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THERE'S A GOOGLE SCHOLAR ALERT FOR THAT: AN INTEGRATIVE REVIEW METHODOLOGY EXPLORING MOBILE APP FEATURES THROUGH LEXIMANCER

Abstract:

Mobile application (app) usage has become a universal trend. Paramount in most app designers' focus, is what mobile app users want in terms of features offered by an app. Forming part of a larger study which aims to determine the most desirable app features for a mobile blood donation app, this paper reports on one section of that study's exploratory sequential mixed method research strategy. The paper illustrates how the use of Google Scholar alerts, over a period of six months, was systematically employed to inform the researchers of the most current research on app features. Abstracts and keywords from 47 academic articles which were included in the alert emails, were analysed through the natural language analysis software Leximancer. The findings aimed at highlighting prominent concepts and themes related to the development, selection, and application of mobile app features. Findings showed a prevalence of research articles focused on mobile health apps, specifically apps that support self-management of various illnesses.

Keywords:

Google Scholar; Leximancer; mobile app features; research trends

JEL Classification: L31, L86, O32

1 Introduction

South Africa is in constant need of blood donations, with blood reserves in the country being at constantly low levels (News24, 2018). The scarce commodity of blood, in the form of voluntary donations, is "given to trauma and accident victims, surgery patients, burn victims and people with blood diseases such as leukaemia and sickle-cell anaemia" (Cape Times, 2019). A concern is that South African youth constitute 50% of the population, but this demographic remains critically low on donors (News24, 2018). Considering the 18 – 34 years old South African demographic boasts the most frequent users of social media and that 78% of South Africans use mobile apps, app technology and the functionality it offers, may be able to serve the plight of blood donation in the country (Hootsuite, 2019:36,49). For an app to be successful, however, it needs to meet the needs of its users. To inform a larger study investigating preferred features of a mobile blood donation app in South Africa, this research aimed to establish what the larger research community is considering, when investigating mobile app features.

The use of apps is one of the most preferred ways of using mobile services (Kulta & Karjaluoto, 2016:169). In South Africa feature phones, which allow mobile app functionality, are also "popular and widely used" (Statista, 2019). The development of these mobile apps takes place in a competitive environment, where developers need to understand what users expect and require from any app that they download (Sarro, Harman, Jia, & Zhang, 2018:76). This understanding should specifically focus on interactive features, which increase "mobile touchpoints" and enhances engagement with customers (Kulta & Karjaluoto, 2016:171). Research on user experience, such as determining user preferred app features, is "rooted in User-Centred Design and usability" (Lallemand, Gronier & Koenig, 2015:46). To cultivate an understanding of the research space that explores user experience, this paper aimed at illuminating the focus of the scientific community currently, around mobile app features.

The work reported on in this paper, formed part of a larger study aimed at establishing preferred mobile app features of existing and potential blood donors in South Africa. In this paper, the researchers report on how Google Scholar Alerts were employed to gain insight into recent academic research trends focusing on mobile app features, to support the principle aim of the larger study. The goal of this research was to gain a snapshot overview of the most current research in the mobile app feature landscape, at a specific point in time, to inform the larger study which was mentioned. It must be noted that the researchers conducted this analysis as part of the ongoing literature review typically associated with academic research, but did not rely solely on the outcome of the findings of this paper for the identification of literature relevant to the study.

2 The relevance of recent research on mobile app features

As with many global blood service organisations, South African agencies are confronted with the issue of recruiting and retaining blood donors (Asamoah-Akuoko, Hassall, Bates, & Ullum, 2017:864). As mentioned, mobile apps are one way in which to engage with customers – or in the case of voluntary blood donation, donors. In this context, the research relevant to this paper set out to identify the latest research published on mobile app features, to gain a certain degree of insight into the literature landscape. The tool chosen in this instance was Google Scholar, a "scholarly literature retrieval and citations tracking tool" (Halevi, Moed & Bar-Ilan, 2017:824).

Google Scholar is a "free academic web search engine" that specialises in identifying bibliographic scholarly material (Martin-Martin, Orduna-Malea, Harzing, & López-Cózar, 2016:152) from approximately 100 million academic records (Peralta-Pizza, Pinzón, Gaitán, Eslava-Schmalbach, J. & Rodriguez-Malagon, 2019:1). In general, it is necessary for scholars to be aware of the development of their field of study, and to stay informed about recent literature publications (Botha, Lilford & Pitt, 2011:89). Such awareness becomes even more crucial when one is involved in a focused study such as the one of which this paper's subject forms part. According to Harzing and Alakangas (2016:800,802), Google Scholar provides the most comprehensive coverage when compared to Scopus and Web of Science, but that it does not have a "strong quality control process." This limitation, and the design and methodology of the research, will be addressed in the next sections.

3 Research design

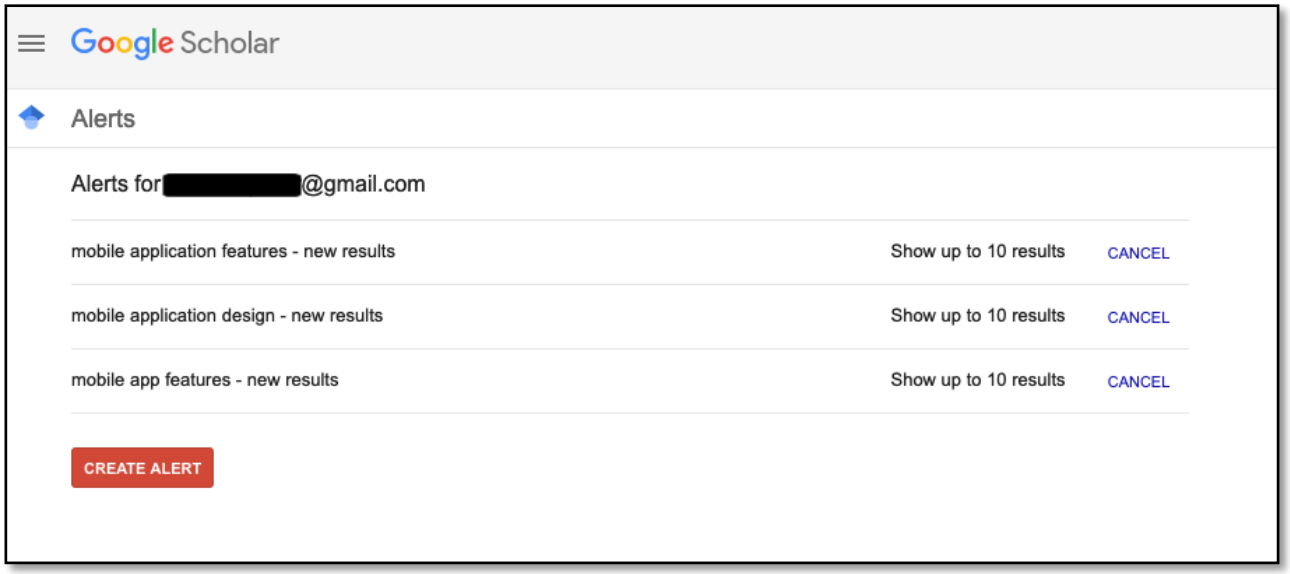
The philosophical paradigm within which this research was conducted was pragmatism, operating from the assertion that "concepts are only relevant where they support action" and where meaning must lead to practical consequence (Saunders, Lewis & Thornhill, 2012:130). The research approach was noted to be abduction, as the researchers were open to being lead to surprises and sought to let those surprises lead them to new understanding (Rechertz, 2014:126). In the context of this research, that new understanding was the landscape of recently published academic literature on mobile app features. The research strategy for the research relevant to this paper was a qualitative content analysis, employing the use of a software-generated natural language analysis through Leximancer. The content analysis for this study was conducted as an integrative review, as it synthesised "existing literature on a topic with the goal of understanding trends in that body of knowledge" (Williams & Vogt, 2011:189). The methodological choice for this research was mono-method qualitative, during a cross-sectional time horizon.

4 Research methods

The research question which framed this paper was *'What are the research trend in the mobile application landscape, based on articles highlighted through recent Google Scholar Alerts?*'.

The population of the study was Google Scholar Alerts, set up for a Gmail account, between 1 October 2018 and 31 March 2019. The alerts relevant to this paper, were set up to notify the requester of new publications fitting the key words "mobile application features" and "mobile app features" (See Figure 1 below).

Figure 1: Google Scholar Alert list including the two relevant alert terms



Source: Screenshot from Gmail Alert settings page

In total, the two relevant alert terms garnered 151 emails to be sent to the Gmail account over the course of the six months. Using purposive, judgmental sampling, 47 articles from the lists of new articles in the alert emails, were deemed relevant to ultimately be included in the analysis. The exclusion criteria were that no patent applications, or academic theses be included. Only articles published in peer reviewed, academic journals that focused on app features, were considered relevant. The article titles, abstracts and keywords from the 47 identified articles were combined in an Excel spreadsheet, and submitted for thematic analysis through Leximancer. Figure 2 shows a screenshot of a section, with rows not collapsed, of the Excel spreadsheet containing the combined data, as explained above.

Figure 2: Data collection – abstracts and keywords of relevant academic articles

Title of Paper	Abstract	Keywords
Adolescent feedback on predisposing, reinforcing	Objective: Mobile health apps hold potential to support and reinforce positive health	Adolescent, apps, asthma, mHealth, self-management
Caregiver Daily Reporting of Symptoms in Autism	Background: Currently, no medications are approved to treat core symptoms of	Autism spectrum disorder; ecological momentary assessment; symptom
A Mobile Application for Cat Detection and Breed	Deep learning is one of the latest technologies in computer science. It allows using	Cats, Feature extraction,Object detection, Deep learning, Training,Image
A Mobile Application for Tree Classification and	This paper presents a novel application of machine learning through a mobile	Vegetation, Image color analysis, Machine learning, Image recognition,
Mobile Crowdsensing Application of Road Condition	This application has been developed for android phones to determine road	Not available
Development of PositiveLinks: A Mobile Phone App	Background: Linkage to and retention in HIV care are challenging, especially in the	mHealth; HIV; treatment adherence and compliance; retention in care
Smart Mobile Computing in Pregnancy Care	Pregnancy is a period of changes. With all the information available and all the	Not available
Evaluating the Feasibility of Using a Mobile App to	Background: The Centers for Disease Control and Prevention supports the	Cancer Patients; Patient Navigation Evaluation; Mobile Applications; Outcome
Designing meaningful outcome parameters using	Aims Health data captured by commercially available smart devices may represent	Patient-reported outcome measure; Mobile health; Heart failure; Mobile
Voice Assistant for Visually Impaired	In this modern society, visually impaired persons need helpful tools for operating	Voice Assistant, Text to speech, Mobile application, TTS Engine, Voice
User Experience of an App-Based Treatment for	Background: Stress urinary incontinence (SUI) affects 10%-39% of women. Its first-	mobile applications; urinary incontinence; stress; pelvic floor muscle training;
Multimedia Field Test: Can Users Strike Out OCD	NOCD is a mobile application that was developed as an adjunct to evidence-based	mHealth; behavioral intervention technology; mobile application; OCD;
The Development of an Arabic Weight-Loss App	Background: Obesity and its related illnesses are a major health problem around the	weight loss; mobile app; obesity; physical activity; smartphone; mHealth;
Submitted to the WorldCIST'17: The AppVox	AppVox is a mobile application that provides support for children with speech and	Assistive technologies, mobile application, speech and language impairments,
Towards an Audio-Locative Mobile Application for	We live in an age in which digital media is omnipresent and augmented reality is	Audiovisual cartography Multimedia cartography Locative media Storytelling
A Review of Instant Messaging and Mobile	Advanced mobile messaging applications are growing ever more popular as they	Instant Messaging, Mobile Messaging, Line
Epuyen tourism. An app for tourists 2.0.	The locality of Epuyen in the province of Chubut (Argentina) lacks ICT tools oriented	Computer software, information services, information technology, mobile
Dermatological Diagnosis By Mobile Application	Health care mobile application delivers the right information at the right time and	Health Care, Skin, Mobile application, Patients.
Review of Mobile Apps for Prevention and	Opioid-related harm is a major public health concern in Canada and abroad. There is	Not available
Gamification and Behavior Change Techniques in	Background: Diabetes management apps may have positive effects on diabetes self-	Apps, behavior change techniques, diabetes self-management, gamification,
A Mobile App for Assisting Users to Make Informed	Background: On many websites and mobile apps for personal health data collection	data security; mobile app; education; feasibility studies
Users' preferences and design recommendations to	Background Mobile phone applications (apps) offer motivation and support for self-	Not available
Navigating the Graveyard: Designing Technology for	In this paper, we consider graveyards as a design context, and present a prototype	Graveyards, cemetery, death, deathscapes, designing for sensitive contexts,
A Contribution into Developing a Model for Prostate	New Healthcare models are developed with the focus on the community members	Mobile Applications, Prostatic Neoplasms, Comparative Study, Self Care
Abstract 14983: Developing a Mobile Health	Introduction: Heart failure is a prevalent among older adults and is characterized by	Not available
Mobile Eye Friend Application	To provide a platform or mechanism which can be beneficial, usable and efficient in	Android, Eye, OpenCV, Face recognition, Real detection etc

Source: Screenshot from Excel document used for data capturing in this research project

Reliability in qualitative research focuses credibility, which encourages engagement with research participants; transferability, which holds that the research is not aiming at generalising findings, and that the methodology that was followed should be clearly described to encourage transferability in other cases; dependability, which considers the accuracy of transcripts; and confirmability which notes the possibility of "investigator bias" (Kumar, 2014:219; Lichtman, 2014:195). This research considered the concept of reliability in each of these categories in the following ways:

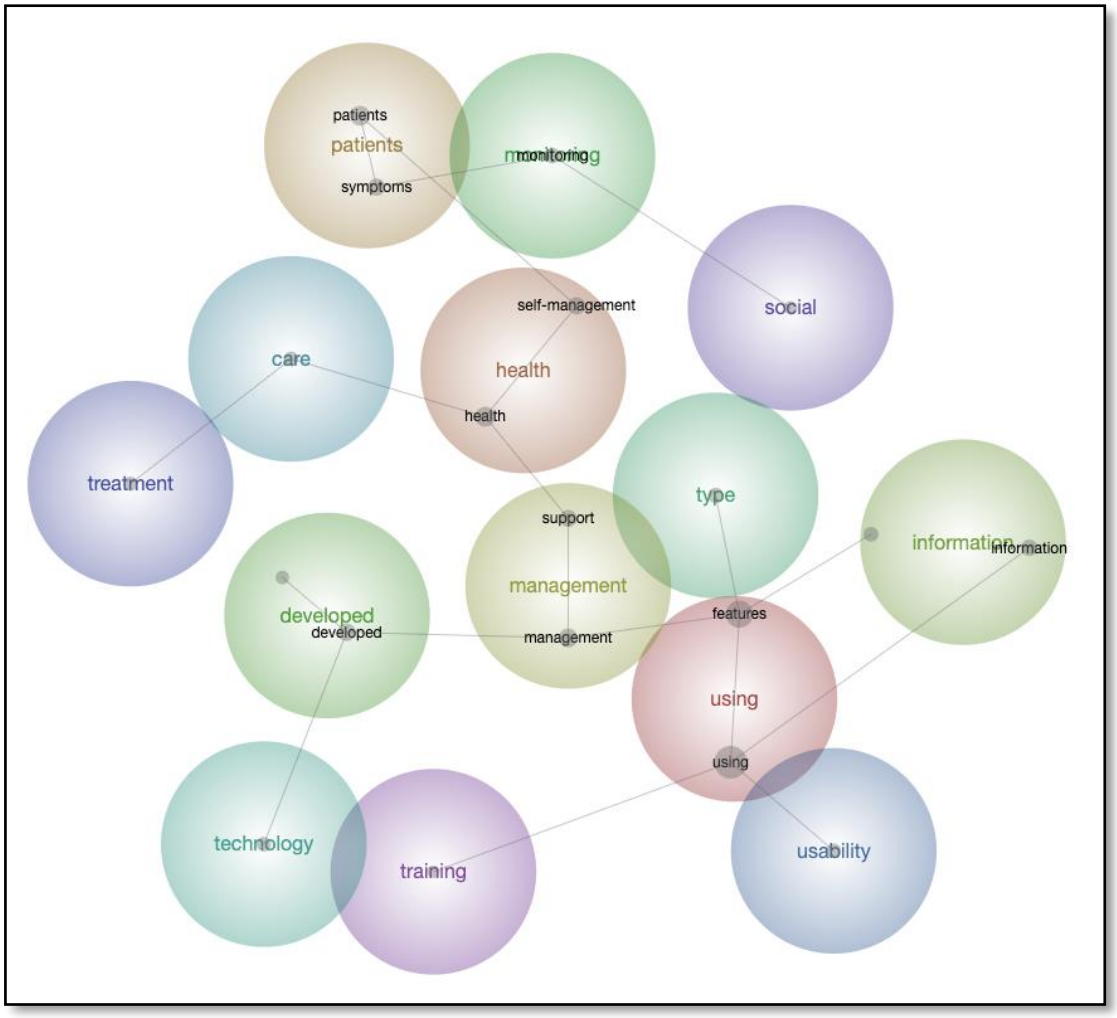
- Since the research used secondary data analysis, and attempted to identify themes in data that had previously not been combined in this way. Therefore, the "research participants" in this case is an abstract consideration, and can be described as any scholar that finds value in this analysis. The presentation of this research encouraging engagement.
- The researchers attempted to describe the methodology of the research in detail, encouraging others to attempt similar analyses.
- The accuracy of transcripts was not considered to be a concern, since the titles, abstracts and keywords used in the analysis were copied verbatim from the journals in which they were published.
- Investigator bias in qualitative research is a realistic concern, however the exclusion and inclusion criteria, described in the methodology section, attempted to mitigate any possible bias in the selection of the research sample.

The relatively short time from which the sample was collected – six months – may be a limitation to the study. However, the researchers applied the findings from this research not as a descriptive indication of what a literature review should cover, but as a guidepost in terms of the literature review of the larger study. In this context, the most recent academic research, focusing on the concept of mobile app features, was considered as a method of triangulation of the existing and ongoing literature review for the overarching study. The findings discussed in the following section will describe which themes were prevalent in the most recent academic research pertaining to mobile app features, as presented through Google Scholar Alerts.

5 Findings

Leximancer is a "text analytics tool that can be used to analyse the content of collections of textual documents and to display the extracted information visually" (Leximancer, 2017:3). Leximancer employs a colour coding classification to main themes that are identified in the text it analyses; important themes are shown in reds and oranges, and less prevalent themes are shown in greens and blues (Leximancer, 2017:12,24). Themes are shown in a concept map (Figure 3), with the coloured coded circles encompassing the theme, and the theme's main concepts shown within the circle. The size of the theme circles is not indicative of a theme's importance, it is simply a boundary marker (Leximancer, 2013). What is important to note is that the number of concepts displayed within a theme circle, determines the theme's dominance in the text.

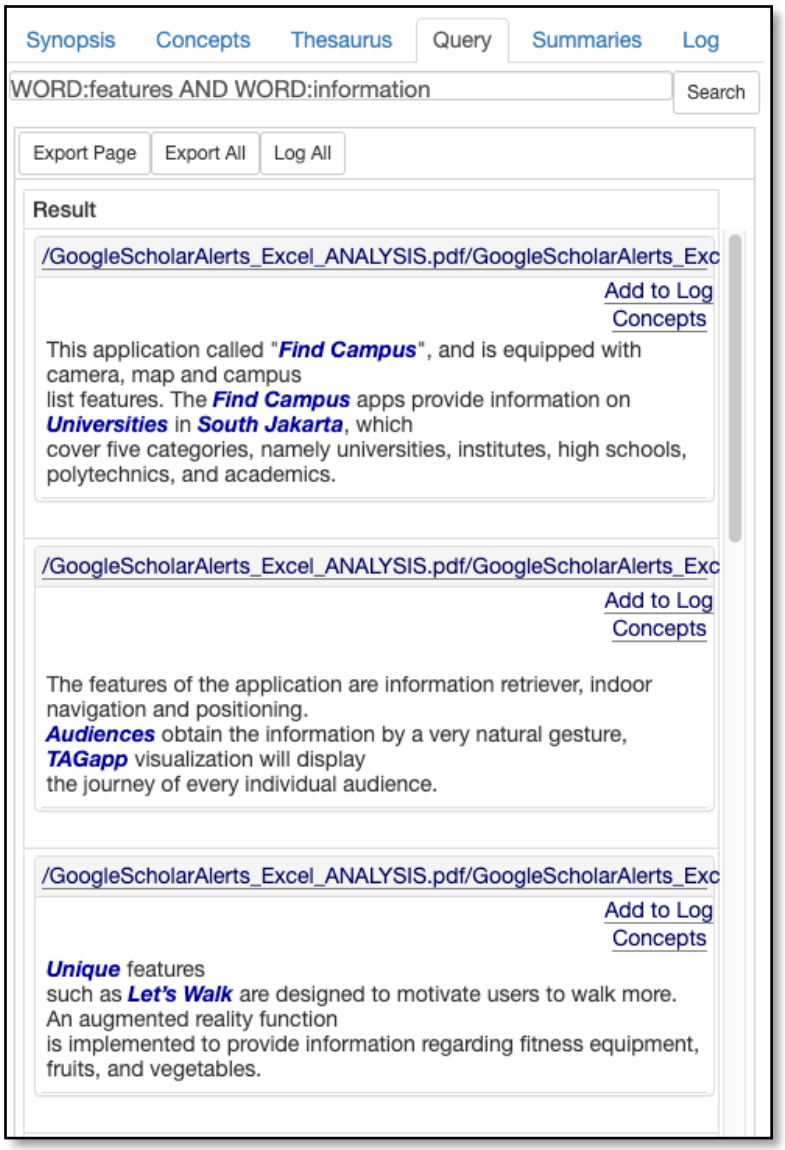
Figure 3: Concept map generated from 47 identified articles



Source: Concept map generated by Leximancer, from the data collected for this study

An important feature in Leximancer is the ability to perform conceptual analysis, determining concept classes within a text, and "explicitly extracting a thesaurus of terms for each concept" (Leximancer, 2017:8). Themes are made up of such concepts, and the concepts contained within each theme are measured for co-occurrence in a relational analysis (Leximancer, 2017:8). Therefore, Leximancer determines the presence of concepts, and how these concepts relate to one another, while creating a thesaurus through an iterative learning process (Leximancer, 2017:66). Figure 4 shows the thesaurus phrases for the concept 'features' (within the theme 'using'), when the thesaurus seed word 'information' was queried within this theme. What we can deduct from this, is what was being suggested specifically, when authors referred to 'information', in relation to 'features'.

Figure 4: Excerpt of thesaurus phrases, from which the thesaurus terms 'features' and 'information' supported



Source: Author screenshot of Leximancer thesaurus phrases relevant to the thesaurus terms 'features' and 'information'

The research aimed at shedding light on the trends of the most recent published research regarding mobile app features, to inform and verify the focus of the ongoing literature review of the larger study. To this end, it was determined that the theme '**usability**' was closely related to the most dominant theme of 'using'. Upon querying the thesaurus seed words to gain context in this matter, it was discovered that focus was being placed on the functionality of mobile apps in terms of the usability of features – '**features**' also appeared as a concept under the main theme of 'using.' The following quotes illustrate the focus on functionality as described:

"However, more work is needed to improve the usability and accuracy of MyFootCare, that is, by refining the process of taking and analyzing photos of DFUs and removing unnecessary features."

"We interviewed app users after 3 weeks to identify usability issues, need for training on the phone or app, and to assess acceptability. We tracked and analyzed usage of app features for the cohort over 2 years."

"Patients provided insight to improve the app's presentation and usability and general lessons on useful features for chronic disease apps."

The analysis also showed that research focus was strongly associated with the themes '**patients**' and '**health**', specifically in the concept of 'self-management' of health issues by patients through apps. The themes of 'patients' and 'health' were the second and third most dominant themes in the analysis, respectively. This finding indicates niche areas in which mobile app features are being investigated at present, as is supported by the following text excerpts:

"It has several features intended to assist users to monitor and track their food consumption and physical activities. The app provides personalized diet and weight loss advice."

"The applied model of mobile application for prostate cancer has been done in compliance with requirements of Iranian health information technologists, urologists and oncologists."

"Public health professionals should partner with app developers in the development of asthma self-management apps that include predisposing, reinforcing and enabling features to meet user needs and ensure they are effective and accepted behaviour change apps."

"Mobile technology may reduce individual and health system barriers to accessing cancer care and treatment and support post treatment cancer survivors while also assisting navigators in conducting their work efficiently and effectively."

The next most dominant theme in the analysis, was that of 'management' which appeared to refer to the management of specific illnesses using mobile apps; illnesses that were mentioned included diabetes, obesity, and asthma. 'Support', the most prevalent concept in the theme of 'management', was found to imply support for self-management of various illnesses, as is shown in the quotes below:

A total of 56 apps matched the inclusion criteria and were reviewed in terms of the features they offer to support self-management.

...and a reward system for daily peak flow entry (reinforcing), to support their asthma management.

Mobile technology may reduce individual and health system barriers to accessing cancer care and treatment and support post treatment cancer survivors...

This study aimed to examine app usage and feature preferences among people with DM, and explore their recommendations for future inclusions to foster engagement with diabetes apps.

6 Conclusion

User-centred design is informed by various considerations to ensure an artefact's relevance once completed. To gain a better understanding of what the scientific community is investigating around mobile app features, a pivotal part of user-centred design in mobile app technology, it was necessary to conduct an integrative review of recently published literature in this space. This paper explained the process and findings of a Leximancer content analysis, which aimed to determine the focus of recent research, conducted in the mobile app feature landscape. The findings of this study will be used to inform and triangulate the literature review of an ongoing study exploring user-preferred features for a mobile blood donation app in South Africa. The study utilised Google Scholar Alerts to gather studies, published within a period of six months, in this study area. The analysis processed the titles, abstracts and keywords of 47 academic studies, using Leximancer.

Findings showed that the most recent research conducted on app features, focused on the usability of the features of mobile health apps. The focus of these apps appeared to fall on support of self-management of various illnesses. The value of this research to the overarching research project, is that the researchers can state with confidence that mobile health apps are at the forefront of app feature research, and that this area of literature should be considered paramount in any discussion of research aimed at establishing user-preferred mobile app features.

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