

A Review of mHealth Gambling Apps in Australia

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Abstract

Problem gamblers face numerous barriers to intervention and support, such as shame and stigma, need for control, and lack of resources. Fortunately, digital health has paved the way for private, autonomous, and highly accessible interventions for problem gambling. Mobile applications (apps) are a part of the digital health platform; however, few apps are available, and a review has not been undertaken. This study had one simple aim: to review the health apps for problem gambling available in Australia from Google Play and Apple iTunes. Focus was given to, among other elements, cost, update recency, popularity, and functions of the apps. In January 2020, 17 health apps for problem gambling were identified and data were extracted. The investigation showed that the apps are generally free or low cost and are not popular in terms of downloads and ratings. In most cases, months or years had passed since previous updates, and the apps had a small number of functions with little variance in the types provided. However, many of the functions are viewed positively by problem gamblers and professionals involved in problem gambling research and intervention. Overall, although the limited range of health apps for problem gambling available in Australia provides a foundation for intervention, there is room for improvement in the quality and range of in-app functions, which may in turn have positive effects on popularity. Further, a greater number of apps may benefit users by encouraging price competitiveness and regular app updates.

Keywords: mHealth, smartphone app, mobile app, gambling app, gambling

Résumé

Les joueurs compulsifs font face de nombreux obstacles à l'intervention et au soutien, notamment la honte et la stigmatisation, le besoin de contrôle et le manque de ressources. Heureusement, la santé numérique leur a ouvert la voie aux interventions privées, autonomes et très accessibles. La plateforme de santé numérique comporte des applications mobiles, mais celles-ci sont peu nombreuses et n'ont pas fait l'objet d'analyses. Cette étude avait un objectif simple : examiner les applications

du domaine de la santé destinées aux joueurs compulsifs et offertes en Australie à partir de Google Play et d'Apple iTunes. Nous nous sommes concentrés notamment sur le coût, la récence de la mise à jour, la popularité et les fonctions des applications. En janvier 2020, 17 applications du domaine de la santé destinées aux joueurs compulsifs ont été repérées et les données ont été extraites. L'analyse montre que les applications sont généralement gratuites ou à faible coût, et ne sont pas populaires sur le plan des téléchargements et des évaluations. Dans la plupart des cas, elles n'avaient pas été mises à jour depuis des mois ou des années, et offraient un petit nombre de fonctions dont le type variait peu. Toutefois, un grand nombre des fonctions sont considérées de manière positive par les joueurs compulsifs et les professionnels de la recherche et de l'intervention dans le domaine du jeu compulsif. Dans l'ensemble, bien que la gamme restreinte d'applications de santé destinées aux joueurs compulsifs et accessibles en Australie jette les bases de l'intervention, il y a place à l'amélioration de la qualité et des fonctions de ces applications, ce qui pourrait les rendre plus populaires. En outre, l'augmentation du nombre d'applications pourrait être profitable aux utilisateurs en favorisant la concurrence des prix et les mises à jour régulières.

Introduction

High-quality and highly accessible digital self-treatment options—such as healthcare management applications (hereafter, mHealth apps)—are needed to help gamblers overcome obstacles that they face in treatment (Cunningham et al., 2011; Suurvali et al., 2008). Aside from apps, there are many eHealth options for the treatment of problem gambling. eHealth is the use of information and communication technologies for health support (World Health Organization, 2020). Studies have demonstrated the effectiveness of these options for problem gambling (Cunningham et al., 2011; LaBrie et al., 2012; Rodda & Lubman, 2014; Rodda et al., 2015; Turrisi et al., 2009) and with similar attrition rates as in traditional treatment (Gainsbury & Blaszczynski, 2011). However, despite the global increase in problem gambling across age groups (Calado et al., 2017; Calado & Griffiths, 2016) and the acceptance of mHealth apps by consumers as behaviour change tools (Payne et al., 2015), mHealth apps for problem gambling is a largely untapped area (Martinez-Perez et al., 2013). Cohn et al. (2011) and Aitken and Lyle (2015) agree, arguing that research on mHealth apps and subsequent addiction research is developing too slowly. Furthermore, with the global prevalence of smartphones (Chen et al., 2017) and the growing trend to supplement and substitute traditional treatment with healthcare technology (Heaven, 2018; Rai et al., 2013), using mHealth apps for self-treatment of problem gambling is a practical, highly accessible, and low-cost solution. Few mHealth gambling apps are available for download, however. Currently, iOS and Android are the duopolies of smartphone operating systems, with iOS using exclusively Apple products and Android dominating the rest of the

market. These systems provide access to mobile apps for smartphone users and, combined, enable access to 17 mHealth gambling apps in Australia.

With such low numbers, mHealth gambling apps in Australia go unnoticed. In a large-scale Australian gambling behaviour survey, 2,000 respondents received treatment for problem gambling, yet not a single individual reported having used healthcare apps or eHealth when asked about their experiences (Paterson et al., 2019). Until recently, there were no published reviews of trials of mHealth apps for problem gambling (Giroux et al., 2017), likely because of the small number of apps available. However, a recent feasibility study showed that problem gamblers are accepting of healthcare apps as an intervention (Humphrey et al., 2020). Furthermore, experts are optimistic about the concept, and problem gamblers have positive views towards the idea of using an app for support (Bullen et al., 2015). Unfortunately, most of the few apps available in the Australian market from major app stores are poor quality and their numbers have grown by only 12 in the last 7 years (Savic et al., 2013). Furthermore, the three most underpinned apps by clinical and academic experts—Mobile Monitor Your Gambling & Urges, iPromises, and Cost2Play (Humphrey et al., 2019)—are not available in Australian app stores.

As there is an absence of research on mHealth gambling apps, users and treatment providers have to rely on ratings, download rates, advice from peers, app descriptions, and imagery from developers, as well as their own user experiences. This reliance may lead gamblers to make uninformed decisions. A study by Perski et al. (2017) revealed that consumers select mHealth smoking and alcohol apps on the basis of not only the look and feel of the app, but also the app's quality, which they judged through ratings. Determining the quality of mHealth apps is more than simply citing download rates and user ratings; these tools are not valuable for gauging quality but rather popularity. This has led researchers to use various methods to determine high-quality content in mHealth apps, such as feedback from users and treatment providers (McClure et al., 2016), point-based quality evaluation (Powell et al., 2016), systematic reviews and meta-syntheses of data from efficacy studies (Coorey et al., 2018), and reports of patient adherence (Shan et al., 2019). As previously done in a study by Ahmed et al. (2018), in the present study, content was reviewed to determine quality; specifically, mHealth gambling apps were reviewed to assess app quality for self-treatment of problem gambling. The findings from this research offer insight to gamblers and healthcare workers around mHealth gambling apps in Australia. Furthermore, this research addresses the need for future development in the area.

Method

App Selection

The apps in this study were found in the Google Play Store and the Apple iTunes store in January 2020. The inclusion criterion was apps developed specifically for quitting and controlling gambling; therefore, non-gambling-specific apps that could

be used for gambling reduction (i.e., apps that track finances and spending) or generic addiction apps were not covered in this study. To support this criterion, the following search terms were used to locate appropriate apps: gambling therapy, gambling treatment, gambling addiction, gambling cessation, quit gambling, and problem gambling. Seventeen gambling-specific addiction self-treatment apps were located by using the search terms. Because most search results produced generic addiction self-treatment apps accompanied by commercial gambling apps, all pages of search results from both the Google Play and Apple iTunes stores were checked to ensure no apps were excluded. Few of the apps appeared on the first page of results and most were not easily visible among the search results; therefore, it is assumed that most users will likely download apps from the first page of results or choose generic addiction self-treatment apps.

Data Collection

Screenshots and descriptions provided by developers were the initial source of information in this study. However, this information was later found to be misleading in that some functions presented in screenshots were links to developer websites or external websites managed separately from the app. Descriptions also overstated claims about treating gambling when the apps were incredibly basic, outdated, and included one or few functions. The apps were manually downloaded and used to identify in-app functions. The Apple store shows only ratings for apps with five or more reviews (Rajani et al., 2019), and so some data could not be located for apps exclusive to Apple.

Identification of Functions

Because no studies have performed a content review of mHealth gambling apps, there is no standard selection of functions or popularity measures to apply. Therefore, the identification of functions was taken from studies that used focus group discussions with problem gamblers (Bullen et al., 2016; Humphrey et al., 2020) and mHealth smoking app reviews (Fiore et al., 2008; Jacobs et al., 2014), as nicotine addiction is categorized alongside gambling disorder by the American Psychiatric Association (APA) in the *Diagnostic Statistical Manual of Mental Health Disorders* (5th ed.; APA, 2013).

Results

Professional Involvement in App Design

Four apps covered in this study were designed individually or collaboratively by groups with experience in treating problem gambling. Gamban, which solely focusses on blocking software, was designed in collaboration with problem gamblers, treatment providers, and gambling industry professionals. GT was a collaborative design between treatment providers and a registered charity group specializing in problem gambling. Lastly, two apps were developed through government groups:

Gambling Help was designed by a state council in the United States with a support directory and communication functions (some content unusable for Australian users) and Stay on Track, which hosts tracking functions, was co-developed by an Australian state government and gambling support organization. Gambling Addiction Therapy – Get Professional Help, through its app store description, claims to have been developed in collaboration with therapists who specialize in problem gambling. However, there is nothing in the developer details, privacy policy, or app content to suggest that this is true. Perhaps this claim is derived from the main app function of connecting users with treatment providers for paid services. The remaining apps were designed by app developers who do not possess particular experience or education in the treatment of problem gambling. This suggests that these apps were motivated solely by commercial gain rather than public health betterment. Surprisingly, these apps perform comparatively well in terms of ratings and download rates—where this information is available—in comparison to the four expertly designed apps. The difference in performance between the 17 apps would, however, require trial studies.

Costs and Updates

Searches through the two app stores revealed 17 mHealth gambling apps. Most of the apps ($n = 11$) provided privacy policies that outlined how user privacy was protected. Nine of the apps were free, meaning there were no costs associated with downloading and accessing functions. Three apps were free to download and used paid subscription mechanisms to increase access to functions, and five apps were freemium, which included in-app purchases but were free to download. Costs varied for these in-app purchases, with most being under \$15.00 per purchase, but some charged up to \$86.99 per purchase (see Table 1). The number of days since the last update also varied between apps at the time of data collection. Although 64 days was the least number of days since the last update, for GamBlock Browser, the app with the greatest number of days since the last update was Stay on Track at 1,850 days (see Table 2). The average was 433 days since the last update, meaning that on average the most recent update was older than 12 months.

Downloads and Ratings

Information about the download rate for the 13 apps available from Google Play showed that the average number of downloads was 2,573. Two apps were downloaded more than 10,000 times, and nine apps were downloaded 1,000 times or less. This pales in comparison to other mHealth apps for substance abuse disorders (APA, 2013): A search through the app stores shows that popular mHealth smoking and alcohol apps have download rates of over one million. Though download rates were low in comparison with those for other mHealth addiction apps, there was a wide variance, from 50 to 10,000 downloads. However, this was not reflected in app ratings, as apps with lower downloads generally had higher ratings than the more popular apps did (see Table 2). Although six apps did not have any ratings, the remaining 11 averaged 25 ratings and 3.3 out of 5 stars.

Table 1
Author Comments on Apps and App Functions

App	Comments	Functions presented by app
Barred Gambling (Google Play)/ Online Gambling Addiction (Apple)	<ul style="list-style-type: none"> • Wide variance in ratings; most are 1 or 5 stars • Most reviews state that the app shuts down frequently • Broad functionality • App provides hyperlinks to external online sources in place of in-app functions • Aesthetically poor quality • Free to download and use • Available from Google Play and Apple • After a 3-day trial, the app charges \$5/month subscription • Aesthetically well designed • Mostly positive reviews and responsiveness on review portal by developers • A unique panic function that allows user to lock phone for a period • A productivity tracker to log non-gambling behaviour • Available from Google Play • Very costly: some in-app purchases exceed \$80 • Aesthetically well designed • Wide variance in ratings: either 1 or 5 stars • Available from Google Play and Apple • No privacy policy • Account required • Contains ads • The main function is to provide biblical quotations • Available from Apple • No privacy policy • After a 2-week trial, the app charges \$47.32/year subscription • Aesthetically well designed • Most ratings are 1 or 5 out of 5 stars • An account and personal details are required to use the app 	<ul style="list-style-type: none"> • Blocking software (web links) • Information features (lists negative effects and corrupt betting sites) • Motivation tool (inspiration quotations) • Support directory (non-Australian and online channels) • Social media integration
Gambling/ BetBlocker	<ul style="list-style-type: none"> • Blocking software 	<ul style="list-style-type: none"> • Blocking software
BetQuit	<ul style="list-style-type: none"> • Blocking software 	<ul style="list-style-type: none"> • Blocking software
Christians Quit Gambling Addiction	<ul style="list-style-type: none"> • Information features (lists negative effects) • Motivation tools (biblical verses) 	<ul style="list-style-type: none"> • Information features (lists negative effects) • Motivation tools (biblical verses)
Gamban	<ul style="list-style-type: none"> • Blocking software 	<ul style="list-style-type: none"> • Blocking software

Table 1 Continued.

App	Comments	Functions presented by app
Gambling Addiction	<ul style="list-style-type: none"> • Many reviews claim that the blocking software is ineffective • Available from Google Play • No privacy policy • An account and personal details are required for a trial or full subscription • An information repository with unedited content from Wikipedia • Available from Google Play • No privacy policy • Free to download with cheap in-app purchases • Aesthetically well designed • Supports personalization of content • Has gamified elements • Charges for removal of pop-up ads • Available from Google Play • Supports personalization of content • Links users to multiple treatment platforms • Requires user account and in-app purchases • All positive reviews 	<ul style="list-style-type: none"> • Information features (lists negative effects)
Gambling Addiction Calendar	<ul style="list-style-type: none"> • Available from Google Play • No privacy policy • Free to download with cheap in-app purchases • Aesthetically well designed • Supports personalization of content • Has gamified elements • Charges for removal of pop-up ads • Available from Google Play • Supports personalization of content • Links users to multiple treatment platforms • Requires user account and in-app purchases • All positive reviews 	<ul style="list-style-type: none"> • Abstinence tracker • Information features (lists negative effects) • Distraction tool (pictures of puppies) • Motivation tool (inspirational quotations) • Milestone system
Gambling Addiction Therapy	<ul style="list-style-type: none"> • Available from Google Play • Hyperlinks to the developers' online sources are offered in place of in-app functions • Aesthetically well designed • Mostly positive reviews • Available from Google Play and Apple 	<ul style="list-style-type: none"> • Support directory (online channels)
GT	<ul style="list-style-type: none"> • Available from Google Play • Hyperlinks to the developers' online sources are offered in place of in-app functions • Aesthetically well designed • Mostly positive reviews • Available from Google Play and Apple 	<ul style="list-style-type: none"> • Blocking software (web link) • Information features (lists negative effects) • Emergency helpline (non-Australia) • Distraction tool (mindfulness audio) • Workbook (web links) • Contact to support groups (non-Australia and online channels) • Chat/communication • Risk assessment
Gambling Therapy	<ul style="list-style-type: none"> • Contains pop-up ads • Encourages gambling: provides sports betting odds 	

Table 1 Continued.

App	Comments	Functions presented by app
12 Steps Gamblers Anonymous	<ul style="list-style-type: none"> • Available from Google Play • Offers no content to support problem gambling • Supports personalization of content • Not affiliated with Gamblers Anonymous program: piggybacks the name • Account required despite being anonymous • Offers in-app purchases • Available from Apple • Provides only hyperlinks to external online information sources: no in-app content • Available from Google Play • No privacy policy • Reviews claim the blocking software malfunctions: blocks websites and apps unrelated to gambling • Reviews claim devices became unusable and no technical support is offered • Available from Google Play • No privacy policy • Reviews claim that blocking software is ineffective • Available from Google Play and Apple • Marketed in Australia but only provides US helpline details • Available from Google Play and Apple • Requires account • Provides finance tracking and betting planner • Colour codes financial gains from wins in tracker function • Available from Apple • No privacy policy • Reviews are 1 or 5 out of 5 stars • Blocking software operates only through the app, not through other device apps or browsers • Available from Apple 	<ul style="list-style-type: none"> • Abstinence tracker • Personal diary
Gambling Addiction	<ul style="list-style-type: none"> • Provides only hyperlinks to external online information sources: no in-app content • Available from Google Play • No privacy policy • Reviews claim the blocking software malfunctions: blocks websites and apps unrelated to gambling • Reviews claim devices became unusable and no technical support is offered • Available from Google Play • No privacy policy • Reviews claim that blocking software is ineffective • Available from Google Play and Apple • Marketed in Australia but only provides US helpline details • Available from Google Play and Apple • Requires account • Provides finance tracking and betting planner • Colour codes financial gains from wins in tracker function • Available from Apple • No privacy policy • Reviews are 1 or 5 out of 5 stars • Blocking software operates only through the app, not through other device apps or browsers • Available from Apple 	<ul style="list-style-type: none"> • Information features (lists negative effects)
GamBlock Browser	<ul style="list-style-type: none"> • Reviews claim the blocking software malfunctions: blocks websites and apps unrelated to gambling • Reviews claim devices became unusable and no technical support is offered • Available from Google Play • No privacy policy • Reviews claim that blocking software is ineffective • Available from Google Play and Apple • Marketed in Australia but only provides US helpline details • Available from Google Play and Apple • Requires account • Provides finance tracking and betting planner • Colour codes financial gains from wins in tracker function • Available from Apple • No privacy policy • Reviews are 1 or 5 out of 5 stars • Blocking software operates only through the app, not through other device apps or browsers • Available from Apple 	<ul style="list-style-type: none"> • Blocking software
Bet Blocker	<ul style="list-style-type: none"> • Reviews claim that blocking software is ineffective • Available from Google Play and Apple • Marketed in Australia but only provides US helpline details • Available from Google Play and Apple • Requires account • Provides finance tracking and betting planner • Colour codes financial gains from wins in tracker function • Available from Apple • No privacy policy • Reviews are 1 or 5 out of 5 stars • Blocking software operates only through the app, not through other device apps or browsers • Available from Apple 	<ul style="list-style-type: none"> • Blocking software • Abstinence tracker • Emergency helpline (non-Australia) • Chat/communication • Abstinence tracker • Emergency helpline • Finance tracker
BF Browser	<ul style="list-style-type: none"> • Reviews are 1 or 5 out of 5 stars • Blocking software operates only through the app, not through other device apps or browsers • Available from Apple 	<ul style="list-style-type: none"> • Blocking software

Table 2
Number of Functions, Download Rates, and Ratings

App	Number of functions	Days since update	Download rate	Number of ratings	Average rating
Barred Gambling (GP)/Online Gambling Addiction (Apple)	5	1,547	10,000 (GP)	36 (GP)	3.5/5 (GP)
Gambling/BetBlocker	1	328	100 (GP)	0	-
BetQuit	1	501	1,000 (GP)	32 (GP)	3.2/5 (GP)
Christians Quit Gambling Addiction	2	669	500 (GP)	2 (GP)	3.5/5 (GP)
Gamban	1	242	5,000 (GP)	27 (GP)	3.3/5 (GP)
Gambling Addiction	1	414	100 (GP)	1 (GP)	1/5 (GP)
Gambling Addiction Calendar	5	421	Apple: n/a	1 (Apple)	5/5 (Apple)
Gambling Addiction Therapy	1	301	100 (GP)	8 (GP)	5/5 (GP)
GT	8	460	10,000 (GP)	46 (GP)	4/5 (GP)
Gambling Therapy	0	369	50 (GP)	0	-
12 Steps Gamblers Anonymous	2	411	Apple: n/a	0	-
Gambling Addiction	1	486	500 (GP)	0	-
GamBlock Browser	1	236	1,000 (GP)	16 (Apple)	3.2/5 (GP)
Bet Blocker	2	323	5,000 (GP)	7 (Apple) 243 (GP)	3.4/5 (GP) 3/5 (Apple)
Gambling Help	2	573	100 (GP)	0	-
Stay on Track	3	2,022	Apple: n/a	0	-
BF Browser	1	983	Apple: n/a	5 (Apple)	3.4/5 (Apple)

Note. GP = Google Play; n/a = not available.

Functions

In this study, 13 different functions were found across the apps reviewed (see Table 3 for descriptions). Most apps ($n = 15$) had three or fewer functions. Their most common functions were information repositories and blocking software ($n = 6$), and the least common functions were milestone systems, social media integration, risk assessments, and finance trackers ($n = 1$; see Table 4). A minority of the apps ($n = 3$) had misleading functions, meaning that they falsely claimed to host functions and instead hosted links to websites managed outside of the app. Three apps had four or more functions, which was reflected in high download rates of 10,000 or more for two of the apps available in Google Play (Barred Gambling Online App Self Exclusion Tool and GT; see Table 4).

Although some functions are more common than others, few apps hosted innovative functions (see Table 1). Gambling/BetBlocker hosted two unique functions: a panic button that allows users to lock their phone for a period of time and a productivity tracker to log non-gambling behaviour. Three apps, Gambling Addiction Calendar, 12 Steps Gamblers Anonymous, and Gambling Addiction Therapy, supported personalization of content, and Gambling Addiction Calendar was the sole app to have gamified elements in its design. A bet planner that allows users to pre-plan their

Table 3
Functions and Descriptions

Function	Description
Blocking software	Restricts or completely blocks access to gambling sites and apps on the device.
Abstinence tracker	Keeps a time-based record of days abstained from gambling through manual data entry.
Information features	A repository of information on varying topics related to gambling, such as treatment tips and definitions.
Emergency helpline	Calls a gambling helpline when activated.
Distraction tools	A range of media, such as images and meditation audios, to use for self-distraction when feeling gambling urges.
Motivation tools	A repository of media, such as images and motivational quotations, that offer motivational support.
Workbooks/exercises	Reading and writing materials to educate users about gambling addiction and treatment.
Support directory	A directory of community groups and welfare organizations that offer support for problem gambling.
Chat or communication	Connects users to other users or professionals via email, chatroom, or messaging platforms.
Finance tracker	Keeps a financial record of gains and losses from gambling through manual data entry.
Social media integration	Links users to social media groups or allows users to share data, such as abstinence achievements, in milestone system functions.
Risk assessment	Performs a real-time assessment of gambling risk level.
Milestone system	Keeps a time-based record of abstinence via manual data entry. Rewards users for achieving predetermined lengths of abstinence with badges and trophies that users can share on social media.

Table 4
Number of Apps Adopting Identified Functions

Function	Number of apps
Blocking software	6
Abstinence tracker	4
Information features	6
Emergency helpline	2
Distraction tools	2
Motivation tools	3
Support directory	3
Chat or communication	2
Finance tracker	1
Social media integration	1
Risk assessment	1
Milestone system	1

bets was another unique function exclusive to Stay on Track. Although some innovative functions were offered by some apps, there were also obvious flaws in others. For example, Gambling Addiction's sole function is an information repository with content copied unedited from Wikipedia, 12 Steps Gamblers Anonymous forces users to create an account with identifying information despite promoting the app's focus on user anonymity, and Gambling Help provides a support directory of US services but no Australian services. Some apps ($n = 4$) varied greatly in ratings, most being either 1 or 5 out of 5, and three of the four apps with blocking software had reviews that claimed the software is ineffective. Most apps ($n = 13$) were available from Google Play, and seven apps did not provide privacy policies to users. Apps also varied in terms of aesthetics, as some came across as appealing and professional and others as very basic.

Discussion

Main Findings

This study involved downloading mHealth gambling apps from the Apple iTunes and Google Play stores to collect data. Some previous studies (e.g., Wali et al., 2019) used screenshots and descriptions of mHealth apps available on app stores to collect data. This approach was avoided in this study because of the risks around inaccurate claims of app functions and effectiveness made by developers. In addition, on downloading the apps and selecting the functions, it was clear that not all are in-app functions. Rather, they are website links to the developer's online resources or from external groups.

The most popular function provides information such as the negative effects of gambling and reasons to quit gambling. However, this information is at times very basic and subjective. As some of these apps are from outside of Australia, it is

possible that the information is jurisdiction and culturally bound. Another popular function is blocking software, which limits users' access to gambling apps and sites. Reviews of these apps often comment on how they severely restrict the functionality of users' devices beyond their intended purpose, such as web browsing and using social media apps. Furthermore, the apps developed outside of Australia may have limited coverage of Australian and international gambling sites. Generally, the apps hosted positive and beneficial functions. For example, tracking functions, blocking software, social media integration, motivational content, chat, and milestones are all functions that received positive feedback from problem gamblers in focus group discussions on mHealth (Bullen et al., 2016; Humphrey et al., 2019). Functionality around distraction tools, support directories, information repositories, and crisis situations were also viewed positively in the gambling and public health literature (IMS Institute for Healthcare Informatics, 2015; Rodda et al., 2015; Savic et al., 2013). Positively reviewed functions, such as self-assessment, finance tracking, and journaling (Bullen et al., 2016; Chigurupati, 2011), were scarce among the apps.

Some of the apps hosted innovative and unique functions, such as a panic button that allows users to lock their phone for a period of time, a productivity tracker to log non-gambling behaviour, and a bet planner that allows users to pre-plan their bets. Personalization of content and gamified design through a milestone system were also noted in the apps. Moreover, there is room for more innovative apps and functions. Smoking cessation apps are known to use noise, imagery, and hypnosis, among other things, to help users cease smoking (Regmi et al., 2018), and alcohol quit apps use gain-framed messaging and flexible reduction planning (Perski et al., 2017). High-quality functions of other addiction quit apps, such as personalized quit plans, device integration, and medication advice (Thornton et al., 2017), were absent from mHealth gambling apps.

App stores do not outline how they rank apps in search results. However, it is accepted that ratings, reviews, and download rates can influence others' decisions to download apps (Azar et al., 2013). The average rating across the apps was 3.3 out of 5. Two apps were rated a 5 out of 5, indicating that they were high quality. However, for both of these apps, the rating was calculated from fewer than 10 user reviews, most of which were poorly written generic statements, which suggests that they are not genuine, a concern echoed by other research (Powell et al., 2016). This can pose a challenge for problem gamblers who are considering mHealth apps, considering that the ratings and reviews of mHealth smoking and alcohol apps are influential in the choice to download them (Perski et al., 2017). In the present study, the apps generally had few or no reviews.

A similar finding was reported in another app review study (Caro-Alvaro et al., 2017). Furthermore, although 3.3 is a good average, this rating may not correlate with effectiveness and quality; rather, it may be a reflection of usability. The two most-rated apps had more than 50 ratings, both of which scored 3.3. Research findings show that there are strong correlations between app ratings and the number of downloads (Finkelstein et al., 2017); however, this was not observed here. In light

of this, it is important to be cautious when assessing app ratings, as there is no guarantee that they are a reliable measure of quality (Powell et al., 2016). Until a reliable coding system is developed that classifies mHealth app content for testing and validation, gamblers seeking an app for self-treatment are dependent on screenshots and descriptions from developers, download rates, ratings, and reviews. Fortunately, with a small range of free mHealth gambling apps, gamblers have the option to download all apps available to conduct their own assessment, an approach that is feasible for mHealth gambling apps only because of the small number that are available.

Implications and Future Research

With the findings from this research in mind, app developers and designers need to focus on creating mHealth gambling apps with verified effective functions for behaviour change. Apps should be based on treatment theory and evidence-based research that assesses the effectiveness of mHealth apps for addiction treatment. Registered gambling treatment centres should collaborate with app developers and healthcare experts to identify features that increase engagement, usability, and successful outcomes. The Australian Therapeutic Goods Administration does not recognize health care apps as medical devices and does not regulate their dissemination (Therapeutic Goods Administration, 2019). This means that developers can develop and distribute apps as treatment tools for problem gambling without regulation, leaving consumers vulnerable to poor quality apps. Fortunately, research that reviews mHealth apps can serve consumers in the absence of regulation.

Validation studies should be the focus of future research. Studies that evaluate app engagement, usability, and outcomes of mHealth gambling apps would contribute immensely to an overlooked area of research. Engagement with apps can be measured through self-reported questionnaires (e.g., Stoyanov et al., 2016). This approach was used by Bakker and Rickard (2018) in their assessment of mHealth app engagement and could be used to measure engagement with mHealth gambling apps. Equally, mHealth app usability is a subjective assessment by users achieved through a self-reported questionnaire (e.g., Zhou et al., 2019). Evaluating outcomes would come from trials or studies that use apps to indicate effectiveness, wherein results are verified by testers (Ahmed et al., 2018; Coorey et al., 2018).

In addition, future research should focus on identifying how behaviour theories are used in mHealth gambling apps. For example, Schnall et al. (2015) reviewed mHealth apps for the treatment and management of human immunodeficiency virus for evidence of elements of behaviour theories. They found that the application of the self-determination theory through app functions improved users' health and addressed their healthcare needs. Furthermore, smoking cessation apps based on cognitive behaviour therapy were found to be more effective in increasing quit motivation and prolonging use than were apps without a theoretical basis (Tudor-Sfetea et al., 2018). Similar research on mHealth gambling apps is needed.

Conclusion

The majority of mHealth gambling apps have few functions, the value of which is questionable. This limits the functionality of the app. Few apps have moved beyond this to incorporate a range of highly technical functions that are verified behaviour modifiers. Although these developers should be acknowledged for their contribution to mHealth gambling apps, there is room for progress, collaboration, and innovative ideas.

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