

Blood donor app usage behaviour and perceptions: Considerations for a blood donation app



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Background: South Africa often experiences critically low blood stock levels, making it vulnerable to blood shortages for everyday use and during times of crisis. There are over 3.5 billion smartphone users worldwide and, during 2019, app downloads were estimated at 204 billion. Considering that at least 51% of South Africans own a smartphone that can access the Internet and apps, it is clear that blood donation organisations in South Africa could benefit from engaging with the public through a mobile app.

Objectives: This article aimed to determine whether South African blood donors' app usage behaviour and perceptions were conducive to introduce a blood donation app, and what these behaviours and perceptions could reveal, to support South African Blood Donation Organisations in their recruitment and engagement endeavours.

Method: The research problem discussed in this article sought to highlight the app usage behaviour of blood donors, and their perceptions about a proposed blood donation app. Forming part of a larger sequential mixed-methods study, the data presented in this article were gathered through a quantitative online questionnaire involving 2154 South Africans respondents.

Results: The findings revealed that the majority of respondents owned a smart device and that they used apps falling within the 'Communication' category. Of the respondents, 41% believed that a blood donation app will encourage younger South Africans to donate blood more regularly, whilst 25% of respondents were of the opinion that an app will motivate all South Africans to donate blood more often.

Conclusion: The value of this research lies in the insight gained into the behaviour and perceptions of South African blood donors, which can inform the conceptualisation and design of a blood donation app, thereby improving its efficacy and subsequently supporting the strategy of employing such a technology to increase blood donation.

Keywords: app features; smartphone use; blood donation app; blood donor interaction; blood donor perceptions.

Introduction

South Africa's high incidence of human immunodeficiency virus (HIV), trauma and chronic illness places constant strain on the country's already limited blood supply (Nkosi 2020). It is widely reported that fewer than 1% of South Africans donate blood, and therefore the South African National Blood Service (SANBS), the larger of the two blood donation organisations (BDOs) in South Africa, strategically aims to increase the recruitment of new donors (Arrive Alive 2019; Swanevelder et al. 2019). The research question posed in this article formed part of a larger study on mobile app preferences (Potgieter & Rensleigh 2019a, 2019b) and aimed to determine whether South African blood donors' app usage behaviour and perceptions were conducive to introduce a blood donation app, and what these behaviours and perceptions could reveal, to support South African BDOs in their recruitment and engagement endeavours.

The use of an app to engage with blood donors is a practical idea, considering that the opportunities for user interaction through apps are vast, with more than 60 million smartphone subscriptions being recorded in South Africa during 2021 (Independent Communications Authority of South Africa [ICASA] 2021). It is crucial that the prospective users of an app be considered during the conceptualisation and development of the app, specifically in terms of understanding the users' needs, concerns and preferences (Arnhold, Quade & Kirch 2014; Krebs & Duncan 2015; Middelweerd et al. 2015). In addition, De Villiers, Chuchu and Chavarika (2020) found that if users were included in the design phase of an app, and enjoyed the co-creational activity, they were more likely to respond favourably to the final product. The necessity of including users in the

App	Publisher	Category	Usage Rank
WhatsApp Messenger	WhatsApp Inc.	COMMUNICATION	1
Facebook Lite	Facebook	SOCIAL	2
Google Play services	Google LLC	TOOLS	3
Google Chrome: Fast & Secure	Google LLC	COMMUNICATION	4
SHAREit - Transfer & Share	SHAREit Technologies Co.Ltd	TOOLS	5
Facebook	Facebook	SOCIAL	6
Google	Google LLC	TOOLS	7
YouTube	Google LLC	VIDEO_PLAYERS	8
Instagram	Instagram	SOCIAL	9
Messenger - Text and Video Chat for Free	Facebook	COMMUNICATION	10

Source: SimilarWeb, 2019, Mobile app ranking, viewed 13 September 2019 from <https://www.similarweb.com/apps/top/google/app-index/za/all/top-free>

FIGURE 1: Top 10 Android apps in South Africa, September 2019.

development phase of an app formed the basis of this article's focus. The researchers aimed to establish what perceptions South African blood donors held towards a blood donation app and what their app usage behaviour would reveal in terms of what they would require from such an app.

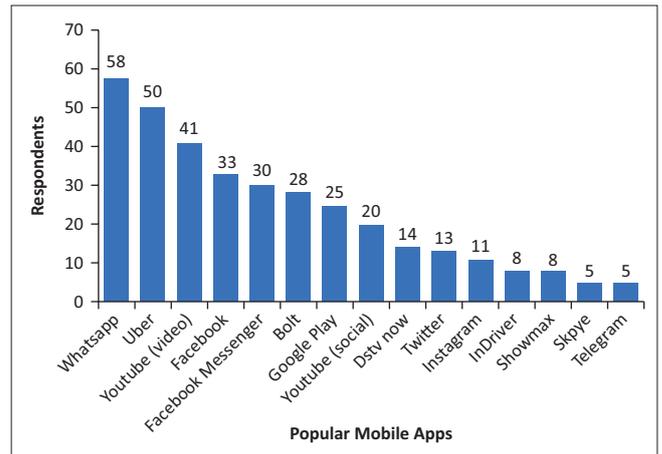
Literature review

Projections place the number of global smartphone users at 3.8 billion by 2021 (Holst 2020). The combination of smartphone penetration, the distribution of high-speed mobile infrastructure and the advancement of the iPhone OS (iOS) and Android app ecosystems has culminated in the perfect landscape for organisations to interact with their customers via apps (Jung et al. 2019). This booming technological landscape lies in stark contrast to the seemingly constant struggle of volunteer blood donor programmes in low-income countries, such as South Africa, where as much as 67% of transfusions are given to children under the age of five, and blood donation rates per capita are insufficient (Transfusion News 2018; World Health Organisation 2017, 2020).

Worldwide, a 'high degree of readiness and receptiveness' in terms of the use of blood donation apps has been recorded, with the trend being most pronounced in metropolitan areas and smart cities (Ouhbi et al. 2015:1; Yuan et al. 2016:620). Notably, in the quest to stimulate blood donation, identifying preferred app features has been established as a crucial step in successfully appealing to blood donors through a blood donation app (Yuan et al. 2016:620). An example of a success story in the mobile blood donation arena is that of the American Red Cross' Blood Donor app, which was developed in response to declining numbers of blood donors in the United States of America. Adoption of the Blood Donor app resulted in a 22.7% increase in scheduled appointments and 'around 600 000' lives being saved (Brown 2017; Moore 2019).

Mobile app trends in South Africa

In South Africa, the use of smartphones, and therefore apps, has become ubiquitous (Minnaar, Mototo & Chuchu 2020),



Source: Clement, J., 2020, Most popular mobile apps used in South Africa as of February 2020, viewed 19 May 2020, from <https://www.statista.com/statistics/1103151/most-popular-mobile-apps-south-africa/>

FIGURE 2: Most popular mobile apps used in South Africa, February 2020.

and it is common for organisations to 'guide their business through online platforms' such as apps (Maziriri et al. 2020). As shown in Figure 1, of the top 10 Android apps in South Africa during September 2019, the majority fell within the 'Tool' and 'Social' app categories, followed by those apps that fall within the 'Communication' app category (SimilarWeb 2019).

South African companies often engage with their followers through apps that fall within the 'Social' app category and through apps that facilitate communication, such as Facebook Messenger and WeChat (Flemming 2019). Communication apps were the third most popular app category represented on the top 10 list during this time (SimilarWeb 2019). Figure 2 shows the most popular mobile apps in South Africa, as of February 2020 (We Are Social & Hootsuite 2019). WhatsApp, which is often cited as South Africa's most popular app (Clement 2020), comes in the first position, with the taxi-hailing app Uber in second place (Clement 2020).

The popularity of communication apps is also shown in Figure 3 (We Are Social & Hootsuite 2020), where the use of mobile apps by category as of January 2020 shows that 95% of users, aged 16–64 years, spent almost just as much time per month on 'chat apps' as they do on social networking apps (96%). Notably, after entertainment and video apps (83%), which saw the third highest percentage of users per month, 75% of users reported that they spent a significant amount of time using location-based map apps.

Based on the app ranking and categories shown in this article, it is evident that communication, connectedness and functionality – using optimising tools – are important to app users in the South African landscape.

Blood donation and blood donation apps in South Africa

The need to understand a blood donation base is fundamental in the context of South Africa, where there is a high prevalence



Source: We Are Social & Hootsuite, 2020, *Digital 2020 South Africa*, viewed 18 February 2020, from <https://www.helloyes.co.za/digital-statistics-and-usage-in-south-africa-in-2020/>

FIGURE 3: Use of mobile apps by category in South Africa, January 2020.

of transfusion-transmissible infections (TTIs) within the population. However, research focused on blood donation practices is lacking in the sub-Saharan region (Burzynski, Nam & Le Voir 2016). Moreover, the South African blood donor base, at 437 000, is comparatively small (Tagny et al. 2010; Van den Berg et al. 2019), and with a population of 58.78 million (Stats SA 2019) that amounts to less than 1% of the South African population donating blood, this fact in itself deserves to be investigated more robustly.

Myths surrounding blood donation, for example, that you lose energy or become infertile if you donate blood, are widespread in sub-Saharan Africa (Lownik et al. 2012). Myths such as these could be dispelled by educational information being available through a blood donation app. South African blood donors could be educated, recruited and motivated to donate blood if the right information is disseminated through a mobile app.

Often, during times of high demand such as national holidays, blood shortages befall South Africa. A blood shortage is defined as a situation where blood donations are less than required, and pressure is placed on BDOs for increased blood supply (Gaz'lam 2019). The largest BDO in South Africa, the SANBS, seeks to have a bloodstock, of blood type O, of 5 days and regards a bloodstock of less than 2 days a shortage (Asamoah-Akuoko et al. 2017).

When designing interventions for improving the rate of blood donation, there are unique factors that should be taken into consideration when one focuses on sub-Saharan Africa (Asamoah-Akuoko et al. 2017). The need for education, motivation and recruitment of consistent blood donors is a necessity in South Africa (Muthivhi et al. 2015), which is why a blood donation app could assist in more than one way to improve BDO's engagement with donors and potential

donors. An example of the practical use of an app to engage with donors would be to distribute promotional communication, which is a need that existing and potential blood donors in South Africa have, especially if the distributed communication appeals to altruistic tendencies and practical aspects such as reminders of blood drives or when a blood donation is due (Muthivhi et al. 2015).

The SANBS launched a mobile app on Google Play and the Apple App Store called 'Calendar for Good' in 2017 (Media Update 2017). The app was designed to remind South Africans to do a good deed every day, and users could receive a push notification every morning 'with a suggestion for how to make a world of difference to someone else's day' (South African National Blood Service 2017). The app also encouraged blood donation and notified users of SANBS events (Media Update 2017). Calendar for Good had limited functionalities and did not offer features such as user profiles with donation tracking, and from October 2019, the app was no longer available for download.

In addition, in 2017, South Africa's second blood service, the Western Cape Blood Service (WCBS), launched a blood donation app for Android and Apple devices, to 'increase participation in blood donation' (Bizcommunity 2017). The app received 6364 downloads in the first 16 days after being launched, and the WCBS saw an increase of 780 new donors in less than a month after the launch of the app (Bizcommunity 2017). The WCBS app offers functionalities that are comparable to the American Red Cross Blood Donor app (Western Cape Blood Service 2020).

The WCBS app has been downloaded from Google Play more than 10 000 times since 14 October 2019 although the app's star rating was only 2.9 out of 5 (Google Play 2020). Of the 74

reviews published for the app on Google Play, several users complained about feature and functionality frustrations. The WCBS app is commended for its innovation, especially as it is the only app of its kind in South Africa. However, the app evidently had several technical issues, which hindered the use of its listed features. The researchers believe that the present research will be of value to the developers of this existing app to inform improvements and highlight user behaviours and perceptions regarding an app of this nature.

To this end, the research presented in this article will highlight the behaviours and perceptions of South African blood donors with regard to app technology in relation to blood donation.

Methodology

The research problem identified in this study was that BDOs in South Africa struggle to maintain a safe bloodstock level, whilst millions of South Africans own smartphones and can therefore be motivated, through app engagement, to donate blood. However, in order to determine the viability of introducing a new blood donation app in South Africa, it is important to determine South Africans' behaviour and perceptions regarding app technologies.

The data collection employed self-selected sampling, where respondents were emailed an invitation to participate in an online, quantitative questionnaire; respondents could choose whether they wanted to take part in the survey (Saunders, Lewis & Thornhill 2012). The email and data capturing process was administered through iFeedback, a South African data solutions company, via two respondent databases: the Citizen Science Institute database and the Interactive Direct Business Database (iFeedback 2020). In total, iFeedback sent 28437 emails to randomly selected members of these databases during July and August 2018. Upon conclusion, 2154 responses were received back for the questionnaire, and the statistical analysis and testing were conducted by the University of Johannesburg's Statistical Consultancy Services (Statcon), using the Statistical Package for Social Scientists (SPSS) software program.

Results and discussion

The questionnaire used in this study concentrated on technology and blood donation behaviour; however, the research focus of this article is to present app usage behaviour of the sample and their perceptions of a blood donation app. Although 2154 individuals submitted the questionnaire, these respondents had to be either existing or potential blood donors, and they had to own or have access to and use a smart device, such as a smartphone or tablet. Of the 2154 respondents, 824 (38.3%) were existing blood donors, and 1330 (61.7%) were not.

Blood donor services have minimum requirements for people who want to donate blood, which include a minimum weight and minimum and maximum age. Of the 1330 respondents who stated that they were not existing blood donors, 1313

answered the question 'If you are not an existing blood donor, is it because you do not meet some, or any, of the listed requirements?'. However, most of those respondents who stated that they did not donate blood, at 61.9% (823), specified that they did not donate blood for reasons other than not meeting the minimum requirements. This implied that these individuals could be regarded as potential blood donors, as they met the minimum requirements for donating blood in South Africa, and could continue with the survey.

Another qualifying question in the survey was whether respondents owned or had access to and used a smart device. A smart device was defined as 'a mobile device that can browse the Web and run applications (apps)'. As only existing and potential blood donors could answer this question, 1620 responses were received, and the majority of respondents (1584, 97.8%) confirmed that they did own or have access to a smart device, which they used. This finding also supports the notion that smartphone, and therefore app usage, in South Africa is indeed pervasive (Minnaar et al. 2020) and that a mobile app should be well received by blood donors in the country.

When respondents, most of whom were between 31 and 50 years of age, were asked whether a blood donation app could increase blood donations in South Africa, 650 (41.3%) of 1575 respondents stated that an app will encourage 'younger' (16–40-year-olds) people to donate more often. In addition, 401 (25.5%) respondents were of the opinion that a blood donation app will motivate all South Africans to donate blood more often regardless of their age. A smaller number of respondents (282, 17.9%) stated that an app would only raise blood donation awareness in South Africa but will not necessarily lead to increased blood donations. These results show that most respondents hold the view that an app will increase blood donation or at the very least raise awareness about the matter, which in itself can act as a sufficient motivator for blood donation (Boenigk, Leipnitz & Scherhag 2011).

Frequently used app categories were explored in another question, and a total of 809 respondents made 10507 selections to identify which app categories they used on their smart devices. Figure 4 shows that the most popular app category, used by 809 (100%) respondents, was 'Communications', which was followed by 'Finance' with 654 (80.8%) responses and 'Maps & Navigation', with 642 (79.4%) responses. Remarkably, the 'Social' app category was only the fifth most popular app category and was selected by 563 (69.6%) respondents, whilst the 'Weather' category took fourth place, with 570 (70.5%) responses. The 'Business' category, which included documents, editors and job search apps, was the sixth most used app category, with 502 (62.1%) responses.

From these findings, it is clear that respondents value communicating on their smart devices and also use these devices to simplify routine parts of their lives, such as banking, navigation, administrative tasks and weather considerations.

		Responses		Percent of cases
		<i>N</i>	Percent	
\$A10 Which categories of apps do you use on your smart device? ^a	A10.1 Art and design	118	1.1	14.6
	A10.2 Auto and vehicles	221	2.1	27.3
	A10.3 Beauty	82	0.8	10.1
	A10.4 Books and reference	420	4.0	51.9
	A10.5 Business	502	4.8	62.1
	A10.6 Comics	24	0.2	3.0
	A10.7 Communications	809	7.7	100.0
	A10.8 Dating	37	0.4	4.6
	A10.9 Education	221	2.1	27.3
	A10.10 Entertainment	473	4.5	58.5
	A10.11 Events	271	2.6	33.5
	A10.12 Family	147	1.4	18.2
	A10.13 Finance	654	6.2	80.8
	A10.14 Food and drink	359	3.4	44.4
	A10.15 Games	291	2.8	36.0
	A10.16 Health and fitness	440	4.2	54.4
	A10.17 House and home	185	1.8	22.9
	A10.18 Libraries and demo	45	0.4	5.6
	A10.19 Lifestyle	102	1.0	12.6
	A10.20 Maps and navigation	642	6.1	79.4
	A10.21 Medical	146	1.4	18.0
	A10.22 Music and audio	477	4.5	59.0
	A10.23 News and magazines	376	3.6	46.5
	A10.24 Parenting	60	0.6	7.4
	A10.25 Personalisation	215	2.0	26.6
	A10.26 Photography	450	4.3	55.6
	A10.27 Productivity	369	3.5	45.6
	A10.28 Shopping	341	3.2	42.2
	A10.29 Social	563	5.4	69.6
	A10.30 Sports	203	1.9	25.1
	A10.31 Tools	211	2.0	26.1
	A10.32 Travel and local	310	3.0	38.3
	A10.33 Video players and editors	173	1.6	21.4
	A10.34 Weather	570	5.4	70.5
Total	10507	100.0	1298.8	

FIGURE 4: App categories used by respondents.

It therefore stands to reason that should respondents be receptive to the idea of a blood donation app, such an app would need to aid them in streamlining their lives, making it easier and more convenient for them to donate blood.

Conclusion

This research aimed to establish app usage behaviour and the perceptions of South African blood donors towards a blood donation app. It was found that respondents indicated that a blood donation app will increase blood donation or will at the very least raise awareness about the matter, which was found to be a necessary precursor for increased blood donation. Furthermore, it was established that respondents valued apps that allowed them to communicate and streamline their lives through practical apps such as banking, navigation, weather and admin tasks. Therefore, keeping to the idea of simplifying donors' lives, a blood donation app should first and foremost aim to eliminate everyday barriers faced by blood donors when they want to donate blood. Based on the findings of this study, blood donation app developers should first and foremost make the practice of blood donation as easy as possible, through using app functionalities such as, for example, communication about blood drives, and navigation functions to nearby blood drives.

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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

All the authors contributed equally to the development of this article. A.P. conceptualised the research from her PhD study, developed the structure and key issues of the article, and did the write-up. C.R. was responsible for editing and final structure and submission of the article to the journal.

Ethical considerations

Ethical clearance was obtained from the University of Johannesburg's College of Business and Economics Ethical Clearance Committee (No. IKM2018_018_RENSLEIGH_POTGIETER). All respondents gave informed consent to participate in the study.

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Data availability

The data that support the findings of this study are available from the corresponding author (A.P.) upon reasonable request.

Disclaimer

The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of any affiliated agency of the authors.

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