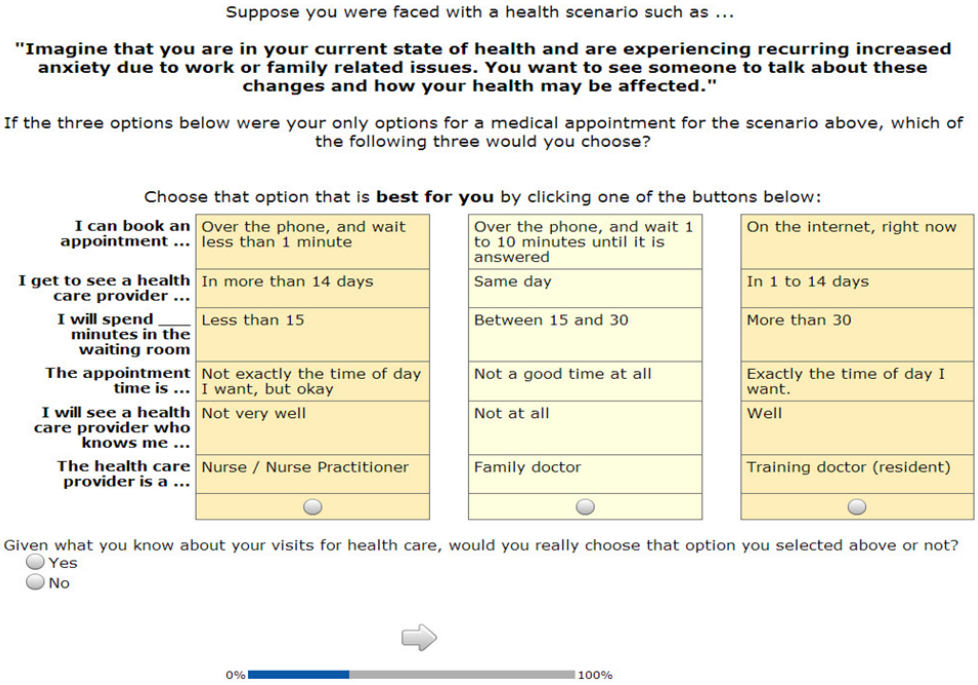
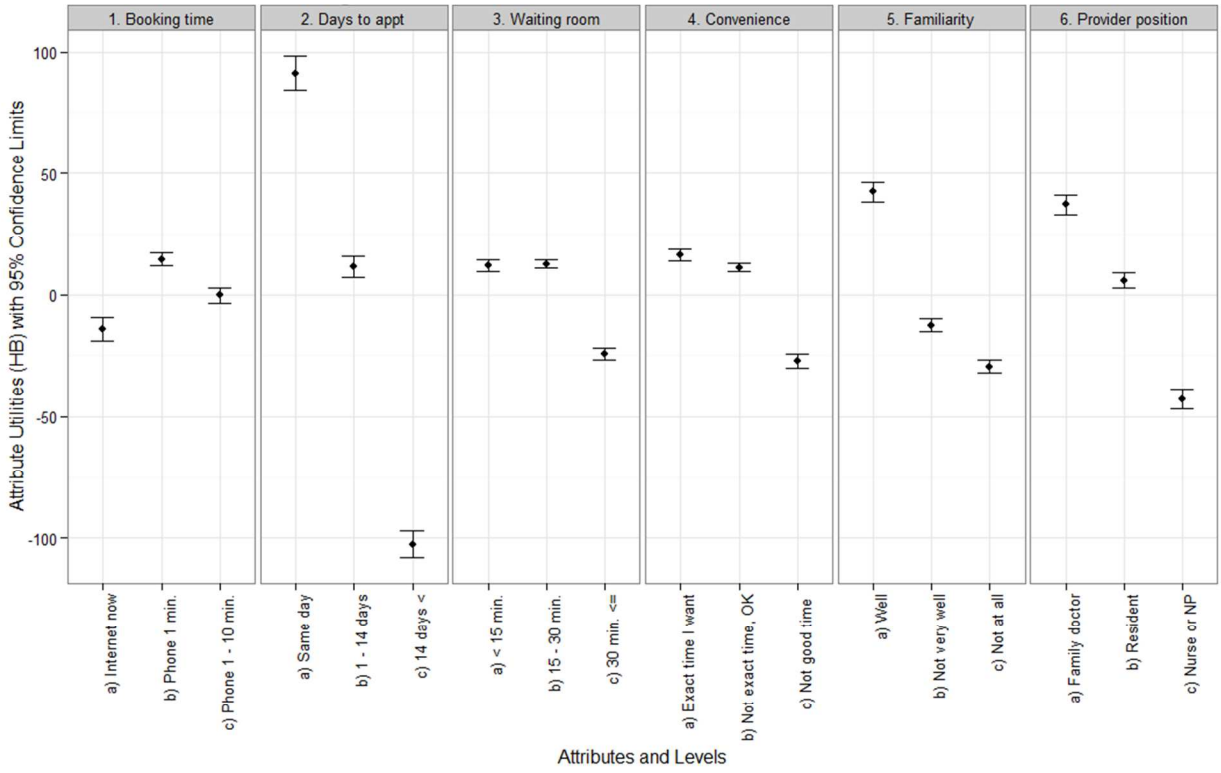
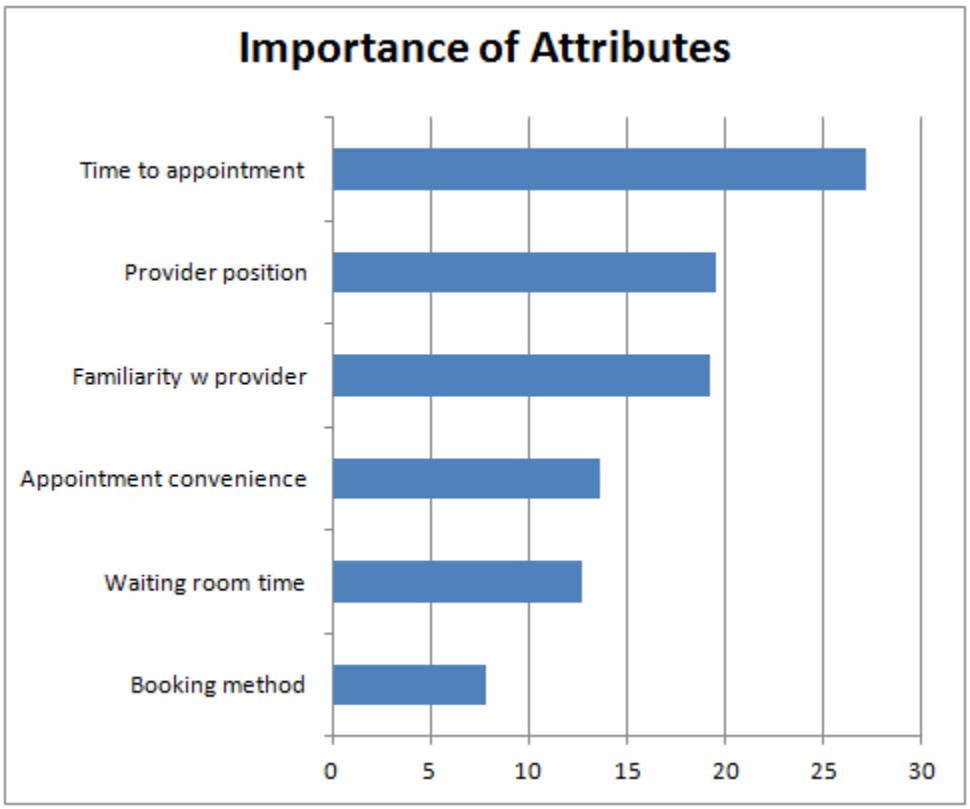


Example of a choice task given to participants in the questionnaire

165x112mm (150 x 150 DPI)


1. Booking time
2. Days to appt
3. Waiting room
4. Convenience
5. Familiarity
6. Provider position
Attribute Utilities (HB) with 95% Confidence Limits
100
50
0
-50
-100
a) Internet now
b) Phone 1 min.
c) Phone 1 - 10 min.
a) Same day
b) 1 - 14 days
c) 14 days <
a) < 15 min.
b) 15 - 30 min.
c) 30 min. <=
a) Exact time I want
b) Not exact time, OK
c) Not good time
a) Well
b) Not very well
c) Not at all
a) Family doctor
b) Resident
c) Nurse or NP
Attributes and Levels



Relative importance of the six attributes related to patient appointment preferences

127x106mm (96 x 96 DPI)

	Configuration of Two Wait Scenarios					
Simulated Wait Scenario	**Booking appointment**	**Time to appointment**	**Waiting room time**	**Appointment convenience**	**Familiarity w provider**	**Provider level**
Shorter wait … but to see a resident I don't know	**Phone answered within 1 minute**	Same day	**Less than 15 minutes**	**Exact time of day I want**	Not at all familiar	A resident
Longer wait … but I see my own doctor		In 1 to 14 days			Well familiar	My family doctor

	Percentages Choosing Wait Scenario under 6 Health States					
Simulated Wait Scenario	**Routine check-up**	**Anxiety**	**Child/ family member sick**	**Blood in stools**	**New cold**	**New sudden pain**
Shorter wait … but to see a resident I don't know	*24*	*41*	*42*	*47*	*61*	*64*
Longer wait … but I see my own doctor	*76*	*59*	*58*	*53*	*39*	*36*

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***
Oliver D et al. Primary care patient trade-offs between continuity and access in interprofessional teaching clinics: a cross-sectional survey using discrete choice experiment

	Item No	Recommendation	Page/paragraph
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Title page
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Pg 1
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Pg 3-4
Objectives	3	State specific objectives, including any prespecified hypotheses	Pg 4-5 and 6 para 2
Methods			
Study design	4	Present key elements of study design early in the paper	Pg 5 para 2 – pg 7
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Pg 7 para 3 – pg 8
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	Pg 7 para 3-4
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Pg 6 para 2-3
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	*Same method used to collect all variables- no between-group comparisons or predictive analyses*
Bias	9	Describe any efforts to address potential sources of bias	Limitations described pg 12
Study size	10	Explain how the study size was arrived at	Pg 6 para 2
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were	Pg 7 para 2

		chosen and why	
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Pg 7 para 2
		(*b*) Describe any methods used to examine subgroups and interactions	n/a
		(*c*) Explain how missing data were addressed	n/a
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	n/a
		(*e*) Describe any sensitivity analyses	n/a
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Pg 7 par a3
		(b) Give reasons for non-participation at each stage	n/a
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Pg 7 para 3
		(b) Indicate number of participants with missing data for each variable of interest	n/a
Outcome data	15*	Report numbers of outcome events or summary measures	Pg 8-9, fig 3, 4
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	n/a
		(*b*) Report category boundaries when continuous variables were categorized	n/a
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	n/a
Other analyses	17	Report other analyses done—eg analyses of subgroups	Pg 9

		and interactions, and sensitivity analyses	
Discussion			
Key results	18	Summarise key results with reference to study objectives	Pg 10 para 1
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Pg 11 para 2
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Pg 11-12
Generalisability	21	Discuss the generalisability (external validity) of the study results	
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Title page

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Patient trade-offs between continuity and access in primary care interprofessional teaching clinics: a cross-sectional survey using discrete choice experiment

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Patient trade-offs between continuity and access in primary care interprofessional teaching clinics: a cross-sectional survey using discrete choice experiment

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ABSTRACT

Objective: Timely access to care and continuity with a specific provider are important determinants of patient satisfaction when booking appointments in primary care settings. Advanced access booking systems that restrict the majority of providers' appointment spots for same-day appointments and keep the number of pre-booked appointments to a minimum. In the teaching clinic environment, continuity with the same provider can be a challenge. This study examines trade-offs that patients may consider during appointment bookings for 6 different clinical scenarios across a number of key access and continuity attributes using a discrete choice experiment (DCE) method.

Design: Cross-sectional survey.

Setting : Two urban family medicine teaching clinics in Canada.

Participants: Convenience sample of 430 patients of family medicine clinics aged 18 and older.

Intervention: Discrete choice conjoint experiment survey.

Primary outcome measures: Patient preferences on six attributes: appointment booking method, appointment wait time, time spent in the waiting room, appointment time convenience, familiarity with health care provider and position of health care provider. Data was analyzed by Hierarchical Bayes (HB) analysis to determine estimates of part-worth utilities for each respondent.

Results: Patients rated appointment wait time as the most highly valued attribute, followed by position of provider, then familiarity with the provider. Patients showed a significant preference ($p<0.02$) for their own physician for booking of routine annual check-ups and other logical preferences across attributes overall and by clinical scenario.

Conclusions: Participants preferred timely access to their primary care team over other attributes in the majority of health state scenarios tested, especially urgent issue, however they were willing to wait for a check-up. These results support the notion that advanced access booking systems which leave the majority of appointment spots for same day access and still leave a few for continuity (check-up) bookings, align well with trends in patient preferences.

KEY WORDS: Patient preference, family practice, choice behavior, appointments and schedules, surveys and questionnaires

ABBREVIATIONS:

HB: Hierarchical Bayesian

DCE: Discrete choice experiment

ARTICLE SUMMARY

Strengths and Limitations of this Study

- This study designed a discrete choice experiment with input from stakeholders about attributes that were important in their context.
- The study was conducted in two clinics that are part of an academic family medicine department and results may not be applicable in other jurisdictions.
- The study participants were a convenience sample of patients who may have been frequent visitors to the practice and their views may not represent all patients.

Funding

This work was supported by a pilot research grant from the Department of Family Medicine, McMaster University.

Competing Interests

All authors none declared.

Ethical approval

The McMaster University Faculty of Health Sciences/Hamilton Health Sciences research ethics board approved this study.

BACKGROUND

Improving the patient experience in out-patient primary care settings is an important priority for health policy advisors and health care providers.[1–4] When patients contact primary care clinics for appointments, how many days or weeks must they wait for their appointments? Will they see providers they know best when they are finally seen? How long must they wait in reception areas and will the appointments be offered at times that are convenient for them? Most importantly, which attributes of that scheduling/consultation process are priorities for patients and which are they willing to trade-off in order to have a satisfactory experience in booking and attending that appointment?

This study was designed to gain deeper understanding of the relative value that patients place on various attributes connected to each attempt to access their primary care providers. We used the discrete choice experiment (DCE) method that has been utilized extensively in health care research.[5–12] In this method, respondents are presented with a questionnaire with varying combinations of different attributes of a decision, e.g., treatment or procedure, and for each combination, asked to choose which of the options they prefer. Patients' preferences as expressed by part-worth utilities (PWUs) are estimated for each decision attribute. The importance of each attribute is estimated and the PWUs used in simulations to better understand patients' preferences for and trade-offs among complete configurations of the treatment.

Speed of access and continuity with the same clinician are commonly studied attributes in various clinical scenarios and while both are often identified as key priorities for patients they are also attributes that are often in conflict with each other in real world

clinical practice. The interplay between access and continuity may be complicated even more in primary care settings that have inter-professional teams or in academic clinics where patients may be expected to see different types of clinicians (e.g., nurse vs doctor versus resident physicians). Patients often must decide whether to take the appointment offered today if it means having to see a provider other than their family physician. Will that decision change based on the health reason that prompts the appointment request?

By gaining a better understanding of patient preferences in various health states, clinical teams will be better positioned to design health systems in ways that are truly patient-centred. Advanced access scheduling systems are an example of a re-design strategy used in many primary care settings to reduce wait times and improve access to clinicians by limiting the proportion of pre-booked appointments and opening up time for same or next-day appointments.[10] Advanced access booking has been adopted by many primary care clinics around the world and its value has been evaluated and generally found to be positive.[11–15]

This study uses DCE in an inter-professional academic setting to evaluate patients' preferences for six attributes of access to their family practice clinic including health provider (family physician, resident physician or allied health professionals), familiarity with the provider, method of booking (telephone versus online) and wait times across different clinical scenarios.

METHODS

We conducted a cross-sectional survey with family practice patients, using a DCE method that we developed through literature review and focus groups with stakeholders.

Questionnaire Development

The core of the questionnaire was comprised of a DCE. DCEs are used regularly and increasingly to study the preferences of patients and physicians for health services and products as well as preferences of consumers in general. Health applications include in-hospital patient care,[16] colorectal cancer,[17] and usage of pharmaceuticals.[18] International Society for Pharmacoeconomics and Outcomes Research guidelines[19] were followed for the design, execution, analysis and interpretations of the DCE.

An initial set of continuity and access attributes was derived from the literature. To refine the attributes for relevance to the study setting, a focus group discussion was held at each participating clinic. Each group included a nurse, receptionist, a resident and a staff physician who had been involved with implementing advanced access booking. We provided scenarios to practice team members in the focus group, to stimulate discussion about attributes. The scenarios reflected access attributes from the literature and that the research team felt were relevant to primary care: speed of appointment, appointment with regular clinician who knows the patient, type of provider (physician, nurse, resident). These attributes were validated by the focus group as very important to include. Participants also suggested an attribute relating to number of phone calls needed to reach the practice for an appointment which was felt to be a lower priority and not included in the DCE. We next described four scenarios that might affect

patients' access preferences (new minor symptom, new urgent symptom, anxiety issues, routine check-up) and asked for input on these and for additional scenarios that would be relevant in the context of a family practice teaching centre. The additional level of online booking was added to the appointment booking method attribute, and for type of provider, the levels of family doctor, training doctor (resident) and nurse/nurse practitioner were recommended. The wording of attribute levels was also refined through discussions and expert judgment of the research team (including two physicians involved in implementing open access). (Table 1)

Table 1: Attributes and levels that comprised the discrete choice experiment

Attribute	**Level 1**	**Level 2**	**Level 3**
I can book an appointment	On the internet, right now	Over the phone, and wait less than 1 minute	Over the phone, and wait 1 to 10 minutes until it is answered
I get to see a health care provider	On the same day	In 1 to 14 days	In more than 14 days
I will spend ___ minutes in the waiting room	Less than 15	Between 15 and 30	More than 30
The appointment time is	Exactly the time of day I want	Not exactly the time of day I want, but okay	Not a good time at all

I will see a health care provider who knows me	Well	Not very well	Not at all
The health care provider is a	Family doctor	Training doctor (resident)	Nurse/Nurse Practitioner

The fractional factorial random experiment was designed using Sawtooth Software SSI Web v7.0.26, as was the whole questionnaire. Each respondent saw a series of 10 randomly designed choice sets, each of which provided three alternative configurations of a possible scenario of waiting times and appointment encounters. Two fixed tasks were added to test internal reliability. A representative choice task is provided in Figure 1. The questionnaire began with questions about frequency of visits to the clinic usual provider seen and self-reported health status, and ended with demographic questions after the choice sets. The questionnaire was pilot tested for clarity and time-to-complete with four staff members of the research team not familiar with the project. Minor wording changes were made. The DCE was introduced and explained to respondents prior to the first choice question.

We hypothesized that patients' preferences for appointment arrangements would be related to the nature and urgency of health states for those appointments.[20] Based on literature review and our focus groups, we defined six states that may motivate requests for consultations with primary health care providers. For example, we hypothesized that patients would be relatively less motivated to press for quick appointments if they were

seeking routine check-ups and more highly motivated if they experienced sudden pain or if a child were sick.

A random 1/6 of the sample was presented with each of these health states and asked to answer all of the DCE choice questions as if they were in that state.

The six health scenarios varied in the discrete choice experiment were:

1. Imagine that you are in your current state of health and develop a new symptom (such as **a cold**). You are pretty sure you know what it is, and you want some medication for it.
2. Imagine that you are in your current state of health and develop a new symptom (such as **unexpected blood in stools**). You are not sure what the symptom means, and you want to consult someone to find out.
3. Imagine that you are in your current state of health and develop a new symptom (such as **sudden pain**). You want to see someone to help relieve this unpleasant feeling.
4. Imagine that you are in your current state of health and are experiencing recurring **increased anxiety** due to work or family related issues. You want to see someone to talk about these changes and how your health may be affected.
5. Imagine that you are in your current state of health. You are due for a **routine check-up** or follow-up (such as appointments for a chronic condition or a physical exam).
6. Imagine that your **child or another family member is sick**. You would like to book an appointment for them to see a health care provider.

For a DCE study, a sample size of 300 to 500 subjects is generally considered adequate and Johnson's often-used rule-of-thumb calculates a sample of 100 for a DCE having our design specifications.[21]

Survey Participants

A convenience sample of patients was recruited in 2012 from two inter-professional family practice teaching clinics with which the researchers are affiliated, in Hamilton, Ontario, Canada. One clinic serves approximately 17,000 patients and the other 12,000. The clinics are staffed by family physicians (n=30), family medicine residents (n=70), nurse practitioners (n=10), mental health therapists (n=6), pharmacists (n=3), occupational therapists (n=2), and dieticians (n=2).

Patients aged 18 year or older and able to read English well enough to complete the questionnaire were eligible. English proficiency was not formally assessed prior to initiation of the survey.

The questionnaire was created electronically (web-based) and self-administered via computer-assisted personal interviews (CAPI). Recruitment was done by a research assistant who approached patients in the waiting room (clinic A, n=53) while waiting to see their health care providers, and through emails to patients who had email addresses on file (clinic B, n=377). The research assistant initiated the CAPI questionnaire on her laptop for patients recruited in the waiting room of Clinic A and was available for questions.

Statistical Methods

The experiment was created within Sawtooth Software SSI Web as a randomized fractional factorial design. The choice data was analyzed using HB within Sawtooth Software CBC/HB for the sample overall.

Aggregate-level multinomial logit analysis was executed to provide initial-level analysis of the choice data as was a basic count-analysis. Hierarchical Bayes estimation (HB) of preference coefficients was chosen over multinomial logit (MNL) since HB largely overcomes the independence of irrelevant alternatives (IIA) issue of MNL[22] and provides preference coefficients for each individual respondent. Huber and Train[23] found that part-worth utility estimates produced by HB and mixed logit were not significantly different. HB uses the Metropolis Hastings Algorithm, a type of Markov chain Monte Carlo iterative procedure that analyzes individual choices at the lower model level using MNL and then analyzes the aggregated data at the upper level using multivariate normal methods. The initial burn-in phase was run with 20,000 iterations with 20,000 additional iterations used for estimating the part-worth utilities.

Internal reliability for the DCE was examined by analyzing the consistency of the fixed choice tasks that were not included in the main analysis. Statistical significance testing used a 5% level of risk. Analysis of variance (ANOVA), multivariate analysis of variance (MANOVA) and independent sample t-tests conducted in R were used to explore whether significant differences existed in preference coefficients among subgroups formed by the randomized health scenarios and other covariates.

Simulations were conducted in Sawtooth Software SMRT using the randomized first choice simulation method. That method was chosen because it attempts to mimic the noise inherent in human decisions by automatically adding appropriate error to the levels of the attributes included in the simulation scenarios, plus an overall error term. We chose the simulation profiles to contain the three most important attributes to ensure a good split in shares-of-preferences and to provide a range of shares across the six scenarios.

The McMaster University Faculty of Health Sciences/Hamilton Health Sciences research ethics board approved this study.

Patient and public involvement

This study developed a survey instrument to elicit patient preferences based on previous literature of similar patient surveys, however patients were not involved in creating the version used in this study. Patients were the participants in this study.

RESULTS

The email request to complete the survey was sent to 1285 patients in the two clinics and 378 (29.4%) completed the survey. Recruitment in the waiting room of one of the clinics took place approximately one half-day per week from February to July 2012, resulting in 53 additional completed surveys, for a total of 430 fully complete and usable responses. Most respondents were 40-59 years of age (39%) or 60 and older (32%). The majority of respondents were female (69%). Nearly half (45%) reported having been to the clinic three or more times in the six months prior to the survey (Table 2).

Table 2: Characteristics of the respondents who were recruited from a clinic waiting room (n=53) or by email invitation from the clinic (n=377)

	Clinic waiting room (n=53)	Email invitation (n=377)
Age category (%)*		
34 and younger	34.0%	17.5%
35 to 49	28.3%	25.2%
50 to 69	22.6%	35.0%
65 and older	9.4%	21.5%
missing	5.7%	0.8%
Female (%)	64.2%	70.0%
Ethnicity – identified as White* (%)	73.6%	89.4%
Number of people living in household (%)		
One	30.2%	18.0%
Two	26.4%	39.8%
Three	17.0%	15.1%
Four	13.2%	18.8%
Five or more	13.2%	8.0%
missing	0	0.3%
Been a patient of clinic*:		

2 years or longer Less than 2 years missing	67.9% 32.1% 0	89.7% 9.8% 0.5%
Perception of health scale rating (mean, standard deviation) 0=very poor, 10=excellent	8.3, (2.2)	8.1, (2.0)

* $p < 0.05$ for difference between groups

The part-worth utilities and 95% confidence intervals from the HB analysis interacting the health states with the individual attribute levels are shown in Supplementary File 1. ANOVA and MANOVA tests ($p \leq 0.05$) indicated that PWUs for wait time before appointment and familiarity with health care provider varied significantly among the health state scenarios and within attributes while not showing significant differences for the other four attributes. The two fixed tasks were not significantly different (Chi-square=2.86, $p>0.20$), supporting the internal reliability of the design and data.

The relative importance of the 6 attributes for each of the randomized health scenarios is presented in Figure 2. Time to appointment had the greatest impact on patient choices, provider position and familiarity with provider were second and third most influential and very close in impact. Appointment convenience, waiting room time and booking method followed in sequential relative impact. Waiting time to appointment had the lowest impact on those confronted with the routine check-up scenario and the greatest impact for those faced with a sudden new pain. Aggregate importance differences were statistically different ($p \leq 0.05$).

Figure 3 shows one of several simulations conducted to investigate the sensitivity of patients' preferences for different continuity and access scenarios that might actually be confronted by patients. In both profiles, the appointment was made by a phone call that was answered within one minute, the waiting room times was less than 15 minutes and the appointment was at the exact time of day that the patient wanted. In one profile (row 1), the patient's appointment was scheduled for the same day and the patient would see a resident who was not known to the patient. In the second profile (row 2), the patient would have to wait one to 14 days for the appointment but would see the family doctor with whom the patient was very familiar.

Simulations using the PWUs are presented for each randomized health scenario in the lower frame of Figure 3. The numbers in each column show the percentages of patients who would likely choose each of the two simulated access/continuity scenarios when faced with the indicated health scenario. As hypothesized, most patients (76%) would like to have the continuity of seeing their family doctor for a routine check-up and would not mind waiting 1 to 14 days to see that MD. On the other hand, 64% of those who responded under the new sudden pain health state wanted an appointment that same day and were willing to see a resident with whom they were not at all familiar. Close to being as insistent for quick service were those who were in the new cold health state, where 61% wanted the same day appointment and only 39% preferred waiting longer to see their own doctor. Those presented with the anxiety, child/family member sick, blood-in-stools health states would rather see their own doctor, but likely would not be quite as demanding for the same day appointment.

DISCUSSION

In this DCE study of 430 patients, comparing multiple attributes of accessing the primary care clinic, we found that patient choices for appointment bookings in a primary care teaching clinic were primarily influenced by speed of obtaining the appointment (access), followed by the professional position of the health care provider (family doctor, resident or nurse/nurse practitioner) and then the patient's familiarity with the provider (continuity). These results help to demonstrate that an advanced access booking model does in fact target what many patients value most across a number of health states, i.e., timely access to their primary care team.

This study was conducted in a jurisdiction where health policy makers are currently strongly encouraging most, if not all, primary health care providers to adopt an advanced access model of appointment bookings.[24] Our results lend support to the notion that improved and timely access to primary care seems to be the leading priority for patients as well. In many scenarios tested, patients were willing to trade-off continuity with their usual provider for a shorter wait in the clinic in order to have the offer of a same day appointment. This is the exact reality that teaching clinics and many group practices face, where clinicians are often out of the office either on other rotations in the case of resident physicians, or doing other clinical work in a hospital or long term care home in the case of staff clinicians. Each patient's usual provider will not always be available when needed, so other choices must to be offered. In multi-disciplinary teaching clinics, those choices are often a provider who the patient has never met, or a resident or nurse who the patient does not know well.

These trade-offs between continuity and quick access are made quite routinely when discussing access to primary care. It seems that patients who are accustomed to receiving their care in a teaching clinic setting are willing to make trade-offs between continuity and access attributes for most health states, but prefer to see their usual physician for their annual physical exams – perhaps reassuring patients that familiar and often more experienced providers are indeed overseeing their care and aware of their ongoing health needs.

The results from this study did seem to differ somewhat from a previous DCEs examining access to primary care. Rubin et al. examined patient preferences for booking routine appointments and described trade-offs between rapid appointment access, choice of provider and choice of time.[6] They found that for many of their patients sampled, speed of access was not as highly valued as continuity with the same provider or a convenient appointment time. The difference between Rubin's result and ours, could be due in part to our patient's having a longstanding relationship with our teaching clinic philosophy and design, where patients agree up front that they will be seen by resident physicians who are only in our clinic for 2-years. For most of the patients in our study, the expectation of continuity with the same provider is often not present from the start, and what matters most is being seen when they need to be seen.

Where is a growing body of literature supporting the importance of increasing both continuity and faster access in practicing patient-centred primary care.[20,25–27] To suggest that any one or two attributes could be most highly valued by all patients in all health states is a drastic oversimplification of what drives patients to seek care. A major advantage of the study design used in this experiment is the ability to run custom

simulations in the DCE, which allowed us to look more closely at real life scenarios and gain deeper understanding of how patients make their choices when accessing primary care services. Our results make clear that while quick access is important for most people, it is not the only priority in certain health states. Primary care systems need to be adaptable enough to offer patients choices to account for variabilities in patient preferences across diverse health states.

This study had some limitations. It was conducted in two clinics that are part of an academic family medicine department and results may not be entirely generalizable to other settings and practice models. We studied a convenience sample of patients who may have been more frequent visitors to the practice and their views may not represent all patients.

Our results and conclusions are based on the attributes and levels included in the DCE we designed. While we followed a robust process to determine which attributes are important and relevant in our context using focus groups of key informants with expert knowledge of the clinical setting as well as previous literature in similar settings, we cannot be sure we captured all important attributes. The appointment booking method is a compound attribute of method and time to book the appointment. We had no desire to separately estimate the booking method (internet or phone) from the booking wait time ('right now', 'less than 1 minute' and '1 to 10 minutes'). Separating the appointment booking method from the time-to-book would have created a situation where prohibitions would have been needed to avoid unrealistic combinations of method and time, thereby reducing the statistical quality of the design. While some may desire to

estimate each univariate attribute separately, this compound attribute best supported this research.

As primary care environments experiment with options such as on-line appointment bookings to further improve convenience for patients, the relative worth placed on this attribute was of particular interest. When looking at the method of appointment booking (on-line vs phone), there was a preference for phone booking over on-line booking. This may seem surprising given societies' general embrace of technology, but this is perhaps a reflection of people's tendencies to favour things with which they have had experience. Simply put, since patients have never had the option of on-line booking, they are less likely to appreciate the potential value, although further study will be required to understand this attribute more completely as time evolves.

In conclusion, patients preferred timely access to care over all other attributes for the majority of health scenarios tested in this study. In other words, patients seeking care for sudden pain, new cold-like illness or other episodic ailments are willing to trade-off continuity for the offer of a timely appointment. The exception to this rule is the scenario of a patient booking for a routine check-up where they prefer to see the provider with which they are most familiar. These results support the notion that advanced access booking models which hold most, but not all appointment spots for same day access match up well with patient preferences over a vast array of clinical scenarios.

FIGURE LEGENDS

Figure 1: Example of a choice task given to participants in the questionnaire

Figure 2: Relative importance of attributes by health scenario

Figure 3: Simulated shares-of-preference for two wait scenarios

STATEMENTS

Author Contributions

DO, MH, KD, HQ, GA and DG contributed to conception and design of the study. DO, MH, KD, HQ contributed to data collection. KD analysed the data. DO, MH, KD wrote the initial draft of the manuscript. DO, MH, KD, HQ, GA and DG interpreted results, critically revised the manuscript and approved the final version.

Data Sharing

Please contact corresponding author for data access requests.

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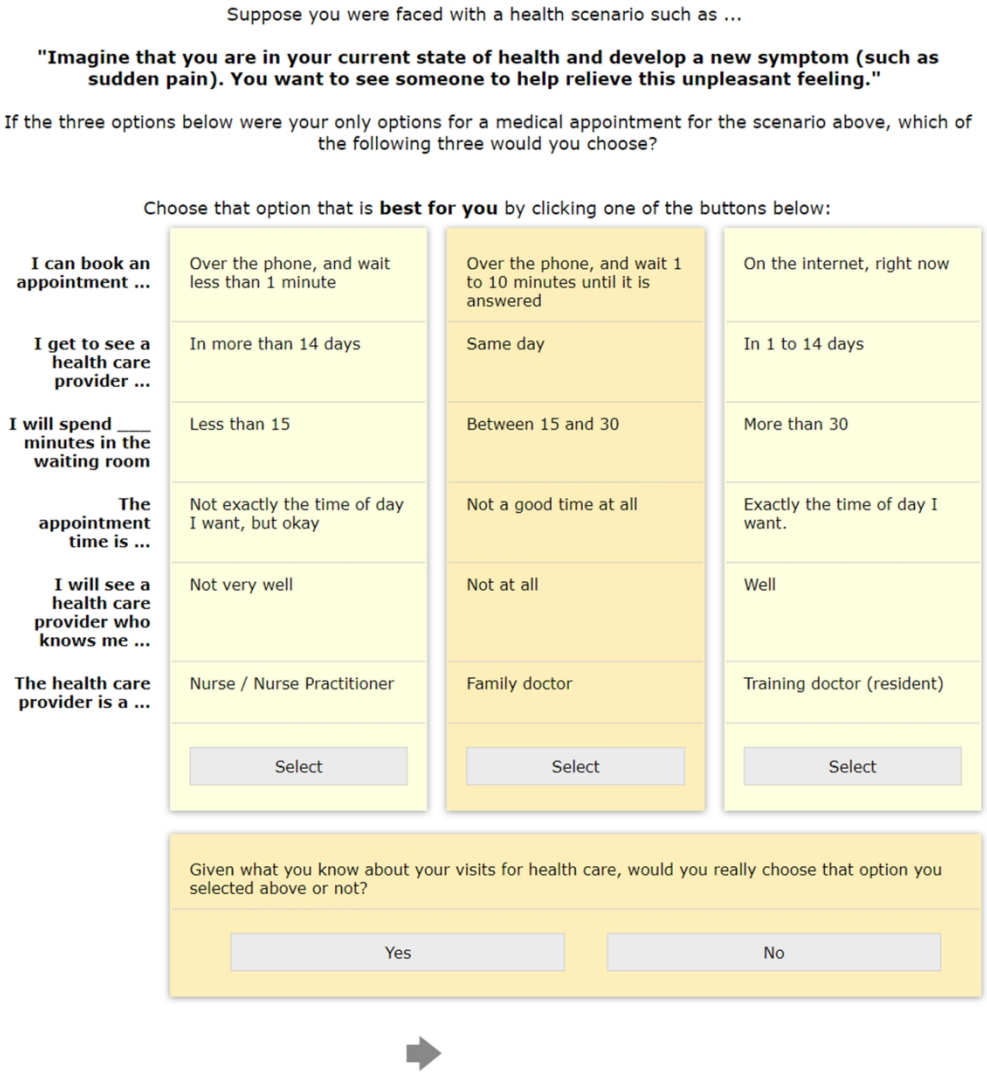

Example of a choice task given to participants in the questionnaire

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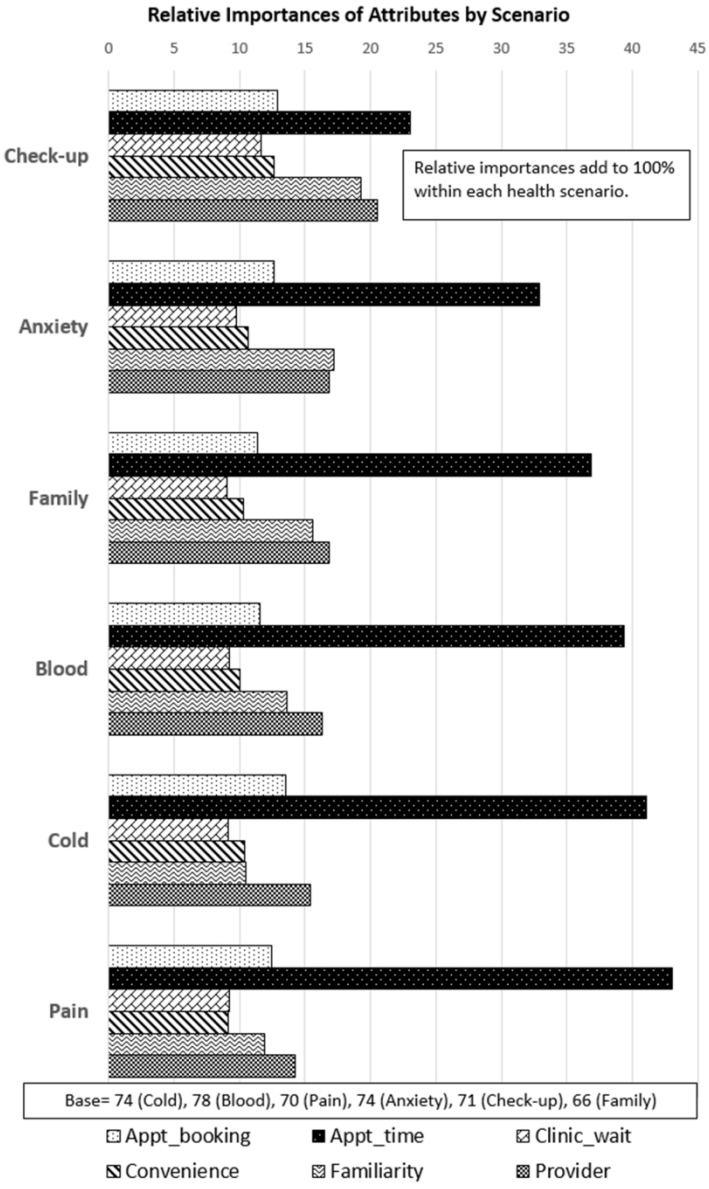

Relative importance of attributes by health scenario

163x270mm (300 x 300 DPI)

	Configuration of Two Waiting Time Scenarios					
Simulated Wait Scenario	**Booking appointment**	**Time to appointment**	**Waiting room time**	**Appointment convenience**	**Familiarity w provider**	**Provider level**
Shorter wait … but to see a resident I don't know	Phone answered within 1 minute	Same day	Less than 15 minutes	Exact time of day I want	Not at all familiar	A resident
Longer wait … but I see my own doctor		In 1 to 14 days			Well familiar	My family doctor

	Percentages Choosing Waiting Time Scenario under 6 Health Scenarios					
Simulated Wait Scenario	**Routine check-up**	**Anxiety**	**Child/ family member sick**	**Blood in stools**	**New cold**	**New sudden pain**
Shorter wait … but to see a resident I don't know	*24*	*41*	*42*	*47*	*61*	*64*
Longer wait … but I see my own doctor	*76*	*59*	*58*	*53*	*39*	*36*

Simulated shares-of-preference for two wait scenarios

245x101mm (300 x 300 DPI)

Supplementary File 1: Part worth utilities for the attributes and 95% confidence intervals, for the six scenarios, among the 430 respondents

	New Cold Scenario			Blood in Stools Scenario			Sudden Pail Scenario			Anxiety Scenario			Routine Check-up Scenario			Child/Family Member Sick Scenario		
Attributes & Levels	*Part-Worth Utilities*	*Lower Confidence Limit*	*Upper Confidence Limit*	*Part-Worth Utilities*	*Lower Confidence Limit*	*Upper Confidence Limit*	*Part-Worth Utilities*	*Lower Confidence Limit*	*Upper Confidence Limit*	*Part-Worth Utilities*	*Lower Confidence Limit*	*Upper Confidence Limit*	*Part-Worth Utilities*	*Lower Confidence Limit*	*Upper Confidence Limit*	*Part-Worth Utilities*	*Lower Confidence Limit*	*Upper Confidence Limit*
1. Booking time																		
a) Internet now	-22.02	-34.95	-9.09	-8.11	-18.85	2.62	-12.74	-24.51	-0.98	-11.91	-25.11	1.29	-16.32	-27.71	-4.92	-15.07	-25.14	-4.99
b) Phone 1 min	21.11	14.30	27.92	15.29	9.03	21.55	14.97	7.75	22.20	9.79	2.51	17.06	12.54	5.73	19.36	13.14	7.30	18.98
c) Phone 1 - 10 min	0.91	-6.53	8.35	-7.18	-13.40	-0.96	-2.23	-9.25	4.79	2.12	-5.53	9.78	3.77	-3.73	11.28	1.93	-5.84	9.69
2. Days to appt.																		
a) Same_day	117.20	100.56	133.83	103.03	86.27	119.79	119.05	101.40	136.69	80.17	66.07	94.27	37.58	21.90	53.26	90.71	71.84	109.59
b) 1 - 14 days	-0.59	-11.19	10.00	13.35	2.94	23.76	1.69	-9.35	12.73	22.39	12.81	31.96	13.73	3.85	23.62	16.66	4.80	28.52
c) 14 days <	-116.60	-130.87	-102.34	-116.38	-129.81	-102.95	-120.74	-133.83	-107.65	-102.56	-114.72	-90.39	-51.32	-64.98	-37.65	-107.38	-121.19	-93.57
3. Clinic wait																		
a) < 15 min	10.73	5.23	16.24	14.81	10.43	19.20	11.71	6.08	17.34	10.39	3.66	17.13	10.01	1.47	18.55	13.51	8.23	18.80
b) 15 - 30 min	12.70	8.93	16.46	11.20	7.55	14.86	14.18	11.20	17.16	12.86	8.85	16.87	16.57	11.76	21.39	7.41	3.22	11.61
c) 30 min plus	-23.43	-28.23	-18.63	-26.02	-30.27	-21.76	-25.89	-30.96	-20.83	-23.26	-28.92	-17.59	-26.58	-34.02	-19.15	-20.93	-27.80	-14.05
4. Convenience																		
a) Exact time I want	16.21	10.12	22.29	12.20	6.54	17.86	14.03	8.66	19.41	16.09	10.33	21.85	21.91	14.24	29.57	17.31	11.20	23.42
b) Not exact but OK	11.37	7.68	15.06	13.02	9.74	16.31	10.38	7.26	13.49	13.05	8.77	17.33	10.51	5.45	15.58	7.94	2.64	13.25
c) Not good time	-27.58	-34.43	-20.72	-25.22	-31.98	-18.47	-24.41	-30.38	-18.44	-29.14	-35.88	-22.41	-32.42	-41.10	-23.74	-25.25	-32.75	-17.75
5. Familiarity																		
a) Know well	24.21	16.96	31.45	40.37	33.46	47.29	29.98	21.67	38.29	50.20	38.32	62.08	59.39	48.03	70.75	49.69	39.16	60.23
b) Know not very well	-3.74	-8.99	1.52	-11.65	-17.93	-5.36	-5.08	-9.97	-0.18	-15.97	-23.80	-8.14	-23.32	-30.92	-15.72	-16.67	-23.88	-9.45
c) Know not at all	-20.47	-25.75	-15.20	-28.73	-34.28	-23.17	-24.91	-31.15	-18.66	-34.23	-41.50	-26.97	-36.07	-43.04	-29.09	-33.03	-39.47	-26.59
6. Provider position																		
a) Family doctor	35.50	25.76	45.23	39.17	30.29	48.05	32.39	23.07	41.70	32.47	23.29	41.65	45.08	32.90	57.25	37.51	28.82	46.20
b) Resident	1.17	-5.61	7.95	2.19	-4.24	8.61	1.71	-5.91	9.33	12.01	4.00	20.01	9.74	0.63	18.85	8.25	1.09	15.41
c) Nurse or NP	-36.66	-46.41	-26.92	-41.35	-50.71	-31.99	-34.10	-43.39	-24.80	-44.48	-54.40	-34.55	-54.82	-65.33	-44.31	-45.76	-56.03	-35.49
a) Opt-out	-21.65	-49.07	5.77	-19.85	-40.04	0.33	-1.19	-26.79	24.42	-37.87	-63.28	-12.45	-23.26	-57.40	10.88	-13.63	-41.85	14.58

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***
Oliver D et al. Primary care patient trade-offs between continuity and access in interprofessional teaching clinics: a cross-sectional survey using discrete choice experiment

	Item No	Recommendation	Page/paragraph
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Title page
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Pg 1
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Pg 3-4
Objectives	3	State specific objectives, including any prespecified hypotheses	Pg 4-5 and 6 para 2
Methods			
Study design	4	Present key elements of study design early in the paper	Pg 5 para 2 – pg 7
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Pg 7 para 3 – pg 8
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	Pg 7 para 3-4
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Pg 6 para 2-3
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	*Same method used to collect all variables- no between-group comparisons or predictive analyses*
Bias	9	Describe any efforts to address potential sources of bias	Limitations described pg 12
Study size	10	Explain how the study size was arrived at	Pg 6 para 2
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were	Pg 7 para 2

		chosen and why	
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Pg 7 para 2
		(*b*) Describe any methods used to examine subgroups and interactions	n/a
		(*c*) Explain how missing data were addressed	n/a
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	n/a
		(*e*) Describe any sensitivity analyses	n/a
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Pg 7 par a3
		(b) Give reasons for non-participation at each stage	n/a
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Pg 7 para 3
		(b) Indicate number of participants with missing data for each variable of interest	n/a
Outcome data	15*	Report numbers of outcome events or summary measures	Pg 8-9, fig 3, 4
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	n/a
		(*b*) Report category boundaries when continuous variables were categorized	n/a
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	n/a
Other analyses	17	Report other analyses done—eg analyses of subgroups	Pg 9

		and interactions, and sensitivity analyses	
Discussion			
Key results	18	Summarise key results with reference to study objectives	Pg 10 para 1
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Pg 11 para 2
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Pg 11-12
Generalisability	21	Discuss the generalisability (external validity) of the study results	
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Title page

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Patient trade-offs between continuity and access in primary care interprofessional teaching clinics in Canada: a cross-sectional survey using discrete choice experiment

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Patient trade-offs between continuity and access in primary care interprofessional teaching clinics in Canada: a cross-sectional survey using discrete choice experiment

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ABSTRACT

Objective: Timely access to care and continuity with a specific provider are important determinants of patient satisfaction when booking appointments in primary care settings. Advanced access booking systems that restrict the majority of providers' appointment spots for same-day appointments and keep the number of pre-booked appointments to a minimum. In the teaching clinic environment, continuity with the same provider can be a challenge. This study examines trade-offs that patients may consider during appointment bookings for 6 different clinical scenarios across a number of key access and continuity attributes using a discrete choice experiment (DCE) method.

Design: Cross-sectional survey.

Setting : Two urban family medicine teaching clinics in Canada.

Participants: Convenience sample of 430 patients of family medicine clinics aged 18 and older.

Intervention: Discrete choice conjoint experiment survey.

Primary outcome measures: Patient preferences on six attributes: appointment booking method, appointment wait time, time spent in the waiting room, appointment time convenience, familiarity with health care provider and position of health care provider. Data was analyzed by Hierarchical Bayes (HB) analysis to determine estimates of part-worth utilities for each respondent.

Results: Patients rated appointment wait time as the most highly valued attribute, followed by position of provider, then familiarity with the provider. Patients showed a significant preference ($p<0.02$) for their own physician for booking of routine annual check-ups and other logical preferences across attributes overall and by clinical scenario.

Conclusions: Participants preferred timely access to their primary care team over other attributes in the majority of health state scenarios tested, especially urgent issue, however they were willing to wait for a check-up. These results support the notion that advanced access booking systems which leave the majority of appointment spots for same day access and still leave a few for continuity (check-up) bookings, align well with trends in patient preferences.

KEY WORDS: Patient preference, family practice, choice behavior, appointments and schedules, surveys and questionnaires

ABBREVIATIONS:

HB: Hierarchical Bayesian

DCE: Discrete choice experiment

ARTICLE SUMMARY

Strengths and Limitations of this Study

- This study designed a discrete choice experiment with input from stakeholders about attributes that were important in their context.
- The study was conducted in two clinics that are part of an academic family medicine department and results may not be applicable in other jurisdictions.
- The study participants were a convenience sample of patients who may have been frequent visitors to the practice and their views may not represent all patients.

Funding

This work was supported by a pilot research grant from the Department of Family Medicine, McMaster University.

Competing Interests

All authors none declared.

Ethical approval

The McMaster University Faculty of Health Sciences/Hamilton Health Sciences research ethics board approved this study.

BACKGROUND

Improving the patient experience in out-patient primary care settings is an important priority for health policy advisors and health care providers.[1–4] When patients contact primary care clinics for appointments, how many days or weeks must they wait for their appointments? Will they see providers they know best when they are finally seen? How long must they wait in reception areas and will the appointments be offered at times that are convenient for them? Most importantly, which attributes of that scheduling/consultation process are priorities for patients and which are they willing to trade-off in order to have a satisfactory experience in booking and attending that appointment?

This study was designed to gain deeper understanding of the relative value that patients place on various attributes connected to each attempt to access their primary care providers. We used the discrete choice experiment (DCE) method that has been utilized extensively in health care research.[5–12] In this method, respondents are presented with a questionnaire with varying combinations of different attributes of a decision, e.g., treatment or procedure, and for each combination, asked to choose which of the options they prefer. Patients' preferences as expressed by part-worth utilities (PWUs) are estimated for each decision attribute. The importance of each attribute is estimated and the PWUs used in simulations to better understand patients' preferences for and trade-offs among complete configurations of the treatment.

Speed of access and continuity with the same clinician are commonly studied attributes in various clinical scenarios and while both are often identified as key priorities for patients they are also attributes that are often in conflict with each other in real world

clinical practice. The interplay between access and continuity may be complicated even more in primary care settings that have inter-professional teams or in academic clinics where patients may be expected to see different types of clinicians (e.g., nurse vs doctor versus resident physicians). Patients often must decide whether to take the appointment offered today if it means having to see a provider other than their family physician. Will that decision change based on the health reason that prompts the appointment request?

By gaining a better understanding of patient preferences in various health states, clinical teams will be better positioned to design health systems in ways that are truly patient-centred. Advanced access scheduling systems are an example of a re-design strategy used in many primary care settings to reduce wait times and improve access to clinicians by limiting the proportion of pre-booked appointments and opening up time for same or next-day appointments.[10] Advanced access booking has been adopted by many primary care clinics around the world and its value has been evaluated and generally found to be positive.[11–15]

This study uses DCE in an inter-professional academic setting to evaluate patients' preferences for six attributes of access to their family practice clinic including health provider (family physician, resident physician or allied health professionals), familiarity with the provider, method of booking (telephone versus online) and wait times across different clinical scenarios.

METHODS

We conducted a cross-sectional survey with family practice patients, using a DCE method that we developed through literature review and focus groups with stakeholders.

Questionnaire Development

The core of the questionnaire was comprised of a DCE. DCEs are used regularly and increasingly to study the preferences of patients and physicians for health services and products as well as preferences of consumers in general. Health applications include in-hospital patient care,[16] colorectal cancer,[17] and usage of pharmaceuticals.[18] International Society for Pharmacoeconomics and Outcomes Research guidelines[19] were followed for the design, execution, analysis and interpretations of the DCE.

An initial set of continuity and access attributes was derived from the literature. To refine the attributes for relevance to the study setting, a focus group discussion was held at each participating clinic. Each group included a nurse, receptionist, a resident and a staff physician who had been involved with implementing advanced access booking. We provided scenarios to practice team members in the focus group, to stimulate discussion about attributes. The scenarios reflected access attributes from the literature and that the research team felt were relevant to primary care: speed of appointment, appointment with regular clinician who knows the patient, type of provider (physician, nurse, resident). These attributes were validated by the focus group as very important to include. Participants also suggested an attribute relating to number of phone calls needed to reach the practice for an appointment which was felt to be a lower priority and not included in the DCE. We next described four scenarios that might affect

patients' access preferences (new minor symptom, new urgent symptom, anxiety issues, routine check-up) and asked for input on these and for additional scenarios that would be relevant in the context of a family practice teaching centre. The additional level of online booking was added to the appointment booking method attribute, and for type of provider, the levels of family doctor, training doctor (resident) and nurse/nurse practitioner were recommended. The wording of attribute levels was also refined through discussions and expert judgment of the research team (including two physicians involved in implementing open access). (Table 1)

Table 1: Attributes and levels that comprised the discrete choice experiment

Attribute	**Level 1**	**Level 2**	**Level 3**
I can book an appointment	On the internet, right now	Over the phone, and wait less than 1 minute	Over the phone, and wait 1 to 10 minutes until it is answered
I get to see a health care provider	On the same day	In 1 to 14 days	In more than 14 days
I will spend ___ minutes in the waiting room	Less than 15	Between 15 and 30	More than 30
The appointment time is	Exactly the time of day I want	Not exactly the time of day I want, but okay	Not a good time at all

I will see a health care provider who knows me	Well	Not very well	Not at all
The health care provider is a	Family doctor	Training doctor (resident)	Nurse/Nurse Practitioner

The fractional factorial random experiment was designed using Sawtooth Software SSI Web v7.0.26, as was the whole questionnaire. Each respondent saw a series of 10 randomly designed choice sets, each of which provided three alternative configurations of a possible scenario of waiting times and appointment encounters. Two fixed tasks were added to test internal reliability. A representative choice task is provided in Figure 1. The questionnaire began with questions about frequency of visits to the clinic usual provider seen and self-reported health status, and ended with demographic questions after the choice sets. The questionnaire was pilot tested for clarity and time-to-complete with four staff members of the research team not familiar with the project. Minor wording changes were made. The DCE was introduced and explained to respondents prior to the first choice question.

We hypothesized that patients' preferences for appointment arrangements would be related to the nature and urgency of health states for those appointments.[20] Based on literature review and our focus groups, we defined six states that may motivate requests for consultations with primary health care providers. For example, we hypothesized that patients would be relatively less motivated to press for quick appointments if they were

seeking routine check-ups and more highly motivated if they experienced sudden pain or if a child were sick.

A random 1/6 of the sample was presented with each of these health states and asked to answer all of the DCE choice questions as if they were in that state.

The six health scenarios varied in the discrete choice experiment were:

1. Imagine that you are in your current state of health and develop a new symptom (such as **a cold**). You are pretty sure you know what it is, and you want some medication for it.
2. Imagine that you are in your current state of health and develop a new symptom (such as **unexpected blood in stools**). You are not sure what the symptom means, and you want to consult someone to find out.
3. Imagine that you are in your current state of health and develop a new symptom (such as **sudden pain**). You want to see someone to help relieve this unpleasant feeling.
4. Imagine that you are in your current state of health and are experiencing recurring **increased anxiety** due to work or family related issues. You want to see someone to talk about these changes and how your health may be affected.
5. Imagine that you are in your current state of health. You are due for a **routine check-up** or follow-up (such as appointments for a chronic condition or a physical exam).
6. Imagine that your **child or another family member is sick**. You would like to book an appointment for them to see a health care provider.

For a DCE study, a sample size of 300 to 500 subjects is generally considered adequate and Johnson's often-used rule-of-thumb calculates a sample of 100 for a DCE having our design specifications.[21]

Survey Participants

A convenience sample of patients was recruited in 2012 from two inter-professional family practice teaching clinics with which the researchers are affiliated, in Hamilton, Ontario, Canada. One clinic serves approximately 17,000 patients and the other 12,000. The clinics are staffed by family physicians (n=30), family medicine residents (n=70), nurse practitioners (n=10), mental health therapists (n=6), pharmacists (n=3), occupational therapists (n=2), and dieticians (n=2).

Patients aged 18 year or older and able to read English well enough to complete the questionnaire were eligible. English proficiency was not formally assessed prior to initiation of the survey.

The questionnaire was created electronically (web-based) and self-administered via computer-assisted personal interviews (CAPI). Recruitment was done by a research assistant who approached patients in the waiting room (clinic A, n=53) while waiting to see their health care providers, and through emails to patients who had email addresses on file (clinic B, n=377). The research assistant initiated the CAPI questionnaire on her laptop for patients recruited in the waiting room of Clinic A and was available for questions.

Statistical Methods

The experiment was created within Sawtooth Software SSI Web as a randomized fractional factorial design. The choice data was analyzed using HB within Sawtooth Software CBC/HB for the sample overall.

Aggregate-level multinomial logit analysis was executed to provide initial-level analysis of the choice data as was a basic count-analysis. Hierarchical Bayes estimation (HB) of preference coefficients was chosen over multinomial logit (MNL) since HB largely overcomes the independence of irrelevant alternatives (IIA) issue of MNL[22] and provides preference coefficients for each individual respondent. Huber and Train[23] found that part-worth utility estimates produced by HB and mixed logit were not significantly different. HB uses the Metropolis Hastings Algorithm, a type of Markov chain Monte Carlo iterative procedure that analyzes individual choices at the lower model level using MNL and then analyzes the aggregated data at the upper level using multivariate normal methods. The initial burn-in phase was run with 20,000 iterations with 20,000 additional iterations used for estimating the part-worth utilities.

Internal reliability for the DCE was examined by analyzing the consistency of the fixed choice tasks that were not included in the main analysis. Statistical significance testing used a 5% level of risk. Analysis of variance (ANOVA), multivariate analysis of variance (MANOVA) and independent sample t-tests conducted in R were used to explore whether significant differences existed in preference coefficients among subgroups formed by the randomized health scenarios and other covariates. The size of the

differences between is described using Cohen's guide to effect[24] sizes as represented by eta-squared (or partial eta-squared, but equal here).

Simulations were conducted in Sawtooth Software SMRT using the randomized first choice simulation method. That method was chosen because it attempts to mimic the noise inherent in human decisions by automatically adding appropriate error to the levels of the attributes included in the simulation scenarios, plus an overall error term. We chose the simulation profiles to contain the three most important attributes to ensure a good split in shares-of-preferences and to provide a range of shares across the six scenarios.

The McMaster University Faculty of Health Sciences/Hamilton Health Sciences research ethics board approved this study.

Patient and public involvement

This study developed a survey instrument to elicit patient preferences based on previous literature of similar patient surveys, however patients were not involved in creating the version used in this study. Patients were the participants in this study.

RESULTS

The email request to complete the survey was sent to 1285 patients in the two clinics and 378 (29.4%) completed the survey. Recruitment in the waiting room of one of the clinics took place approximately one half-day per week from February to July 2012, resulting in 53 additional completed surveys, for a total of 430 fully complete and usable responses. Most respondents were 40-59 years of age (39%) or 60 and older (32%).

The majority of respondents were female (69%). Nearly half (45%) reported having been to the clinic three or more times in the six months prior to the survey (Table 2). The average age of patients is 48.2 years and 52.5% are female in clinic A, and average age is 45.4 years and 56.3% are female at clinic B.

Table 2: Characteristics of the respondents who were recruited from a clinic waiting room (n=53) or by email invitation from the clinic (n=377)

	Clinic waiting room (n=53) (A)	Email invitation (n=377) (B)	Population of City of Hamilton (2016)[25]
Age category (%)*			
34 and younger	34.0%	17.5%	58.4%
35 to 49	28.3%	25.2%	18.9%
50 to 69	22.6%	35.0%	27.1%
65 and older	9.4%	21.5%	17.3%
missing	5.7%	0.8%	0%
Female (%)	64.2%	70.0%	51.1%
Ethnicity – identified as White* (%)	73.6%	89.4%	Not available
Number of people living in household (%)	30.2%	18.0%	98.3%
One	26.4%	39.8%	28.2%

Two Three Four Five or more missing	17.0% 13.2% 13.2% 0	15.1% 18.8% 8.0% 0.3%	32.2% 15,9% 14,6% 9.1% 0%
Been a patient of clinic*: 2 years or longer Less than 2 years missing	67.9% 32.1% 0	89.7% 9.8% 0.5%	Not applicable
Perception of health scale rating (mean, standard deviation) 0=very poor, 10=excellent	8.3, (2.2)	8.1, (2.0)	Not applicable

* $p < 0.05$ for difference between groups

The part-worth utilities and 95% confidence intervals from the HB analysis interacting the health states with the individual attribute levels are shown in Supplementary File 1. ANOVA and MANOVA tests ($p \leq 0.05$) indicated that PWUs for wait time before appointment and familiarity with health care provider varied significantly among the health state scenarios and within attributes while not showing significant differences for the other four attributes. The two fixed tasks were not significantly different (Chi-square=2.86, $p>0.20$), supporting the internal reliability of the design and data.

The relative importance of the 6 attributes for each of the randomized health scenarios is presented in Figure 2 and the effect sizes are shown in Supplementary File 2. There was significant variation over all six attributes and across the six health scenarios (MANOVA, Wilk's lambda = 0.694, p-value < 0.0001) indicating a range of different responses under the various health conditions. The relative importance of time-to-appointment, waiting room time, familiarity with provider and provider level varied significantly over the 6 health scenarios. Using Cohen's guide to effect sizes as represented by eta-squared (or partial eta-squared, but equal here), the effect size of health scenario can be considered large for time-to-appointment, between medium and large for familiarity with provider, between small and medium for waiting room time, appointment convenience and provider level and small for method of booking appointment. The relative importance of time-to-appointment was statistically significantly less ($p<0.05$) for those responding to the routine check-up scenario than all others. The relative importance of familiarity with provider was statistically significantly greater ($p<0.05$) for those responding to the routine check-up scenario than for those responding to new cold and new sudden pain and was numerically greater than all others.

Figure 3 shows one of several simulations conducted to investigate the sensitivity of patients' preferences for different continuity and access scenarios that might actually be confronted by patients. In both profiles, the appointment was made by a phone call that was answered within one minute, the waiting room times was less than 15 minutes and the appointment was at the exact time of day that the patient wanted. In one profile (row

1), the patient's appointment was scheduled for the same day and the patient would see a resident who was not known to the patient. In the second profile (row 2), the patient would have to wait one to 14 days for the appointment but would see the family doctor with whom the patient was very familiar.

Simulations using the PWUs are presented for each randomized health scenario in the lower frame of Figure 3. The numbers in each column show the percentages of patients who would likely choose each of the two simulated access/continuity scenarios when faced with the indicated health scenario. As hypothesized, most patients (76%) would like to have the continuity of seeing their family doctor for a routine check-up and would not mind waiting 1 to 14 days to see that MD. On the other hand, 64% of those who responded under the new sudden pain health state wanted an appointment that same day and were willing to see a resident with whom they were not at all familiar. Close to being as insistent for quick service were those who were in the new cold health state, where 61% wanted the same day appointment and only 39% preferred waiting longer to see their own doctor. Those presented with the anxiety, child/family member sick, blood-in-stools health states would rather see their own doctor, but likely would not be quite as demanding for the same day appointment.

DISCUSSION

In this DCE study of 430 patients, comparing multiple attributes of accessing the primary care clinic, we found that patient choices for appointment bookings in a primary care teaching clinic were primarily influenced by speed of obtaining the appointment (access), followed by the professional position of the health care provider (family doctor,

resident or nurse/nurse practitioner) and then the patient's familiarity with the provider (continuity). These results help to demonstrate that an advanced access booking model does in fact target what many patients value most across a number of health states, i.e., timely access to their primary care team.

This study was conducted in a jurisdiction where health policy makers are currently strongly encouraging most, if not all, primary health care providers to adopt an advanced access model of appointment bookings.[26] Our results lend support to the notion that improved and timely access to primary care seems to be the leading priority for patients as well. In many scenarios tested, patients were willing to trade-off continuity with their usual provider for a shorter wait in the clinic in order to have the offer of a same day appointment. This is the exact reality that teaching clinics and many group practices face, where clinicians are often out of the office either on other rotations in the case of resident physicians, or doing other clinical work in a hospital or long term care home in the case of staff clinicians. Each patient's usual provider will not always be available when needed, so other choices must to be offered. In multi-disciplinary teaching clinics, those choices are often a provider who the patient has never met, or a resident or nurse who the patient does not know well. On the other hand, there was variability in importance by the health state presented. The relative importance of familiarity with the provider was greater in the context of a routine check-up compared to a new cold and new sudden pain. This finding makes sense since most people are not in a rush to have the routine annual check-up but do like to see their regular health provider for continuity.

These trade-offs between continuity and quick access are made quite routinely when discussing access to primary care. It seems that patients who are accustomed to receiving their care in a teaching clinic setting are willing to make trade-offs between continuity and access attributes for most health states, but prefer to see their usual physician for their annual physical exams – perhaps reassuring patients that familiar and often more experienced providers are indeed overseeing their care and aware of their ongoing health needs.

The results from this study did seem to differ somewhat from a previous DCEs examining access to primary care. Rubin et al. examined patient preferences for booking routine appointments and described trade-offs between rapid appointment access, choice of provider and choice of time.[6] They found that for many of their patients sampled, speed of access was not as highly valued as continuity with the same provider or a convenient appointment time. The difference between Rubin's result and ours, could be due in part to our patient's having a longstanding relationship with our teaching clinic philosophy and design, where patients agree up front that they will be seen by resident physicians who are only in our clinic for 2-years. For most of the patients in our study, the expectation of continuity with the same provider is often not present from the start, and what matters most is being seen when they need to be seen.

Where is a growing body of literature supporting the importance of increasing both continuity and faster access in practicing patient-centred primary care.[20,27–29] To suggest that any one or two attributes could be most highly valued by all patients in all health states is a drastic oversimplification of what drives patients to seek care. A major advantage of the study design used in this experiment is the ability to run custom

simulations in the DCE, which allowed us to look more closely at real life scenarios and gain deeper understanding of how patients make their choices when accessing primary care services. Our results make clear that while quick access is important for most people, it is not the only priority in certain health states. Primary care systems need to be adaptable enough to offer patients choices to account for variabilities in patient preferences across diverse health states.

This study had some limitations. It was conducted in two clinics that are part of an academic family medicine department and results may not be entirely generalizable to other settings and practice models. We studied a convenience sample of patients who may have been more frequent visitors to the practice and their views may not represent all patients.

Our results and conclusions are based on the attributes and levels included in the DCE we designed. While we followed a robust process to determine which attributes are important and relevant in our context using focus groups of key informants with expert knowledge of the clinical setting as well as previous literature in similar settings, we cannot be sure we captured all important attributes. The appointment booking method is a compound attribute of method and time to book the appointment. We had no desire to separately estimate the booking method (internet or phone) from the booking wait time ('right now', 'less than 1 minute' and '1 to 10 minutes'). Separating the appointment booking method from the time-to-book would have created a situation where prohibitions would have been needed to avoid unrealistic combinations of method and time, thereby reducing the statistical quality of the design. While some may desire to

estimate each univariate attribute separately, this compound attribute best supported this research.

As primary care environments experiment with options such as on-line appointment bookings to further improve convenience for patients, the relative worth placed on this attribute was of particular interest. When looking at the method of appointment booking (on-line vs phone), there was a preference for phone booking over on-line booking. This may seem surprising given societies' general embrace of technology, but this is perhaps a reflection of people's tendencies to favour things with which they have had experience. Simply put, since patients have never had the option of on-line booking, they are less likely to appreciate the potential value, although further study will be required to understand this attribute more completely as time evolves.

In conclusion, patients preferred timely access to care over all other attributes for the majority of health scenarios tested in this study. In other words, patients seeking care for sudden pain, new cold-like illness or other episodic ailments are willing to trade-off continuity for the offer of a timely appointment. The exception to this rule is the scenario of a patient booking for a routine check-up where they prefer to see the provider with which they are most familiar. These results support the notion that advanced access booking models which hold most, but not all appointment spots for same day access match up well with patient preferences over a vast array of clinical scenarios.

FIGURE LEGENDS

Figure 1: Example of a choice task given to participants in the questionnaire

Figure 2: Relative importance of attributes by health scenario

Figure 3: Simulated shares-of-preference for two wait scenarios

STATEMENTS

Author Contributions

DO, MH, KD, HQ, GA and DG contributed to conception and design of the study. DO, MH, KD, HQ contributed to data collection. KD analysed the data. DO, MH, KD wrote the initial draft of the manuscript. DO, MH, KD, HQ, GA and DG interpreted results, critically revised the manuscript and approved the final version.

Data Sharing

Please contact corresponding author for data access requests.

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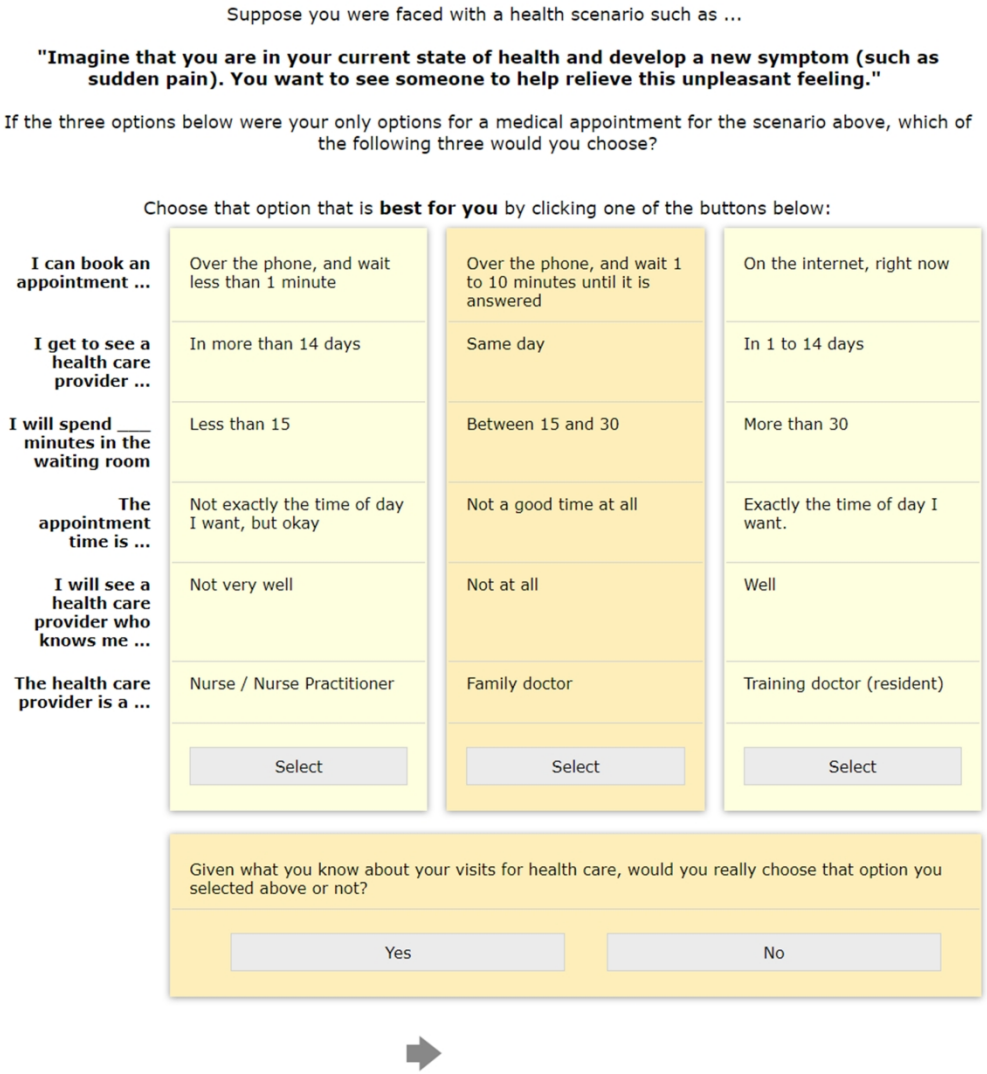
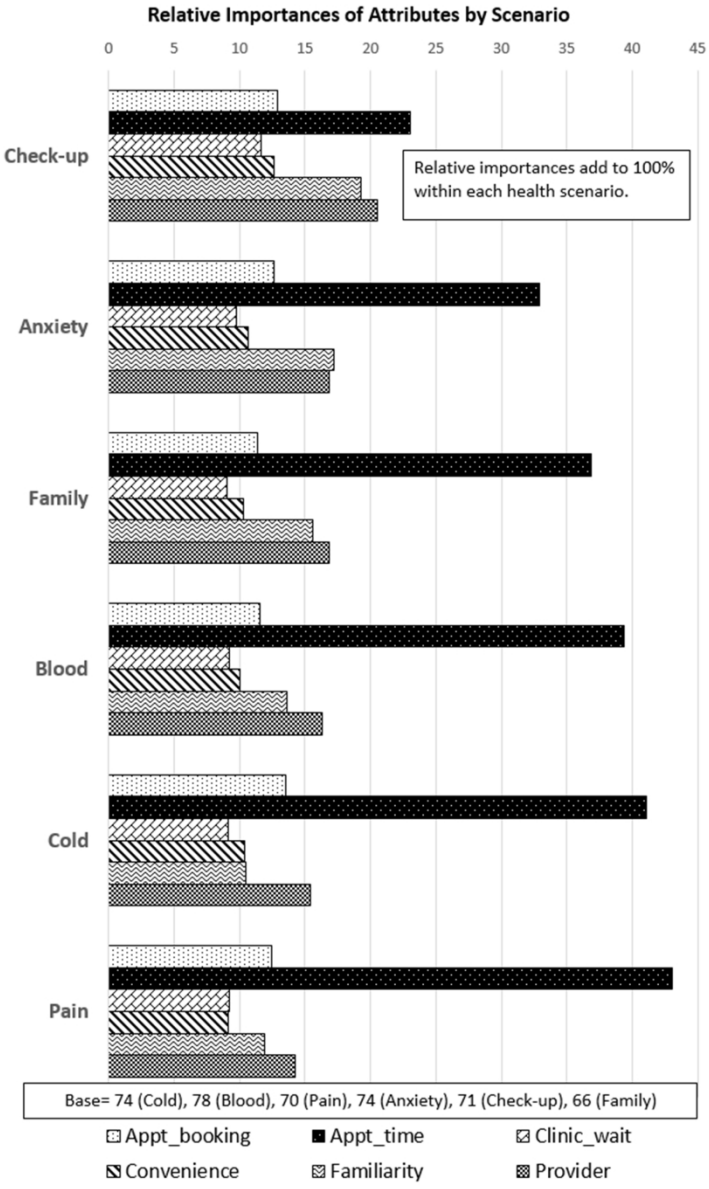


Example of a choice task given to participants in the questionnaire

270x291mm (300 x 300 DPI)



Relative importance of attributes by health scenario

163x270mm (300 x 300 DPI)

	Configuration of Two Waiting Time Scenarios					
Simulated Wait Scenario	**Booking appointment**	**Time to appointment**	**Waiting room time**	**Appointment convenience**	**Familiarity w provider**	**Provider level**
Shorter wait … but to see a resident I don't know	Phone answered within 1 minute	Same day	Less than 15 minutes	Exact time of day I want	Not at all familiar	A resident
Longer wait … but I see my own doctor		In 1 to 14 days			Well familiar	My family doctor

	Percentages Choosing Waiting Time Scenario under 6 Health Scenarios					
Simulated Wait Scenario	**Routine check-up**	**Anxiety**	**Child/ family member sick**	**Blood in stools**	**New cold**	**New sudden pain**
Shorter wait … but to see a resident I don't know	*24*	*41*	*42*	*47*	*61*	*64*
Longer wait … but I see my own doctor	*76*	*59*	*58*	*53*	*39*	*36*

Simulated shares-of-preference for two wait scenarios

245x101mm (300 x 300 DPI)

Supplementary File 1: Part worth utilities for the attributes and 95% confidence intervals, for the six scenarios, among the 430 respondents

	New Cold Scenario			Blood in Stools Scenario			Sudden Pail Scenario			Anxiety Scenario			Routine Check-up Scenario			Child/Family Member Sick Scenario		
Attributes & Levels	*Part-Worth Utilities*	*Lower Confidence Limit*	*Upper Confidence Limit*	*Part-Worth Utilities*	*Lower Confidence Limit*	*Upper Confidence Limit*	*Part-Worth Utilities*	*Lower Confidence Limit*	*Upper Confidence Limit*	*Part-Worth Utilities*	*Lower Confidence Limit*	*Upper Confidence Limit*	*Part-Worth Utilities*	*Lower Confidence Limit*	*Upper Confidence Limit*	*Part-Worth Utilities*	*Lower Confidence Limit*	*Upper Confidence Limit*
1. Booking time																		
a) Internet now	-22.02	-34.95	-9.09	-8.11	-18.85	2.62	-12.74	-24.51	-0.98	-11.91	-25.11	1.29	-16.32	-27.71	-4.92	-15.07	-25.14	-4.99
b) Phone 1 min	21.11	14.30	27.92	15.29	9.03	21.55	14.97	7.75	22.20	9.79	2.51	17.06	12.54	5.73	19.36	13.14	7.30	18.98
c) Phone 1 - 10 min	0.91	-6.53	8.35	-7.18	-13.40	-0.96	-2.23	-9.25	4.79	2.12	-5.53	9.78	3.77	-3.73	11.28	1.93	-5.84	9.69
2. Days to appt.																		
a) Same_day	117.20	100.56	133.83	103.03	86.27	119.79	119.05	101.40	136.69	80.17	66.07	94.27	37.58	21.90	53.26	90.71	71.84	109.59
b) 1 - 14 days	-0.59	-11.19	10.00	13.35	2.94	23.76	1.69	-9.35	12.73	22.39	12.81	31.96	13.73	3.85	23.62	16.66	4.80	28.52
c) 14 days <	-116.60	-130.87	-102.34	-116.38	-129.81	-102.95	-120.74	-133.83	-107.65	-102.56	-114.72	-90.39	-51.32	-64.98	-37.65	-107.38	-121.19	-93.57
3. Clinic wait																		
a) < 15 min	10.73	5.23	16.24	14.81	10.43	19.20	11.71	6.08	17.34	10.39	3.66	17.13	10.01	1.47	18.55	13.51	8.23	18.80
b) 15 - 30 min	12.70	8.93	16.46	11.20	7.55	14.86	14.18	11.20	17.16	12.86	8.85	16.87	16.57	11.76	21.39	7.41	3.22	11.61
c) 30 min plus	-23.43	-28.23	-18.63	-26.02	-30.27	-21.76	-25.89	-30.96	-20.83	-23.26	-28.92	-17.59	-26.58	-34.02	-19.15	-20.93	-27.80	-14.05
4. Convenience																		
a) Exact time I want	16.21	10.12	22.29	12.20	6.54	17.86	14.03	8.66	19.41	16.09	10.33	21.85	21.91	14.24	29.57	17.31	11.20	23.42
b) Not exact but OK	11.37	7.68	15.06	13.02	9.74	16.31	10.38	7.26	13.49	13.05	8.77	17.33	10.51	5.45	15.58	7.94	2.64	13.25
c) Not good time	-27.58	-34.43	-20.72	-25.22	-31.98	-18.47	-24.41	-30.38	-18.44	-29.14	-35.88	-22.41	-32.42	-41.10	-23.74	-25.25	-32.75	-17.75
5. Familiarity																		
a) Know well	24.21	16.96	31.45	40.37	33.46	47.29	29.98	21.67	38.29	50.20	38.32	62.08	59.39	48.03	70.75	49.69	39.16	60.23
b) Know not very well	-3.74	-8.99	1.52	-11.65	-17.93	-5.36	-5.08	-9.97	-0.18	-15.97	-23.80	-8.14	-23.32	-30.92	-15.72	-16.67	-23.88	-9.45
c) Know not at all	-20.47	-25.75	-15.20	-28.73	-34.28	-23.17	-24.91	-31.15	-18.66	-34.23	-41.50	-26.97	-36.07	-43.04	-29.09	-33.03	-39.47	-26.59
6. Provider position																		
a) Family doctor	35.50	25.76	45.23	39.17	30.29	48.05	32.39	23.07	41.70	32.47	23.29	41.65	45.08	32.90	57.25	37.51	28.82	46.20
b) Resident	1.17	-5.61	7.95	2.19	-4.24	8.61	1.71	-5.91	9.33	12.01	4.00	20.01	9.74	0.63	18.85	8.25	1.09	15.41
c) Nurse or NP	-36.66	-46.41	-26.92	-41.35	-50.71	-31.99	-34.10	-43.39	-24.80	-44.48	-54.40	-34.55	-54.82	-65.33	-44.31	-45.76	-56.03	-35.49
a) Opt-out	-21.65	-49.07	5.77	-19.85	-40.04	0.33	-1.19	-26.79	24.42	-37.87	-63.28	-12.45	-23.26	-57.40	10.88	-13.63	-41.85	14.58

Relative Importances by Random Health Scenario (percentages by column)

Attribute	Total	New Cold (C)	Blood in Stools (B)	New Sudden Pain (P)	Anxiety (A)	Routine Check-up (R)	Child/ Family Member Sick (S)	F	p-value	eta-squared	Tukey contrasts	Cohen's f	Power
Booking Appointment	12.39	13.50	11.53	12.44	12.65	12.87	11.34	0.62	0.69	0.007		0.085	0.227
Time to Appointment	36.06	41.10	39.35	43.01	32.95	23.03	36.86	13.9	< 0.001	0.141	A,B,C,P,S>R; C,P>A	0.404	1
Waiting Room Time	9.69	9.16	9.25	9.25	9.73	11.64	9.07	2.25	0.048	0.026		0.163	0.738
Appointment Convenience	10.52	10.34	10.02	9.14	10.67	12.65	10.32	2.14	0.06	0.025	R>P	0.159	0.712
Familiarity with Provider	14.64	10.46	13.57	11.88	17.16	19.25	15.57	10.35*	< 0.001	0.099	A>C,P; R>B,C,P; S>C	0.331	1
Provider Level	16.70	15.43	16.28	14.28	16.84	20.55	16.85	2.66	0.022	0.03	R>P	0.177	0.816
Base	430	71	78	70	74	71	66						

* not assuming equal variances

MANOVA: Wilk's lambda = 0.694, p-value < 0.0001, F = 5.356

343x68mm (300 x 300 DPI)

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***
Oliver D et al. Primary care patient trade-offs between continuity and access in interprofessional teaching clinics: a cross-sectional survey using discrete choice experiment

	Item No	Recommendation	Page/paragraph
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Title page
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Pg 1
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Pg 3-4
Objectives	3	State specific objectives, including any prespecified hypotheses	Pg 4-5 and 6 para 2
Methods			
Study design	4	Present key elements of study design early in the paper	Pg 5 para 2 – pg 7
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Pg 7 para 3 – pg 8
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	Pg 7 para 3-4
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Pg 6 para 2-3
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	*Same method used to collect all variables- no between-group comparisons or predictive analyses*
Bias	9	Describe any efforts to address potential sources of bias	Limitations described pg 12
Study size	10	Explain how the study size was arrived at	Pg 6 para 2
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were	Pg 7 para 2

		chosen and why	
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Pg 7 para 2
		(*b*) Describe any methods used to examine subgroups and interactions	n/a
		(*c*) Explain how missing data were addressed	n/a
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	n/a
		(*e*) Describe any sensitivity analyses	n/a
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Pg 7 par a3
		(b) Give reasons for non-participation at each stage	n/a
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Pg 7 para 3
		(b) Indicate number of participants with missing data for each variable of interest	n/a
Outcome data	15*	Report numbers of outcome events or summary measures	Pg 8-9, fig 3, 4
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	n/a
		(*b*) Report category boundaries when continuous variables were categorized	n/a
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	n/a
Other analyses	17	Report other analyses done—eg analyses of subgroups	Pg 9

		and interactions, and sensitivity analyses	
Discussion			
Key results	18	Summarise key results with reference to study objectives	Pg 10 para 1
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Pg 11 para 2
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Pg 11-12
Generalisability	21	Discuss the generalisability (external validity) of the study results	
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Title page

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Patient trade-offs between continuity and access in primary care interprofessional teaching clinics in Canada: a cross-sectional survey using discrete choice experiment

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Patient trade-offs between continuity and access in primary care interprofessional teaching clinics in Canada: a cross-sectional survey using discrete choice experiment

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ABSTRACT

Objective: Timely access to care and continuity with a specific provider are important determinants of patient satisfaction when booking appointments in primary care settings. Advanced access booking systems that restrict the majority of providers' appointment spots for same-day appointments and keep the number of pre-booked appointments to a minimum. In the teaching clinic environment, continuity with the same provider can be a challenge. This study examines trade-offs that patients may consider during appointment bookings for 6 different clinical scenarios across a number of key access and continuity attributes using a discrete choice experiment (DCE) method.

Design: Cross-sectional survey.

Setting : Two urban family medicine teaching clinics in Canada.

Participants: Convenience sample of 430 patients of family medicine clinics aged 18 and older.

Intervention: Discrete choice conjoint experiment survey.

Primary outcome measures: Patient preferences on six attributes: appointment booking method, appointment wait time, time spent in the waiting room, appointment time convenience, familiarity with health care provider and position of health care provider. Data was analyzed by Hierarchical Bayes (HB) analysis to determine estimates of part-worth utilities for each respondent.

Results: Patients rated appointment wait time as the most highly valued attribute, followed by position of provider, then familiarity with the provider. Patients showed a significant preference ($p<0.02$) for their own physician for booking of routine annual check-ups and other logical preferences across attributes overall and by clinical scenario.

Conclusions: Participants preferred timely access to their primary care team over other attributes in the majority of health state scenarios tested, especially urgent issue, however they were willing to wait for a check-up. These results support the notion that advanced access booking systems which leave the majority of appointment spots for same day access and still leave a few for continuity (check-up) bookings, align well with trends in patient preferences.

KEY WORDS: Patient preference, family practice, choice behavior, appointments and schedules, surveys and questionnaires

ABBREVIATIONS:

HB: Hierarchical Bayesian

DCE: Discrete choice experiment

ARTICLE SUMMARY

Strengths and Limitations of this Study

- This study designed a discrete choice experiment with input from stakeholders about attributes that were important in their context.
- The study was conducted in two clinics that are part of an academic family medicine department and results may not be applicable in other jurisdictions.
- The study participants were a convenience sample of patients who may have been frequent visitors to the practice and their views may not represent all patients.

Funding

This work was supported by a pilot research grant from the Department of Family Medicine, McMaster University.

Competing Interests

All authors none declared.

Ethical approval

The McMaster University Faculty of Health Sciences/Hamilton Health Sciences research ethics board approved this study.

BACKGROUND

Improving the patient experience in out-patient primary care settings is an important priority for health policy advisors and health care providers.[1–4] When patients contact primary care clinics for appointments, how many days or weeks must they wait for their appointments? Will they see providers they know best when they are finally seen? How long must they wait in reception areas and will the appointments be offered at times that are convenient for them? Most importantly, which attributes of that scheduling/consultation process are priorities for patients and which are they willing to trade-off in order to have a satisfactory experience in booking and attending that appointment?

This study was designed to gain deeper understanding of the relative value that patients place on various attributes connected to each attempt to access their primary care providers. We used the discrete choice experiment (DCE) method that has been utilized extensively in health care research.[5–12] In this method, respondents are presented with a questionnaire with varying combinations of different attributes of a decision, e.g., treatment or procedure, and for each combination, asked to choose which of the options they prefer. Patients' preferences as expressed by part-worth utilities (PWUs) are estimated for each decision attribute. The importance of each attribute is estimated and the PWUs used in simulations to better understand patients' preferences for and trade-offs among complete configurations of the treatment.

Speed of access and continuity with the same clinician are commonly studied attributes in various clinical scenarios and while both are often identified as key priorities for patients they are also attributes that are often in conflict with each other in real world

clinical practice. The interplay between access and continuity may be complicated even more in primary care settings that have inter-professional teams or in academic clinics where patients may be expected to see different types of clinicians (e.g., nurse vs doctor versus resident physicians). Patients often must decide whether to take the appointment offered today if it means having to see a provider other than their family physician. Will that decision change based on the health reason that prompts the appointment request?

By gaining a better understanding of patient preferences in various health states, clinical teams will be better positioned to design health systems in ways that are truly patient-centred. Advanced access scheduling systems are an example of a re-design strategy used in many primary care settings to reduce wait times and improve access to clinicians by limiting the proportion of pre-booked appointments and opening up time for same or next-day appointments.[10] Advanced access booking has been adopted by many primary care clinics around the world and its value has been evaluated and generally found to be positive.[11–15]

This study uses DCE in an inter-professional academic setting to evaluate patients' preferences for six attributes of access to their family practice clinic including health provider (family physician, resident physician or allied health professionals), familiarity with the provider, method of booking (telephone versus online) and wait times across different clinical scenarios.

METHODS

We conducted a cross-sectional survey with family practice patients, using a DCE method that we developed through literature review and focus groups with stakeholders.

Questionnaire Development

The core of the questionnaire was comprised of a DCE. DCEs are used regularly and increasingly to study the preferences of patients and physicians for health services and products as well as preferences of consumers in general. Health applications include in-hospital patient care,[16] colorectal cancer,[17] and usage of pharmaceuticals.[18] International Society for Pharmacoeconomics and Outcomes Research guidelines[19] were followed for the design, execution, analysis and interpretations of the DCE.

An initial set of continuity and access attributes was derived from the literature. To refine the attributes for relevance to the study setting, a focus group discussion was held at each participating clinic. Each group included a nurse, receptionist, a resident and a staff physician who had been involved with implementing advanced access booking. We described the purpose of the discussion as assisting with the creation of the survey instrument for a survey of patients of these clinics, and that participation was voluntary. Informed consent for research participation was not sought from focus group attendees. We provided scenarios to practice team members in the focus group, to stimulate discussion about attributes. The scenarios reflected access attributes from the literature and that the research team felt were relevant to primary care: speed of appointment, appointment with regular clinician who knows the patient, type of provider (physician, nurse, resident). These attributes were validated by the focus group as very important to

include. Participants also suggested an attribute relating to number of phone calls needed to reach the practice for an appointment which was felt to be a lower priority and not included in the DCE. We next described four scenarios that might affect patients' access preferences (new minor symptom, new urgent symptom, anxiety issues, routine check-up) and asked for input on these and for additional scenarios that would be relevant in the context of a family practice teaching centre. The additional level of online booking was added to the appointment booking method attribute, and for type of provider, the levels of family doctor, training doctor (resident) and nurse/nurse practitioner were recommended. The wording of attribute levels was also refined through discussions and expert judgment of the research team (including two physicians involved in implementing open access). (Table 1)

Table 1: Attributes and levels that comprised the discrete choice experiment

Attribute	**Level 1**	**Level 2**	**Level 3**
I can book an appointment	On the internet, right now	Over the phone, and wait less than 1 minute	Over the phone, and wait 1 to 10 minutes until it is answered
I get to see a health care provider	On the same day	In 1 to 14 days	In more than 14 days
I will spend ___ minutes in the waiting room	Less than 15	Between 15 and 30	More than 30

The appointment time is	Exactly the time of day I want	Not exactly the time of day I want, but okay	Not a good time at all
I will see a health care provider who knows me	Well	Not very well	Not at all
The health care provider is a	Family doctor	Training doctor (resident)	Nurse/Nurse Practitioner

The fractional factorial random experiment was designed using Sawtooth Software SSI Web v7.0.26, as was the whole questionnaire. Each respondent saw a series of 10 randomly designed choice sets, each of which provided three alternative configurations of a possible scenario of waiting times and appointment encounters. Two fixed tasks were added to test internal reliability. A representative choice task is provided in Figure 1. The questionnaire began with questions about frequency of visits to the clinic usual provider seen and self-reported health status, and ended with demographic questions after the choice sets. The questionnaire was pilot tested for clarity and time-to-complete with four staff members of the research team not familiar with the project. Minor wording changes were made. The DCE was introduced and explained to respondents prior to the first choice question.

We hypothesized that patients' preferences for appointment arrangements would be related to the nature and urgency of health states for those appointments.[20] Based on

literature review and our focus groups, we defined six states that may motivate requests for consultations with primary health care providers. For example, we hypothesized that patients would be relatively less motivated to press for quick appointments if they were seeking routine check-ups and more highly motivated if they experienced sudden pain or if a child were sick.

A random 1/6 of the sample was presented with each of these health states and asked to answer all of the DCE choice questions as if they were in that state.

The six health scenarios varied in the discrete choice experiment were:

1. Imagine that you are in your current state of health and develop a new symptom (such as **a cold**). You are pretty sure you know what it is, and you want some medication for it.
2. Imagine that you are in your current state of health and develop a new symptom (such as **unexpected blood in stools**). You are not sure what the symptom means, and you want to consult someone to find out.
3. Imagine that you are in your current state of health and develop a new symptom (such as **sudden pain**). You want to see someone to help relieve this unpleasant feeling.
4. Imagine that you are in your current state of health and are experiencing recurring **increased anxiety** due to work or family related issues. You want to see someone to talk about these changes and how your health may be affected.

5. Imagine that you are in your current state of health. You are due for a **routine check-up** or follow-up (such as appointments for a chronic condition or a physical exam).
6. Imagine that your **child or another family member is sick**. You would like to book an appointment for them to see a health care provider.

For a DCE study, a sample size of 300 to 500 subjects is generally considered adequate and Johnson's often-used rule-of-thumb calculates a sample of 100 for a DCE having our design specifications.[21]

Survey Participants

A convenience sample of patients was recruited in 2012 from two inter-professional family practice teaching clinics with which the researchers are affiliated, in Hamilton, Ontario, Canada. One clinic serves approximately 17,000 patients and the other 12,000. The clinics are staffed by family physicians (n=30), family medicine residents (n=70), nurse practitioners (n=10), mental health therapists (n=6), pharmacists (n=3), occupational therapists (n=2), and dieticians (n=2).

Patients aged 18 year or older and able to read English well enough to complete the questionnaire were eligible. English proficiency was not formally assessed prior to initiation of the survey.

The questionnaire was created electronically (web-based) and self-administered via computer-assisted personal interviews (CAPI). Recruitment was done by a research assistant who approached patients in the waiting room (clinic A, n=53) while waiting to

see their health care providers, and through emails to patients who had email addresses on file (clinic B, n=377). The research assistant initiated the CAPI questionnaire on her laptop for patients recruited in the waiting room of Clinic A and was available for questions. In clinic A, informed consent was obtained verbally by the research assistant, after the patient reviewed study information that was approved by the research ethics board, with the research assistant. In clinic B, the same study information was provided in the email and informed consent was assumed by completion of the survey online.

Statistical Methods

The experiment was created within Sawtooth Software SSI Web as a randomized fractional factorial design. The choice data was analyzed using HB within Sawtooth Software CBC/HB for the sample overall.

Aggregate-level multinomial logit analysis was executed to provide initial-level analysis of the choice data as was a basic count-analysis. Hierarchical Bayes estimation (HB) of preference coefficients was chosen over multinomial logit (MNL) since HB largely overcomes the independence of irrelevant alternatives (IIA) issue of MNL[22] and provides preference coefficients for each individual respondent. Huber and Train[23] found that part-worth utility estimates produced by HB and mixed logit were not significantly different. HB uses the Metropolis Hastings Algorithm, a type of Markov chain Monte Carlo iterative procedure that analyzes individual choices at the lower model level using MNL and then analyzes the aggregated data at the upper level using

multivariate normal methods. The initial burn-in phase was run with 20,000 iterations with 20,000 additional iterations used for estimating the part-worth utilities.

Internal reliability for the DCE was examined by analyzing the consistency of the fixed choice tasks that were not included in the main analysis. Statistical significance testing used a 5% level of risk. Analysis of variance (ANOVA), multivariate analysis of variance (MANOVA) and independent sample t-tests conducted in R were used to explore whether significant differences existed in preference coefficients among subgroups formed by the randomized health scenarios and other covariates. The size of the differences between is described using Cohen's guide to effect[24] sizes as represented by eta-squared (or partial eta-squared, but equal here).

Simulations were conducted in Sawtooth Software SMRT using the randomized first choice simulation method. That method was chosen because it attempts to mimic the noise inherent in human decisions by automatically adding appropriate error to the levels of the attributes included in the simulation scenarios, plus an overall error term. We chose the simulation profiles to contain the three most important attributes to ensure a good split in shares-of-preferences and to provide a range of shares across the six scenarios.

The McMaster University Faculty of Health Sciences/Hamilton Health Sciences research ethics board approved this study.

Patient and public involvement

This study developed a survey instrument to elicit patient preferences based on previous literature of similar patient surveys, however patients were not involved in creating the version used in this study. Patients were the participants in this study.

RESULTS

The email request to complete the survey was sent to 1285 patients in the two clinics and 378 (29.4%) completed the survey. Recruitment in the waiting room of one of the clinics took place approximately one half-day per week from February to July 2012, resulting in 53 additional completed surveys, for a total of 430 fully complete and usable responses. Most respondents were 40-59 years of age (39%) or 60 and older (32%). The majority of respondents were female (69%). Nearly half (45%) reported having been to the clinic three or more times in the six months prior to the survey (Table 2). The average age of patients is 48.2 years and 52.5% are female in clinic A, and average age is 45.4 years and 56.3% are female at clinic B.

Table 2: Characteristics of the respondents who were recruited from a clinic waiting room (n=53) or by email invitation from the clinic (n=377)

	Clinic waiting room (n=53) (A)	Email invitation (n=377) (B)	Population of City of Hamilton (2016)[25]
Age category (%)*			
34 and younger	34.0%	17.5%	58.4%
35 to 49	28.3%	25.2%	18.9%

50 to 69 65 and older missing	22.6% 9.4% 5.7%	35.0% 21.5% 0.8%	27.1% 17.3% 0%
Female (%)	64.2%	70.0%	51.1%
Ethnicity – identified as White* (%)	73.6%	89.4%	Not available
Number of people living in household (%) One Two Three Four Five or more missing	30.2% 26.4% 17.0% 13.2% 13.2% 0	18.0% 39.8% 15.1% 18.8% 8.0% 0.3%	98.3% 28.2% 32.2% 15,9% 14,6% 9.1% 0%
Been a patient of clinic*: 2 years or longer Less than 2 years missing	67.9% 32.1% 0	89.7% 9.8% 0.5%	Not applicable
Perception of health scale rating (mean, standard deviation)	8.3, (2.2)	8.1, (2.0)	Not applicable

0=very poor, 10=excellent			

* p < 0.05 for difference between groups

The part-worth utilities and 95% confidence intervals from the HB analysis interacting the health states with the individual attribute levels are shown in Supplementary File 1. ANOVA and MANOVA tests ($p \leq 0.05$) indicated that PWUs for wait time before appointment and familiarity with health care provider varied significantly among the health state scenarios and within attributes while not showing significant differences for the other four attributes. The two fixed tasks were not significantly different (Chi-square=2.86, p>0.20), supporting the internal reliability of the design and data.

The relative importance of the 6 attributes for each of the randomized health scenarios is presented in Figure 2 and the effect sizes are shown in Supplementary File 2. There was significant variation over all six attributes and across the six health scenarios (MANOVA, Wilk's lambda = 0.694, p-value < 0.0001) indicating a range of different responses under the various health conditions. The relative importance of time-to-appointment, waiting room time, familiarity with provider and provider level varied significantly over the 6 health scenarios. Using Cohen's guide to effect sizes as represented by eta-squared (or partial eta-squared, but equal here), the effect size of health scenario can be considered large for time-to-appointment, between medium and large for familiarity with provider, between small and medium for waiting room time, appointment convenience and provider level and small for method of booking appointment. The relative importance of time-to-appointment was statistically significantly less (p<0.05) for those responding to the routine check-up scenario than all

others. The relative importance of familiarity with provider was statistically significantly greater ($p<0.05$) for those responding to the routine check-up scenario than for those responding to new cold and new sudden pain and was numerically greater than all others.

Figure 3 shows one of several simulations conducted to investigate the sensitivity of patients' preferences for different continuity and access scenarios that might actually be confronted by patients. In both profiles, the appointment was made by a phone call that was answered within one minute, the waiting room times was less than 15 minutes and the appointment was at the exact time of day that the patient wanted. In one profile (row 1), the patient's appointment was scheduled for the same day and the patient would see a resident who was not known to the patient. In the second profile (row 2), the patient would have to wait one to 14 days for the appointment but would see the family doctor with whom the patient was very familiar.

Simulations using the PWUs are presented for each randomized health scenario in the lower frame of Figure 3. The numbers in each column show the percentages of patients who would likely choose each of the two simulated access/continuity scenarios when faced with the indicated health scenario. As hypothesized, most patients (76%) would like to have the continuity of seeing their family doctor for a routine check-up and would not mind waiting 1 to 14 days to see that MD. On the other hand, 64% of those who responded under the new sudden pain health state wanted an appointment that same day and were willing to see a resident with whom they were not at all familiar. Close to

being as insistent for quick service were those who were in the new cold health state, where 61% wanted the same day appointment and only 39% preferred waiting longer to see their own doctor. Those presented with the anxiety, child/family member sick, blood-in-stools health states would rather see their own doctor, but likely would not be quite as demanding for the same day appointment.

DISCUSSION

In this DCE study of 430 patients, comparing multiple attributes of accessing the primary care clinic, we found that patient choices for appointment bookings in a primary care teaching clinic were primarily influenced by speed of obtaining the appointment (access), followed by the professional position of the health care provider (family doctor, resident or nurse/nurse practitioner) and then the patient's familiarity with the provider (continuity). These results help to demonstrate that an advanced access booking model does in fact target what many patients value most across a number of health states, i.e., timely access to their primary care team.

This study was conducted in a jurisdiction where health policy makers are currently strongly encouraging most, if not all, primary health care providers to adopt an advanced access model of appointment bookings.[26] Our results lend support to the notion that improved and timely access to primary care seems to be the leading priority for patients as well. In many scenarios tested, patients were willing to trade-off continuity with their usual provider for a shorter wait in the clinic in order to have the offer of a same day appointment. This is the exact reality that teaching clinics and many group practices face, where clinicians are often out of the office either on other

rotations in the case of resident physicians, or doing other clinical work in a hospital or long term care home in the case of staff clinicians. Each patient's usual provider will not always be available when needed, so other choices must to be offered. In multi-disciplinary teaching clinics, those choices are often a provider who the patient has never met, or a resident or nurse who the patient does not know well. On the other hand, there was variability in importance by the health state presented. The relative importance of familiarity with the provider was greater in the context of a routine check-up compared to a new cold and new sudden pain. This finding makes sense since most people are not in a rush to have the routine annual check-up but do like to see their regular health provider for continuity.

These trade-offs between continuity and quick access are made quite routinely when discussing access to primary care. It seems that patients who are accustomed to receiving their care in a teaching clinic setting are willing to make trade-offs between continuity and access attributes for most health states, but prefer to see their usual physician for their annual physical exams – perhaps reassuring patients that familiar and often more experienced providers are indeed overseeing their care and aware of their ongoing health needs.

The results from this study did seem to differ somewhat from a previous DCEs examining access to primary care. Rubin et al. examined patient preferences for booking routine appointments and described trade-offs between rapid appointment access, choice of provider and choice of time.[6] They found that for many of their patients sampled, speed of access was not as highly valued as continuity with the same provider or a convenient appointment time. The difference between Rubin's result and

ours, could be due in part to our patient's having a longstanding relationship with our teaching clinic philosophy and design, where patients agree up front that they will be seen by resident physicians who are only in our clinic for 2-years. For most of the patients in our study, the expectation of continuity with the same provider is often not present from the start, and what matters most is being seen when they need to be seen.

Where is a growing body of literature supporting the importance of increasing both continuity and faster access in practicing patient-centred primary care.[20,27–29] To suggest that any one or two attributes could be most highly valued by all patients in all health states is a drastic oversimplification of what drives patients to seek care. A major advantage of the study design used in this experiment is the ability to run custom simulations in the DCE, which allowed us to look more closely at real life scenarios and gain deeper understanding of how patients make their choices when accessing primary care services. Our results make clear that while quick access is important for most people, it is not the only priority in certain health states. Primary care systems need to be adaptable enough to offer patients choices to account for variabilities in patient preferences across diverse health states.

This study had some limitations. It was conducted in two clinics that are part of an academic family medicine department and results may not be entirely generalizable to other settings and practice models. We studied a convenience sample of patients who may have been more frequent visitors to the practice and their views may not represent all patients.

Our results and conclusions are based on the attributes and levels included in the DCE we designed. While we followed a robust process to determine which attributes are important and relevant in our context using focus groups of key informants with expert knowledge of the clinical setting as well as previous literature in similar settings, we cannot be sure we captured all important attributes. The appointment booking method is a compound attribute of method and time to book the appointment. We had no desire to separately estimate the booking method (internet or phone) from the booking wait time ('right now', 'less than 1 minute' and '1 to 10 minutes'). Separating the appointment booking method from the time-to-book would have created a situation where prohibitions would have been needed to avoid unrealistic combinations of method and time, thereby reducing the statistical quality of the design. While some may desire to estimate each univariate attribute separately, this compound attribute best supported this research.

As primary care environments experiment with options such as on-line appointment bookings to further improve convenience for patients, the relative worth placed on this attribute was of particular interest. When looking at the method of appointment booking (on-line vs phone), there was a preference for phone booking over on-line booking. This may seem surprising given societies' general embrace of technology, but this is perhaps a reflection of people's tendencies to favour things with which they have had experience. Simply put, since patients have never had the option of on-line booking, they are less likely to appreciate the potential value, although further study will be required to understand this attribute more completely as time evolves.

In conclusion, patients preferred timely access to care over all other attributes for the majority of health scenarios tested in this study. In other words, patients seeking care for sudden pain, new cold-like illness or other episodic ailments are willing to trade-off continuity for the offer of a timely appointment. The exception to this rule is the scenario of a patient booking for a routine check-up where they prefer to see the provider with which they are most familiar. These results support the notion that advanced access booking models which hold most, but not all appointment spots for same day access match up well with patient preferences over a vast array of clinical scenarios.

FIGURE LEGENDS

Figure 1: Example of a choice task given to participants in the questionnaire

Figure 2: Relative importance of attributes by health scenario

Figure 3: Simulated shares-of-preference for two wait scenarios

STATEMENTS

Author Contributions

DO, MH, KD, HQ, GA and DG contributed to conception and design of the study. DO, MH, KD, HQ contributed to data collection. KD analysed the data. DO, MH, KD wrote the initial draft of the manuscript. DO, MH, KD, HQ, GA and DG interpreted results, critically revised the manuscript and approved the final version.

Data Sharing

Please contact corresponding author for data access requests.

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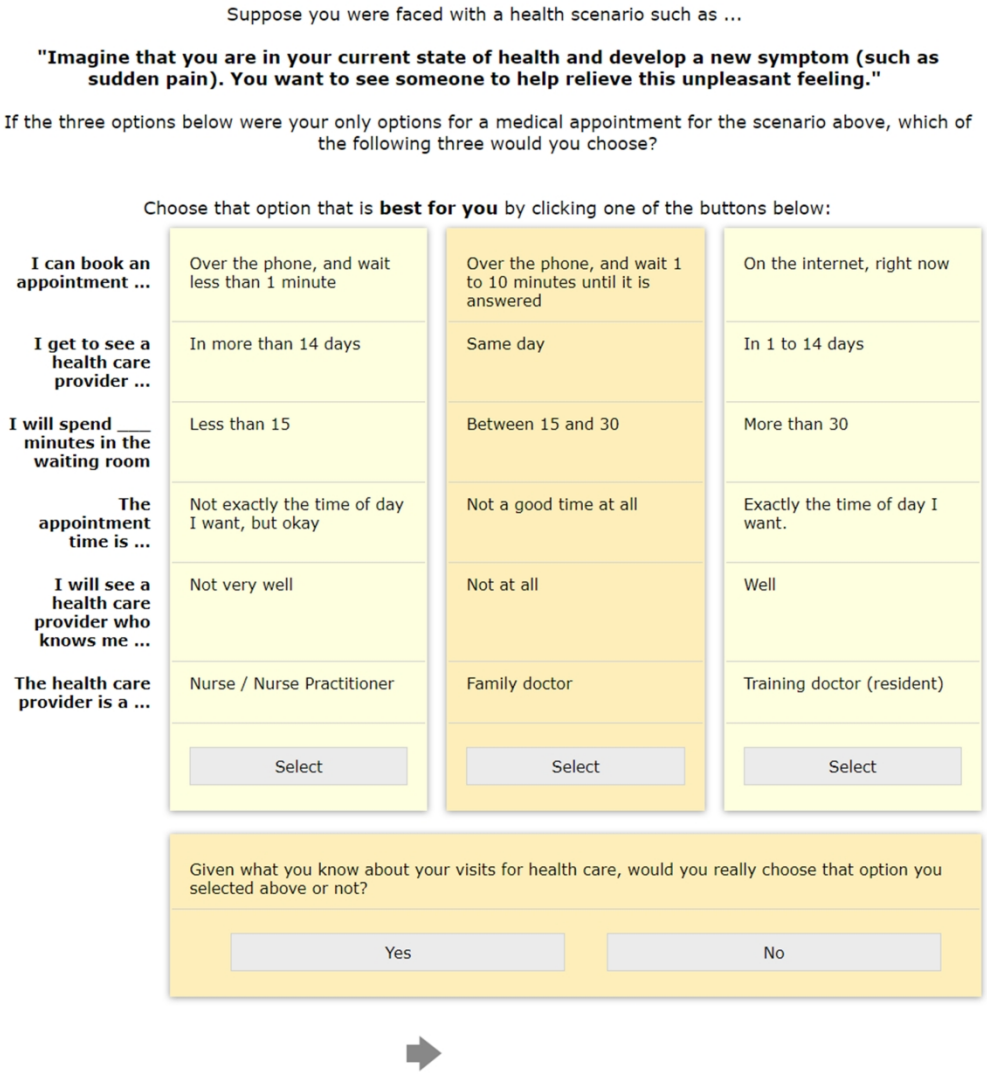

Example of a choice task given to participants in the questionnaire

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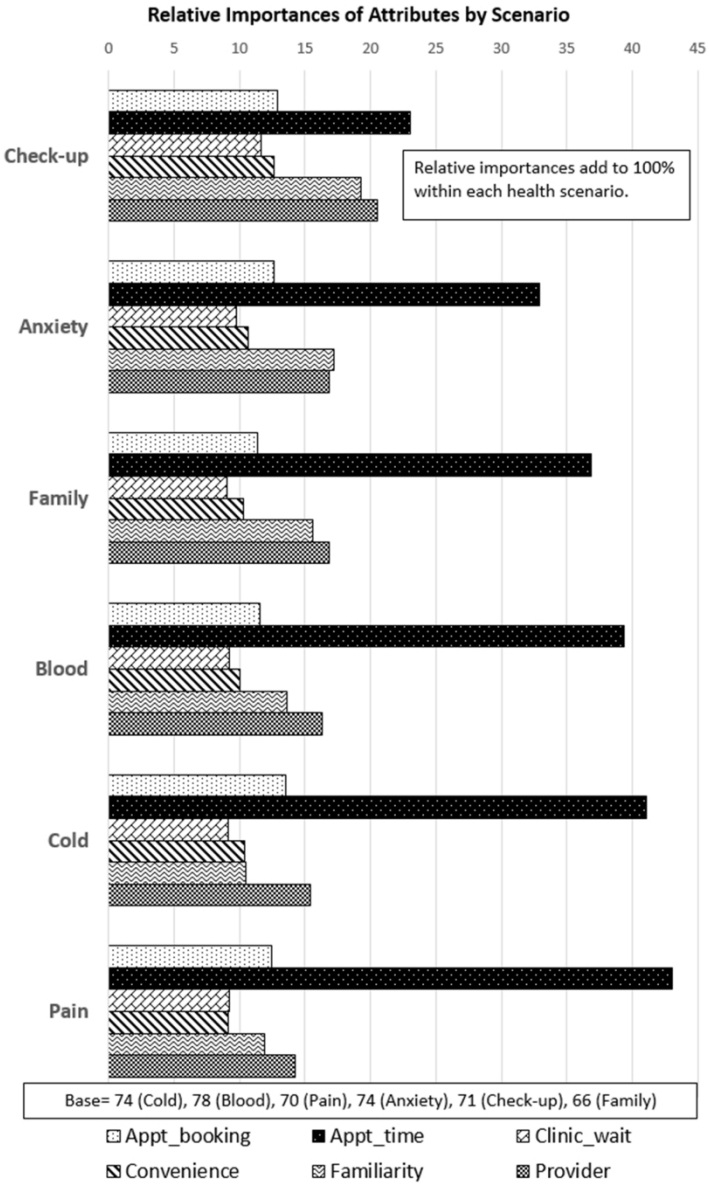

Relative importance of attributes by health scenario

163x270mm (300 x 300 DPI)

	Configuration of Two Waiting Time Scenarios					
Simulated Wait Scenario	**Booking appointment**	**Time to appointment**	**Waiting room time**	**Appointment convenience**	**Familiarity w provider**	**Provider level**
Shorter wait … but to see a resident I don't know	Phone answered within 1 minute	Same day	Less than 15 minutes	Exact time of day I want	Not at all familiar	A resident
Longer wait … but I see my own doctor		In 1 to 14 days			Well familiar	My family doctor

	Percentages Choosing Waiting Time Scenario under 6 Health Scenarios					
Simulated Wait Scenario	**Routine check-up**	**Anxiety**	**Child/ family member sick**	**Blood in stools**	**New cold**	**New sudden pain**
Shorter wait … but to see a resident I don't know	*24*	*41*	*42*	*47*	*61*	*64*
Longer wait … but I see my own doctor	*76*	*59*	*58*	*53*	*39*	*36*

Simulated shares-of-preference for two wait scenarios

245x101mm (300 x 300 DPI)

Supplementary File 1: Part worth utilities for the attributes and 95% confidence intervals, for the six scenarios, among the 430 respondents

	New Cold Scenario			Blood in Stools Scenario			Sudden Pail Scenario			Anxiety Scenario			Routine Check-up Scenario			Child/Family Member Sick Scenario		
Attributes & Levels	*Part-Worth Utilities*	*Lower Confidence Limit*	*Upper Confidence Limit*	*Part-Worth Utilities*	*Lower Confidence Limit*	*Upper Confidence Limit*	*Part-Worth Utilities*	*Lower Confidence Limit*	*Upper Confidence Limit*	*Part-Worth Utilities*	*Lower Confidence Limit*	*Upper Confidence Limit*	*Part-Worth Utilities*	*Lower Confidence Limit*	*Upper Confidence Limit*	*Part-Worth Utilities*	*Lower Confidence Limit*	*Upper Confidence Limit*
1. Booking time																		
a) Internet now	-22.02	-34.95	-9.09	-8.11	-18.85	2.62	-12.74	-24.51	-0.98	-11.91	-25.11	1.29	-16.32	-27.71	-4.92	-15.07	-25.14	-4.99
b) Phone 1 min	21.11	14.30	27.92	15.29	9.03	21.55	14.97	7.75	22.20	9.79	2.51	17.06	12.54	5.73	19.36	13.14	7.30	18.98
c) Phone 1 - 10 min	0.91	-6.53	8.35	-7.18	-13.40	-0.96	-2.23	-9.25	4.79	2.12	-5.53	9.78	3.77	-3.73	11.28	1.93	-5.84	9.69
2. Days to appt.																		
a) Same_day	117.20	100.56	133.83	103.03	86.27	119.79	119.05	101.40	136.69	80.17	66.07	94.27	37.58	21.90	53.26	90.71	71.84	109.59
b) 1 - 14 days	-0.59	-11.19	10.00	13.35	2.94	23.76	1.69	-9.35	12.73	22.39	12.81	31.96	13.73	3.85	23.62	16.66	4.80	28.52
c) 14 days <	-116.60	-130.87	-102.34	-116.38	-129.81	-102.95	-120.74	-133.83	-107.65	-102.56	-114.72	-90.39	-51.32	-64.98	-37.65	-107.38	-121.19	-93.57
3. Clinic wait																		
a) < 15 min	10.73	5.23	16.24	14.81	10.43	19.20	11.71	6.08	17.34	10.39	3.66	17.13	10.01	1.47	18.55	13.51	8.23	18.80
b) 15 - 30 min	12.70	8.93	16.46	11.20	7.55	14.86	14.18	11.20	17.16	12.86	8.85	16.87	16.57	11.76	21.39	7.41	3.22	11.61
c) 30 min plus	-23.43	-28.23	-18.63	-26.02	-30.27	-21.76	-25.89	-30.96	-20.83	-23.26	-28.92	-17.59	-26.58	-34.02	-19.15	-20.93	-27.80	-14.05
4. Convenience																		
a) Exact time I want	16.21	10.12	22.29	12.20	6.54	17.86	14.03	8.66	19.41	16.09	10.33	21.85	21.91	14.24	29.57	17.31	11.20	23.42
b) Not exact but OK	11.37	7.68	15.06	13.02	9.74	16.31	10.38	7.26	13.49	13.05	8.77	17.33	10.51	5.45	15.58	7.94	2.64	13.25
c) Not good time	-27.58	-34.43	-20.72	-25.22	-31.98	-18.47	-24.41	-30.38	-18.44	-29.14	-35.88	-22.41	-32.42	-41.10	-23.74	-25.25	-32.75	-17.75
5. Familiarity																		
a) Know well	24.21	16.96	31.45	40.37	33.46	47.29	29.98	21.67	38.29	50.20	38.32	62.08	59.39	48.03	70.75	49.69	39.16	60.23
b) Know not very well	-3.74	-8.99	1.52	-11.65	-17.93	-5.36	-5.08	-9.97	-0.18	-15.97	-23.80	-8.14	-23.32	-30.92	-15.72	-16.67	-23.88	-9.45
c) Know not at all	-20.47	-25.75	-15.20	-28.73	-34.28	-23.17	-24.91	-31.15	-18.66	-34.23	-41.50	-26.97	-36.07	-43.04	-29.09	-33.03	-39.47	-26.59
6. Provider position																		
a) Family doctor	35.50	25.76	45.23	39.17	30.29	48.05	32.39	23.07	41.70	32.47	23.29	41.65	45.08	32.90	57.25	37.51	28.82	46.20
b) Resident	1.17	-5.61	7.95	2.19	-4.24	8.61	1.71	-5.91	9.33	12.01	4.00	20.01	9.74	0.63	18.85	8.25	1.09	15.41
c) Nurse or NP	-36.66	-46.41	-26.92	-41.35	-50.71	-31.99	-34.10	-43.39	-24.80	-44.48	-54.40	-34.55	-54.82	-65.33	-44.31	-45.76	-56.03	-35.49
a) Opt-out	-21.65	-49.07	5.77	-19.85	-40.04	0.33	-1.19	-26.79	24.42	-37.87	-63.28	-12.45	-23.26	-57.40	10.88	-13.63	-41.85	14.58

Relative Importances by Random Health Scenario (percentages by column)

Attribute	Total	New Cold (C)	Blood in Stools (B)	New Sudden Pain (P)	Anxiety (A)	Routine Check-up (R)	Child/ Family Member Sick (S)	F	p-value	eta-squared	Tukey contrasts	Cohen's f	Power
Booking Appointment	12.39	13.50	11.53	12.44	12.65	12.87	11.34	0.62	0.69	0.007		0.085	0.227
Time to Appointment	36.06	41.10	39.35	43.01	32.95	23.03	36.86	13.9	< 0.001	0.141	A,B,C,P,S>R; C,P>A	0.404	1
Waiting Room Time	9.69	9.16	9.25	9.25	9.73	11.64	9.07	2.25	0.048	0.026		0.163	0.738
Appointment Convenience	10.52	10.34	10.02	9.14	10.67	12.65	10.32	2.14	0.06	0.025	R>P	0.159	0.712
Familiarity with Provider	14.64	10.46	13.57	11.88	17.16	19.25	15.57	10.35*	< 0.001	0.099	A>C,P; R>B,C,P; S>C	0.331	1
Provider Level	16.70	15.43	16.28	14.28	16.84	20.55	16.85	2.66	0.022	0.03	R>P	0.177	0.816
Base	430	71	78	70	74	71	66						

* not assuming equal variances

MANOVA: Wilk's lambda = 0.694, p-value < 0.0001, F = 5.356

343x68mm (300 x 300 DPI)

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***
Oliver D et al. Primary care patient trade-offs between continuity and access in interprofessional teaching clinics: a cross-sectional survey using discrete choice experiment

	Item No	Recommendation	Page/paragraph
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Title page
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Pg 1
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Pg 3-4
Objectives	3	State specific objectives, including any prespecified hypotheses	Pg 4-5 and 6 para 2
Methods			
Study design	4	Present key elements of study design early in the paper	Pg 5 para 2 – pg 7
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Pg 7 para 3 – pg 8
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	Pg 7 para 3-4
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Pg 6 para 2-3
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	*Same method used to collect all variables- no between-group comparisons or predictive analyses*
Bias	9	Describe any efforts to address potential sources of bias	Limitations described pg 12
Study size	10	Explain how the study size was arrived at	Pg 6 para 2
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were	Pg 7 para 2

		chosen and why	
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Pg 7 para 2
		(*b*) Describe any methods used to examine subgroups and interactions	n/a
		(*c*) Explain how missing data were addressed	n/a
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	n/a
		(*e*) Describe any sensitivity analyses	n/a
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Pg 7 par a3
		(b) Give reasons for non-participation at each stage	n/a
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Pg 7 para 3
		(b) Indicate number of participants with missing data for each variable of interest	n/a
Outcome data	15*	Report numbers of outcome events or summary measures	Pg 8-9, fig 3, 4
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	n/a
		(*b*) Report category boundaries when continuous variables were categorized	n/a
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	n/a
Other analyses	17	Report other analyses done—eg analyses of subgroups	Pg 9

		and interactions, and sensitivity analyses	
Discussion			
Key results	18	Summarise key results with reference to study objectives	Pg 10 para 1
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Pg 11 para 2
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Pg 11-12
Generalisability	21	Discuss the generalisability (external validity) of the study results	
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Title page