

What if we could fight drug addiction with digital technology?

Drug addiction is one of the greatest problems facing European public health authorities. Advances in drug addiction research have focused mostly on the neurobiological aspects of the disease, but now promising new technologies are enhancing our ability to understand and treat drug addiction. A wide range of health tools for drug addiction recovery is available on the internet: information and education websites; assessment and psychotherapeutic software; comprehensive self-help programmes; and social network therapeutic communities. Use of such tools on smartphones and other mobile devices is known as mobile health (mHealth). The utilisation of new technologies in drug addiction treatment and research has generated interest, curiosity and expectation, but also concerns regarding the ethical aspects of their use.

Substance-use disorders (SUDs) are major public health concerns in the EU, with considerable interpersonal, physical and societal consequences. Around 23 million people are affected by [alcohol-related disorders in Europe](#). One in four EU citizens over 15 years of age is a [tobacco smoker](#). There are about 1.3 million high-risk [opioid](#) users in Europe and 2.3 million young adults (aged 15–34 years) used [cocaine](#) in the last year. Given these figures, it is not surprising that there has been significant interest in Europe in the development and implementation of [technology-based interventions \(TBIs\)](#) for people with SUDs.

TBIs do not attempt to replace traditional therapy. Rather, they allow for the combined use of different intervention tools, increasing the still-limited number of therapeutic methods in treating drug dependence, and reaching out to a different typology of subjects. Strategies for managing SUDs should be able to address the chronic and relapsing nature of addiction, and TBIs can provide a valuable support in addressing these challenges.

TBIs include [technology-assisted behaviour therapies](#), education, recovery support programmes, wellness monitoring, and resources for prevention and information. These interventions can be offered via different approaches, including for instance telephone counselling and web-based video conferencing tools, self-directed desktop therapeutic tools, web-based text communication (email, chat, forums), as well as mHealth. Significant overlaps exist between the use of the aforementioned types of tools, and similar services are offered via [different tools](#).

Overall, TBIs for SUDs appear to be effective, although their efficacy in behavioural change tends to be small, and the mechanisms through which the treatment works remain largely unknown. Nonetheless, these changes should be considered important because, from a [public health perspective](#), even small changes become meaningful when multiplied at the population level.

Specifically, [mHealth](#) can provide support in conducting SUD research and [treatment](#) through two different pathways: (i) direct input, via self-assessments by patients; or (ii) via passive data collection, where physiological information is gathered using special sensors.

Using mobile technologies to collect self-assessments is referred to as [ecological momentary assessment \(EMA\)](#). EMAs help people to self-monitor behaviours at the time and in the context in which they occur. Compared to traditional measures using paper-pencil questionnaires, EMA has several benefits, such as increasing our ability to correlate instances of craving to maladaptive behaviours.



© iconimage / Fotolia

What if we could fight drug addiction with digital technology?

Passive data collection often relies on technologies that record patterns of movement within the patient's environment, for example, via global positioning system (GPS) and wireless local area networks (Wi-Fi), which can be used to acquire [location-based data](#). What is specific about these tools is the possibility to gather spatial and temporal information, i.e. where and when the behaviours of the subject occurred.

The impact of the environment in developing or sustaining SUDs has been called the '[exposome](#)' of [addiction](#). The term has already been used in other areas of medical research, such as in cancer research, where it refers to the environmental exposures throughout life as a way of understanding the environmental influence on the onset and development of [tumour diseases](#).

In addition, physiological information from special sensors, such as those measuring blood pressure, heart rate, skin temperature or substance concentration levels in blood, can be combined with the gathered spatial and temporal data in order to get a more detailed profile of the patient and her or his behaviour, including monitoring physiological responses or [precursors to craving](#).

Possible impacts and developments

TBIs have the potential to play an important role in enhancing the availability of SUD treatment. Given the substantial gap between the number of individuals seeking addiction treatment and the health system's capacity to offer adequate and timely health support, TBIs appear to offer interesting [opportunities for clinicians](#), health administrators and decision-makers to expand the availability of medical services and reduce health service barriers, such as reduced patient mobility, treatment costs or carer availability.

Moreover, based on information from smartphones and other mobile devices, it is possible to deliver, in real time, interventions during people's daily lives. Information can be utilised by clinicians, health personnel, peers or family for detailed messages and suggestions, helping the patient to control her or his cravings. In addition to real-time monitoring of factors related to SUDs, information collected by these technologies can be used to calculate the risk for new episodes of the specific maladaptive behaviour: it has been found that relapse to substance use can be predicted using information from surveys of use and risk factors in the previous weeks. Algorithms may then be developed to identify behavioural patterns indicative of treatment progress, such as treatment response and triggers for cravings and behaviour that increases the risk of relapse.

Anticipatory policy-making

Despite encouraging progress, TBIs for SUDs need to be evaluated with caution. This field of medical science still suffers from a lack of clarity and consistency. Across the research literature there are methodological difficulties, such as a lack of common definitions, selection biases, study attrition, difficulties in mounting randomised clinical trials and uncertain conclusions drawn from the findings. Supporting TBIs for SUDs by investing in research is important for a better understanding of the potential and limits of these [applications](#). Improving the quality of research will enable effective clinical interventions, but can also help decision-makers to better understand the potential of these technologies from a public health perspective.

Given the proliferation of technology applications, a possible policy option for fostering the implementation of TBIs in SUD treatment is to provide adequate ICT infrastructure and stimulate digital literacy among healthcare [professionals](#). Training for health personnel will become not only necessary but also multi-disciplinary in the near future. Clinicians should develop expertise in different types of media and technological interventions, developing collaborations with experts in other fields, such as cognitive psychology, ICT and communication.

TBIs for SUDs are a component of the application of ICT in healthcare (eHealth). Several barriers hamper the wider uptake of [eHealth solutions in Europe](#), such as limited interoperability between eHealth solutions and insufficient evidence of cost-effectiveness. A [legal framework](#) applicable to mHealth tools exists, but practical implementation brings forward [questions](#) about how specific software should be classified and thus which rules should apply. Another barrier to wider uptake of digital health applications is a lack of transparency regarding the utilisation of data collected by such applications. A [privacy code of conduct](#) for mHealth apps is currently being developed, because the issue of ambiguous data collection may render the implementation of online therapy for SUDs incompatible with health professionals' ethical duty to protect their patients' privacy and to guarantee patient confidentiality.