

Psychotherapy Assisted with Mobile Applications

1. Introduction

In the recent years, a significant increase in the prevalence of psychological diseases has been noted in Poland and the Western world. One of the consequences is the increase in the number of patients undergoing psychological therapy (PT). In the United States alone, annually 18.1% of the adult population suffers from anxiety disorders. The lifetime prevalence is estimated to be as high as 28.8%. According to the report by The National Institute of Mental Health, which, as one of the institutes of the National Institutes of Health is a part of the U.S. Department of Health and Human Services, about 40% of the patients receive professional treatment. The latest levels of the anxiety disorders occurrence rate in Poland is not known, but the authors estimate it to be similar to Western Europe.

2. Cognitive-behavioral therapy (CBT)

Cognitive-behavioral therapy (CBT) is one of the main trends in the psychotherapy. It is focused on the cognitive factors and behavioral patterns involved in the mental distress and psychological disorders of a patient. A key part of the CBT is a full collaboration and engagement of the patient, who should become an active participant in the therapy. Reinforcement of the proper cognitive and behavioral patterns plays an essential role during the entire course of the therapy. The patient is instructed how to recognize the cognitive dissonances. Supporting tools in CBT, such as thoughts diaries or activity diaries are often used to track

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the progress of the therapy. A patient records the triggering events (i.e. events that induced anxiety) and the details of the situations in which those happened. Belief revision, the key mechanism of the CBT is attempted. As meta-analyses show, the efficiency of CBT is proved in the treatment of various disorders, i.e. depression, anxiety disorders, substance abuse. Typically, therapy involves multiple sessions spread over a long period of time. For therapy to be successful, consistency and continuity of the therapy must be ensured.

3. Support of CBT by mobile applications

Supporting psychotherapy through the use of new ICT (Information and Communication Technologies) is an emerging trend. According to the CBOS research in Poland conducted in 2015, over 64% of the adult population in Poland uses the internet on the weekly basis. In the age group of under 35 years, the popularity of internet use is much higher, over 95% of the population has direct access to the internet. As of 2014, over 88% of the adult population in Poland uses mobile phones. In Western Europe, the percentage is much higher, e.g. in the UK, 78% of the population uses the internet daily or almost daily. Furthermore, 74% of the population uses mobile access to the internet. A British study from 2015 states that the population of patients suffering from mental disorders uses ICT technologies in a way similar to the general population. The use of ICT support in therapy is recommended in the UK Government's strategy "No health without mental health". A survey of AppStore and Google Play platforms shows that multiple applications, which may be used to support the CBT therapy, are already available. Most of them, however, consist of only a single tool, i.e. sleep diary. Therapists interviewed by the authors complained about the lack of the dedicated standalone platforms. The support of a typical therapy would involve several different, often inconsistent applications.

The traditional way of tracking the therapy progress involves the use of notebooks or diaries. According to the interviewed therapists and patients, it is one of the reasons behind the problems with consistency of the logs. Patients often fail to bring the notebooks with themselves and do not write down the missing notes later. As a result, the logs and the diaries are often filled with gaps, which significantly limits their potential value for the assessment of the therapy progress. A potential solution would be to use an appropriate smartphone application. As multiple studies and surveys show, the majority of the young and middle-aged

population uses smartphones every day. Most of the time the patient takes the smartphone with himself/herself, hence it should be possible to fill the notes in real time. Another problem often faced in the out-patient therapy is the lack of communication between the patient and the therapist between the sometimes infrequent therapy sessions. Several studies concerning the use of supportive mobile applications in CBT have been released within the last 2 years.

A study from 2015 claims to be the first trial that tests feasibility and efficacy of the CBT-informed smartphone application in the treatment of early psychosis. The authors recommend further randomised clinical trials of the mobile solutions supporting psychotherapy. A British study examined the effectiveness of CBT-supporting application developed jointly by Universities of Manchester and Liverpool. The results were promising.

4. A solution proposal

The authors propose a concept of a mobile platform to support the psychotherapy process. The proposed platform consists of two components: a mobile application called '*First Psychological Aid Kit*', and an internet-based platform used for communication with the therapist. The mobile application provides a patient and his/her therapist with easy to use supportive tools, such as a thought diary, with a submodule for detection of cognitive dissonances and faulty beliefs, a sleep diary, an activity log, a mood assessment module and the first aid-kit. The *first-aid kit module* allows the patient to find the answers to the frequent questions and the guidelines for the situations of emotional distress. The submodule consisting of tools designed to distract the patient during anxiety attacks is also available. It is suggested that the use of thought diaries, one of central techniques in CBT, demonstrates a beneficial therapeutic impact in comparison to the control condition.

Experienced therapists who we have consulted for this study have suggested that one of the significant challenges in the implementation of these techniques is a lack of cooperation from the patient, often motivated by the unwillingness to monitor and record the data into the diary on a regular basis. According to the therapy consultants, the patients often complain about the need to regular permanent access to their diary tool as the biggest obstacle. The necessity of updating the traditional paper diary at a later time, further negatively impacts the efficiency of the therapy, delays the log record, and also discourages the

patients from developing a habit of recording the progress and learning about his or her emotional distress.

The application which we develop for mobile phones or smartphones allows and facilitates the recording directly into a smartphone, which a patient normally carries with him/her all the time, hence exempts him or her from the obligation of carrying a paper diary. In the same way, the mobile application allows for more consistent record of sleep patterns and activities patterns, hence it is much more useful in the later assessment of the patient's condition and improvements of this condition.

The first aid kit module further allows mitigating anxiety attacks during emotional distress, by answering typical questions or purposely distracting the patient's attention from the situation which causes the stress attack. The second component of the intended solution is a web-based platform for the communication between the patient and the therapist. The therapist will be able to access the logs and diaries of his/her patients between the sessions. It allows a stable and regular online connection with the patient.

In the traditional therapy process, the meetings between patient and his therapist usually happen in between 1–2 weeks' time, often more rarely or irregularly. On the other hand, the mobile-assisted therapy allows a regular monitoring of the progress, allows for an additional communication channel, and a better picture of the patient's life photography, both at present and of the past experiences as a retrospect. The recorded view is less distracted and more accurately collected. The main challenge, on the other hand, is related with the confidential nature of the recorded information, how safe is the storage of the recorded information.

5. Future developments

The idea started as part of the Group Project Course at the Faculty of Electronics, Telecommunications and Informatics of the Gdansk University of Technology. The concept of the solution is a result of multiple consultations with the experienced therapists and software engineers. The mobile application component of the platform is already being tested at the Technical University of Gdansk. The cooperating therapists have very positively assessed its usability and benefits. Before the clinical tests, minor UI tweaks will be conducted. The

latter part of the platform, web-based platform for continuous on-line communication between a patient and a therapist is still being developed.

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Streszczenie

Artykuł prezentuje koncepcje stworzenia i zastosowania aplikacji na smartfony, ułatwiającej terapię psychologiczną. Przedstawiono pomysł, aby dziennik aktywności (ang. *activity log*), podstawowe narzędzie zbierania danych w terapii psychologicznej, był zapisywany przez pacjenta na smartfonie. Zapis w aplikacji, poza wygodą dla samego pacjenta, pozwala rejestrować proces i intensywność objawów w czasie oraz umożliwia kontakt między terapeutą i pacjentem w czasie rzeczywistym. W artykule przedstawione są między innymi wyniki programu testowego, zaprezentowane korzyści dla pacjenta oraz psychoterapeuty, a także dalszy plan rozbudowy aplikacji i jej funkcjonalności. Koncepcja jest nowatorska, autorzy nie natrafili na podobne zastosowanie aplikacji mobilnej w terapii psychologicznej.

Słowa kluczowe: aplikacja mobilna na smartfony, psychoterapia, technologie informatyczne w medycynie