

# Managerial practices for app-based primary care telemedicine service acceptance in South Africa



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## Dates:

Received: 25 Apr. 2024  
 Accepted: 28 Aug. 2024  
 Published: 30 Sept. 2024

## How to cite this article:

Van Tonder, G., Du Preez, R., & Pentz, C.D. (2024). Managerial practices for app-based primary care telemedicine service acceptance in South Africa. *South African Journal of Business Management*, 55(1), a4667. <https://doi.org/10.4102/sajbm.v55i1.4667>

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**Purpose:** This study addresses the qualitative research phase of a mixed methods study conducted to investigate patient acceptance of an app-based telemedicine service for primary care aimed at South African public health care sector patients.

**Design/methodology/approach:** Qualitative data were collected by means of semi-structured individual interviews with patients who had exposure to an existing app-based primary care telemedicine service in South Africa named Kena Health. Thematic analysis of the qualitative data using ATLAS.ti software was conducted to identify the relevant antecedents of telemedicine service acceptance in the study's context.

**Findings/results:** Eight antecedents of app-based primary care telemedicine service acceptance among South African patients (who are predominantly reliant on public health care sector services to receive medical care) were identified, namely, perceived compatibility, perceived ease of use, relative advantage, price value, trust, innovativeness, privacy perception and care perception.

**Practical implications:** To date, prior literature has not yet identified the specific antecedents that would apply to the acceptance of an app-based telemedicine service for primary care among South African individuals who are predominantly reliant on the country's public health care system to receive medical care.

**Originality/value:** Our study contributes to the literature by identifying which existing factors of technology acceptance apply to primary care telemedicine service acceptance, predominantly in the South African public health care sector context. Furthermore, additional antecedents of telemedicine service acceptance that have not been included in technology acceptance theory until present, that is, (positive) privacy perception and care perception are identified.

**Keywords:** telemedicine; health care; app-based primary care; South African public health care sector; privacy perception; care perception.

## Introduction and background to the study

Telemedicine services provide people, especially in underserved populations, with access to health care like never before (Waller & Stotler, 2018, p. 8). According to Bestsenny et al. (2021), a global surge in the use of telemedicine services was observed since the coronavirus disease 2019 (COVID-19) pandemic's early stages in 2020, with continuous growth in the demand for such a service also evident in countries such as South Africa where access to affordable health care remains a challenge for many individuals. Where telemedicine was already used in several developed countries before COVID-19, the pandemic highlighted the need for and relevance of telemedicine in developing countries as well. Telemedicine provision makes more convenient access to more affordable health care alternatives possible, especially to individuals who would normally experience difficulty to access quality health care services because of certain constraints, such as geographical area, financial limitations and logistical challenges (Percept, 2020). Pertaining to South Africa specifically, telemedicine services provide a health care service alternative to specifically address the needs of the majority of patients in the country, that is, individuals who are generally fully reliant on the overburdened public health care sector for medical care because of a lack of medical insurance. A lack of medical insurance often implies an inability to pay for the more expensive alternative, that is, private health care sector services.

At the time of this study, relevant antecedents or determinants of South African public sector patients' acceptance of telemedicine services have not yet been identified, including app-based

**Note:** Special Collection: Managerial Practices.

telemedicine services for primary care. Moreover, investigations of the possible resulting relationships between telemedicine service acceptance and important outcomes for telemedicine service providers were found to be scant. We conducted a novel mixed methods study informed by an exploratory sequential approach to address this research gap. The qualitative research phase identified relevant antecedents of telemedicine service acceptance in our study's unique South African public health care sector context. In the quantitative phase these determinants were measured in relation to telemedicine service acceptance as well as perceived value, patient participation, patient experience, patient satisfaction with a telemedicine service, patient trust in telemedicine services and two dependent variables as possible outcomes of patient satisfaction and trust, namely continuance intention towards both a telemedicine service and the telemedicine service provider. However, in this article, only the findings from the qualitative research phase are reported, emphasising the identification of the relevant antecedents of patients' acceptance of an app-based telemedicine service for primary care in the South African public health care sector.

The research was conducted in the context of an existing mobile application-based primary care telemedicine service in South Africa called Kena Health that aims to specifically address the needs of patients who would be fully reliant on the South African public health care system to receive primary care if telemedicine alternatives were to be unavailable (Kena Health, 2022). Kena Health's service is based on the concept of direct virtual patient-provider primary care consultation on a mobile application platform, which includes a chat function that patients may decide to use instead of a video consultation, for example. The chat function concept used by Kena Health was originally designed in Sweden and later sold to a Brazilian company (S. Burger [personal interview], 08 February 2024).

At present, after buying the rights to tailor the app's chat function for the South African market, Kena Health is an independent South African company and an example of how managerial practice between developed and developing countries contributed to establishing a service that makes quality health care more accessible to more people in South Africa. The focus of the research was on patients who are typically reliant on public healthcare services to receive medical care and who have previously been exposed to Kena Health's service, because such prior exposure was pivotal for investigating outcomes such as patients' satisfaction, trust and continuance intention.

Even though South Africa boasts the highest standard of health care on the African continent, the country's health care system is two-tiered and regarded as highly unequal, as the country's public health care sector (serving about 80% of the population) is underfunded, while most of the population cannot afford the exorbitant costs associated with private medical care provided by the private health care sector

(Buswell, 2022; Rensburg, 2021). A major gap between public and private health care facilities in much of the country exists given significant funding differences and the best medical specialists mostly working in the private sector (Heunis et al., 2019).

Consequently, South African citizens as well as expats are encouraged to pay for a private health insurance plan even though health care at a reduced price is offered in the public sector to provide for individuals who earn the lowest levels of disposable income (Buswell, 2022; Ngobeni et al., 2020).

Public health care in South Africa can be accessed by any individual, regardless of their immigration status or nationality; however, it primarily serves those who cannot afford the costs of private health insurance, which is typically a necessity for access to private medical care (Hlafa et al., 2019; Michel et al., 2020). According to Buswell (2022) and Hlafa et al. (2019), the public sector is funded by government spending through taxation as well as point-of-care spending by individuals using public health care services. Even as public health care services seem highly affordable to even the lowest income earners, waiting times to see a qualified health professional can be long, especially when patients need to see a specialist (Maphumulo & Bhengu, 2019; Mhlanga & Garidzirai, 2020).

On the other hand, private health care in South Africa, despite being smaller than the public health care sector, is regarded as comparable to health care in the developed countries such as France, Germany and the United Kingdom (Buswell, 2022). Mwangama et al. (2020) reported that about 79% of doctors in South Africa work in the private sector in about 200 private hospitals across the country. Even though the private sector is regarded as being of superior quality to the public sector, it has, however, recently come under some criticism for being monopolised by a small number of large providers and over-pricing (Picard & Zimper, 2022; Wasserman, 2023). In this sector, patients are enabled (by paying private health insurance) to choose their own health care professional, experience shorter waiting times and access specialist health care without a referral from a general practitioner (Buswell, 2022).

Rensburg (2021) argued that the way in which the South African health care system is funded perpetuates inequality and that the need for a strong primary health care network consisting of well-trained competent community health workers is paramount. Unfortunately, much trust has been lost in South Africa's public health care system by South African residents, as primary public health institutions, in rural areas specifically, are too poorly equipped and maintained to be able to provide efficient and effective health care services (Bhamjee et al., 2022; Maphumulo & Bhengu, 2019). Poor maintenance of public health institutions could point to a lack of good governance, corruption and mismanagement of resources (Naher et al., 2020). Subsequently, alternative methods to provide for individuals

who would typically be reliant on public health institutions for their medical needs, such as mobile platforms, have been explored in previous research (Morris et al., 2022).

### Insights into mobile phone usage in South Africa

Bhaskar et al. (2020) stated that sub-Saharan Africa in particular, but also Africa in general, suffers high burdens of disease and physician shortages, which would require international support for assisting the instigation of digital health efforts. In South Africa, high mobile and internet penetration rates underscore the possibility for telemedicine to compensate for physician shortage even though some constraints such as economic development and internet speed should be accounted for considering telemedicine implementation (Bhaskar et al., 2020; Zgovu, 2021).

The number of mobile users in South Africa has increased, particularly among lower-income individuals, and, in 2019, smartphone penetration reached over 90% (Miyajima, 2022). According to O'Dea (2022), between 20 and 22 million people in South Africa use a smartphone, which resembles approximately a third of the South African population. It has been confirmed that continued growth in smartphone penetration is expected (Taylor, 2023). These statistics are noteworthy as smartphones are the predominant means by which mobile applications, such as app-based telemedicine services, can be accessed and used. Such penetration levels (ownership and usage of smartphones) include individuals with lower socio-economic status and citizens who would typically be reliant on public health care services for their medical needs. According to Adepoju (2020), more Africans will continue to be or become owners of smartphones, and it is expected that the number of mobile connection users in sub-Saharan Africa (including South Africa) will reach 1.05 billion in 2025. In 2022, the number of smartphone users in South Africa reached 25.5 million (Statista, 2022).

The investment by the South African government in the procurement of equipment that would be compatible with telemedicine at scale has not been made for South Africa's public health system (Bhamjee et al., 2022; Katurura & Cilliers, 2018). According to Bhamjee et al. (2022), many if not most public sector hospitals in South Africa are limited in their access to internet and information technology (IT) support, infrastructure, equipment and human resources, which are all essential for the successful and sustainable implementation of telemedicine service delivery. Public health care facilities in South Africa are not yet ready (and such potential future readiness is uncertain) to deliver telemedicine services effectively and efficiently (Aruleba & Jere, 2022; Bhamjee et al., 2022; Mbunge et al., 2022).

Consequently, providing and utilising alternative (private and/or commercial) channels for telemedicine for delivering primary medical care to citizens reliant on South Africa's public health care system remain a noteworthy strategy for offering cost-effective improvements to health care service

delivery (both in South Africa and Africa) (Bhaskar et al., 2020; Mbunge et al., 2022; Olu et al., 2019). The use and significance of mobile applications (for instance, Kena Health) as primary care telemedicine platforms for public sector patients, bridging the gap between quality primary health care delivery and patients' access to such care, are deemed relevant to improve the overburdened and deficient South African public health care system.

### Theoretical underpinnings

Our study is applicable to the service domain within business and marketing management and thus draws upon theories fitting to service marketing, relationship marketing, customer relations and consumer behaviour. Three technology acceptance models (TAMs), innovation diffusion theory (IDT) and self-efficacy theory provide the theoretical point of departure to investigate which factors of technology acceptance could be deemed relevant antecedents of the acceptance of an app-based telemedicine service for primary care.

According to Zhou et al. (2019), the theoretical analysis framework of the TAM and the Unified Theory of the Acceptance and Use of Technology (UTAUT) in the context of telemedicine service technology is based on an important shared assumption that patients' behavioural intentions to accept telemedicine would mainly depend on their understanding of and willingness to accept the new technology comprising telemedicine. Technology acceptance (or acceptance of telemedicine service in the context of this study) is defined as 'actual system use' in the TAM, while in the UTAUT, such acceptance is defined as 'use behaviour' (Harst et al., 2019, p. 2). Both models aim to investigate technology acceptance to specifically explain the use of the technology (Harst et al., 2019), and therefore, we argue that acceptance of the technology implies actual use of the technology. In our study, acceptance is not considered as merely cognitive acceptance prior to use, but actual usage of the service (including use of the platform through which the service is provided).

In the UTAUT, four constructs are postulated as the main drivers of the acceptance of technology, namely, performance expectancy, effort expectancy, facilitating conditions and social influence (Chang, 2012; Patil et al., 2020; Venkatesh et al., 2012).

Building on UTAUT, UTAUT 2 included habit, hedonic motivation and price value as three additional constructs to explain technology acceptance (Chang, 2012; Patil et al., 2020). Unified Theory of the Acceptance and Use of Technology 2 was extended from UTAUT to make UTAUT (originally developed within an organisational context) more applicable to exploring the technology acceptance of end-users. Tuan (2022) confirmed that it is important to not only include organisational mechanisms but also include customer characteristics in the same model to investigate customer's readiness to engage in digital service delivery following their

acceptance (and therefore use) of the relevant technology, which applies to our focus on patients as the end-users of an app-based primary care telemedicine service.

Technology acceptance model combined with IDT could represent the most powerful theoretical basis for emphasising the adoption or acceptance of innovative technology, as academics have applied it extensively to explore the acceptance of a variety of technological innovations (Al-Rahmi et al., 2019; Moore & Benbasat, 1991). Scholars (Al-Rahmi et al., 2019; Wani & Ali, 2015) agree that IDT comprises five fundamental attributes that are largely involved to influence the acceptance of an innovation by contributing to the decrease of uncertainty that customers may foster towards the innovation. The five attributes are relative advantage, compatibility, complexity, observability and trialability (Al-Rahmi et al., 2019; Wani & Ali, 2015).

An understanding of the South African health care landscape with specific consideration of the country's public health care sector, as well as mobile usage among the general population, provided context for a research design and methodology for answering the research question: What are the main determinants (antecedents) of an app-based telemedicine service for primary care among South Africans who are typically reliant on the country's public health care services for their primary medical needs?

## Research design and methodology

A theoretical model was proposed drawing from the literature on the TAM, the UTAUT, UTAUT 2, IDT and Self-efficacy Theory. Our study followed a mixed methods exploratory sequential design for data collection and analysis. This study focuses on the first, that is, the qualitative phase.

Several antecedents of telemedicine service acceptance were identified by means of a literature study, followed by thematic analysis of qualitative data, after the data had been collected through individual semi-structured interviews. Participants were recruited on the Kena Health client base by the distribution of a Google form inviting individuals to participate in the study. The form was distributed to each patient on the client base by an employee of Kena Health that acted as our channel of contact with the industry partner. Participants that consented to participate received an invitation to an online interview. The goal of the qualitative research phase was to identify antecedents of telemedicine service acceptance (in the context of app-based primary care) for inclusion in the quantitative measurement of the empirical research model. Once interviews were completed, the interview data were transcribed and uploaded to ATLAS.ti for thematic analysis.

To collect qualitative data for thematic analysis, a total of 14 semi-structured individual interviews were conducted with patients who have had at least one prior service interaction with Kena Health (refer to Addendum 1). Based on research

by Alam (2021), it was deduced that a significant saturation in the frequency of themes may be reached after conducting between 6 and 12 interviews among a sample that represents homogenous characteristics and to which a similar set of questions is asked. Theme saturation was reached after 14 interviews were completed.

To identify the relevant antecedents of telemedicine service acceptance, both deductive and inductive coding approaches were used to identify themes from the data. Deductive coding was possible based on existing technology acceptance factors identified in the literature. Inductive coding took place in cases where participants provided 'novel' data and/or insights that at face value differed from the existing technology acceptance factors previously reported in literature.

The validation of the data was underscored by investigator triangulation, which added to the rigour of the study because the researcher was both the data collector and analyst, potentially predisposing the analysis to bias if not for the validation steps applied (Creswell & Miller, 2000). Investigator triangulation (by intercoder agreement to test for the consistency of the researcher's coding findings) was conducted with two other investigators with expertise in the fields of marketing, consumer behaviour and industrial psychology. At the point of consensual coding, intercoder agreement was 85%, which was deemed sufficient, based on inferences by Miles et al. (2013), for final refinement of the agreed upon codes. The codes represented the identified independent variables for inclusion in the subsequent quantitative research phase to follow (not reported in this article).

## Ethical considerations

An application for full ethical approval was made to the Research Ethics Committee at Stellenbosch University, and ethics consent was received on 23 February 2023. The ethics approval number is ONB-2022-26695. Written informed consent was obtained from all individual participants involved in the study by way of a Google form. Confidentiality of data was maintained by analysing the responses from participants anonymously as well as keeping access to the data secured by a password that was only known to the researcher.

## Results

In this section, the demographic characteristics of the sample of participants will be reported. We also discuss each of the eight identified antecedents of telemedicine service acceptance in our study's South African public health care sector context for inclusion in the empirical quantitative measurement of the final research model.

### Profile of the sample of participants

The sample of interview participants represented 11 female and 3 male South African citizens, which was representative

of the overall gender demographic of Kena Health's client base, different racial groups as well as geographical areas. Most of the participants (57.1%) were between 28 and 37 years of age at the time of data collection, while 21.4% were between 38 and 47 years old. Only 1 participant was between 58 and 67 years old, and the remaining 14.3% of participants were between 18 and 27 years of age.

More than half of the participants (64.3% of the sample) indicated a dependency on the use of public transport such as a minibus taxi, bus or train (with the use of minibus taxi being the highest).

Minibus taxis are the predominant mode of transport used by individuals who cannot afford their own vehicle or other forms of transport, as minibus taxis service 66.5% of South African households compared to buses (23.6%) and trains (9.9%) (Gedye, 2020). Such individuals form part of the profile of individuals who are typically reliant on public health care sector services as well as the target market of Kena Health; 64.3% of the participants confirmed that they depend on pharmacies, public clinics and public hospitals when in need of primary care services (in the absence of telemedicine alternatives to receive care). All participants indicated that they used their own smartphone or mobile device and had access to Wi-Fi and/or broadband and/or fibre by which they made use of the app-based telemedicine service.

In the sample, 57.1% of participants stated that they heard of Kena Health through social media. Regarding disposable income, 42.9% of the participants indicated that they earned a household income of less than R34 999.00 (approximately \$1837.00) per year, while 14.3% did not know what their household income per year is. Furthermore, 42.9% of the participants were unemployed and looking for work, while only 21.4% were employed and working for wages. The highest level of education among the most participants was a National Senior Certificate (grade 12 in the South African higher education system) (42.9%), whereas 28.6% of the participants had at least 1 year of technical training at a college or similar institution but did not complete any degree. One participant was qualified with an Honours degree, one with a Bachelor's degree and two with a Master's degree, respectively.

Within this article, only 2 identifiers (participant number and gender) are available for each direct quotation due to ethical considerations and data sensitivity.

### Identified antecedents of telemedicine service acceptance

The final set of codes (each representing an independent variable) that were agreed upon comprises perceived compatibility, perceived ease of use, price value, relative advantage, innovativeness, trust, privacy perception and care perception. Each antecedent is defined using both formal definitions from the literature and further explanations as it

emerged from the intercoder agreement and consensual coding process. These are addressed next.

*Perceived compatibility:* Perceived compatibility refers to the degree to which accepting an innovation is compatible with what an individual would normally do or like to do and consistent with the individual's values and beliefs, needs, past experiences and previous ideas (Helitzer et al., 2003; Nordhoff et al., 2021; Wani & Ali, 2015; Yuen et al., 2020).

The extent to which the app-based telemedicine service is compatible with an individual's preference when receiving health care is also included. Several interviewees explained that older individuals tend to endorse traditional cultural perspectives on health treatment, such as the use of traditional healers more than younger individuals and that the use of telemedicine would likely, as a result, be associated with lower compatibility among older individuals. Conversely, according to the interviewees, telemedicine could be more compatible with the needs of younger individuals regarding health treatment. However, the emphasis remains on the compatibility of telemedicine with each individual patient's need and preference, irrespective of their age.

As one interviewee explained:

'... being able to speak with someone [*on the telemedicine app*] that will understand what I need and be able to match it with the current climate [*steering away from only following traditional beliefs on healthcare*], so to say, and not question or try and encourage you otherwise, I think for me that was the selling point mostly.' (Participant 2, Male)

Another interviewee stated:

'... time, time, time, time, time. You know when you go to the doctors, you find queues, sometimes you go in lunch and you can't find time. So especially for me, you know, trying to balance work and school sometimes I don't find time when I'm sick, like especially in terms of work, you have to ask. Maybe you have to ask for sick leave. So that is very convenient because I don't have to do that [*to use the app*]. You know, I just get my prescription and then when I knock off, I just go to the pharmacy and get whatever that I need.' (Participant 1, Female)

Insights gained from the interviews indicated that patients found the app-based telemedicine service more compatible with their needs and preferences related to receiving primary care compared to public health care sector facilities that they would be reliant on in the absence of a telemedicine alternative. The thematic analysis suggested that such compatibility served as a distinct motivation for the participants to accept and continue using the app-based telemedicine service to receive primary care.

*Perceived ease of use:* Defined as the extent to which a person believes that using a technological system would be 'free of effort', perceived ease of use includes perceptions of complexity, that is, the extent to which individuals perceive

the technology innovation as relatively easy or difficult to understand and use (Davis, 1989; Wani & Ali, 2015). Furthermore, effort expectancy as described in the UTAUT framework is also accounted for, that is, patients' perceptions regarding how simple it would be to use the technology, how easy it would be to learn to use the technology, how easily the technology would be understandable and clear, as well as how clear and how convenient the use of the technology would be (Cimperman et al., 2016; Wilson et al., 2021).

Relating to the app-based telemedicine provider, Kena Health, one interviewee for instance explained:

'I think the app is very user friendly. Everybody and anyone can use it. Even an elder or someone. When you open an account, you just put your cell phone number, your name and your password and that's it. So, it's not even that complicated. I've already introduced it to a few people and also some of my family members. So now they also use it.' (Participant 1, Female)

Another interviewee stated:

'It was surprisingly easy to use. You know, I could easily manoeuvre the app, everything could be easily accessed. There were no problems'. (Participant 3, Female)

The perceived ease of use related to the app-based telemedicine service consistently emerged as a prominent theme throughout the analysis of the qualitative data.

*Price value:* Price value, forming part of UTAUT 2, refers to the cost structure and pricing that an individual associates with the use of the technology (Chang, 2012). Here, perceptions of affordability are included, that is, when an individual deems the total cost to use the technology (the service including the platform through which it is delivered) and receive the necessary care affordable (Saxena et al., 2022; Zhou et al., 2019). Based on the qualitative data, the price value of an app-based telemedicine service compared to an in-person alternative seemed to have been a noteworthy antecedent of people's acceptance of the service.

One interviewee said:

'So for me, another thing that made me go for it [*the telemedicine service*] is that it was cheaper. When I calculated the money I was gonna pay to see the doctor in-person and the money that I paid to get the assistance at Kena, it was very cheap on Kena for me. So even when I used the app, they prescribed some pills for me to go and get, and even after buying them at Clicks, the total cost was much cheaper than what an in-person consultation would have been. So for me, that's why I was happy [*with the telemedicine service*].' (Participant 6, Female)

*Relative advantage:* The extent to which patients could perceive an app-based primary care telemedicine service as better than traditional in-person primary care services denotes relative advantage (Helitzer et al., 2003; Moore & Benbasat, 1991). A predominant factor here is the associated convenience of the app-based telemedicine service compared to in-person

services (Dhagarra et al., 2020; Swan, 2019; Zhou et al., 2019). Perceptions of waiting time are included, which indicates the extent to which patients perceive reduced waiting times related to the virtual health care delivery context compared to in-person alternatives (Dhagarra et al., 2020; Zhou et al., 2019). Perceptions of usefulness are also included, that is, patients' perceptions that using the app-based telemedicine service would lead to better results compared to traditional in-person health care services, for example, the reduced service time of receiving health care and faster delivery of the necessary service for the individual's particular need while lower costs apply (Kamal et al., 2020).

From our qualitative data analysis, it was clear that patients deemed the relative advantage of the app-based telemedicine service as greater than that of an in-person health care alternative, warranting inclusion in the empirical model. As one interviewee explained:

'The best and biggest benefit is the application of the telemedicine service. I think anyone with a smartphone understands what they need. This service literally becomes the easiest way to get a prescription and get your medications, and even including the repeat. So that removes the driving, the standing in queues and so on. So, if we're able to get this done over the phone, getting a script and not even needing to print it out, I think that's just the definition of convenience.' (Participant 2, Male)

*Innovativeness:* As one of the four components of technology readiness, innovativeness is defined as a disposition towards technology-based systems and technology innovations, which entails readiness and eagerness to use these systems (Lin et al., 2007; Parasuraman, 2000). Innovativeness is further defined as a person's willingness to embrace new technology and change, as well as the degree to which a consumer would accept new product or service innovations at relatively earlier stages compared to other consumers (Makki et al., 2016). An individual's curiosity about technology innovation and overall readiness to use it was included in this variable based on the findings from the qualitative data. Patients who were curious about the app-based telemedicine service (and consequently decided to accept it) were also individuals who identified with being generally open to test and try new technological innovations, such as receiving health care online (which is still quite a novel innovation among the general South African population).

For example, one interviewee noted:

'One set of the target market are people who are willing to try new things digitally, who have a like a fairly good understanding of technology and very comfortable with using apps.' (Participant 5, Female)

Another interviewee shared:

'I guess I was curious. I've never done an online consultation before, so I guess I just wanted to find out how it works and stuff and how they will offer consultations ...' (Participant 9, Female)

*Trust:* Trust as an antecedent of telemedicine acceptance is a belief that the party that the patient is putting his or her trust

in (the service provider) has high integrity and is reliable and knowledgeable (Kamal et al., 2020; Morgan & Hunt, 1994). In the presence of trust, patients would also associate the service provider with consistency, honesty, fairness, competency, helpfulness, responsibility and even benevolence (Berger et al., 2020; Morgan & Hunt, 1994).

The data analysis yielded the insight that an individual's sense of trust that may lead to acceptance of the telemedicine service was induced by hearing and seeing others' positive experiences of the app, especially through reviews. One interviewee explained:

'People now go to Google to, you know, search and get their symptoms and all, and sometimes they don't get it right. I'm saying telemedicine is the best thing to have because you know that if you talk to somebody on that app, you know you will get a proper diagnosis of what is going on with you. Unlike going to Google your symptoms and all that because sometimes you get it wrong but people sometimes depend on it. Telemedicine is very good and better.' (Participant 3, Female)

Therefore, based on the qualitative results, a sense of awareness of the service (through patient reviews, for example) is also encompassed in the trust antecedent included in the empirical model.

*Privacy perception:* Privacy perception can be conceptualised as the extent to which an individual may perceive a telemedicine service as either more or less private than in-person health care services (Lassarén et al., 2022). Where telemedicine acceptance is often associated with more privacy risks compared to in-person alternatives (Baudier et al., 2020; Kamal et al., 2020), our qualitative results showed that patients had perceptions of more patient privacy during app-based teleconsultations compared to in-person consultations at public clinics for example. The app-based consultations allowed for 'anonymous' consultation where the patients did not have to be seen (for example, when text or call was used instead of video) and where other patients could not listen in on the patient's conversation with the health care professional, as is often the case in South African under-resourced public health care facilities. These circumstances are deemed highly important by the participants for their acceptance of the app-based telemedicine service. An interviewee, for example noted:

'... You can just be anonymous, you can just find your prescription or whatever that you're looking. So for me, I think it's just a good thing because I think some people sometimes are afraid to go to the hospital or clinic because they will be afraid that maybe the nurse will shout at them or the doctor will not be ... you know, that fear. But in terms of through the Kena app, it's that there's a possibility that you don't allow them to see you. So, yeah. I think it's just convenient for everyone.' (Participant 1, Female)

Another interviewee mentioned:

'When I came back again to the app, the information we [*the patient and the practitioner*] discussed was no longer there, so once you discussed something, then it's wiped out, so like, you cannot go back. Sometimes if someone gets access to your

phone, they can go to the apps and read your stuff and all that. So that's a nice thing about this app [*Kena*], the information, whatever you asked or discussed is no longer there.' (Participant 3, Female)

*Care perception:* Care perception encompasses aspects of care such as empathy, kindness and respect that patients attach to a telemedicine service, sometimes even more so than when compared to in-person health care services (Mercer et al., 2004). This notion was confirmed in the findings yielded by our data analysis as participants emphasised their experience of care related to the app-based telemedicine service, for instance, that the health care professional listened with genuine care to what they shared, understood their fears and concerns and treated them with understanding and empathy. Moreover, especially compared to in-person interactions at public health care facilities, experiences that the health care professional was not rushed during the consultation but gave the patients a chance to share their needs in its entirety were also highlighted. Participants' perceptions of professionalism experienced during the service interaction are also included, because a sense of professionalism is associated with a high level of care and correlates with the perceived competency of the health care professional involved. Here, the health care professional's competency may reflect the following: interpersonal and communication skills, patient care including clinical reasoning and the use of the particular technological system or platform to deliver the health care service.

One interviewee particularly noted:

'I have thought it [*using the Kena app*] could help me because most of the time when you go to public clinics or other clinics, they shout at us without giving us the help that we came for. So I thought it will help me because I wanted to come straight to a person who won't judge me and whatsoever.' (Participant 7, Female)

Another interviewee stated:

'So being able to speak with someone [*on the telemedicine app*] that will understand what I need and be able to match it with the current climate, so to say, and not question or try and encourage you otherwise, I think for me that was the selling point mostly.' (Participant 2, Male)

## Conclusion, recommendations and limitations

To conclude, we recommend the inclusion of eight hypothesised antecedents of telemedicine service acceptance for empirical quantitative measurement and testing in a theoretical research model (our theoretical research model for quantitative testing is central to the second phase of our mixed methods study and not reported in this study). Considering the potential effect and strength of these eight antecedents pertaining to telemedicine service acceptance in the South African public health care sector context poses a novel contribution to the literature.

Our results can only be applied to telemedicine services aimed at delivering app-based primary care. Furthermore, as our sample represents participants (patients) who typically cannot afford medical insurance and are therefore dependent on public health care sector services in South Africa, the results can only be applied to target markets with similar characteristics. Future studies can replicate our research among South African private sector patients, for example, representing South Africans who typically can afford medical insurance and thus have more disposable income (representing patients who possibly attach more value to certain factors different to a public sector target market). Moreover, even though theme saturation was reached after 14 interviews, we acknowledge that this number of interviews could act as a limitation of the qualitative findings and that future research could incorporate the insights of more patients. We suggest that similar research be conducted on other telemedicine services such as treatment for specific conditions (e.g. diabetes and haemophilia) in a South African context, as the antecedents of the acceptance of such telemedicine services could potentially differ from the antecedents of app-based primary care reported in this study.

## Acknowledgements

### Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

### Authors' contributions

G.v.T. conceptualised, wrote and edited the original copy of the article. R.D.P. and C.D.P. contributed to writing, reviewing and editing the article.

### Funding information

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

### Data availability

Primary data were collected by the authors and are available on reasonable request.

### Disclaimer

The views and opinions expressed in this article are those of the authors and are the product of professional research. It does not necessarily reflect the official policy or position of any affiliated institution, funder, agency or that of the publisher. The authors are responsible for this study's results, findings and content.

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Addendum starts on the next page →

# Addendum 1

## Interview discussion guide

The interviewer will be using the following document as a guideline for conducting interviews for the study's qualitative research phase. This guide covers subjects that must be discussed to obtain the qualitative data for the researcher's study. Textbox 1 represents sample questions for the interviews based on telemedicine acceptance research conducted by Holtz et al. (2022). The accommodating probing technique was used to facilitate further investigation of participants' answers during the interviews (Moerman, 2010).

### Textbox 1. Sample qualitative interview questions.

How does your technology access or connectivity impact your willingness to use telemedicine services?

Why did you use telemedicine? / Why haven't you used telemedicine?

Were you able to have your visit from your home or did you have to go someplace else?

Describe the process of setting up a telemedicine appointment, from scheduling to the visit.

How would you describe the communication between you and your provider during the telemedicine visit?

What are things you liked about your telemedicine visit(s)?

What are things that you didn't like about your visit?

How (if at all) have your past experiences with telemedicine impacted your future use of telemedicine?

Would you recommend telemedicine to a relative or friend? Why or why not?

Source: Holtz, B., Mitchell, K., Hirko, K., & Ford, S. (2022). Using the Technology Acceptance Model to characterize barriers and opportunities of telemedicine in rural populations: Survey and interview study. *JMIR Formative Research*, 6(4), e35130

Time allocated	Topic for discussion
<b>Introduction</b>	
7 min	Thank the interviewee that he or she is willing to be interviewed. Introduction and explanation that the interview is voluntary, and that the interviewee may withdraw at any time during the interview. The interviewer will ask if the interviewee consents to the interview being recorded; if not, notes will be taken by hand by the interviewer. Give a quick explanation of the study.
<b>Kena Health</b>	
10 min	Ask participants how they came to hear of Kena Health and app-based telemedicine. Ask participants what encouraged them to decide to use the Kena Health app. Employ accommodating probing tactics based on participants' answers to further explore their responses.
<b>Drivers and barriers of acceptance</b>	
10 min	Ask participants what the biggest motivator for them was to use the app. Employ accommodating probing tactic based on participants' answers to further explore their responses. Ask participants what made it difficult for them to use the app and/or what would cause them to discontinue using the app. Employ accommodating probing tactic based on participants' answers to further explore their responses.
<b>Experience and continuance intention</b>	
10 min	Ask participants how they experienced the service on the Kena Health app. Employ accommodating probing tactic based on participants' answers to further explore their responses. Ask participants whether they would use the service again or not and why. Employ accommodating probing tactic based on participants' answers to further explore their responses.
<b>Conclusion</b>	
3 min	Take time to thank the participant and reassure the interviewee of their anonymity. An additional 5–10 min will be allowed to ask or discuss any other topics the interviewee would like to add.