Use of Mobile Applications in Smoking, Alcohol and Substance Use Disorders

Mobil Uygulamaların Sigara, Alkol ve Madde Kullanım Bozukluklarında Kullanımı

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ABSTRACT

Currently, technology and mobile health applications are developing and being applied in different fields every day. Especially the use of mobile technology in many health fields offers various opportunities for the use of mobile applications in smoking, alcohol and substance use disorders, which is an important public mental health problem. The aim of this review study was to examine 16 mobile applications designed for the treatment and monitoring of smoking, alcohol and substance use. It was concluded that self-monitoring, notification and warning systems, location services, peer and expert support services were frequently used in the analyzed mobile applications. As a result of the studies, the use of mobile applications as a preventive intervention in the prevention of addiction and as an additional treatment option in addiction treatment is promising. However, this situation brings along various harms, risks and obstacles. This review of the relevant literature provides a critical update of mobile applications used in smoking, alcohol and substance use disorders. This review is expected to be an important guide for mental health professionals and mobile application designers working on addiction.

Keywords: Mobile application, digital health, addiction, community mental health

ÖZ

Günümüzde teknoloji ile mobil sağlık uygulamalarının geliştiği ve her geçen gün farklı alanlarda uygulandığı bilinmektedir. Özellikle mobil teknolojinin birçok sağlık alanında kullanılması önemli bir toplum ruh sağlığı sorunu olan sigara, alkol ve madde kullanım bozukluklarında mobil uygulamaların kullanımı için çeşitli fırsatlar sunmaktadır. Bu derleme çalışmasında sigara, alkol ve madde kullanımı tedavisi ve izlemi için tasarlanan 16 mobil uygulamanın incelenmesi amaçlanmıştır. İncelenen mobil uygulamalarda çoğunlukla kendini takip, bildirim ve uyarı sistemlerinin, konum hizmetlerinin, akran ve uzman desteği hizmetlerinin sıklıkla kullanıldığı sonucuna ulaşılmıştır. Yapılan çalışmalar sonucunda mobil uygulamaların bağımlılığın önlenmesinde koruyucu bir müdahale olarak ve bağımlılık tedavisinde ek bir tedavi seçeneği olarak kullanımı umut vaat etmektedir. Ancak bu durum çeşitli zararları, riskleri ve engelleri de beraberinde getirmektedir. İlgili literatür doğrultusunda yapılan incelemede sigara, alkol ve madde kullanım bozukluklarında kullanılan mobil uygulamalara eleştirel bir inceleme sağlanmıştır. Bu derlemenin, bağımlılık konusunda çalışan ruh sağlığı profesyonelleri ve mobil uygulama tasarımcıları için önemli bir rehber olabileceği düşünülmektedir.

Anahtar sözcükler: Mobil uygulama, dijital sağlık, bağımlılık, toplum ruh sağlığı

Introduction

Nowadays, there is a significant progress in technology with the development of computing devices (Bhavnani et al. 2016). With this advancement in technology, the increase in the use of digital health interventions within the scope of mHealth applications offers important opportunities for improving healthcare services (Wang et al. 2018). Mobile applications designed as an mHealth application allow users to offer many different behavioral interventions that can help them lead healthier lives and reduce the likelihood of potentially preventable health problems (Milne-Ives et al. 2020). According to the We Are Social (2022) report, the ownership of a smartphone and the number of mobile connections are increasing in Turkey and around the world. Given the widespread use of mobile phones among the public, the use of mobile technologies is seen as an opportunity to increase the reach of healthcare interventions (Getty et al. 2019).

The increase in smartphone ownership and use of smartphone applications also increases the possibility of using this technology for mental health services (Iliescu et al. 2021). Smartphone utilization rates of individuals with

serious mental health problems were found to be similar to the general population. In line with this result, serious mental illnesses can be addressed through mobile interventions provided through smartphones for researchers, clinicians and technology developers (Young et al. 2020). In recent years, the number of studies applying mobile technologies in psychiatry has been increasing exponentially (Swendsen 2016). More than 15,000 mobile applications are known to have been created in health services, yet at least 29% of mobile applications are used in mental health services. These mobile apps functionally provide mental health services such as symptom assessment, mindfulness, relaxation, psychoeducation, therapy assignments, appointment reminders, practicing skills learned in therapy, and monitoring symptoms, mood or mood state (Torous and Roberts 2017, Wang et al. 2018a). These mobile apps have been suggested in the literature to have the potential to improve the monitoring and management of mental health symptoms or disorders (Wang et al. 2018a).

One study of patients discharged from a psychiatric clinic concluded that a large number of patients had the necessary technology, knew how to use apps, and were interested in using the functionality of their smartphones to enhance their current mental health treatment (Iliescu et al. 2021). The results of another research in a substance use treatment center suggest that smartphones and mobile apps can provide clinical benefits to promote the continued use of treatment skills after substance use treatment is completed (Dahne and Lejuez 2015). Hsu et al. (2022) reported that more than half of the participants felt comfortable with a mobile application that collected information about appointment and medication reminders or symptom questionnaires. These results are significant in terms of the potential use of mobile health applications in mental disorders, especially addiction, by researchers, patients and mental health professionals.

In a systematic review exploring mobile applications, researchers stated that five main health behaviors were addressed in mobile applications and that behavior change was targeted in these applications (Milne-Ives et al. 2020). One of the health behaviors targeted to be changed is addiction, which is an important public mental health problem today caused by individuals' smoking, alcohol and substance use (DiClemente 2016).

The use of mobile applications to promote evidence-based skill use following the completion of addiction treatment relies on users having access to smartphones that can download mobile applications (Dahne and Lejuez 2015). A study examining mobile applications in mental health services concluded that although the number of articles published on smartphone use in substance and addiction disorders had started in 2015, it reached the third place in 2018 and increased steadily (Miralles et al. 2020). Mobile applications designed for addiction and increasing as technology develops can be accessed from application stores such as Google Play Store or AppStore (IOS), but there are debates in the literature about the effectiveness and provability of these applications for health behavior change (Milne-Ives et al. 2020, Wray 2022). The aim of this review study is to examine the content and effectiveness of sample mobile applications that were found in the literature and used in addiction. The information provided in the study is expected to serve as a guide for researchers, mental health professionals, and manufacturers working in the field of mobile health technology.

Mobile Applications Designed for Smoking

Quittr

It is a game-based smoking cessation intervention. The application, which is compatible with both Android and IOS mobile phones and tablets, has three interfaces. It includes demographic information, smoking habits, information toolboxes containing a wide range of educational materials that can support the user in quitting, and interfaces for setting personal goals (Figure 1).

A notification system was designed to encourage users to actively use the application for 28 days and to encourage data entry by sending notifications to their phones. In addition, various mini-games were created to reduce cigarette cravings and distract attention. Distraction games are simple mini-games that can be played alone in a session of 1 to 5 minutes. They are designed to demand mental focus and two hands to provide a meaningful and effective distraction or alternative to the act of smoking. The type of games include city building, fruit-cutting-ninja games, endless running style games, finding hidden objects, etc. The games also include a reward system to ensure motivation (Bindoff et al. 2016).
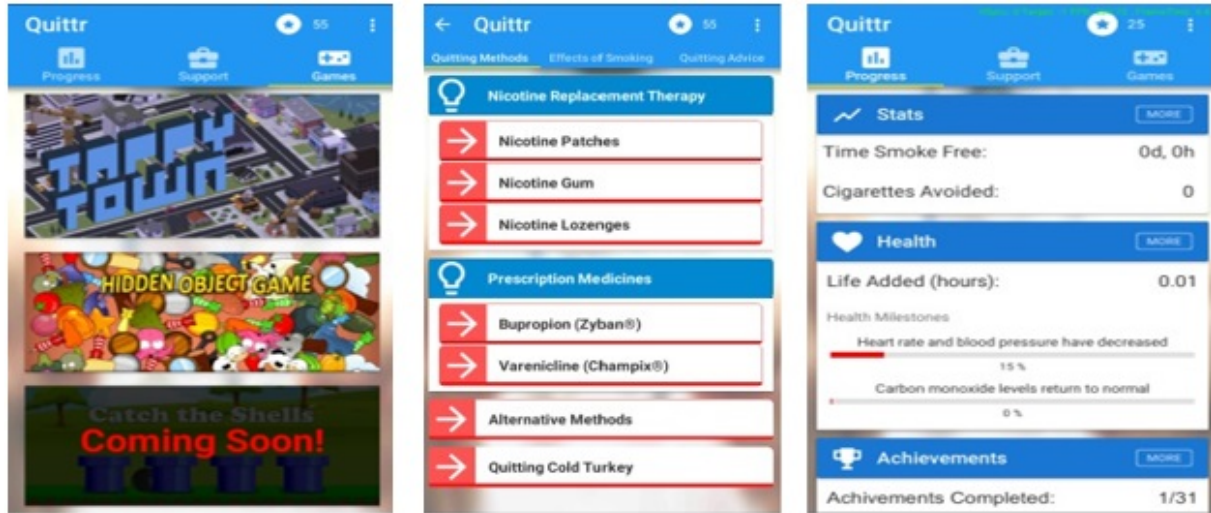
Figure 1. Screenshots of Quittr application

TControl

The TControl (Tobacco Cessation Control) application for Android phones is a mobile application that tracks the status of individuals who quit smoking and provides comments, advice and psychological support messages. In this application, users can communicate with each other and clinicians through messaging. Thus, they can share their experiences with each other through chat. The application can be used regardless of age and gender and its widespread implementation can reduce costs for the public health system (Figure 2, Pifarré et al. 2017).
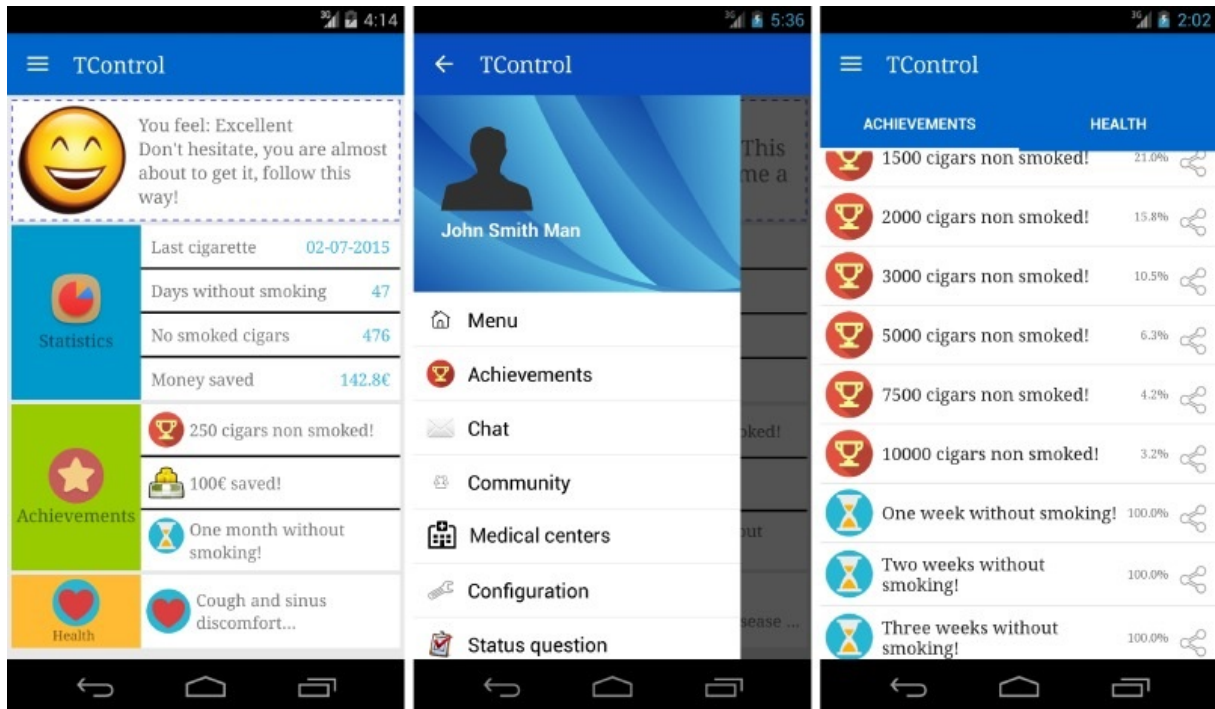

Figure 2. Screenshots of TControl application

Bırakabilirsin (You Can Quit)

Bırakabilirsin (You Can Quit Smoking) mobile application was designed in cooperation with the Green Crescent and the Turkish Ministry of Health and was launched on February 9th, Quit Smoking Day. The application, which can be downloaded free of charge from Google Play Store and IOS application stores, aims to motivate users to quit smoking. For this purpose, users can start using the application by setting a target date before

quitting smoking and the application shares suggestions about quitting preparations every day. From the moment of quitting smoking, the emotions triggering smoking and the desire to smoke are tracked and presented graphically to the users. Thus, the users are able to receive suggestions in the direction of the situations in which they feel the most desire to smoke. The application also includes information on the number of days without smoking and the economic savings achieved by not smoking. Users can statistically track the economic gains they make by quitting smoking through the mobile application and share their progress in their social media accounts by keeping a success diary. In addition, for those who need support in this regard, the free Green Crescent Counseling Center Hotline 115 can be easily accessed and support can be obtained (Figure 3, Bırakabilirsin 2022).
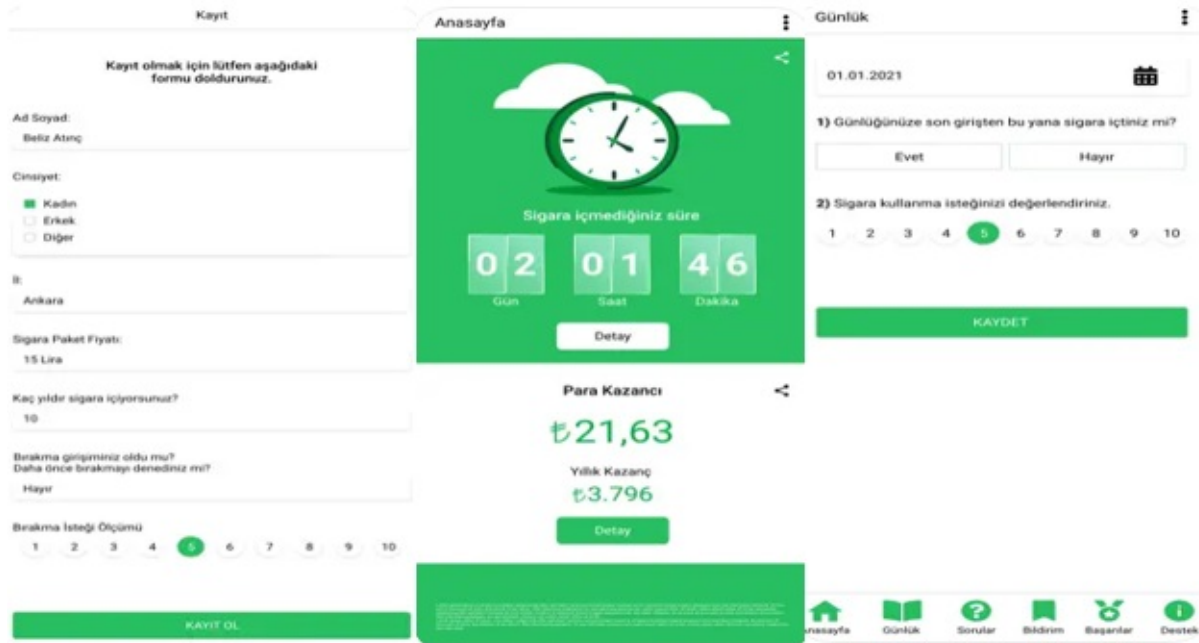
Figure 3. Screenshots of Bırakabilirsin (You Can Quit) application

Yeşil Dedektör (Green Detector)

Another mobile application designed and launched by the Green Crescent in collaboration with the Turkish Ministry of Health is the "Yeşil Detektör (Green Detector)" mobile application. This application, which is not directly related to smoking addiction, is a mobile application that aims to reduce the violations of businesses and customers who violate the use of tobacco products in closed spaces. With this application, it is possible for field inspectors to inspect the place by providing location and location notification in a closed place where tobacco use is observed. In this context, the rights of customers who do not use tobacco products are protected and violations are minimized by ensuring compliance with the ban (Yeşil Detektör 2022).

A review of mobile applications used in smoking cessation indicated that mobile applications have a positive effect on promoting an increase in the quitting rate, but there is a need for studies addressing the prevention of relapse and the decrease in the desire to smoke after quitting (Regmi et al. 2017). There is a need for qualitative and quantitative studies examining the effectiveness of mobile applications designed in collaboration with the Green Crescent and the Ministry of Health of the Republic of Turkey in an evidence-based manner.

Mobile Applications Designed for Alcohol and Drug Use

BeSober

It was developed by the researchers to implement an interactive mobile application and a relapse intervention to help users curb the urges that lead to alcohol consumption. The application consists of various systems depending on user inputs. The application aims to convert the user's alcohol consumption amounts, such as cans, bottles, mugs or glasses, into standard units of alcohol to keep the tracking in accurate measurements, which enables self-monitoring and tracking, especially by keeping the user aware of his/her progress in recovering from addiction. By utilizing geofencing, the user's current location is tracked and smart notification

systems alert the user when the user enters and leaves areas where alcohol use is at risk. Motivational notifications are provided to users in order to motivate the user and prevent relapse. In addition, when creating an account on the application, the user provides the necessary information about their interests. These inputs are considered as important data in understanding the user's mindset and entertainment activities. In addition, there is a social network structure within the application where users can benefit from each other's experiences and make friends (Figure 4, Jayachandra et al. 2020).
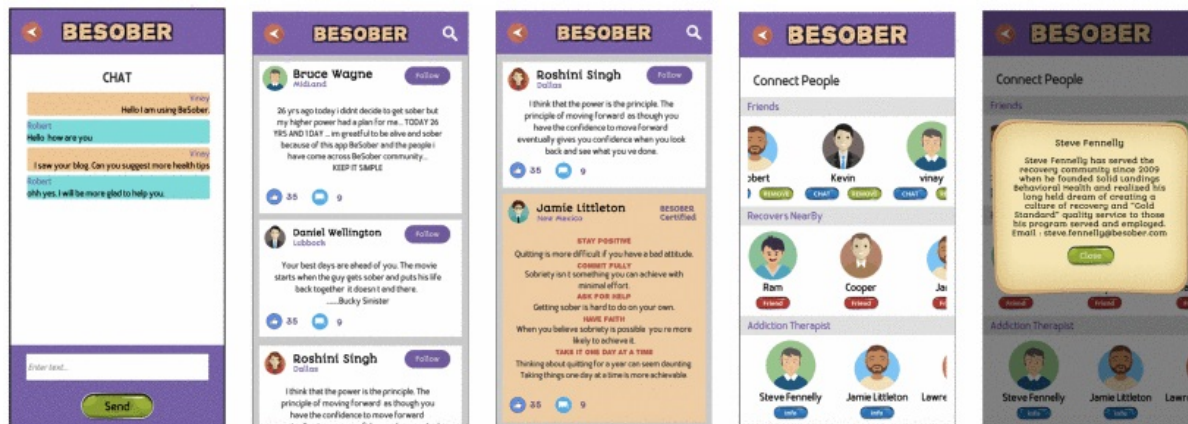
Figure 4. Screenshots of BeSober application

Drinkaware: Track and Calculate Units

Drinkaware Trust is a UK-based independent charity that aims to reduce alcohol-related harm by helping people make better choices about drinking. The mobile application created by this organization to reduce alcohol consumption is only available for free download in the UK iTunes store. It is not available in iTunes stores in other countries or in any Google Play store (Williamson et al. 2022).

Figure 5. Screenshots of Drinkaware application

The aims of this designed application are as follows;

1. Allow users to calculate units and calories in drinks and track alcohol consumption over time,

2. Get feedback on how drinking affects health, understand trends in drinking habits and set goals,

3. Reducing drinking related to lifestyles and receiving supportive notifications when certain successes are achieved; and

4. Identifying geographical locations (e.g. 'local bar' or 'supermarket') where users may feel additional support is needed to regulate alcohol consumption (Attwood et al. 2017).

In a mixed-methods study of the effectiveness of the application, which was downloaded by more than 170,000 users in the first 12 months, researchers found that the Drinkaware application helped to increase awareness of the amount of alcohol consumed, facilitated self-monitoring of alcohol intake, and encouraged more mindful

drinking (Attwood et al. 2017)

Drink Less

Drink Less is an application designed to support a person who is making a genuine attempt to reduce their alcohol consumption and is available for free download in the AppStore (smartphones IOS-8 and above). The application recommends that users set at least one goal to reduce alcohol consumption and offers access to five intervention modules. These intervention modules are as follows (Figure 6);

**Figure 6. Screenshots of Drink Less application**

Normative Feedback provides participants with personalized information about how their drinking is compared to other people in their age group and gender in the UK. Cognitive Bias Retraining aims to retrain approach biases towards alcohol through an approach-avoidance game. Self-Monitoring and Feedback allows participants to record their alcohol consumption and provide feedback on the consequences of consumption (calories consumed, money spent and impact on mood, productivity and sleep) and progress towards goals. Action Planning enables participants to set implementation intentions to reduce their drinking. Identity Change helps participants to promote a change in their identity so that they no longer see alcohol consumption as an important part of their identity (Crane et al. 2018).

In a study where the effectiveness of the application was measured on 672 people, it was concluded that participants frequently used the self-monitoring and feedback module, and that the module was found to be important in terms of satisfaction and recommendations by users, but did not have a significant effect on weekly alcohol consumption (Crane et al. 2018).

Promillekoll ve Party Planner

Promillekoll is a Swedish language application that anyone can download for free from the IOS and Google Play app stores. It was created as a standalone application that can be used offline and is designed as a public application. The application is theoretically based on the assumption that the user's knowledge of current blood alcohol levels can contribute to one's protective, cognitive and behavioral strategies. Promillekoll also offers a set of specific strategies to keep alcohol consumption at a non-harmful level. This application allows a person to easily monitor consumption to get a better idea of when to stop alcohol intake. It displays the estimated blood alcohol level based on user input and presents it graphically to the user. The application alerts the user if the entered drink results in a blood alcohol level above 0.06 percent and provides information texts about alcohol and blood alcohol level. In a study examining the results on university students, no significant effect was found on alcohol consumption (Gajecki et al. 2014).

The "Party Planner" application was designed with a similar purpose to Promillekoll. In addition to Promillekoll, the application has the functionality to predict drinking activity and blood alcohol level before a planned alcohol consumption. Thus, it allows the user to monitor himself/herself by simulating the drinking activity and comparing it with real-time activity (Berman et al. 2019).
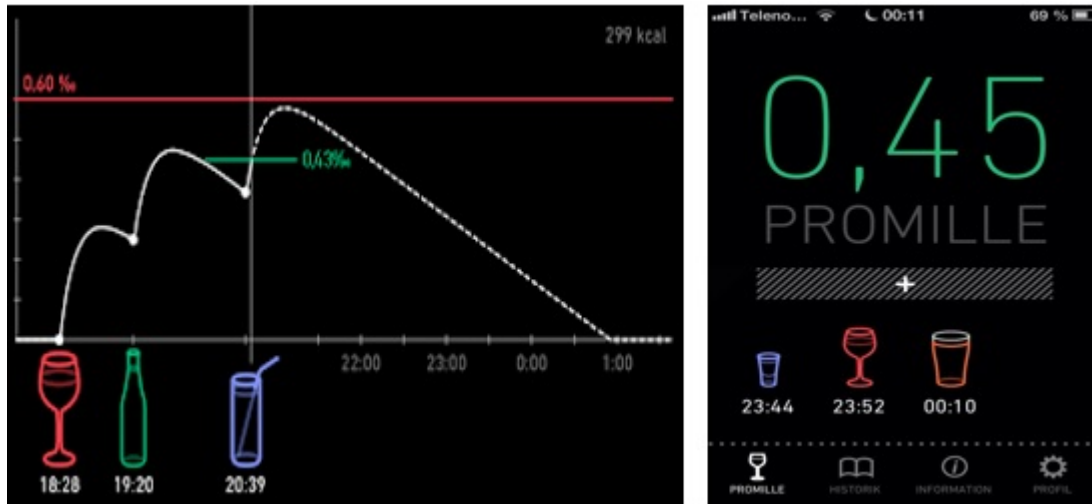
Figure 7. Screenshots of Promillekoll application

Figure 8. Screenshots of Ray's Night Out application

Ray's Night Out

This is a mobile application designed for adolescents aged 16-25 to reduce alcohol use. The effectiveness of the application has been identified by a randomized controlled study and can only be downloaded from the IOS store before the study, while access is also provided from the post-work Google Play store. In practice, a virtual avatar named Ray is represented. Users perform various activities by taking this avatar out for a night in a virtual environment at night. Among these events, users can buy alcoholic-non-alcoholic drinks and meals on the avatar, dance, flirt, play games called "bar travia". In this process, users are asked not to exceed the line set for Ray. When the line called the drowsiness line is exceeded, the avatar has behavioral changes, energy changes, vomiting, fainting, etc. changes are visualized and shown to users. Thus, it was thought that with the social learning process, young people could learn to create self-controlling lines and stay below this line. In addition, an increase in the level of information about alcohol consumption and the information contained in the application content are one of the objectives of the application. As a result of the study, the increase in information about alcohol consumption and the decrease in alcohol use problems were stated in the 1-month follow-up process of users (Figure 8, Hides et al. 2018). The fact that the application is part of a randomized controlled study, involves monitoring work, is based on social learning theory and is performed on young people makes it different from other applications.

HealthCall-S

This application is designed to be used by alcohol-dependent and drug-abusing individuals living with Human Immunodeficiency Virus (HIV). In the application, the effectiveness of which was tested with a randomized controlled trial, the researchers also conducted short motivational interviews with the users in the intervention group before the application. The application includes self-monitoring questionnaires about users in English and Spanish. These survey questions included inquiries about daily drug use and dollar amount spent on it, alcoholic drinking habits (types of drinks; number and size of drinks for each type), HIV medication adherence, safe sex practices and healthy living, feelings of stress, and overall quality of the day. Depending on user input, the user can access 30-day statistical reports. The application also includes video clips to facilitate ease of access and use by users. In addition to these video clips, video clips that give a daily tip about staying away from drugs and alcohol were also designed in the application content (Figure 9). According to the results of the study, it was concluded that alcohol and drug use of individuals with alcohol and drug use living with HIV successfully decreased (Aharonovich et al. 2017). The randomized controlled design of the study with individuals living with HIV and the use of motivational interviewing skills make the application different from other applications.

Figure 9. Screenshots of HealthCall-S application

A-CHESS (Addiction– Comprehensive Health Enhancement Support System)

The mobile app created for individuals with alcohol addiction is based on the self-determination theory and has a comprehensive content. The application includes;

1. High-risk location tracking with GPS (Global Positioning System) technology

2. Educational resources excerpted from scientific articles and books

3. Panic button

4. Regular assessments

5. Relaxation tools

6. Asking questions to the expert

7. Motivational quotes and declarations

8. Open expert (sharing the questions asked and answered by the expert with all participants)

9. Drug resources for addiction

10. Discussion and support groups where users can communicate with each other

11. Sobriety counter to remind participants how many days they have been sober

12. There is a healthy news bulletin that provides information about healthy events related to alcohol and drug use in the city where users live (McTavish et al. 2012).

The content of the mobile application, the effectiveness of which was proven by a randomized controlled trial,

can be accessed from the link https://chess.wisc.edu/achess-archive/Home/MainMenu.aspx?GUID=. The application can be downloaded with a login code from IOS stores in Australia, New Zealand, USA, United Kingdom, United Kingdom, Ireland, Canada and Switzerland, but is not available from the Google Play store (Figure 10, Colbert et al. 2020).

Figure 10. Screenshot of A-CHESS application

S-Health

The S-Health mobile application was developed by the researchers to support self-management of addiction symptoms and recovery for substance use patients with limited access to mental health services. To support users' self-management, the application offers daily questionnaires. Based on the cognitive-behavioral model, these questionnaires are designed to help patients better identify triggers (emotions, places, people, etc.), recognize strategies to cope with these situations, monitor substance use and cope with cravings. In daily questionnaires, participants are asked to report their cravings, emotions, triggers, responses to triggers, and social context (Liang et al. 2018):

a. Welcome page   b. A sample question in the daily survey   c. A sample question in the daily survey
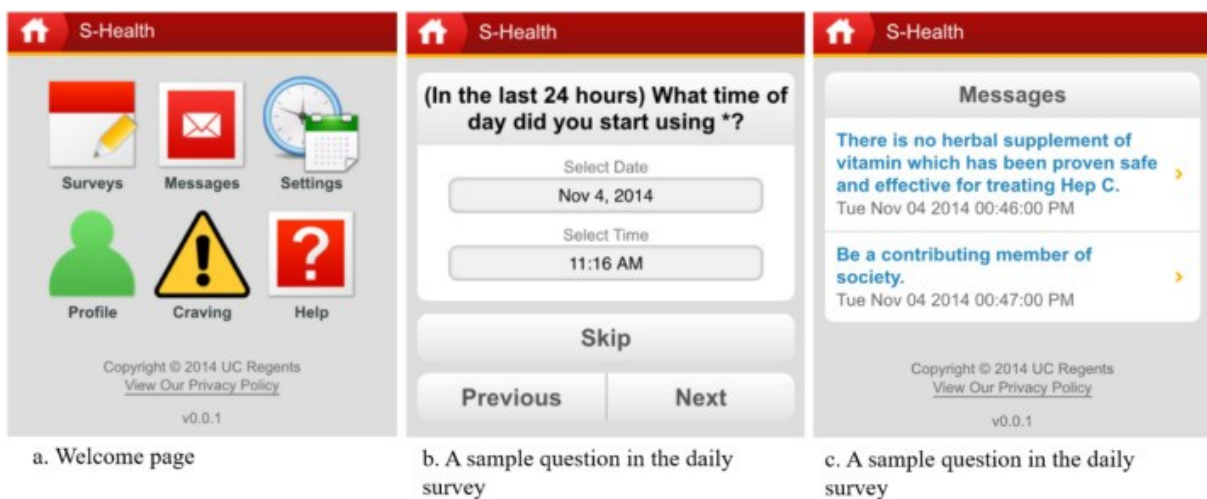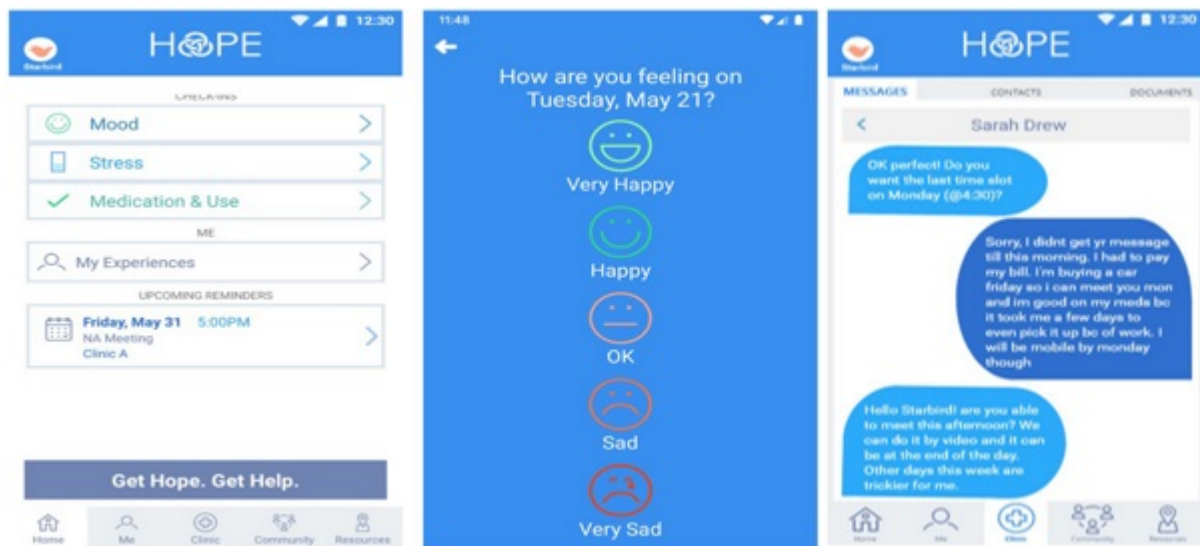
Figure 11. Screenshots of S-Health application

1. Cravings: Participants are asked to rate their cravings for the items on a scale from 0 to 10 (0 = no craving, 10 = maximum craving).

2. Affect: The International Positive and Negative Affect Schedule Short Form (I-PANAS-SF) (Thompson, 2007).

3. Triggering thoughts, places and situations: participants were asked to enter their own text or choose from a list of common triggers associated with relapse (e.g., "I am bored"; "I feel sad")

4. Responses to triggers: participants are asked to enter their own text or choose from a list of common coping responses (e.g., "I called my friend and talked about it")

5. Social context: participants were asked whether their use behaviors occurred alone or with a romantic partner, family, friends, gang, colleagues, classmates or others (Liang et al. 2018).

In this intervention, which was tested with a randomized controlled trial, the substance use of the participants in the intervention group in the last week was lower than the control group. This finding was supported by urinalysis (Figure 11, Liang et al. 2018). No data was found on the accessibility of the mobile application in application stores such as Google Play and IOS.

HOPE (Heal-Overcome-Persist-Endure)

The HOPE mobile application, designed as an adjunct to opioid use disorder treatment, was piloted with a small patient group of 25 users. In addition to the patient participants, a doctor, a nurse and a social worker participated in the application as clinicians. When the application content is analyzed (Figure 12);

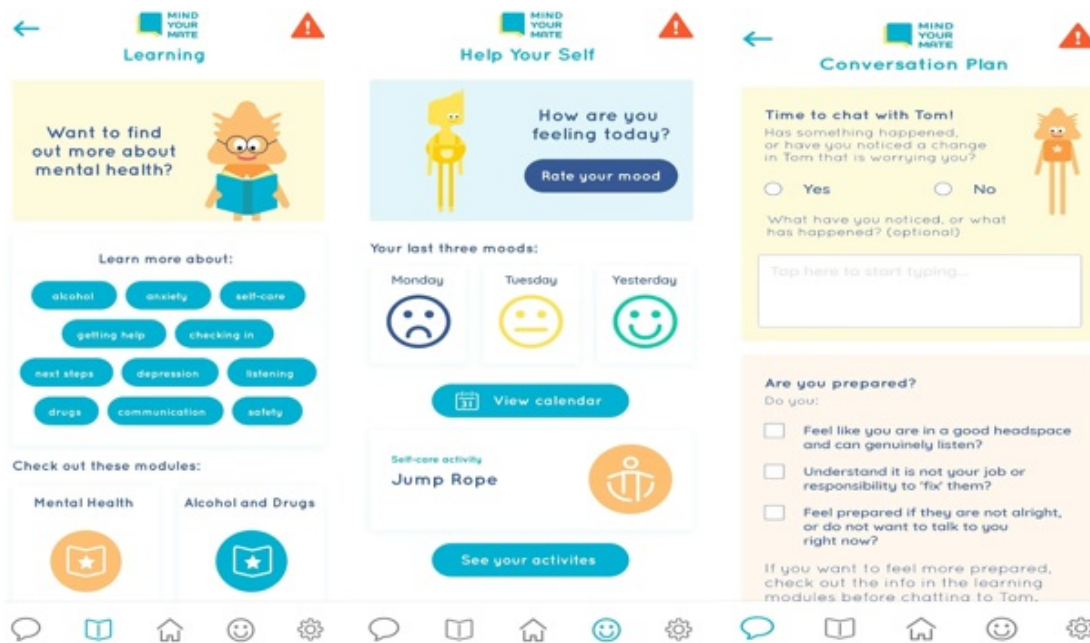**Figure 12. Screenshots of HOPE application**

1. There is a self-reporting and self-monitoring system that questions users' moods, stress levels and substance use habits. he data in this tracking system is also accessible to mental health professionals who can login to the application..

2. An emergency support system that provides access to support request from the community, clinical contact number, crisis hotline and 911 emergency number, a notification system that reminds information such as appointment etc,

3. An anonymous community board where patient users can communicate with each other on topics of their choice,

4. A system where users share their experiences of triggers and incentives for substance use,

5. A self-monitoring system that allows users to set improvement goals and monitor themselves,

6. Private and secure messaging between patients and clinicians and a secure document upload system for users to share information with clinicians,

7. A system with names and phone numbers of clinical staff or people entered by the user,

8. Frequently asked questions, links to rescue-related information, and a system for entering timing and location information for rescue group meetings were also designed into the app (Waselewski et al. 2021, Hodges et al. 2022).

As a result of the implementation, interviews were conducted with the participants at the end of 1 month and the participants reported strong positive perceptions of the program. In individual interviews, clinicians and users emphasized the importance of self-monitoring, social support and communication in addition to the treatment of opioid use disorder and stated that the application was an efficient and useful application (Waselewski et al. 2021). No data was found regarding the availability of the mobile application in app stores.

Mind your Mate

It is designed to increase peer support for adolescents with anxiety, depression and alcohol and substance use. The Mind your Mate application was developed by school counselors and developers to meet the needs of young people to better support their peers in substance use and mental health and features self-care strategies, gamified ongoing support and customizable content. The application content first includes a web-based introductory lesson of approximately 40 minutes in length on identified mental health and substance use for 23 adolescents. The training includes topics on anxiety-depression-alcohol and substance use, active listening skills, emotion regulation skills, self-care, motivational interviewing and communication skills. Adolescents who receive the training communicate with other adolescents based on peer support by monitoring their moods, anxiety and depression levels, and alcohol and substance use. This also leads to socialization. The learning section of the application includes educational modules with quick links to specific topics. The self-care section allows users to monitor their mood and enter healthy activities (Figure 13, Birrell et al. 2022).

Figure 13. Screenshots of Mind Your Mate application

According to the results of the focus interviews conducted with the users of the application, which was designed in beta version with the cooperation of the school and software developers and is available in IOS-Google Play stores, students have privacy concerns. The researches have shown that the application has the potential to help adolescents in their efforts to prevent alcohol and substance use. The program needs randomized controlled trials that test its feasibility, acceptability and effectiveness (Birrell et al. 2022). The unique aspect of the application is that it is an application aimed at preventing alcohol-substance use in adolescents with peer support.

UYUMA (Anti-Drug Mobile Application)

The project was designed by the Ministry of Interior of the Republic of Türkiye, General Directorate of Security

within the scope of the project in order to create a permanent and strong combat environment by creating citizen sensitivity in the fight against drugs through technological means, in accordance with the awareness of social responsibility and by making it more effective. The application, like the other applications mentioned in the current review, is not an application directly used by individuals with drug use, but has been developed for the use of citizens within the scope of the fight against drugs. Since 2018, the application can be downloaded publicly from Google Play and IOS stores. Individuals can report to the police by pressing the button in the application when they want to report the drug trade, which they see where they are and which is a crime, to the police. With the location information and visual support system in the application, the nearest law enforcement officers arrive at the scene. The identity information of the reporting person is kept confidential (UYUMA 2018). No scientific study has been found on the effectiveness of the application.

Figure 14. Screenshots of UYUMA application

Discussion

In this review, the contents of mobile applications created as a preventive, preventive and treatment supplement in smoking, alcohol and substance use disorders were examined. This review is expected to be a guide for mental health professionals who cooperate with software producers. When the contents of mobile applications are analyzed, similar contents of the applications are observed. In mHealth applications created in addition to the treatment of smoking, alcohol and substance use, behavioral change is targeted and a self-monitoring system is frequently used. There is a need for further evaluation of the effectiveness of mobile health applications to determine which applications are most useful and which behavior change theories and techniques best support positive behavior change. This is important because of the ubiquity of mobile health apps in society. Mobile applications must be able to effectively improve and sustain positive health behaviors if they are to fulfill their health improvement goals (Milne-Ives et al. 2020).

In these applications targeting behavioral change, researchers use a tracking system based on self-monitoring based on the data input of the users. Self-monitoring with statistical data in line with the information entered by the user (Gajecki et al. 2014, Bindoff et al. 2016, Aharonovich et al. 2017, Attwood et al. 2017, Pifarré et al. 2017, Crane et al. 2018, Liang et al. 2018, Colbert et al. 2020, Jayachandra et al. 2020, Waselewski et al. 2021, Bırakabilirsin 2022, Birrell et al. 2022), clinician follow-up (Pifarré et al. 2017, Waselewski et al. 2021) and peer follow-up (Pifarré et al. 2017, Colbert et al. 2020) is provided. Through the notification systems included in the content of the applications, it is aimed to raise awareness, prevent relapse and provide self-management in smoking, alcohol and substance use. However, this is dependent on user inputs and the motivation of users is essential for this. For example, if participants are unwilling to disclose the actual amount consumed, self-reported drug use may be underreported (Capon et al. 2016). In order to gain or increase motivation, educational information (McTavish et al. 2012, Bindoff et al. 2016, Crane et al. 2018, Hides et al. 2018, Waselewski et al. 2021, Birrell et al. 2022), rewards (Bindoff et al. 2016), and gains (Bırakabilirsin 2022) are reported to the user. Applications with a system that estimates the blood alcohol level based on user input and warns the user at a certain level have been found to be less effective (Gajecki et al. 2014, Berman et al. 2019). Although this may be related to users' desire to quit the habit of drinking alcohol, evidence-based studies with large samples are recommended. In addition, the development of wearable technology products that estimate blood alcohol levels

without depending on the data entered by the user with changing motivation is considered to provide important results to the relevant literature. This is supported by the finding that the most common reason for stopping using applications is the time required to enter data (Alqahtani and Orji 2019).

In applications supported by location support, notifications warn the person (McTavish et al. 2012, Attwood et al. 2017, Jayachandra et al. 2020) and are also used for the purpose of reporting to prevent criminal drug trafficking and smoking indoors and to increase sensitivity in society (UYUMA 2018, Yeşil Detektör 2022). These applications developed by the Turkish ministries for reporting purposes are not directly used by individuals with smoking and substance use, but they are important in reducing addiction and crime rates. However, there is a need for more studies proving the effectiveness of these applications in Turkey.

One of the important factors for gaining motivation in addiction treatment is peer support and self-help groups. Individuals with a history of addiction and who have had the same experiences can gain motivation through each other's experiences (Kesgin and Yaman 2021). For this purpose, communication with peers and monitoring of each other's moods and smoking habits and alcohol-substance-use habits were enabled in the current studies. This system based on peer support is considered to be an important social networking system in order to socialize, make friends, benefit from experiences and gain motivation (Pifarré et al. 2017, Jayachandra et al. 2020, Waselewski et al. 2021). However, it should be kept in mind that this situation can be beneficial as well as harmful, depending on the motivation of the user, the purpose of use of the application or the intention to abuse. For example, a user who is abusive and wants to access the substance can reach the substance through the application. This risk reveals the importance of producing applications by evaluating the control mechanisms, security system and risk factors. Mobile applications that will be created to prevent and reduce addiction should be examined and controlled in terms of these and similar ethical concerns (Capon et al. 2016).

Usability is considered as one of the barriers affecting the use and adoption of mobile health applications. A study found that usability issues highlighted by users are mostly related to errors, design issues, lack of guidance and explanation, data loss, internet connection problems, battery and memory usage problems (Alqahtani and Orji 2019). In existing reviews, there is information on how to use the application by an animated character for usability (Aharonovich et al. 2017, Birrell et al. 2022). In a study examining 106 mental health applications from IOS and Google Play to identify usability problems, it was concluded that mental health applications should undergo usability assessment before being offered to the public (Alqahtani and Orji 2019). Qualitative studies are especially needed to test the usability of mobile applications used in addiction.

When the applications are analyzed in terms of accessibility, not all applications are accessible to the public. While some of them are available in the App Store stores for the IOS operating system, some of them can only be downloaded from the Google Play Store application stores created for the Android operating system. There are applications available in both stores as well as applications that are not available in both stores. In addition, the fact that there are no language options in the applications and that they can be downloaded from the application stores based on countries shows that mobile applications can be criticized in terms of accessibility. In addition, although many mental health applications are publicly available, most have not undergone scientific evaluation and many well-researched applications are not publicly available. The fact that many applications cannot be accessed from the app store after they are used only for scientific study purposes can be considered as a negative finding that trust-related problems may emerge (Mehrotra and Tripathi 2018, Alqahtani and Orji 2019). Given that most smartphone users download apps that are used for a limited period of time, it is unclear whether individuals with addiction will use mobile treatment programs in the longer term. The response to these issues requires carefully designed prospective research in both clinical and control populations (Swendsen 2016).

One of the issues negatively associated with trust in apps is user reports of data privacy and confidentiality (Sunyaev et al. 2015, Birrell et al. 2022). This issue is among the challenges that hinder the adoption of technology and applications (Sharma et al. 2018). For this reason, it is critical for mobile application producers to be careful about data privacy and to produce software by taking user opinions.

Although many applications available in app stores provide evidence-based data, the majority of currently available applications are not based on scientific evidence and are thought to be harmful to users (Torous and Laura 2017). In order to prevent this harm and to increase the reliability of applications, the educational information included in the application content should be evidence-based scientific data and applications should be made available to the public after their effectiveness has been scientifically assessed with larger samples before they are made available to the public (Alqahtani and Orji 2019, Williamson et al. 2022). For example, in Turkey, the "Bırakabilirsin" application, which is designed to reduce and prevent smoking addiction, is accessible to the public, but no data have been found in terms of providing scientific evidence. There is a need for systematic review and meta-analysis studies on the scientific validity and reliability of these and similar applications and

studies on the effectiveness of the applications by the relevant ministries.

Conclusion

In this study, 16 mobile applications designed for smoking, alcohol and substance use disorders were examined and discussed. Self-tracking system, location information, notification systems, educational information and peer support were frequently used in the existing studies. These applications show promise for the usability and effectiveness of mobile applications in addition to addiction treatment. According to the results reported, mobile applications available in application stores and open to everyone should be increased, should be scientific and easy to be used by everyone, should be reliable for privacy and confidentiality, should be universal all over the world, and applications should be developed by considering ethical concerns and various risks. Apart from smoking, alcohol and substance addiction, studies examining mobile applications produced for other behavioral addictions should also be conducted. In addition, due to the limited number of addiction studies in Turkey, it may be recommended to adapt and scientifically evaluate applications related to addiction in the Turkish society. There is a need for studies that scientifically evaluate the addiction-related mobile applications available in the application stores open to access in Turkey. This review provides various information on the benefits and risks of mobile applications used in addiction for mental health professionals and software producers, as well as a critical perspective on the applications.

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