Abstract

A better understanding of the public's preferences and what factors influence them is required if they are to be used to drive decision-making in health. This is particularly the case for service areas undergoing continual reform such as emergency and primary care. Accordingly, this study sought to determine if attitudes, socio-demographic characteristics and healthcare experiences influence the public's intentions to access care and their preferences for hypothetical emergency care alternatives. A discrete choice experiment was used to elicit the preferences of Australian adults (n=1529). Mixed logit regression analyses revealed the influence of a range of individual characteristics on preferences and service uptake choices across three different presenting scenarios. Age was associated with service uptake choices in all contexts, whilst the impact of other sociodemographics, health experience and attitudinal factors varied by context. The improvements in explanatory power observed from including these factors in the models highlight the need to further clarify their influence with larger populations and other presenting contexts, and to identify other determinants of preference heterogeneity. The results suggest social marketing programs undertaken as part of demand management efforts need to be better targeted if decision-makers are seeking to increase community acceptance of emerging service models and alternatives. Other implications for health policy, service planning and research, including for workforce planning and the possible introduction of a system of co-payments are discussed.

Introduction

Provision of emergency care in Australia is currently, predominantly, a universal service responsibility of the government. Internationally, it is embedded within a culture of system reform focussed on reducing avoidable admissions and encouraging greater personal responsibility for health (Forero, Hillman, & McCarthy, 2010; Harris et al., 2015). Health policy shifts have emphasised greater use of healthcare preferences to drive decision-making about how scarce resources are best allocated (e.g., Arendts et al., 2011; de Bekker-Grob, Ryan, & Gerard, 2012; Harris et al., 2015; Lancsar & Louviere, 2008; Neuman et al., 2010; Potoglou et al., 2011; Ryan, Gerard, & Amaya-Amaya, 2008; Scuffham, Whitty, Taylor, & Saxby, 2010; Scuffham et al., 2014; Whitty et al., 2014a). Although the use of preferences is grounded in sound principles of decision-making and represents a strong commitment to consumer engagement, it may also unwittingly reinforce health disparities given the significant inequalities which exist within populations, cultural considerations, and evidence regarding differences in the use of services and how preferences can be shaped by knowledge, attitudes and beliefs (Katz, 2001).

The evidence suggests that the public's healthcare preferences are heterogeneous (e.g., Cernohorsky & Voracek, 2013; Foster et al., 2010; Harris et al., 2015; Neuman et al., 2010; Schwappach, 2003; Scuffham et al., 2010; Stafinski, Menon, Marshall, & Caulfield, 2011; van der Star & van den Berg, 2011; Warren et al., 2011; Whitty et al., 2014b), demonstrating the need to identify and better understand the influencing and differential factors which underpin preference heterogeneity (Harris et al., 2015; Tengilimoglu, Dursun-Kilic, & Gulec, 2012). The existence of such heterogeneity is no less the case for emergency care (Harris et al., 2015). Although the need to examine the public's preferences for emergency care alternatives has been identified (Gerard et al., 2004; Leung et al., 2009; San

Miguel et al., 2002) further research is needed to ascertain the role of individual characteristics in preference construction (Bryan & Dolan, 2004; Foster et al., 2010; Harris et al., 2015; San Miguel et al., 2002; Warren et al., 2011). Furthermore, it is especially important to understand any variation in preferences for emergency care, as this may impact people's behaviour in seeking care, potentially driving both appropriate and inappropriate access. Accordingly, researchers have identified the need for greater consideration of contextual issues, attitudes and beliefs about responsibilities for health (e.g. health and social consciousness), socio-demographic factors and different health status and related experiences on healthcare preferences (e.g., Bryan & Dolan, 2004; Harris et al., 2015; San Miguel et al., 2002; Warren et al., 2011). Many of these factors have been found to reflect those which influence emergency department presentations (Hunt et al., 2006; Huntley et al., 2011; Leung et al., 2009; Philips et al., 2010; Tsai et al., 2010). In response, this study aims to establish if and how attitudinal, sociodemographic and personal health related factors influence the public's intentions to access care and their preferences for emergency care alternatives as reflected in current and proposed health reforms, both in Australia and internationally (Harris et al., 2015). The specific research questions to be addressed were:

1. Do socio-demographic characteristics, health related measures and attitudes towards responsibilities for health influence the public's intention to access emergency care; and
2. Do socio-demographic characteristics, health related measures and attitudes towards responsibilities for health influence preferences for the different characteristics of emergency care alternatives?

Ultimately, the research sought to better inform health policy, service planning and decision-making processes, including social marketing and workforce planning initiatives in emergency and primary care.

Methods

This study was undertaken as part of a larger project seeking to elicit the public's views on priority health issues, and in this instance, relating alternatives to emergency care (Scuffham et al., 2014; Whitty et al., 2014c). A discrete choice experiment (DCE), supplemented with a questionnaire on demographic and attitudinal characteristics, was developed and administered online to a stratified sample of the general public. Participants from Queensland (n=1073) and South Australia (n=456) were recruited through an internet panel provider (Pure Profile). More than half of the participants (n=909); 456 South Australians and 453 Queenslanders, were assigned to consider the main hypothetical scenario involving preferences for emergency care for the treatment of a possible concussion (S1).

The primary scenario (S1) used to elicit the public's preferences and consider the impact of jurisdictional differences based on state of residence was designed to represent a typical ED presentation involving injuries from an accident or fall. Respondents were told to imagine; *"you have fallen from the top of a ladder and landed heavily. Although you may not have lost consciousness, you hit your head hard and are feeling dazed and nauseous. You are also experiencing pain in your right arm and shoulder and have some cuts and abrasions"*. Smaller samples of the general public (from Queensland) were assigned to two alternative scenarios to undertake further exploratory analyses to consider if and how the influence of individual characteristics varied in relation to a potentially less urgent or 'GP type' presentation involving themselves or a significant other. Accordingly, (S2) described a scenario involving rash/asthma-related issues (as outlined in Table 1) relating to concerns for the self (n=311) and, (S3) the same rash/asthma problems for their (hypothetical) daughter (n=309). Before completing the DCE, participants were asked to rate the urgency of the

presentation under consideration based on a brief description of Australasian triage categories. A breakdown of each sample against key characteristics is provided in Table 2.

Insert Tables 1 & 2 here

Materials

Discrete Choice Experiment (DCE)

The DCE was developed in accordance with best practice guidelines (e.g. Johnson et al., 2012; Lancsar & Louviere, 2008) with further information on the design of the DCE and the identification of attribute levels presented in Harris et al. (2015). The DCE presented a series of hypothetical choices between two service models defined by different levels of five key attributes namely, treating healthcare professional, treatment location, waiting time, out of pocket cost and service quality. The levels associated with each attribute are specified in Table 3.

Key issues affected the experimental design. These included the need to exclude an unfeasible combination whereby an emergency physician provides treatment at home, ensure near orthogonality, and provide a manageable number of choice sets for participants (e.g. Lancsar & Louviere, 2008). A fractional factorial main effects D-efficient design with five attributes (4^2, 3^3) was used to generate unlabelled choice profiles for the DCE using NGENE software (Rose et al., 2012, version 1.1.1). Further precision was achieved by using known 'prior' values for the model parameters from the pilot study to re-run the experimental design for the DCE (Johnson et al., 2012).

An *opt out* option was included for each choice set, whereby respondents could choose to delay accessing care for 24 hours to see if their condition improved. This question

increased the realism of the scenarios, as it is known that a percentage of the public choose not to wait to be seen in ED or choose not to seek ED treatment in the first instance (Blake, Dissanayake, Hay & Brown, 2014; Harris et al., 2015; Kay, Delbridge & Kendrick, 2014). For each block, one choice set was repeated as a consistency check, to provide an indication of data quality and individual responses to the repeat choice set were excluded from the preference models (Richardson, et al., 2009). A sample choice profile as presented to participants is presented in Table 1.

Factors considered to explain preference heterogeneity

In recognition of the number and complexity of individual factors that may be involved, a large number of individual characteristics were measured in the study. These included a range of demographic and socioeconomic indicators, personal health history, use of healthcare services, health status measures and attitudinal measures relating to personal health and broader social responsibilities. These variables are hereafter described as attitudinal measures, sociodemographics and health related factors.

Attitudinal measures

Health consciousness: There are a paucity of available measures to ascertain attitudes towards one's personal health obligations. Researchers have generally relied on measures of certain health promotion behaviours or whether specific health messages can be recalled (e.g., Iversen & Kraft, 2006; Kaskatus & Greenfield, 1997). In this study we have used the Health Consciousness Scale (HCS; Gould 1990), which has sound psychometric properties and has been used in previous studies (e.g. Michaelidou & Hassan, 2008).

Awareness of disadvantage: Much of the published research on awareness of social responsibilities and health has involved qualitative approaches emphasising social consciousness or awareness of social injustice in the context of nursing care (Giddings, 2005;

Kirkham et al., 2009). In view of the paucity of available quantitative measures, a specific item was developed and included in the survey to measure awareness of the impact of social disadvantage. The item asked respondents to agree or disagree with the statement "I am very aware of social disadvantage and how it impacts the community." As a single item the measures was interpreted as awareness of the impact of disadvantage and considered suitable for inclusion in subsequent analyses having split the population into relatively equal halves.

Sociodemographics

The demographic measures in the survey included gender, age, location (i.e. postcode), relationship status and Indigenous status (e.g., ABS, 2012; Cameron et al., 2012; Philips et al., 2010; Tsai et al., 2010). Measures of cultural and linguistic diversity included the number of people who were born overseas and who spoke a language other than English at home (ABS, 2012). A number of indicators of individuals' socioeconomic position were also included in the survey. These socioeconomic indicators comprised annual household income, concession status, education levels and employment status (Cameron et al., 2012; Philips et al., 2010; Tsai et al., 2010).

Health related factors

Personal health status was measured using item 1 of the WHOQOL-BREF (World Health Organisation, 2004) and for normative comparisons, the AQoL-4D (Hawthorne, Richardson & Osbourne, 1999) was administered as a quality of life measure. Health service utilisation was measured in terms of self-reported recent (in the past year) presentations to Accident & Emergency, hospitalisations, and visits to general practice (Huang et al., 2008; Philips et al., 2010; Tsai et al., 2010). Participants were asked if they or a close family member had ever received medical treatment for a range of priority health issues. These included diabetes, heart disease, asthma, other respiratory diseases, skin cancer, other cancer, depression, anxiety, other emotional problems, chronic neck or back pain, arthritis, stomach

ulcer/heartburn and weight management issues. Participants were also asked to indicate if they had private health insurance, both 'hospital' and 'extras cover' (e.g., Krug, 1999; Philips et al., 2010). An item to identify individuals who have worked in the health system in the last ten years was also included for use as a covariate in the analysis (e.g., Tsai et al., 2010).

Selection and refinement of individual characteristics

As categorical variables, all measures of individual characteristics, with the exception of quality of life scores were dichotomised, as indicated in Table 2. The selection and refinement of individual characteristics for use in subsequent analyses were informed by the data, iteratively. It was expected that a number of self-reported health status and experience related measures in the study would be closely associated. For instance, quality of life measures, history of health conditions, and health service utilisation measures would likely be correlated. Counts for each variable and the degree to which they are associated were used to identify which variables would be included in preference models, with variables found to have a correlation of 0.4 or greater with another variable excluded from subsequent analyses. Using this approach, a total of 16 individual measures including attitudinal measures, socio-demographics and health related factors were identified for use in subsequent analyses, from the more than fifty measures of individual characteristics included in the survey. These are outlined in Table 2.

Data analysis methods

Mixed logit (MXL) analyses were undertaken to estimate the probability of choice of an emergency care alternative (dependent variable), using the attribute levels as independent variables. MXL is a more generalised specification of a multinomial logit model, which allows preferences to vary between individuals. The three scenarios were estimated as separate models. For each model, a constant was specified to be associated with the option to delay care (e.g. Cheng et al., 2012; Hess et al., 2014) . All attribute levels and the constant

were included as random parameters, and the individual preference weights were assumed to follow a normal distribution. Attitudinal measures, socio-demographics and health related factors were included in the model, using two different model specifications. In Model A, the individual characteristics were included alongside the constant as covariates to explain the decision to delay care. This addresses Research Question 1 (i.e. the significance of different individual characteristics in explaining the public's propensity to choose or delay accessing care). In Model B, they were used to explain any heterogeneity around the mean preference estimate for each random parameter (i.e. the constant and attribute levels). This addresses Research Question 2, i.e. the significance of different individual characteristics in explaining preferences for emergency care alternatives. For each scenario, the two models (A and B) were compared using model fit criterion (the Akaike Information Criterion divided by the number of observations, or AIC/N), with the preferred model having the lowest AIC/N.

The attributes "cost" and "wait time" and the individuals' AQoL-4D utility score were specified as continuous variables (Hawthorne, Richardson & Osbourne, 1999). All other variables and the choice to access or delay accessing care were dichotomised, and specified with effects coding (refer to Table 2). Location (i.e. State) was only used as a variable for the first scenario (S1) as this was the only sample which included respondents from different states. Each MXL model was estimated using NLOGIT (Greene, 2012, Version 5) with 1000 Halton draws (Harris, et al., 2015). Further information on model formulation is provided in Appendix 1.

Results

A total of 1529 members of the general public who met screening criteria (55.6%) and were matched to state demographics for age and sex completed the survey. While the samples assigned to consider the three scenarios compared well to population norms, notable

exceptions were observed in relation to the low numbers of culturally diverse and Aboriginal and Torres Strait Islander participants. An inspection of missing values revealed that less than 5% of participant characteristic data was missing, thereby minimising the risks to data quality (Tabachnik & Fidell, 2007).

Influence of individual characteristics on intentions to access care (MODEL A)

The MXL parameters for Model A are reported in Table 3 for S1 and S2 and Table 4 for S3. The size and significance of constants associated with a decision to delay care are particularly noteworthy in the models for the first two scenarios (S1: -4.279, $p = 0.032$; S2: -7.919, $p = 0.002$), suggesting a number of factors influencing intentions to access care remain unaccounted for in these two scenarios. However, despite the observed heterogeneity, this was not the case for S3 for which the constant was no longer significant (S3: -5.501, $p = 0.064$).

Insert Tables 3 & 4 here

For each of the presenting scenarios, the number and mix of individual characteristics found to be significant differed. The only individual characteristic found to be significant at the 5% level in all three scenarios was age, with older adults (aged over 45 years) being less likely to delay accessing care compared to people aged 18-45 years (S1: $\beta = -0.633$, $p < 0.001$; S2: $\beta = -0.606$, $p < 0.001$; S3: $\beta = -0.429$, $p = 0.012$). In addition to age, gender was influential in the context of the main scenario (S1) with females less likely to delay and more likely to access care ($\beta = -1.214$, $p < 0.001$). Having no tertiary qualifications and English as a second language respectively, were associated with a decreased likelihood of accessing care in the context of S2 ($\beta = 1.408$, $p < 0.001$; $\beta = 3.131$, $p < 0.001$). Location was not influential

on decisions to access care in S1, the only scenario in which this variable was measured (β = 0.477, p = 0.217).

The influence of attitudinal factors appeared to be minimal. Indeed, health consciousness was not influential in any context. Awareness of social disadvantage was significant in the model for the only scenario involving the care of another (S3: β = -1.711, p = 0.003). However, awareness of social disadvantage was not significantly influential in the two scenarios involving concerns for the self.

The influence of health related factors on service uptake decisions was variable across presenting contexts For instance, people reporting lower quality of life were more likely to access care in the two scenarios involving preferences for one's self (S1: β = -3.054, p <0.001; S2: - 3.851, p = 0.002). As expected, lower perceived urgency was found to significantly decrease the likelihood of accessing care in these scenarios (S1: β = 0.833, p <0.001; S2: β =1.145, p <0.001). Previous use of ED and recent use of GP services respectively were associated with increased likelihood of accessing care in the two rash/asthma related scenarios (S2: -1.459, p = 0.012; S3: β = -1.360, p = 0.021). However, previous experience with asthma was not found to be influential in either rash/asthma related scenario, despite being close to the 0.05 significance level in the context of a possible concussion (S1: β = 0.859, p = 0.051). There were no differences observed in relation to whether or not people had previously worked in health care across all scenarios.

Influence of individual characteristics on preferences for emergency care (MODEL B)

Despite the significance of heterogeneity associated with the main effects, when attitudinal, sociodemographic and health related measures were used to explain heterogeneity around the mean parameters in each model, none of the preference weights for attribute levels, in any of the models, were significantly different from zero ($p \geq 0.05$). Nevertheless, the significance of the remaining heterogeneity around mean preferences suggests the

influence of other factors not considered. NB: To interpret the results, coefficients need to be multiplied by the effects codes outlined in Table 1. Indeed, in Model B, the constant (associated with the decision to delay care, coded as -1) was no longer significant in any of the models (S1:1.313, p =.609; S2: -5.672 p =.533; S3: -1.460, p =.834).

The supplementary tables provided in Appendix 2 outline the significant associations found for each individual characteristic and the different preference patterns observed across scenarios including any impact on standard deviations. For readability purposes, the individual characteristics which were found to significantly influence preference weights for attribute levels and the constant, are summarised for each scenario in Table 5. As outlined in Table 5, almost all individual characteristics were significant covariates in the context of the primary scenario (S1); however, by comparison, very few characteristics influenced preferences in either rash/asthma related scenarios (S2 & S3). The exceptions were health related measures, quality of life and perceived urgency which were influential in all three contexts.

Insert Tables 5 and 6 here

Comparison of different approaches to modelling the public's healthcare preferences

As indicated in Table 6, the inclusion of individual characteristics in models to explain service uptake (associated with the constant) results in improvements in it, compared to the models without individual characteristics included (for the corresponding scenarios reported in Harris et al., 2015). For all scenarios, based on AIC/N comparisons, Model A or the approach using individual characteristics to explain the uptake of care alongside the constant (only), should be adopted in preference to Model B. This suggests that in the context

of emergency care, the consideration of individual characteristics is a stronger predictor of service uptake, than of preference for service characteristics. Nonetheless, both approaches provide a more nuanced understanding of what drives preference heterogeneity and respond to different questions and needs, in particular, for health policy, service planners, clinicians and other decision-makers.

Discussion

This study sought to identify if individual characteristics (and population differences) explain preference heterogeneity in relation to the public's intentions to access care (service uptake) and their preferences for the delivery of emergency care. Across the three presenting contexts examined, a range of measures including awareness of the impact of social disadvantage, different socio-demographic and health related measures were found to influence decisions to take up or delay accessing emergency care (Model A). The mix of factors identified was contextual with only age found to consistently influence decision-making across all three scenarios. When individual characteristics were used to explain preference heterogeneity for the characteristics of care (Model B), the public's average preferences were not significantly different from zero; however, significant preferences were identified for different groups of people in different contexts. It is also important to note, however, that although numerous sub-group differences in preferences were identified, the inclusion of the 16 individual characteristics in the models also explained little preference heterogeneity with significant variation remaining unaccounted for. Nevertheless, the different patterns of preferences observed for different groups of participants, in different contexts, suggests government and other decision-makers should focus their efforts on key cohorts if seeking to raise support for their health reforms. Furthermore, the results of this research support the need to segment populations for targeting social marketing strategies

(Bryant, 2000; Burke & Regetz, 2014) including by age and for higher service users or people in poor health. The results also have important implications for health policy and service planning more broadly if decision-makers are seeking to manage demand, promote alternative models of care, and/or consider introducing possible co-payments or price signals. This extends to implications for workforce planning, particularly plans for role expansion (e.g. emergency health professionals) and responding to state based differences in preferences for different treatment professionals. The significance of perceptions relating to the quality of care, in particular, where presenting problems are considered more urgent or involve concerns for children also suggest a need for specifically targeted strategies.

While associating individual factors with the decision to delay accessing care (i.e. Model A) produced statistically superior models compared to Model B, both approaches to modelling the influence of individual characteristics produced meaningful models with decent fit. Given the current pressures on ED settings (e.g., Fitzgerald & Ashby, 2010; Skinner, 2007), the identification of the public's overall preferences for accessing care is an important organisational and political imperative. Indeed, population level trends and aggregate modelling will be most useful to stakeholders who plan and coordinate place-based, interagency responses, for example, across hospital and primary health care networks. In this instance, the approach used and results reported in relation to the study's first research question are most applicable. However, health service planners and emergency care managers will also be interested in the specific preferences of specific groups for a range of service planning purposes both in the short and longer term. The results reported in relation to the study's second research question will be most useful for informing developing targeted demand management strategies and for benchmarking purposes as reforms continue to be implemented and models of care evolve.

The identification of the public's diverse preferences for emergency care in different scenarios indeed represents a novel contribution to the literature. It is the first Australian study to explore the impact of a diverse range of individual characteristics on the heterogeneity of healthcare preferences, and first internationally, in the context of emergency care alternatives. The study has implications for debates on the use of the public's preferences to inform health care decision making processes and how to respond to the complexity of structural and individual influences involved (e.g. Bryan & Dolan, 2004; Foster et al., 2010; Stafinski et al., 2011; Warren et al., 2011). Furthermore, it suggests the need to consider the public's notions of personal and social responsibilities in healthcare preference studies and consistent with the literature indicating the value of such concepts as potential intermediary frameworks in resolving tensions that may arise in decision-making processes (e.g. Judd & Ferk, 2005).While health consciousness levels were not an overall driver of service uptake, its influence on preference weights may potentially indicate that efforts directed at raising the health consciousness of the population could also indirectly benefit governments seeking to reduce the cost of healthcare and manage demand through promoting hospital alternatives (Medew & Willingham, 2014).

A key limitation of this study is the comparatively small sample size for S2 and S3 (n=311; n=309). It is possible that they were under-powered to identify all true associations between individual characteristics and preferences as statistically significant, as indicated by the numbers of people speaking a language other than English or who have previously worked in the health system. Indeed, there were insufficient numbers of Indigenous participants for inclusion in analyses. Although, the size of these samples is comparable with average sample size for DCEs in health (de Bekker-Grob, et al., 2012), future efforts are needed to respond to identified measurement and analysis issues including using larger sample sizes to consider the influence of individual factors and stability of preferences over

time (e.g. Harris et al., 2015; San Miguel et al., 2002). It is also acknowledged that there are different approaches to framing opt-out choices which have implications for study findings. For example, different findings may have been revealed by first asking if they would or would not access care in each scenario, and then forcing a choice amongst a range of attributes even for those who would not access care. Although there is adequate rationale for the approach used in this study (Cheng et al., 2012; Pederson & Gyrd-Hansen, 2013; Ryan & Skatun, 2004; Whitty et al., 2011), it is also acknowledged that different approaches may yield different results (Bryan & Dolan, 2004). This also extends to the different approaches to analyses that could be adopted even though other approaches were explored and rejected based on model fit comparisons (refer to Appendix 1). Although conditional logit models may be considered preferable for the estimation of behavioural models, given the hypothesis of this study that attributes of the individual influence decision making, multinominal logit was considered more appropriate (Hoffman & Duncan, 1998), and mixed logit as more generalised modelling approach that deals with preference heterogeneity (Lancsar & Louviere, 2008).

Future research efforts should consider the public's preferences in relation to other presenting contexts and if and how this changes when there are variations in the person presenting (e.g. Harris et al., 2015), for different disease and injury types (e.g. Schwappach, 2003), at varying times of day (e.g., Tsai et al., 2010) and considering the influence of other psychographic constructs such as health literacy and self-efficacy (e.g., Alqudah et al., 2014; Macy et al., 2011; Richardson et al., 2009). The findings of this study question the notion that the public will always choose one service configuration over another, and moreover, suggest that people's choices will depend on the presenting context, their individual situations and presumably a range of other yet to be identified factors as indicated by the significance of the standard deviations which remained across all scenarious, in Model B.

Although the results of this study are illuminating, they cannot be used to accurately predict how 'price signals' or the introduction of a system of co-payments would change actual service use patterns or exacerbate health inequalities. Nevertheless, the findings suggest that the more vulnerable people (e.g. socioeconomically disadvantaged) are not only less willing to pay in order to access care but presumably are also less able to do so. This has important implications for policy makers already seeking to "close the gap" and reduce health inequalities.

In reflecting on past and future directions in emergency care research, Kline (2014) has suggested "the key areas of research that will lead to pioneering findings will incorporate elements of shared decision-making and patient participation, and measure end-points that consider quality of life and patient perceptions of wellness" (p. 13). If Kline is correct, then the results of the current study have important implications for future research. The study's findings and its implications, both for health decision-makers and researchers, demonstrate the benefits of engaging a range of stakeholders and industry partners and moreover, the importance of understanding population differences in relation to decisions to access emergency care alternatives and their preferences for how that care is delivered.

Conclusions

The results of this study which is the first to explore the influence of individual characteristics on the public's preferences for emergency care alternatives, help explain the public's heterogeneous health choices and the factors that underpin their preferences for emergency care. The identification of the diverse range of individual characteristics that may warrant inclusion in future choice studies provide valuable insights for healthcare researchers seeking to model to the public's heterogeneous health choices and improve model fit. Furthermore, the results provide important clues for health planners and policy to target their demand management strategies and demonstrate the importance of responding to the

needs and preferences of different population groups. The study's findings, including the significance of socioeconomic differences in health care choices, also have important implications for policy makers already seeking to reduce health inequalities. It is therefore essential, that any responses that may emanate from this study are effectively trialled and monitored to ensure they do not inadvertently add to the pressures on health services or increase inequalities - even if they appear logical or intuitive.

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Table 1. Sample choice set as provided in the context of Scenario 2

You have fallen from the top of a ladder and landed heavily. Although you may not have lost consciousness you hit your head hard and are feeling dazed and nauseous (sick). You are also experiencing pain in your right arm and shoulder, and have some cuts and abrasions.		
	Option A	**Option B**
Treating healthcare professional	General Practitioner (may not be your usual GP)	Emergency healthcare professional (other than a doctor)
Location	Local clinic	Home
Potential cost to you	$0	$200
Maximum waiting time	4 hours	30 mins
Quality of service	Healthcare professional is easy to understand, comprehensive treatment provided with no interruptions	Healthcare professional is not easy to understand, basic treatment provided with some interruptions
Which would you prefer?	Option A ☐	Option B ☐
If this option was available, would you take it, or would you delay for 24 hours to see if your condition improves before accessing care?	I would take my preferred option…….. ☐ I would delay for 24 hours to see if my condition improves before accessing care ……..…… ☐	

Note:

- *Health professionals options; were ED clinician; GP (may not be your usual GP) or an Emergency health professional (other than a doctor)*
- *Treatment locations were; home, local clinical, or hospital,*
- *Potential out of pocket expenses were; $0, $50, $100 or $200*
- *Maximum wait times were; 30 mins, 1 hour, 2 hours or up to 4 hours*
- *Levels of service quality were; healthcare professional is easy to understand, comprehensive treatment provided with no interruptions; healthcare professional is easy to understand, basic treatment provided with some interruptions, or healthcare professional is not easy to understand, basic treatment provided with some interruptions*

Table 2. Breakdown of selected individual characteristics for each sample by scenario with effects coding used for MXL modelling

Individual characteristics		Population sub-groups *(referents in italics)*	Scenario 1 (n=909)	Scenario 2 (n = 311)	Scenario 3 (n=309)	Effects coding
Attitudes	Health consciousness	*High health consciousness*	458	146	153	-1
		Low health consciousness	451	165	156	1
	Aware of disadvantage	*Agree or strongly agree*	607	196	200	-1
		Neutral or disagree	302	115	109	1
Socio-demographics	Age	*18-45 years*	431	152	153	-1
		45 years and over	478	159	156	1
	Gender	*Male*	439	150	150	-1
		Female	470	161	159	1
	Location (State)	*Queensland*	453	not	not	-1
		South Australia	456	applicable	applicable	1
	Relationship status	*Married/partnered*	572	214	209	-1
		Single/widowed/divorced	332	94	97	1
	English as main language	*Main spoken language is English*	848	293	287	-1
		Not main language used	48	11	12	1
	Education	*Have tertiary qualifications*	369	131	146	-1
		No tertiary qualifications	526	175	158	1
	Annual income	*Earn less than $70,000 p.a.*	468	157	132	-1
		Earn more than $70,000 p.a.	318	105	120	1

	Employment status	*Employed/self-employed/studying*	515	189	185	-1
		Not working/retired	388	118	121	1
Health related factors	Quality of life	AQoL4D	χ =0.67 (±0.26)	χ =0.68 (±0.26)	χ =0.70 (±0.24)	utility score
	Asthma Experiences	*Have personal/family experience*	414	158	144	-1
		No previous asthma experiences	495	153	165	1
	Use of ED services	*No use in past 12 months*	671	241	225	-1
		1 or more visits	230	66	76	1
	Use of GP services	*0-3 visits in past 12 months*	581	184	195	-1
		4 or more visits	321	124	111	1
	Worked in health sector	*Have worked in health*	75	15	34	-1
		No industry experience	827	292	272	1
	Perceived urgency	*Classified as ATS category 1-3*	718	158	192	-1
		Classified as ATS category 4-5	201	153	117	1

Table 3. Influence of individual characteristics on service uptake (Model A: S1 and S2)

		S1 (possible concussion)				S2 (rash/asthma-related self)			
Random parameters		Mean Parameter	p	Standard deviation	p	Mean parameter	p	Standard deviation	p
Attribute	Levels								
Principal healthcare professional	• *ED clinician* • GP (may not be your usual GP) • Emergency health professional (not a doctor)	*0.274* *-0.067 **-0.207	 .027 <.001	 **0.257 **0.418	 <.001 <.001	*0.086* 0.074 **-0.160	 .171 .003	 *0.253 0.004	 .028 .981
Location	• *Home* • local clinic • hospital	*-0.028* **-0.094 **0.122	 .006 .001	 **0.395 **0.589	 <.001 <.001	*0.163* 0.089 **-0.252	 .149 <.001	 **0.354 **0.579	 <.001 <.001
Potential cost to you	Per $1 of out of pocket personal expense (based on levels of $0, $50, $100 and $200)	**-0.020	<.001	**0.020	<.001	**-0.028	<.001	**0.022	<.001
Maximum waiting time	Per 1 minute of your time waited (based on levels of 30 mins, 1 hour, 2 hours & 4 hours)	**-0.012	<.001	**0.009	<.001	**-0.010	<.001	**0.007	<.001
Quality	• *Healthcare professional is <u>easy to understand</u>, comprehensive treatment; <u>no interruptions</u>* • Healthcare professional is <u>easy to understand</u>, basic treatment; <u>some interruptions</u> • Healthcare professional is <u>not easy to understand</u>, basic treatment; <u>some interruptions</u>	*0.637* **0.155 **-0.792	 <.001 <.001	 0.007 **0.833	 .951 <.001	*0.584* **0.312 **-0.896	 <.001 <.001	 0.215 **0.738	 .075 <.001
Constant	(associated with delaying care)	*-4.279	.032	**3.648	<.001	**-7.979	.002	**3.344	<.001
Non-random parameters									
Health consciousness	*High health consciousness* Low health consciousness	0.540	.148			0.092	.851		
Aware of disadvantage	*Agree or strongly agree* Neutral or disagree on impacts	0.549	.130			0.023	.957		
Age	*18-45 years* 45 years and over	**-0.663	<.001			**-0.606	<.001		
Gender	*Male* Female	**-1.214	..001			-0.444	.347		
Location (state)	*Queensland* South Australia	0.477	.217			-	-		
Relationship status	*Married/partnered* Single/widowed/divorced	0.693	.082			0.925	.113		
English main language	*Main spoken language is English* Not main language used at home	0.053	.936			**3.131	.001		
Education	*Have tertiary qualifications* No tertiary qualifications	-0.022	.951			**1.408	.004		
Annual income	*Earn less than $70,000* Greater than $70,000	-0.125	.786			-0.081	.878		
Employment status	*Employed/self-employed* Not working/retired	0.492	.220			-0.141	.818		
Quality of life	AQoL4D utility score	**-3.054	<.001			**-3.851	.002		
Asthma experiences	*Have personal/family experience* No experience with asthma	0.859	.051			-0.041	.923		
Use of ED services	*No use in past 12 months* 1 or more visits	0.103	.828			*-1.459	.017		
Use of GP services	*0-3 visits in past 12 months* 4 or more visits	-0.715	.062			-0.896	.076		
Worked in health sector	*Previously worked in health care* No health industry experience	-0.016	.976			0.009	.993		
Perceived urgency	*Classified as ATS category 1-3* Classified as ATS category 4-5	**0.833	<.001			**1.145	<.001		

*Note: p = probability level where **<0.01;*<0.05; referent levels in italics*

Table 4. Influence of individual characteristics on service uptake (Model A: S3)

		S3 (rash/asthma-related daughter)			
Random parameters					
Attribute	Levels	Mean Parameter	P	Standard deviation	P
Principal healthcare professional	• *ED clinician* • GP (may not be your usual GP) • Emergency health professional (not a doctor)	*0.271* 0.064 **-0.355	.181 <.001	0.052 0.002	.753 .988
Location	• *Home* • local clinic • hospital	*-0.008* 0.097 -0.089	.079 .110	**0.335 **0.402	.002 <.001
Potential cost to you	Per $1 of out of pocket personal expense	**-0.018	<.001	**0.018	<.001
Maximum waiting time	Per 1 minute of your time waited	**-0.012	<.001	**0.006	<.001
Quality	• *Healthcare professional is <u>easy to understand</u>, comprehensive treatment; <u>no interruptions</u>* • Healthcare professional is <u>easy to understand</u>, basic treatment; <u>some interruptions</u> • Healthcare professional is <u>not easy to understand</u>, basic treatment; <u>some interruptions</u>	*0.886* **0.198 **-1.084	<.001 <.001	*0.243 **0.917	.019 <.001
Constant	(associated with delaying care)	-5.501	.064	**2.786	<.001
Non-random parameters					
Health consciousness	*High health consciousness* Low health consciousness	0.251	.684		
Aware of disadvantage	*Agree or strongly agree* Neutral or disagree on impacts	**-1.711	.003		
Age	*18-45 years* 45 years and over	*-0.455	.013		
Gender	*Male* Female	-0.293	.604		
Relationship status	*Married/partnered* Single/widowed/divorced	-0.136	.844		
English main language	*Main spoken language is English* Not main language used at home	1.408	.187		
Education	*Have tertiary qualifications* No tertiary qualifications	-0.079	.890		
Annual income	*Earn less than $70,000* Greater than $70,000	-0.927	.229		
Employment status	*Employed/self-employed* Not working/retired	-0.347	.574		
Quality of life	AQoL4D utility score	-0.863	.489		
Asthma experiences	*Have personal/family experience* No experience with asthma	-0.375	.474		
Use of ED services	*No use in past 12 months* 1 or more visits	0.726	.247		
Use of GP services	*0-3 visits in past 12 months* 4 or more visits	*-1.602	.012		
Worked in health sector	*Previously worked in health care* No health industry experience	0.784	.299		
Perceived urgency	*Classified as ATS category 1-3* Classified as ATS category 4-5	0.467	.056		

*Note: p = probability level where **<0.01;*<0.05; referent levels in italics*

Table 5. Summary of influence of individual characteristics on preferences (Model B)

Individual characteristics		Population sub-groups *(referents in italics)*	**Scenario 1 (**n = 909) [possible concussion]	**Scenario 2 (**n = 311) [rash/asthma – self]	**Scenario 3 (**n = 309) [rash/asthma – daughter]
Attitudes	**Health consciousness**	*High health consciousness* Low health consciousness	- lower health conscious more likely to prefer treatment at hospital - less willing to contributing to the costs of care - more likely to delay care		
	Aware of disadvantage	*Agree or strongly agree* Neutral or disagree			
Sociodemographics	**Age**	*18-45 years* 45 years and over	- 45 years and over less likely to prefer treatment from an emergency health professional -are more willing to pay		- 45 years and over are less likely to delay care
	Gender	*Male* Female	-Females are less likely to preference basic treatment from a clinician they do not understand - less likely to delay care		
	Location (state)	*Queensland* South Australia	- South Australians are more likely to prefer treatment from an emergency health professional - less likely to prefer hospital - more likely to delay care		
	Relationship status	*Married/partnered* Single/widowed/divorced	- Singles are less willing to pay - less likely to delay care		
	English as main language	*Main spoken language is English* Not main language used	-If English is a second language, less likely to prefer treatment from an emergency health professional		
	Education	*Have tertiary qualifications* No tertiary qualifications	-People without a tertiary education less likely to prefer GP treatment - more likely to prefer hospital	- People without a tertiary education are more likely to delay care	
	Annual income	*Earn less than $70,000* Greater than $70,000	- Higher earners are more likely to prefer treatment from an emergency health professional - less likely to prefer local clinic - more likely to prefer hospital - more willing to pay - less likely to delay care		
	Employment status	*Employed/self-employed* Not working/retired	-People not working are less likely to prefer GP treatment -more likely to prefer basic treatment from a clinician they may not understand		
Health related factors	**Quality of life**	AQoL4D utility score	-People with lower quality of life are less likely to delay care -more willing to pay	- People with lower quality of life are less likely to delay care	- People with lower quality of life are less likely to delay care
	Asthma Experiences	*Have personal/ family experience* No experience with asthma	- People with no experience of asthma are less likely to prefer basic treatment from a clinician they may not understand -more likely to delay care		
	Use of ED services	*No use in past 12 months* 1 or more visits	-People who attended an ED, less likely to prefer basic treatment from a clinician they can understand		
	Use of GP services	*0-3 visits in past 12 months* 4 or more visits	- Higher users more likely to prefer an emergency health professional - more likely to prefer hospital - more likely to delay care		
	Worked in health sector	*Have worked in health* No industry experience	- People never employed in health less likely to prefer local clinic		
	Perceived urgency	*Classified as ATS category 1-3* Classified as ATS category 4-5	- People assigning less urgent ratings more to prefer GP treatment - more likely to prefer local clinic - less likely to prefer hospital - less willing to pay - less likely to prefer basic treatment from a clinician they may not understand - more likely to delay care	- People assigning less urgent rating are less willing to pay - less likely to prefer basic treatment from a clinician they may not understand	- People assigning less urgent ratings Referents are less willing to pay - more likely to prefer basic treatment from a clinician who is easy to understand - less likely to prefer basic treatment from a clinician they may not understand

Table 6. Comparison of model features

	Model features without characteristics included (Harris et al., 2015)	Model features with individual characteristics associated with the constant (Model A)	Model features with individual characteristics to explain heterogeneity in the model (Model B)
(S1) Possible concussion (self) n = 909 (QLD = 453, SA=456)	Log-likelihood = -7540.775 McFadden's Pseudo R^2 = 0.371 AIC/N = 1.386 Constant = -6.502, p =.000	Log-likelihood = -6220.203 McFadden's Pseudo R^2 = 0.379 AIC/N = 1.372 Constant = -4.279, p =.032	Log-likelihood = -6240.123 McFadden's Pseudo R^2 = 0.377 AIC/N = 1.404 Constant = 1.313, p =.609
(S2) Rash/asthma related presentation (self) n = 311 (QLD)	Log likelihood = -2596.351 McFadden's Pseudo R^2 = 0.367 AIC/N = 1.401 Constant = -4.736, p = .000	Log likelihood = -2090.179 McFadden's Pseudo R^2 = 0.385 AIC/N = 1.372 Constant = -7.919, p = .002	Log-likelihood = - 2022.964 McFadden's Pseudo R^2 = 0.405 AIC/N = 1.406 Constant = -5.672 p =.533
(S3) Rash/asthma related presentation (child) n = 309 (QLD)	Log-likelihood = -2463.418 McFadden's Pseudo R^2 = 0.395 AIC/N of 1.338 Constant = -6.715, p = .000	Log-likelihood = -1914.624 McFadden's Pseudo R^2 = 0.402 AIC/N of 1.336 Constant = -5.501, p =.064	Log-likelihood = -2017.007 McFadden's Pseudo R^2 = 0.396 AIC/N = 1.430 Constant = -1.460, p =.834

Appendix 1:

Modelling approaches to determine the impact of individual characteristics using NLOGIT

Further information on the design of the DCE used to the elicit the public's preferences, including the identification of attribute levels, is described in Harris et al. (2015). The approaches used to determine the impact of individual characteristics on preferences for emergency care alternatives in this study were selected and refined following preliminary analyses and an exploration of other estimation methods such as latent class modelling which produced models with poor fit or explanatory power and were subsequently rejected. As a result, NLOGIT (Greene, 2012, Version 5), was used to estimate the mixed logit models for each of the presenting contexts considered in this study, described as Model A and Model B, respectively.

In **Model A**, the 16 individual characteristics were associated with the constant (only) in the modelling for each scenario, as per the following equation:

$$V(A,B) = bED1\_1 * ATT1\_1 + bED1\_2 * ATT1\_2 + bED2\_1 * ATT2\_1 + bED2\_2 * ATT2\_2 + bED3 * ATT3 + bED4 * ATT4 + bED5\_1 * ATT5\_1 + bED5\_2 * ATT5\_2$$

$$V(delay) = constant + bHC * HC + bSR * SR + bgender * gender + bage * age + bstate * state + bHSysemploy * Hsysemploy + bAQoL * AQoL + bEDuse * EDuse + bGPuse * AGPuse + bmarstat * marstat + bEng * Eng + basthma * asthma + bincome * income + bempl * empl + beduc * educ + burg * urg$$

Where; *u (A) is the utility of choice A, u (B) the utility of choice B, u (delay) the utility associated with delaying accessing care; and ATT_1 = GP, ATT1_2 = Emergency health professional (other than a doctor), ATT2_1 = local clinic, ATT2_2 = hospital, ATT3 = potential cost, ATT4 = maximum waiting*

time, ATT5_1 = basic treatment provided with some interruptions by clinician who is easy to understand, ATT5_2 = basic treatment provided with some interruptions by clinician who is not easy to understand, usual = usual course of action and decision to delay accessing care., HC = health consciousness, SR = awareness of social disadvantage, gender = gender, age = age, state = state (Scenario 1 model only), Hsysemploy= previously employment in the health system, AQoL = quality of life, EDuse = previous use of ED services, GPuse = previous use of GP services, marstat = relationship status, Eng= English as main spoken language, asthma = previous experience with asthma, income = annual household income, empl = employment status and educ = tertiary education status, urg = perceived urgency of scenario.

In **Model B**, the individual characteristics were associated with all possible choices (across scenarios) to examine the degree to which the different characteristics explain any heterogeneity around the mean parameters observed. Whereas the 16 variables were associated with the constant only in Model A, as represented in the equation to estimate $V(delay)$ above, the individual characteristics were associated with all attribute level combinations and the constant in Model B to determine their influence as covariates. Due to the size of the output resulting from Model B, the results of this analysis are presented in Appendix 2: Supplementary Tables 1-9.

Appendix 2: Supplementary Tables (Model B)

Supplementary Table 1

Heterogeneity in Preference Weights Associated with Attitudes, Age and Gender: S1 (Possible Concussion)

Random parameters		Preference weights for Scenario 1 (possible concussion)				Heterogeneity in mean parameters associated with attitudes				Heterogeneity in mean parameters associated with age & gender			
						Health Consciousness *(lower)*		Awareness of disadvantage *(lower)*		Age *(45 years and over)*		Gender *(female)*	
Attribute	Levels	Mean	P	SD	P	β	p	β	P	β	p	β	p
Principal healthcare professional	• ED clinician	*0.083*											
	• GP (may not be your usual GP)	-0.208	.657	**0.215	.002	-0.005	.942	-0.034	.666	0.015	.535	0.030	.672
	• Emergency health professional	0.125	.773	**0.304	<.001	0.104	.152	-0.061	. 425	**-1.075	.<.001	-.0.063	.378
Location	• Home	*0.032*											
	• Local clinic	0.305	.509	**0.258	<.001	-0.017	.830	0.137	.103	-0.005	.853	-0.039	.593
	• Hospital	-0.337	.462	**0.496	<.001	*0.183	.031	0.008	.928	0.027	.294	-0.014	.859
Potential cost	Per $1 of out of pocket expense	-0.013	.173	**0.011	<.001	*-0.003	.035	-0.001	.633	*.001	.029	0.001	.497
Waiting time	Per 1 minute of time waited	-0.006	.512	**0.013	<.001	-0.003	.066	-0.002	.215	-0.001	.058	0.001	.780

Random parameters		Preference weights for Scenario 1 (possible concussion)				Heterogeneity in mean parameters associated with attitudes				Heterogeneity in mean parameters associated with age & gender			
						Health Consciousness *(lower)*		Awareness of disadvantage *(lower)*		Age *(45 years and over)*		Gender *(female)*	
Attribute	Levels	Mean	P	SD	P	β	p	β	P	β	p	β	p
Quality	• Healthcare professional is *easy to understand,* **comprehensive treatment;** no interruptions	*-0.366*											
	• *easy to understand,* **basic treatment;** some interruptions	0.034	.931	0.075	.484	0.001	.992	0.059	.455	0.034	.142	-0.015	.829
	• *not easy to understand,* **basic treatment;** interruptions	0.302	.643	**0.663	<.001	-0.204	.056	-0.071	.510	-0.262	.472	*-0.250	.011

Random parameters		Preference weights for Scenario 1 (possible concussion)				Heterogeneity in mean parameters associated with attitudes				Heterogeneity in mean parameters associated with age & gender			
						Health Consciousness *(lower)*		Awareness of disadvantage *(lower)*		Age *(45 years and over)*		Gender *(female)*	
Attribute	Levels	Mean	P	SD	P	β	p	β	P	β	p	β	p
Constant (associated with delay)		1.313	.601	**3.637	<.001	*1.039	.018	0.254	.558	**-0.623	<.001	**-2.528	<.001

Note. **<.01, *<.05; β = Resulting preference weight; SD = standard deviation

Supplementary Table 2

Heterogeneity in Preference Weights Associated with Socio-demographics: S1 (Possible Concussion)

Random parameters		Heterogeneity in mean parameters associated with socio-demographic characteristics											
		Relationship status *(not partnered)*		Spoken English *(not as main language)*		Education *(not tertiary educated)*		Annual income *($70,000 or more)*		Employment *(not employed or retired)*		State of Residence *(SA)*	
Attribute	Levels	β	P	β	P	B	p	B	p	β	P	β	P
Principal healthcare professional	• ED clinician • GP (may not be your usual GP)	0.058	.460	0.144	.388	**-0.241	.001	0.032	.714	*-0.216	.012	0.037	.591
	• Emergency health professional	0.061	.444	*-0.340	.041	0.069	.350	**0.259	.003	0.097	.226	*0.174	.014
Location	• Home												
	• Local clinic	-0.048	.557	0.206	.252	-0.102	.183	*-0.171	.046	-0.131	.122	0.034	.644
	• Hospital	*0.217	.013	.-0.025	.896	*0.198	.047	*0.198	.041	-0.001	.992	*-0.308	.038
Potential cost	Per $1 of out of pocket expense	**-0.006	.001	0.004	.274	-0.003	.076	*0.004	.017	-0.001	.681	0.069	.367
Waiting time	Per 1 minute of time waited	-0.001	.475	-0.001	.927	-0.001	.502	-0.001	.445	-0.001	.551	-0.003	.056
Quality	• Healthcare professional is												

Random parameters		Heterogeneity in mean parameters associated with socio-demographic characteristics											
		Relationship status *(not partnered)*		Spoken English *(not as main language)*		Education *(not tertiary educated)*		Annual income *($70,000 or more)*		Employment *(not employed or retired)*		State of Residence *(SA)*	
Attribute	Levels	β	P	β	P	B	p	B	p	β	P	β	P
	easy to understand, **comprehensive treatment;** no interruptions												
	• *easy to understand,* **basic treatment;** some interruptions	-0.083	.330	-0.001	.994	0.074	306	0.035	.682	-0.036	.652	-0.013	.854
	• *not easy to understand,* **basic treatment;** interruptions	-0.177	.125	0.139	.677	-0.008	.939	-0.185	.133	*0.232	.043	-0.001	.996
Constant (associated with delay)		**1.796	<.001	-1.191	.287	-0.407	.320	**-1.644	<.001	-0.407	.367	*0.784	.049

Random parameters		Heterogeneity in mean parameters associated with socio-demographic characteristics											
		Relationship status *(not partnered)*		Spoken English *(not as main language)*		Education *(not tertiary educated)*		Annual income *($70,000 or more)*		Employment *(not employed or retired)*		State of Residence *(SA)*	
Attribute	Levels	β	P	β	P	B	p	B	p	β	P	β	P

Note. **<.01, *<.05; β = Resulting preference weight

Supplementary Table 3

Heterogeneity in Preference Weights Associated with Health Related Measures: S1 (Possible Concussion)

Random parameters		Heterogeneity in mean parameters associated with health related measures											
		Quality of life *(lower)*		Asthma history *(yes)*		Use of ED *(have attended in past year)*		GP visits *(4 or more times in year)*		Previously worked in health *(no)*		Perceived urgency *(less urgent)*	
Attribute	Levels	B	p	β	P	β	p	B	p	β	p	β	P
Principal healthcare professional	• ED clinician • GP (may not be your usual GP)	-0.107	.453	-0.134	.057	0.059	.487	-0.070	.377	0.072	.611	**0.109	.001
	• Emergency health professional	0.074	.632	-0.035	.621	-0.087	.295	**0.259	.003	0.097	.487	-0.022	.476
Location	• Home												
	• Local clinic	0.074	.613	-0.061	.421	-0.036	.681	-0.054	.531	*-0.308	.038	**0.100	.003
	• Hospital	0.171	.271	-0.057	.466	0.155	.078	*0.190	.026	-0.141	.362	**-1.001	.003
Potential cost	Per $1 of out of pocket expense	**0.008	.005	0.001	.874	-0.001	.744	0.001	.436	-0.001	.744	**-0.003	<.001
Waiting time	Per 1 minute of time waited	-0.004	.241	-0.001	.611	0.003	.159	-0.001	.638	0.004	.210	0.001	.128
Quality	• Healthcare professional is *easy to*												

Random parameters		Heterogeneity in mean parameters associated with health related measures											
		Quality of life *(lower)*		Asthma history *(yes)*		Use of ED *(have attended in past year)*		GP visits *(4 or more times in year)*		Previously worked in health *(no)*		Perceived urgency *(less urgent)*	
Attribute	Levels	B	p	β	P	β	p	B	p	β	p	β	P
	understand, **comprehensive treatment;** no interruptions												
	• *easy to understand,* **basic treatment;** some interruptions	0.155	.295	0.009	.903	*-0.165	.031	-0.016	.847	-.108	.380	0.041	.198
	• *not easy to understand,* **basic treatment;** interruptions	-0.346	.100	*-0.229	.025	0.023	.844	-0.135	.269	.164	.404	**-0.201	<.001
Constant (associated with delay)		-5.547	<.001	**1.187	.004	-0.439	.371	*1.001	.034	0.933	.267	**0.723	<.001

Note. **<.01, *<.05; β = Resulting preference weight

Supplementary Table 4

Heterogeneity in Preference Weights Associated with Attitudes, Age and Gender: S2 (Rash/Asthma Related – Self)

Random parameters		Preference weights for Scenario 2 (rash/asthma related - self)				Heterogeneity in mean parameters associated with attitudes				Heterogeneity in mean parameters with age & gender			
						Health Consciousness *(lower)*		Awareness of disadvantage *(lower)*		Age *(45 years and over)*		Gender *(female)*	
Attribute	Levels	Mean	P	SD	p	β	p	β	p	β	P	B	p
Principal healthcare professional	• ED clinician	*0.784*											
	• GP (may not be your usual GP)	-1.155	.571	0.100	.760	-0.153	.439	0.117	.559	0.021	.697	-0.077	.686
	• Emergency health professional	0.371	.876	0.035	.968	0.148	.507	-0.206	.343	-0.077	.219	-0.081	.740
Location	• Home	*0.261*											
	• Local clinic	-0.684	.722	0.272	.236	0.180	.414	0.121	.599	-0.003	.966	-0.050	.836
	• Hospital	0.423	.901	**0.527	.001	-0.016	.951	0.160	.535	0.040	.563	-0.105	.715
Potential cost	Per $1 of out of pocket expense	-0.012	.814	**0.013	<.001	-0.004	.419	0.002	.770	0.001	.473	-0.003	.457
Waiting time	Per 1 minute of time waited	-0.009	.721	**0.006	<.001	-0.003	.366	-0.005	.180	-0.001	.829	0.001	.898
Quality	• Healthcare professional is *easy*	*0.468*											

Random parameters		Preference weights for Scenario 2 (rash/asthma related - self)				Heterogeneity in mean parameters associated with attitudes				Heterogeneity in mean parameters with age & gender			
						Health Consciousness *(lower)*		Awareness of disadvantage *(lower)*		Age *(45 years and over)*		Gender *(female)*	
Attribute	Levels	Mean	P	SD	p	β	p	β	p	β	P	B	p
	to understand, **comprehensive treatment;** no interruptions												
	• *Healthcare professional is easy to understand,* **basic treatment**; some interruptions	-0.684	.686	0.098	.851	0.077	.683	0.054	.822	0.029	.722	-0.003	.987
	• *Health care professional is not easy to understand,* **basic treatment**; some interruptions	-0.216	.945	**0.648	<.001	-0.346	.280	-0.377	.287	-0.022	.835	-0.161	.564
Constant (associated with delay)		-5.672	.533	**3.945	<.001	-0.182	.860	-0.059	.959	-0.450	.246	-0.292	.786

Note. **<.01, *<.05; β = Resulting preference weight; SD = standard deviation

Supplementary Table 5

Heterogeneity in Preference Weights Associated with Socio-demographics: S2 (Rash/Asthma related – Self)

Random parameters		Heterogeneity in mean parameters associated with socio-demographic characteristics									
		Relationship status *(not partnered)*		Spoken English *(not as main language)*		Education *(not tertiary educated)*		Annual income *($70,000 or more)*		Employment *(not employed or retired)*	
Attribute	Levels	β	p	β	P	β	p	β	p	β	P
Principal healthcare professional	• ED clinician										
	• GP (may not be your usual GP)	-0.051	.833	0.228	.805	-0.015	.938	0.084	.705	0.060	.798
	• Emergency health professional	-0.074	.748	-0.182	.837	0.065	.790	-0.026	.921	0.015	.959
Location	• Home										
	• Local clinic	-0.140	.528	0.540	.406	-0.050	.832	0.003	.990	-0.192	.442
	• Hospital	-0.106	.659	-0.063	.969	-0.184	.419	-0.043	.863	-0.025	.924
Potential cost	Per $1 of out of pocket expense	0.007	.159	0.001	.961	-0.001	.829	0.007	.191	-0.005	.381
Waiting time	Per 1 minute of time waited	-0.003	.486	0.007	.498	0.001	.947	-0.001	.890	-0.003	.553
Quality	• Healthcare professional is *easy to understand,* **comprehensive treatment;** <u>no interruptions</u>	-0.140	.594	0.088	.934	0.097	.655	0.087	.681	-0.054	.833

Random parameters		Heterogeneity in mean parameters associated with socio-demographic characteristics									
		Relationship status *(not partnered)*		Spoken English *(not as main language)*		Education *(not tertiary educated)*		Annual income *($70,000 or more)*		Employment *(not employed or retired)*	
Attribute	Levels	β	p	β	P	β	p	β	p	β	P
	• Healthcare professional is *easy to understand,* **basic treatment;** some interruptions	0.030	.937	0.593	.723	0.186	.551	-0.234	.543	0.311	.359
	• Healthcare professional is *not easy to understand*, **basic treatment;** some interruptions										
Constant (associated with delaying care)		-0.102	.938	4.607	.066	*2.526	.026	0.066	.957	0.260	.840

Note. **<.01, *<.05; β = Resulting preference weight

Supplementary Table 6

Heterogeneity in Preference Weights associated with Health Related Measures: S2 (Rash/Asthma Related – Self)

Random parameters		Heterogeneity in mean parameters associated with health related measures											
		Quality of life *(lower)*		Asthma history *(yes)*		Use of ED *(have attended in past year)*		GP visits *(4 or more times in year)*		Previously worked in health *(no)*		Perceived urgency *(less urgent)*	
Attribute	Levels	β	P	β	P	β	P	β	p	β	p	β	P
Principal healthcare professional	• ED clinician • GP (may not be your usual GP)	0.222	.612	0.200	.307	-0.044	.862	-0.142	.544	0.342	.605	0.042	.565
	• Emergency health professional	0.215	.702	0.068	.734	0.173	.473	0.050	.838	0.110	.912	-0.092	.225
Location	• Home												
	• Local clinic	0.258	.622	0.061	.783	-0.005	.987	0.083	.749	0.009	.992	0.048	.583
	• Hospital	-0.434	.499	0.109	.633	0.256	.390	-0.298	.262	0.132	.918	-0.099	.204
Potential cost	Per $1 of out of pocket expense	0.015	.191	0.008	.144	-0.003	.611	0.008	.893	-0.009	.647	*-0.004	.041
Waiting time	Per 1 minute of time waited	-0.002	.777	0.002	.506	0.003	.458	-0.002	.633	0.159	.999	0.001	.533
Quality	• Healthcare professional is *easy to understand,* **comprehensive**												

Random parameters		Heterogeneity in mean parameters associated with health related measures											
		Quality of life *(lower)*		Asthma history *(yes)*		Use of ED *(have attended in past year)*		GP visits *(4 or more times in year)*		Previously worked in health *(no)*		Perceived urgency *(less urgent)*	
Attribute	Levels	β	P	β	P	β	P	β	p	β	p	β	P
	treatment; no interruptions												
	• Healthcare professional is *easy to understand*, **basic treatment;** some interruptions	-0.066	.901	0.156	.495	0.028	.920	0.213	.339	0.150	.790	0.101	.136
	• Healthcare professional is *not easy to understand*, **basic treatment;** some interruptions	-0.610	.381	0.110	.712	0.024	.960	-0.402	.252	0.196	.863	*-0.228	.047
Constant (associated with delaying care)		*-5.686	.023	0.082	.941	-1.343	.357	-1.290	.290	-0.744	.851	0.493	.220

Note. **<.01, *<.05; β = Resulting preference weight

Supplementary Table 7

Heterogeneity in Preference Weights Associated with Attitudes, Age and Gender: S3 (Rash/Asthma Related – Daughter)

Random parameters		Preference weights for Scenario 3 (Rash/asthma related - child)				Heterogeneity in mean parameters associated with attitudes				Heterogeneity in mean parameters with age & gender			
						Health Consciousness *(lower)*		Awareness of disadvantage *(lower)*		Age *(45 years and over)*		Gender *(female)*	
Attribute	Levels	Mean	P	SD	p	B	p	β	p	β	p	β	p
Principal healthcare professional	• ED clinician	*-0.847*											
	• GP (may not be your usual GP)	1.409	.267	*0.333	.038	0.039	.874	0.025	.919	-0.068	.429	-0.301	.130
	• Emergency health professional	-0.562	.679	0.298	.118	-0.065	.777	-0.041	.878	-0.079	.357	0.100	.656
Location	• Home	*1.346*											
	• Local clinic	-1.070	.516	**0.535	.002	-0.110	.640	-0.013	.966	0.033	.782	0.118	.643
	• Hospital	-0.276	.866	**0.598	<.001	0.144	.554	0.084	.723	0.033	.758	0.216	.403
Potential cost	Per $1 of out of pocket expense	-0.001	.995	**0.014	<.001	-0.005	.301	-0.003	.482	0.002	.502	-0.002	.652

Random parameters		Preference weights for Scenario 3 (Rash/asthma related - child)				Heterogeneity in mean parameters associated with attitudes				Heterogeneity in mean parameters with age & gender			
						Health Consciousness *(lower)*		Awareness of disadvantage *(lower)*		Age *(45 years and over)*		Gender *(female)*	
Attribute	Levels	Mean	P	SD	p	B	p	β	p	β	p	β	p
Waiting time	Per 1 minute of time waited	0.016	.541	**0.009	<.001	0.001	.797	-0.003	.411	-0.001	.574	-0.003	.409
Quality	• Healthcare professional is *easy to understand*, **comprehensive treatment;** no interruptions	*0.630*											
	• Healthcare professional is *easy to understand*, **basic treatment;** some interruptions	-1.131	.436	0.035	.934	-0.058	.774	0.030	.898	0.069	.404	-0.142	.533
	• Healthcare professional is *not easy to understand*,	0.501	.824	**0.701	<.001	-0.239	.479	-0.241	.400	-0.029	.785	0.094	.766

Random parameters		Preference weights for Scenario 3 (Rash/asthma related - child)				Heterogeneity in mean parameters associated with attitudes				Heterogeneity in mean parameters with age & gender			
						Health Consciousness *(lower)*		Awareness of disadvantage *(lower)*		Age *(45 years and over)*		Gender *(female)*	
Attribute	Levels	Mean	P	SD	p	B	p	β	p	β	p	β	p
	basic treatment; <u>some interruptions</u>												
Constant (associated with delay)		-1.460	.834	**3.782	<.001	0.328	.751	-1.692	.124	**1.353	.001	2.101	.059

Note. **<.01, *<.05; β = Resulting preference weight

Supplementary Table 8

Heterogeneity in Preference Weights Associated with Socio-demographics: S3 (Rash/Asthma Related – Daughter)

Random parameters		Heterogeneity in mean parameters associated with socio-demographic characteristics									
		Relationship status *(not partnered)*		Spoken English *(not as main language)*		Education *(not tertiary educated)*		Annual income *($70,000 or more)*		Employment *(not employed or retired)*	
Attribute	Levels	β	p	β	P	β	p	β	p	β	p
Principal healthcare professional	• ED clinician • GP (may not be your usual GP)	-0.001	.997	-0.239	.635	-0.240	.251	-0.259	.398	0.371	.181
	• Emergency health professional	0.071	.804	-0.111	.885	-0.103	.639	-0.014	.962	-0.102	.704
Location	• Home										
	• Local clinic	0.191	.549	0.076	.934	-0.081	.728	0.103	.744	0.119	.696
	• Hospital	0.089	.825	0.081	.918	-0.124	.604	0.008	.980	0.010	.972
Potential cost	Per $1 of out of pocket expense	-0.002	.758	0.001	.923	0.004	.477	0.002	.724	-0.001	.980
Waiting time	Per 1 minute of time waited	-0.002	.615	-0.004	.834	-0.004	.301	-0.006	.243	-0.001	.927
Quality	• Healthcare professional is *easy to understand,*										

Random parameters		Heterogeneity in mean parameters associated with socio-demographic characteristics									
		Relationship status *(not partnered)*		Spoken English *(not as main language)*		Education *(not tertiary educated)*		Annual income *($70,000 or more)*		Employment *(not employed or retired)*	
Attribute	Levels	β	p	β	P	β	p	β	p	β	p
	comprehensive treatment; no interruptions										
	• Healthcare professional is *easy to understand*, **basic treatment;** some interruptions	0.051	.835	0.230	.808	-0.162	.440	-0.050	.858	0.068	.813
	• Healthcare professional is *not easy to understand*, **basic treatment;** some interruptions	0.110	.723	-0.193	.834	0.353	.315	0.329	.351	0.013	.970
Constant (associated with delaying care)		-0.371	.713	-1.078	.793	0.415	.683	-2.136	.096	-1.635	.146

Note. **<.01, *<.05; β = Resulting preference weight

Supplementary Table 9

Heterogeneity in Preference Weights Associated with Health Related Measures: S3 (Rash/Asthma Related – Daughter)

Random parameters		Heterogeneity in mean parameters associated with health related measures											
		Quality of life *(lower)*		Asthma history *(yes)*		Use of ED *(have attended in past year)*		GP visits *(4 or more times in year)*		Previously worked in health *(no)*		Perceived urgency *(less urgent)*	
Attribute	Levels	β	p	β	p	B	p	β	p	β	p	β	p
Principal healthcare professional	• ED clinician • GP (may not be your usual GP)	-0.243	.652	0.056	.799	-0.024	.929	0.225	.375	-0.162	.679	0.105	.241
	• Emergency health professional	0.156	.797	0.018	.765	0.048	.864	-0.075	.767	0.441	.180	0.018	.867
Location	• Home												
	• Local clinic	0.195	.713	0.024	.932	0.241	.999	-0.002	.993	0.173	.654	0.076	.464
	• Hospital	-0.179	.788	-0.026	.932	-0.085	.779	0.143	.631	0.086	.861	-0.188	.176
Potential cost	Per $1 of out of pocket expense	0.005	.668	0.005	.298	-0.002	.701	-0.009	.117	-0.007	.438	*-0.005	.015
Waiting time	Per 1 minute of time waited	0.003	.739	0.004	.406	0.002	.657	0.001	.890	-0.008	.247	0.001	.405
Quality	• Healthcare professional is *easy to*												

Random parameters		Heterogeneity in mean parameters associated with health related measures											
		Quality of life *(lower)*		Asthma history *(yes)*		Use of ED *(have attended in past year)*		GP visits *(4 or more times in year)*		Previously worked in health *(no)*		Perceived urgency *(less urgent)*	
Attribute	Levels	β	p	β	p	B	p	β	p	β	p	β	p
	understand, **comprehensive treatment;** no interruptions												
	• Healthcare professional is *easy to understand*, **basic treatment;** some interruptions	0.219	.687	-0.031	.908	0.087	.745	0.161	.479	0.194	.619	**0.254	.007
	• Healthcare professional is *not easy to understand*, **basic treatment;** some interruptions	-0.066	.953	0.198	.498	0.035	.925	-0.411	.244	-0.070	.906	**-0.335	.004
Constant (associated with delay)		*-5.986	.020	-0.434	.692	2.110	.071	-1.200	.365	3.631	.061	0.297	.511

Note. **<.01, *<.05; β = Resulting preference weight