

# **Patient Uptake and Satisfaction with Telehealth Services in Rural Australia: An Embedded Correlational Mixed Methods Approach**

## **Introduction**

Following the recent COVID-19 pandemic, telehealth has become an increasingly popular model of healthcare in Australian General Practice (GP).<sup>(1)</sup> Telehealth is defined as the use of videoconferencing and telephone calls to provide health services to patients as an alternative to face-to-face consultations.<sup>(2)</sup> Prior to the COVID-19 pandemic, telehealth use was encouraged in rural Australia to improve access to healthcare.<sup>(3)</sup> This service is particularly valuable in rural Australia where reduced access to health professionals,<sup>(4)</sup> distance to services and lower socioeconomic status (SES) <sup>(3)</sup> are longstanding barriers to accessing healthcare. The increased availability and use of telehealth during the COVID-19 pandemic has revealed the integral role of this service in overcoming these barriers in both rural communities and wider Australia.

Telehealth uptake refers to the increased awareness and use of this service. It has significantly increased since the COVID-19 global pandemic, when in-person consultations posed a significant risk of disease transmission. In March 2020, the Australian Government introduced temporary Medicare Benefits Scheme (MBS) telehealth items to reduce this risk. These MBS items were available to GPs and other medical professionals and were extended until 31 December 2021.<sup>(5)</sup> This resulted in an increased uptake of telehealth consultations with the number of MBS telehealth items processed tripling from 449,004 items in March 2020 to 1,338,432 items in July 2021.<sup>(6)</sup> In the fourth quarter of 2021, General Practice conducted 82% of all telehealth consultations.<sup>(7)</sup> On 1 January 2022, the Australian Government added a permanent MBS telehealth item to ensure access to telehealth services continued beyond the pandemic.<sup>(8)</sup> The significant and ongoing uptake of telehealth reveals the importance of understanding patient satisfaction with the service in the context of General Practice.

## **Patient satisfaction with telehealth**

Patient experiences with telehealth in Australia have been largely positive. A cross-sectional survey of 596 telehealth users found that 61.9% of participants described telehealth as “Just as good as” or “Better than” in-person consultations. Participants who were less satisfied with telehealth described various limitations, including: communication barriers, technological limitations and the lack of physical examination, among others. <sup>(9)</sup> Additionally, another study found that 84% of users would use telehealth again. Those who preferred in-person visits explained that the inability of GPs to perform a physical exam via telehealth is a significant limitation of the service. <sup>(10)</sup>

Current research into patient demographics and satisfaction with telehealth is largely limited to patient age, gender, education, health literacy, income and technological capability.<sup>(11-20)</sup>

The majority of literature has linked increased satisfaction with telehealth users who are younger,<sup>(14, 16, 18)</sup> female,<sup>(17, 19)</sup> have high health literacy,<sup>(20)</sup> higher education status <sup>(18)</sup> and greater technological abilities/experience.<sup>(14, 18)</sup> However, there are a number of inconsistencies in these findings. Some studies suggest that younger patients are more suited to telehealth consultations given their higher satisfaction rates.<sup>(14, 16, 18)</sup> On the contrary, one study identified a positive relationship between increasing age and satisfaction with telehealth. While it might be expected that the elderly community are less familiar with technology, this study suggested that higher satisfaction rates may be due to difficulty in travelling greater distances.<sup>(13)</sup> Similarly, multiple studies have identified no link between gender and satisfaction with telehealth,<sup>(12, 13, 20,</sup>

21) while others suggest that female sex is a predictive factor for increased satisfaction with these services.(15, 17, 19) These inconsistent results reveal the need for further research into the relationship between patient profile and satisfaction with telehealth.

This study will investigate the broader patient profile, defined as patient's age, gender, language(s) spoken, ethnicity, education level, employment status, income, living situation, travel to the GP (mode of transport and time taken), disability, the patient's presenting complaint and health literacy.

Existing literature focuses on patients consulting specialists and has been conducted overseas. Previous research has involved patients attending an outpatient rheumatology clinic,(11, 15) gastroenterologist,(12) ophthalmologist,(13) sports medicine physician,(14) surgeon,(18) physical, speech or occupational therapy,(19) allergy clinic(21) or urology department.(22) The few studies that include a broader sample of patients were conducted in the United States.(16, 17, 20, 23) These studies are therefore unlikely to provide insight into telehealth satisfaction among patients attending rural Australian General Practices.

Limitations in the existing literature include small sample sizes,(11-13, 16, 20) patient recall bias (14, 23) and central tendency bias (14) introduced by the use of Likert scales. While these limitations are often unavoidable, this study will explore and attempt to overcome the bias introduced by sampling error. This bias is apparent in studies that fail to investigate the patient demographics of those who do not use telehealth. Polinski et al.(17) suggest that the preference for telehealth or in-person visits is likely related to a patient's satisfaction with these services. They recognise that those who select a telehealth consultation are more likely to have had positive experiences in the past, compared to patients who opt for in-person consultations. By neglecting to analyse the demographics of patients who do not use telehealth, the relationship between patient profile, satisfaction with and uptake of this service cannot be completely understood.

### **Uptake of Telehealth**

Relationships between patient demographics and uptake of telehealth have been previously identified. A study conducted by Hardie et al.(24) surveyed 30% of the Australian population and revealed that telehealth use was higher in females. In the same study, age analysis revealed that uptake was lowest in patients in both the youngest (0-14, and 15-19 years) and oldest (70+ years) age groups. Other literature suggests that this low uptake is due to poorer technological ability in the elderly and reduced demand for GP consultations in the young.(10) Finally, Hardie et al. (24) found that uptake of telehealth was higher in patients from rural and regional primary health networks and lower in patients of lower socio-economic status (SES). These authors recommend further investigation into what aspects of socio-economic status contribute to this lower uptake. Their suggestion for further research encompasses a more comprehensive patient profile. This includes employment, home environment, language barriers, disability, perceived risk of in-person consultations, disease nature (chronic vs acute) and access to technology. Furthermore, with a quantitative methodology alone, this study was unable to ascertain an explanation for the relationships identified. This exposes a significant gap in existing literature where aspects of the patient perspective may be overlooked. By including both qualitative and quantitative data, a mixed-methodological approach may allow a more detailed understanding of patient experiences with telehealth.

Further research is required to understand how the patient profile influences both satisfaction and uptake with telehealth in rural General Practice. As a result, this study will involve a mixed-methodological approach to address the research question and fill the gaps in existing literature. The findings are intended to promote future improvements in telehealth delivery. This is especially

important in Australian communities where the recent uptake of telehealth provides opportunity to overcome long-standing barriers in accessing healthcare.

## Aims

This study aims to address the following research question: Does the patient profile influence patient uptake and satisfaction with telehealth services in rural Australia?

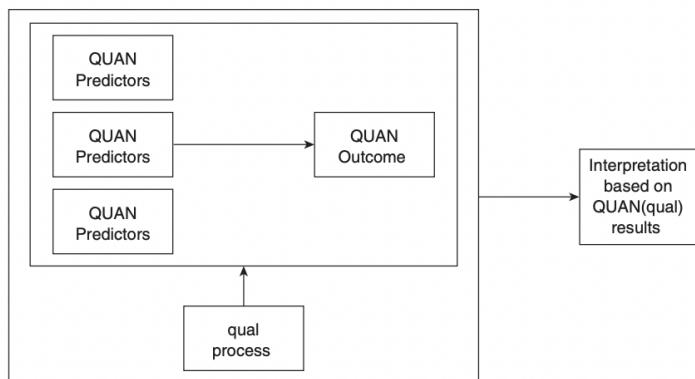
This research question will be answered by achieving the following aims:

1. Determining the relationship, if any, between uptake of telehealth and the patient profile (age, gender, language(s) spoken, ethnicity, education level, employment status, income, living situation, travel to the GP (mode and time taken), disability, the patient's presenting complaint and health literacy).
2. Determining the relationship, if any, between satisfaction with telehealth and the patient profile, in those patients who have previously used this service.
3. Understanding the relationship, if any, between the patient profile and perspectives of and experiences with telehealth.

## Methods

### Design

An embedded correlational mixed methodological design with sequential timing (as in Figure 1) was used to answer the research question. Sequential timing involved first analysing the quantitative data to identify any relationships between variables. This was followed by an analysis of qualitative data to support and explain these quantitative relationships. Greater weighting was placed on quantitative data, with the qualitative data complementing the findings. This embedded, correlational design was selected because it allows the qualitative data to further explain the predictive relationships that arise from the quantitative data analysis.(25)



**Figure 1. Embedded Design: Embedded Correlational Model (26)**

### Sample

Tamworth is a large rural town in the New England Region of New South Wales, Australia. It was selected as the location of this study due to its rural setting, allowing this research to contribute to evidence about telehealth in rural Australia. Four authors were residing in Tamworth for the duration of the study which enabled direct contact with participating GPs and the Tamworth community.

The study population included patients attending GPs in the Tamworth region. All ten GP practices in Tamworth were offering a telehealth service. They were contacted via email and telephone requesting their assistance in sourcing patients to participate in this study. Nine of the ten practices agreed to assist with recruitment.

GPs were provided with printed posters and were asked to display these in their waiting rooms, promoting the research to patients attending their practice. The staff at each practice were asked to make patients aware of the opportunity to participate. The posters advertised an online questionnaire that patients could access by scanning a QR code with their smart phones. It was hoped that they would have time to complete this questionnaire while waiting for their appointment. Owing to initially low participation rates, the online questionnaire was also displayed on community noticeboards and local social media pages to encourage participant involvement.

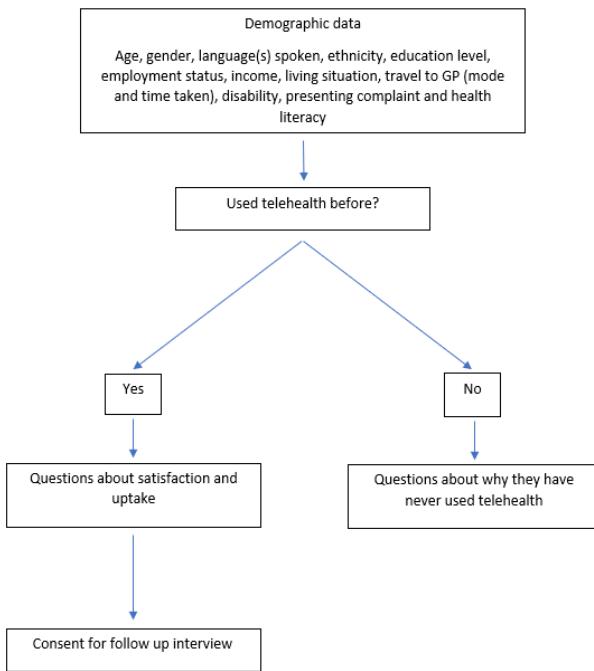
Participants for the semi-structured interviews were sourced using convenience sampling. Questionnaire respondents who had indicated prior experience with telehealth were directed to a question asking if they would participate in a follow-up interview. All participants who agreed to be interviewed were emailed a link directing them to an online scheduling tool. Only those participants who booked an interview using this tool were contacted to ensure that they had sufficient time available to complete an interview.

## **Procedures and Measures**

### Quantitative data

Qualtrics®, an online survey software, was used to develop a 10-minute questionnaire (Appendix 1). An online questionnaire was selected due to the ease of use, increased community familiarity with QR codes and ability to reach a broader range of patients. The questionnaire consisted of 2 components, as demonstrated in Figure 2.

1. Collecting demographic data from all patients (age, gender, language(s) spoken, ethnicity, education level, employment status, income, living situation, travel to the GP (mode and time taken), disability, the patient's presenting complaint and health literacy) and,
2. A) Satisfaction - Identify satisfaction rates among those who have previously used telehealth or,  
B) Uptake - Identify the reason for never having used telehealth.



**Figure 2: Questionnaire Flow Chart**

Component 1 collected patient demographic data by providing participants with multiple choice options and the opportunity to insert free text.

This component also included a measure of health literacy, using a modified version of the Brief Health Literacy Screening Tool.(27) Whilst this tool has only been validated for face-to-face administration, no other method was deemed suitable as other screening tools are time consuming, not validated in English, too specialised or require researcher input.

Component 2 first asked patients if they had previously used telehealth. Those who had prior experience with telehealth were directed to complete component 2A. Those who had never used telehealth were directed to component 2B.

Component 2A included a quantitative measurement of patient satisfaction with telehealth. According to a recent systematic review, the Telehealth Usability Questionnaire (TUQ) is the most comprehensive and frequently used questionnaire to evaluate patient experiences with telehealth.(28) The validity of the TUQ and the individual questionnaire items have been extensively reported.(29) To encourage participation and facilitate ease of completion of the questionnaire, modifications were made to the TUQ. These changes included: narrowing the original 7-point Likert scale to a 5-point Likert scale and reducing the original 21 questions to 13 questions. **The modified TUQ included in this study remains valid despite these modifications, as all the remaining questionnaire items have been validated independently.**

Component 2B of the questionnaire was only available for participants who have had no prior experience with telehealth. It aimed to identify the reasons why participants haven't used this mode of healthcare before by asking, "Why have you never used telehealth?".

### Qualitative data

The semi-structured interviews (Appendix 2) involved a 10 to 30 minute phone call, between a single participant and interviewer. Phone calls were used to conduct the interviews as this was assumed to be a more convenient and accessible tool compared to videoconferencing.

Semi-structured interviews were used to integrate the strengths of structured and unstructured interviews. These strengths include collecting comparable data by using pre-determined questions and allowing flexibility to further explore patient perspectives. During these interviews, participants were asked variations of pre-determined open-ended questions on four topics: patient experiences/satisfaction with telehealth, reasons for use, future use and improvements. Simultaneously, interviewers maintained the freedom to ask prompting questions, allowing participants to further elaborate on their responses. This allowed interviewers to collect detailed data on patient experiences.

The difficulty in proving qualitative data to be valid and reliable is well recognised.(30) As recommended by Guba,(31) the terms validity, reliability and objectivity have been replaced with truth value, consistency and neutrality respectively, when referring to qualitative data. The measures conducted to improve truth value include peer debriefing and brainstorming sessions that were conducted prior to and throughout the process of developing the interview guide, recording, transcribing, reviewing and analysing the qualitative data. Consistency and neutrality were maintained by keeping a running diary, documenting challenges faced and engaging group members in open discussions about any assumptions or challenges faced during the qualitative research process.

## Analysis

### Quantitative data

Questionnaire responses were excluded if they were incomplete, conducted overseas, or where the participant has not resided in the New England region for 12 months or longer. Incomplete responses were defined as <97% completion where the missing 3% only included participant contact details. These missing details were not required for data analysis.

Data cleaning was required to ensure questionnaire responses were suitable for quantitative analysis. This involved calculating mean travel times where a range was given, converting travel times to minutes, re-allocating free text responses under appropriate categorical variables and removing responses where the free text was difficult to interpret.

Statistical analysis was conducted using R and R Studio (Version 2022.02.2, Build 485). A statistically significant sample size was calculated using this software. Given the population of the Tamworth Local Government Area is approximately 77,029 people, a sample of 96 people was calculated, with a 10% margin of error.

Patient demographics, telehealth use, and satisfaction were reported using descriptive statistics. Total values and percentages were used to describe categorical variables. Both continuous variables included outliers, and all were determined to be true responses. As such, the continuous variables had a non-normal distribution and were reported using the median and interquartile range.

Bivariate analysis was used to identify relationships between the patient profile and both patient uptake and satisfaction with telehealth. This involved using Chi squared tests for categorical variables and Kruskall Wallis tests for continuous variables. Several survey questions (e.g. ethnicity, employment) allowed participants to select multiple responses. Multi-select responses were removed from the analysis of these questions. This was to ensure appropriate statistical analysis by limiting the number of categorical variables being compared.

Finally, decision tree analysis was used to identify the combined effect of multiple components of the patient profile and both uptake and satisfaction with telehealth.

### Qualitative data

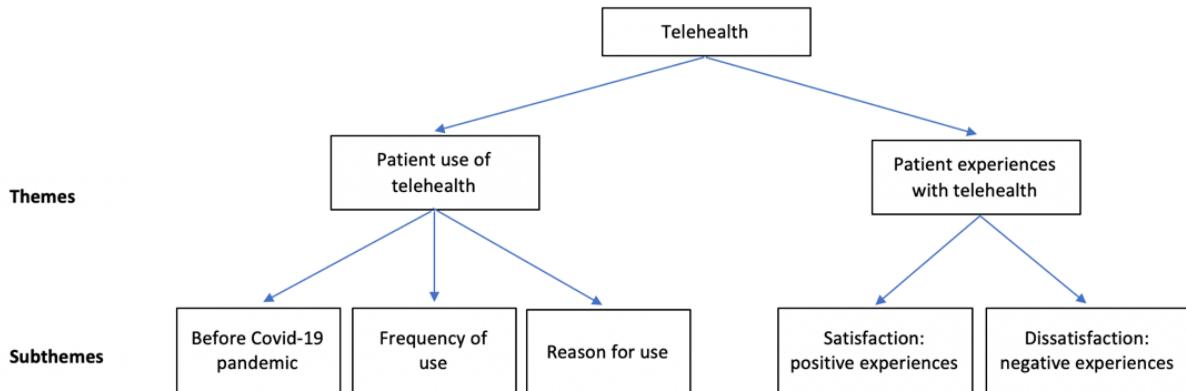
The qualitative data was analysed according to the method of thematic analysis proposed by Braun and Clarke.(32) Familiarisation of the data involved manually transcribing the semi-structured interviews and reading the transcripts multiple times. Inductive coding of the data was achieved with the assistance of NVivo software (version 12.7.0) to generate initial codes. Similarly, an inductive approach was then used to develop these codes into a thematic map of candidate themes and sub-themes. Review of the data occurred in two steps: Step 1 included cross-checking each data extract for suitability within the allocated theme. Step 2 involved re-reading the transcripts and identifying, coding and repeating step 1 with any missing data. This process led to the generation of 2 overarching themes and 5 subthemes.

## Results

Quantitative data collection occurred over 3 months, between 02 March 2022 and 04 May 2022. With variations in how often patients attend their GP, it was predicted that 3 months would allow for adequate patient exposure to the QR codes and online questionnaire. By early May, questionnaire response rates had plateaued. Data collection was then ceased to allow sufficient time for data analysis.

In total, 307 questionnaire responses were recorded. 176 responses were excluded due to being incomplete (36 responses), conducted overseas (130 responses), or the participant not having resided in the New England region for 12 months or longer (10 responses). This yielded 131 valid responses. Most participants were female (79%), under 50 years of age (64%), Caucasian (81%) and spoke English as their first language (97%). 13% of participants identified as Aboriginal and/or Torres Strait Islander origin. The most common household environments were couples living with (35%) or without children (30%). 51.9% of participants reported having a bachelor's degree or higher. A yearly income between \$45,001 and \$120,000 was most frequently reported (48%). 70% of respondents were employed and 16% had a disability. The median health literacy score was 19.5 (IQR 2.5), which is considered 'Adequate' according to the BRIEF Health Literacy Screening Tool. The majority of participants (73%) consulted their GP for an ongoing problem and 90% of respondents travelled to the GP in their own private vehicle. The median time taken to travel to the GP was 12.5 minutes (IQR 19.0), ranging from 0 to 360 minutes.

Of the 95 participants who had previously used telehealth, 50 consented to be contacted for a semi-structured interview. Of these, 11 respondents booked and attended an interview. Semi-structured interviews were conducted between 26 April 2022 and 5 March 2022 to provide participants with a choice of interview dates. All the interviews were included in the qualitative thematic analysis which revealed 2 main themes and 5 sub-themes, as outlined in Figure 3.



**Figure 3. Themes and subthemes generated from qualitative thematic analysis**

Refer to appendix 3 and appendix 4 for results of bivariate analysis and p values, respectively.

#### Uptake of Telehealth and the Patient Profile

Of the 131 participants, 73% had previously used telehealth (see Table 1). 82% of these began using this service during/after the COVID-19 pandemic, with interviewee 11 stating, “*I didn’t even really know telehealth existed before covid.*” Most telehealth users had frequented this service at least 3 times (58%) and were made aware of telehealth through their GP (76%). For example, Interviewee 4 explained that “[The] surgery preferred us not to attend to discuss things with the medicos [doctors], um but rather do it over the phone, uh so I did that a couple of times.” Of those participants who had never used telehealth, 56% reported wanting to see their GP in person and 19% described never having needed the service.

**Table 1. Telehealth uptake summary**

		Frequency (%)
Have you ever used Telehealth to consult with your GP?	Yes	95 (73%)
	No	36 (27%)
When did you first start using telehealth?	Before the COVID-19 pandemic	17 (18%)
	During/After the COVID-19 pandemic	78 (82%)
How did you find out about telehealth?	GP	72 (76%)
	Hospital	15 (16%)
	Newspaper	3 (3%)
	Member of community	3 (3%)
	Other	2 (2%)
How many times have you had a telehealth consultation?	Once	17 (18%)
	Twice	23 (24%)
	3 times or more	55 (58%)

Statistically significant relationships were identified between patient uptake of telehealth and both gender and disability. Telehealth uptake was greater in females ( $p = 0.003263$ ) with 78.8% of all females using telehealth compared to only 48.1% of males. Similarly, uptake of telehealth was

higher in participants with a disability ( $p = 0.02042$ ). 95.2% of those with a disability reported using telehealth compared to only 67.6% of those without a disability.

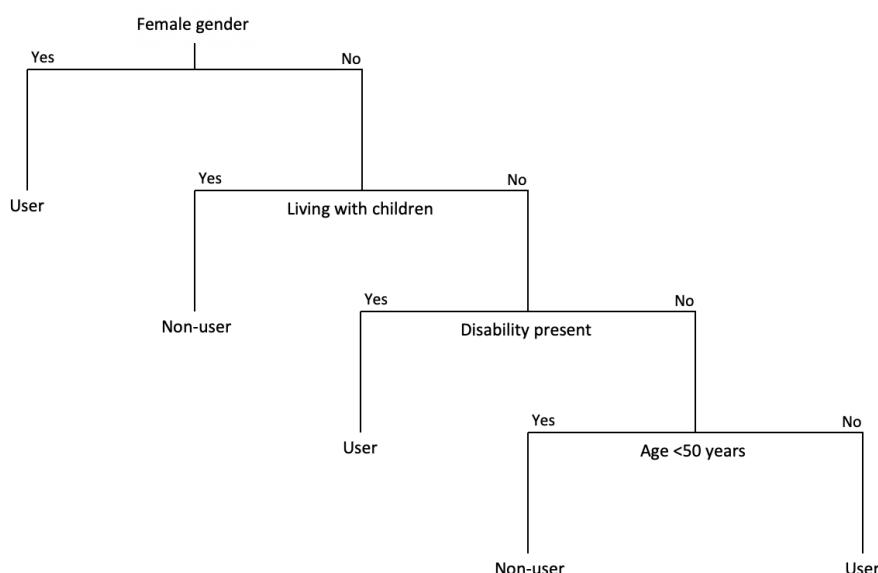
There were no other statistically significant relationships found between uptake of telehealth and the patient profile. However, other findings included greater telehealth use in those aged 40-49 years (82.1%) and over 70 years (81.3%). Telehealth uptake was also higher in those who identified as Aboriginal and/or Torres Strait Islander (87.5%), spoke English as a first language (73.2%), had completed a bachelor's degree or higher (75.9%), had an annual income of \$120,001-180,000 (100%), single parents living with one or more children (82.4%) and those who usually travel to the GP using their own private vehicle (73.3%).

Telehealth use was higher in those who were unemployed (91.7%) compared to those who were employed (66.3%). Interviewee 11 introduced an opposing finding explaining "*Also work commitments you know, I didn't have time to go around town,*" suggesting that those with less time available for appointments would be more inclined to use telehealth.

In addition, participants presenting with an ongoing problem were more likely to use telehealth. 84.2% of those with ongoing issues have used this service compared to only 78.6% of those presenting with a new issue. Interviewee 1 suggested "*If it's a follow-up consultation I think that's certainly easier um just because we've already had an initial consultation face to face.*"

The median health literacy score was similar between those who had prior experience with telehealth and had not used telehealth, with scores of 19.5 (IQR 3.3) and 20 (IQR 1.5), respectively. The median travel time was lower for those who had used telehealth (12.0 minutes, IQR 6.3) compared to those who had never used telehealth (15.0 minutes, IQR 11.2).

Decision tree analysis revealed that telehealth non-users are more likely to be males living with children, or young males (<50 years) without a disability. Female gender was a strong predictor for telehealth use in multiple demographic chains. These outcomes, demonstrated in Figure 4, have a prediction accuracy of 78.8%.



**Figure 4: Decision tree showing demonstrating predictors for telehealth use.**

## Satisfaction with Telehealth and the Patient Profile

The 12 questions regarding patient satisfaction with telehealth services were grouped into 4 categories, seen in Table 2.

Responses from the 5-point Likert scale could be grouped into: Satisfied, indifferent and dissatisfied. Patients who responded with 'Agree' or 'Strongly agree' were satisfied, 'Neither' were indifferent and those who reported 'Disagree' or 'Strongly disagree' were dissatisfied.

**Table 2. Questionnaire Satisfaction Questions**

		n	Strongly agree or Agree	Neither	Strongly disagree or Disagree
			Frequency (%)		
Overall satisfaction and future use	Question 12 - Overall, I am satisfied with this telehealth system.	95	64 (67.4)	15 (15.8)	16 (16.8)
	Question 7 - I like using the system.	95	54 (56.8)	23 (24.2)	18 (18.9)
	Question 13 - I would use telehealth services again.	95	77 (81.1)	8 (8.4)	10 (10.5)
Effectiveness of telehealth	Question 8 - Telehealth provides for my healthcare needs.	95	62 (65.3)	16 (16.8)	17 (17.9)
	Question 9 - Telehealth improves my access to healthcare services.	93	72 (77.4)	10 (10.8)	11 (11.8)
	Question 10 - Telehealth saves me time traveling to a hospital or specialist clinic.	95	82 (86.3)	8 (8.4)	5 (5.3)
	Question 11 - Telehealth is an acceptable way to receive healthcare services.	95	62 (65.3)	13 (13.7)	20 (21.1)
Interaction with the GP	Question 4 - I could easily talk to the clinician using the system.	95	77 (81.1)	9 (9.5)	9 (9.5)
	Question 5 - I could hear the clinician clearly.	95	84 (88.4)	4 (4.2)	7 (7.4)
	Question 6 - I felt I was able to express myself effectively.	95	74 (77.9)	12 (12.6)	9 (9.5)
Technological aspect	Question 1 - It was easy to learn to use the system.	95	76 (80.0)	16 (16.8)	3 (3.2)
	Question 2 - The way I interact with this system is pleasant.	95	74 (77.9)	12 (12.6)	9 (9.5)

High satisfaction was reported in response to all questions, as demonstrated in Table 2. Most notably, high satisfaction rates were reported in response to, 'I could hear the clinician' (88.4%) and 'I would use telehealth services again' (81.1%). 86.3% of participants agreed or strongly agreed with Question 10 which stated, 'Telehealth saves me time travelling to a hospital or specialist clinic.'

Patient interviews provided further insight, describing rurality as a contributor to the high satisfaction rates in this question:

*Interviewee 6: "I think that telehealth is, for rural areas and regional areas, that it's a good back up, it enables consultations when it's just not possible."*

*Interviewee 4: "Well, the good thing for me is that because we live on a rural property, um, it saves the need to go into town."*

*Interviewee 11: "I guess it's good to be using technology and using to reach people who are further away. It's a good thing to be using technology for health."*

When asked to comment on overall satisfaction, 67.4% of participants agreed or strongly agreed with 'Overall, I am satisfied with this telehealth system.' Patient interviews suggest that these positive experiences could be attributed to the convenience of telehealth. Patients disliked the long wait times often experienced in GP practices and would prefer the convenience of waiting at home. Interviewee 2 explained that "*The appointment was late, but, you know, doctors' appointments are generally late anyway, so uh it was just a lot more convenient to be able to stay home.*" Interviewee 4 stated "*We're out on a country property and so it's quite uh, more convenient for us to be waiting at home than waiting in a surgery.*" Interviewee 1 explored the convenience of telehealth for households with children, explaining that "*It's so much more convenient for me as a mum with small kids to do that over the phone than to bring children or coordinate babysitting.*"

Another factor that contributed to satisfaction with telehealth was reduced anxiety compared to in-person consultations. For example, interviewee 6 described being "*More relaxed talking to the doctor over the phone than face to face.*" This was supported by interviewee 2 who revealed, "*I think it's easier over the phone to ask some things at times.*"

Despite the overall positive attitudes towards telehealth, patients also described limitations of the service compared to in-person consultations. Patients understood the inability of GPs to perform a physical examination when using telehealth. Interviewee 11 explained that "*She'll [GP] do things like measure my weight and all these things that would be really hard to do via telehealth.*" Interviewee 4 elaborated with "*There's some things that you need to see a medico [doctor] about. For instance, I have a regular 3-to-6-month skin check for cancers... That's a bit hard to do over a telehealth.*"

There were statistically significant relationships between 'Telehealth saves me time travelling to a hospital or specialist clinic' and the patient profile. Higher satisfaction rates in response to this question were reported in participants under 60 years of age ( $p = 0.03242$ ) and those who spoke English as their first language ( $p = 0.01614$ ). Refer to table X1 and X2, respectively.

This study also identified statistically significant relationships between factors contributing to SES and increased satisfaction with telehealth. Agreement with 'Telehealth provides for my healthcare needs' was greatest in participants in the lowest income bracket (\$0-18,200) ( $p = 0.0222$ ), refer to table X3, and for those who had completed high school but no tertiary study ( $p = 0.008502$ ), refer to table X4. Also, participants who were more satisfied with the statement 'I would use telehealth services again' were in the two lowest income brackets (\$0-18,200, \$18,201-45,000) ( $p = 0.04783$ ) and had completed high school but no tertiary study ( $p = 0.02545$ ). Refer to table X5 and X6, respectively.

Those who identified as 'Caucasian', 'Asian' or 'Oceanian' were more likely to agree or strongly agree with 'I could hear the clinician clearly' compared to those of other ethnicities ( $p = 4.02E-05$ ).

All other bivariate relationships between the patient profile and satisfaction with telehealth were not statistically significant.

Finally, the majority of demographic branches analysed using the decision trees generated outcomes of ‘satisfaction’. This suggests that patients of multiple combinations of demographics and backgrounds are likely to be satisfied with telehealth services. Given the similar outcomes for each combination of demographics, no additional relationships regarding the patient profile were identified beyond those already revealed by bivariate analysis.

## **Discussion and Conclusions**

Multiple relationships were identified between the patient profile and both uptake and satisfaction with telehealth services provided by GPs in rural Australia. By further exploring the factors contributing to these relationships, this study provides a deeper understanding of patient perspectives and experiences of telehealth.

### **Uptake**

This study reported on the broader patient profile, with the significant findings being greater telehealth uptake in patients who are female and those with a disability. The higher uptake in female patients is consistent with existing literature however the justification for this relationship remains unknown.(24, 33, 34) Past research regarding the relationship between disability and uptake of telehealth is minimal. One study hypothesised that disability may be a barrier to accessing telehealth services.(24) However, our study demonstrates that disability is associated with increased use of this service. Moving forward, continued telehealth use can offer a more accessible healthcare alternative for those living with a disability.

Telehealth uptake was greater in those aged 40-49 and over 70 years, which is largely consistent with the results identified by Drake et al.(33) The greater uptake of telehealth in those who spoke English as their first language also correlates with existing research.(35)

In this study, telehealth users had a lower median travel time compared to those who had never used the service. This is contrary to previous literature which reports greater telehealth uptake in those who travelled greater distances. This could be attributed to the influence of outliers on the results. Alternatively, lower rates of telehealth uptake in those travelling greater distances could be explained by a lack of recognition of this service in rural communities. Increasing awareness of telehealth in these areas could enable patients living further from their GP to benefit from the convenience of this technology.

While previous research has identified lower telehealth uptake in patients of lower SES, this study further investigated the factors contributing to this relationship. It revealed that uptake of telehealth was lowest in those who had completed high school but no tertiary education. This suggests that education is the principal SES factor contributing to lower telehealth uptake in patients of low SES.

This study also revealed increased telehealth use in patients who were consulting their GP for an ongoing problem. This could be attributed to the ease of telehealth use when consulting a GP who is familiar with the patient’s presenting complaint. Given there is a gap in the literature to support or

explain this finding, further research is required to explain why increased telehealth use is higher in those presenting for an ongoing problem.

### **Satisfaction**

As is consistent with existing literature, this study identified that satisfaction with telehealth is overall high (67.4%). Furthermore, rurality, convenience and reduced anxiety were factors which contributed to positive experiences with telehealth services compared to in-person consultations.

Existing literature has largely identified greater satisfaction with telehealth in younger patients.(14, 16, 18) This study provides additional evidence by describing aspects of this relationship. Patients under 60 years of age were more satisfied with the statement ‘Telehealth saves me time travelling to a hospital or specialist clinic.’ This reveals that the overall greater satisfaction with telehealth in younger patients may be attributable to the convenience of these services.

Patients who spoke English as their first language also expressed greater satisfaction with the time-saving benefit of telehealth, compared to those who spoke another first language. In addition, those who identified as ‘Caucasian’, ‘Asian’ or ‘Oceanian’ were more likely hear the clinician clearly compared to those of other ethnicities. While similar findings have been identified in the United States,(21, 36) this study reveals that satisfaction with telehealth in Australia is influenced by ethnicity and language. This suggests that improvements may be required to increase satisfaction with telehealth for patients of culturally and linguistically diverse backgrounds.

Finally, lower income and lower educational qualifications were associated with greater satisfaction with ‘Telehealth provides for my healthcare needs’ and ‘I would use telehealth again.’ This is contrary to most existing literature which reports lower satisfaction in patients with lower income and educational qualifications.(11, 18, 23) As such, this study uncovers a new relationship between low SES and greater satisfaction with telehealth that needs further research.

### **Strengths and Limitations**

This study was strengthened by exploring patient experiences beyond the initial quantitative relationships identified. The use of an embedded approach enabled deeper understanding of patient perspectives. Other strengths included the use of ongoing member checking, peer debriefing and independent review.

The external validity of this study is impaired due to the exclusion criteria confining participation to patients in the New England Region. Therefore, the results may not be generalisable to other rural Australian communities.

Self-selection, a type of sampling bias, was introduced due to voluntary participation and the use of a monetary incentive. This means that the results may not accurately reflect the Tamworth population. Instead, they may overrepresent those patients with stronger opinions about telehealth and patients for whom the monetary incentive was more significant. Additionally, the use of an online questionnaire may have excluded those patients with poor technological skills. While mandatory participation is not feasible, sampling bias could be partly overcome by offering alternative methods for patients to complete the questionnaire, such as paper-copy documents or online via email or URL.

The use of convenience sampling during the qualitative data collection also introduced sampling bias. By only interviewing participants who actively responded to semi-structured interview requests, it is possible that the qualitative findings only reflect a subset of perspectives. The opinions of those participants with more time available and stronger opinions about telehealth may have been overrepresented. Convenience sampling bias could be avoided by interviewing all participants who consented for follow-up interviews.

This study was also subject to central tendency bias and recall bias, impairing internal validity. The use of a Likert scale to assess satisfaction with telehealth may have introduced central tendency bias. As such, it is possible that the extremes of satisfaction with telehealth, whether positive or negative, were not reflected in our results. By excluding central response items and requiring participants to rank responses, central tendency bias could be avoided. Additionally, recall bias was introduced by asking patients to reflect on past experiences with telehealth in both the questionnaire and semi-structured interviews. Whilst this is largely unavoidable, patient completion of a questionnaire immediately following their telehealth consultations could be used to overcome this limitation in future research.

Finally, the reliability of this study was impaired by the small sample size. However, this is a common limitation encountered by similar Australian literature.(10-14) Most findings identified in this study are consistent with existing literature and as such, can be deemed reliable. However, the novel findings in this study require further research to determine the reproducibility of the results.

## **Implications**

Telehealth has great implications for future use, especially in rural Australia where there are significant barriers to accessing healthcare. This study intends to provide GPs with an understanding of which aspects of the patient profile are linked to greater telehealth uptake and satisfaction. In doing so, it reveals which patients are more suited to telehealth compared to in-person consultations. This insight allows GPs to optimise their use of telehealth by offering the service to those who are most likely to benefit from this technology. It is anticipated that this will increase telehealth access, use and satisfaction, thereby improving overall delivery of rural healthcare.

## **Recommendations for Future Research**

This study has identified several relationships between the patient profile and both uptake and satisfaction with telehealth. However, given the study field was limited to the Tamworth region, further research in other rural and remote communities is recommended to determine if findings are consistent with other parts of Australia. Similarly, it is difficult to interpret the reliability of the findings due to the small sample size. Further research with a larger sample size is recommended to confirm the reliability of this study.

This study has also identified gaps in current knowledge that may be addressed by future research. Comparing patient experiences when using video-conferencing and telephone calls would provide greater insight into patient preferences with telehealth service. Another suggestion for further research includes exploring the reasons for higher satisfaction rates in certain patients. Given the well-established correlation between high telehealth satisfaction rates and female gender, a deeper understanding of why this relationship exists would be an interesting addition to literature in this field.

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## **Appendix 1**

### **STEPH TO INCLUDE ONLINE QUESTIONNAIRE**

## **Appendix 2**

### **Semi-Structured Interview Questions**

#### Experience/Satisfaction

- Can you share with me some of your experiences with telehealth?
  - What did you like?
  - What did you dislike?
- Have you had any telehealth consults that have stood out as being better or worse than others?
  - Why different? Practitioner? Circumstances (e.g. presenting complaint)?
- Have you noticed anything that makes a consult any better or worse?
- How would you compare telehealth to an in-person consultation?
  - Do you feel as comfortable asking questions when using telehealth?
  - Do you feel you understand what the practitioner explains to you as well with telehealth?

#### Reasons for Use

- Why did you initially use telehealth?
- Why did you continue to use telehealth?
- What has telehealth been like for you recently?
  - Has your use changed since the start of the COVID-19 pandemic?

#### Future use:

- For future appointments, would you rather have an in-person or a telehealth consult?
  - Why?

#### Improvement:

- If you could change something about your telehealth experience, would you change anything?
  - What would you change?

- Why would you change it?

### **Appendix 3**

(ADD Contingency tables to final word doc)

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### **Appendix 4**

As above AND MAKE SURE document is landscape.