

# Digital tools to support the implementation of self-care among people with problematic substance use: An integrative literature review

Tuija Karsimus, Ella Plaami, Anna-Maria Mäki-Kuutti, Eeva Ekqvist, Katja Kuusisto

Faculty of Social Sciences, Tampere University, Tampere, Finland

**Anna-Maria Mäki-Kuutti D.Soc.Sc., Postdoctoral Research Fellow, Faculty of Social Sciences, SOC, FI-33014 Tampere University, FINLAND. Email: [anna-maria.maki-kuutti@tuni.fi](mailto:anna-maria.maki-kuutti@tuni.fi)**

## Abstract

Problematic substance use causes significant harm to individuals, communities and society as a whole. Nowadays solutions to bring substance abuse under control and provide help are being sought from digital tools. This literature review scrutinizes digital applications and internet-based self-care programs from the perspective of providing services. The purpose is to ascertain how the preconditions for the implementation of self-care are understood in studies addressing digital tools for the substance abuse sector. The question posed concerns what features in digital applications supporting control of substance abuse, their users and operating environment influence the implementation of self-care. The research method is an integrative literature review. The data consist of peer-reviewed scientific publications from the period 2012–2022. Data were gathered from two databases (ProQuest Central, PubMed). The final corpus comprises 18 research articles. The analytical frame of reference is the definition by El-Osta and others of four main dimensions of self-care. The findings suggest that factors pertaining to applications in the implementation of self-care are the technical usability of the service, the option for anonymity, variation in content, active reminders and application feedback, gamification and ability to identify with the user. Factors pertaining to the users, in addition to age and gender, are mode of substance abuse, duration of using history, severity of the problem, readiness for change, possible concurrent diagnoses, ability to process own feelings, social relations and digital literacy. Factors pertaining to the operating environment are legislation governing substance abuse, national intoxicant culture, stigma attached to substance abuse treatment, availability of support outside the application and the pandemic situation restricting face-to-face interaction. The diverse nature of the group of individuals with problematic substance use will in the future increase the need for user profiling and more individualized tailoring of application content in keeping with their life situations and stages of recovery.

**Keywords:** substance-related disorders, self care, digital technology, mobile applications, user-centered design

*Published under a CC BY 4.0 license (<https://creativecommons.org/licenses/by/4.0/>).*

## Introduction

The problematic use of alcohol and other intoxicants causes our society numerous individual harms, human suffering for significant others and the immediate environment and a burden on public institutions [1,2]. In society the costs of substance abuse are considerable in health care, pensions and sickness benefits, in addition to which the costs incurred by social services and social security through the negative effects of alcohol consumption alone amounted in Finland to some 230–260 million euros in 2016 [3]. Political decision-makers have drawn attention to the need to improve the efficacy and productivity of services in social and health care, to curb rising costs and to develop digital and online services in order to make these services more readily accessible [4]. Keeping the costs of social and health care under control is vital and the aim to produce correctly tailored and effective services deserves support. At the same time, however, it is important to ensure the equitable availability of services and participation for clients [5,6].

As part of keeping costs under control and expanding the substance use treatment reach, digital services have increased. This change has been expedited in recent years by the restrictions imposed on face-to-face services by the COVID-19 pandemic [7–10]. Information technology makes it possible to contact clients with problematic substance use for whom the conventional face-to-face service is not feasible, due, for example, to long distances, multiple health conditions, stigma, or other treatment barriers [11–14]. The benefits of digital services are, however, not evenly dispersed among people with problematic substance use. Utilization of digital services requires users to possess sufficient technical equipment, sufficient expertise in their use and resources to take care of themselves. The further development of technology may improve the

availability of services but at the same time it may create digital inequality, especially among those client groups in the most vulnerable position [15–20].

People with problematic substance use have varying service needs ranging from self-care to peer support and need for special support [21,22]. In recent years the advantages of client segmentation, that is identifying the severity of the client's problem and the amount of their resources, have been acknowledged in improving the efficacy of social and health care services [23–25]. Earlier research has identified the appropriateness of various digital tools, notably for individuals allocated to the self-acting client segment, who have the resources to tackle the problem independently or with the help of peer support [26–28]. *Self-care* is a rarely used term in the discussion on substance abuse care and control of substance abuse. However, the importance of self-care is much discussed in connection with the recovery orientation [29] and in connection with mental health services [30–32]. Self-care can be defined as spontaneous action on the part of individuals, families and communities and as the ability to promote health, to prevent illnesses and maintain health. It is moreover the ability to come to terms with an illness or injury either utilizing healthcare services or without them [33,34].

Self-care can be deemed appropriate when considering the endeavours of a substance abusing individual towards a less deleterious lifestyle. Success with self-care can reduce the costs incurred through both in-patient treatment and primary and specialized social and health care. However, it must be noted that in the case of people with problematic substance use, getting rid of the habit is a long process with periods of being clean and relapses back into substance abuse [35,36]. Thus, the service needs also vary and the digital services in use should detect changes occurring. According to

previous studies [37-42] users of digital applications in substance abuse appreciate individuality and personal interactivity. The option to tailor applications exists, but this has not been utilized [43].

In this article, digital services refer to novel technological tools for clients to manage their addiction, such as internet-based interventions and smartphone applications [15]. Our literature review is concerned with the operational preconditions of digital tools to support self-care. Little research has been accomplished on the factors and mechanisms influencing the implementation of digital self-care. Because of this knowledge gap, we scrutinize digital applications and programs operating by internet for the intoxicant sector from the perspective of self-care. The analytical frame of reference is the four dimensions of self-care proposed by El-Osta and others and based on 32 different models of self-care and theory [44]. These dimensions are:

- 1) the dimension of an individual's knowledge base, health awareness, mental and physical well-being, agency and risk avoidance;
- 2) the dimension of activation for self-care, motivation and change of behaviour;
- 3) support for self-care and service needs;
- 4) social, political, economic and cultural aspects which inhibit or enhance the implementation of self-care.

Successful self-care needs understanding of the background factors at work in different situations [30-32]. There are both client-related and contextual conditions that affect the decision to seek help in the first place [45,46]. There are core elements in breaking free from problematic substance use [21,47]. Treatment has an impact through its attraction; when the client believes in the treatment the results are better [48]. The same likely applies in the context of self-care; it is impossible to ignore the

shame and stigma attached to problematic substance use at many levels [49,50], which may prevent the adoption of various self-care methods.

It is the aim of the present study to ascertain how the preconditions for the implementation of self-care are understood in research on digital tools in the substance abuse sector. We endeavour to create in our review article an extensive and many-sided account of the phenomenon. We ask in our review *what factors in digital applications supporting control of substance abuse, their users and operating environments exert influence in the implementation of self-care.*

## Material and methods

As our research method, we use the integrative literature review, the aim of which is to generate a synthesis of the subject based on original research. This differs from a systematic review in the qualitative point of departure for its research setup and in the fact that it involves no meta-analysis [51-52]. It is very suitable for our research because the purpose of the review is to combine in a novel way the concept of self-care with digital applications for substance abuse treatment [51].

In order to gather our data, we conducted an index term search in two databases (ProQuest Central and PubMed) so as to include research in both social care and health care. The search strings combined the following search words: *addiction\* OR substance\* AND recovery\* OR treatment\* AND app\* OR web\* OR mobile\* OR internet\**. The NOT operator was used to exclude articles on somatic illnesses with the following search term: *diabetes\* OR heart\* OR cancer\* OR hypertension\* OR HIV\* OR asthma\* OR sleep\* OR pain\**. In ProQuest Central search, subject defining was used, and in PubMed, all fields defining was used. Preliminary inclusion and exclusion criteria for the articles were

formed after some test searches in both databases. The criteria were specified after the first selection of articles. The final inclusion and exclusion criteria are presented in Table 1. In keeping with the nature of an integrative review studies using differing research methods were included [52].

The ProQuest Central database yielded 4167 hits and PubMed 2645. There were numerous duplications among these. The hits were arranged in order

of relevance. From the research articles most relevant to our research task we selected 34 articles based on the titles and abstracts for closer scrutiny. Of these a further 16 were rejected due to the inappropriateness of the question formulation and failure to meet the inclusion and exclusion criteria. The research articles for the final review numbered 18 [53-70]. The PRISMA flowchart for literature search is presented in Figure 1.

**Table 1.** Inclusion and exclusion criteria.

---

**Inclusion criteria**

Search terms in databases

Peer-reviewed empirical research articles in English, published between 2012 and 2022, full text access

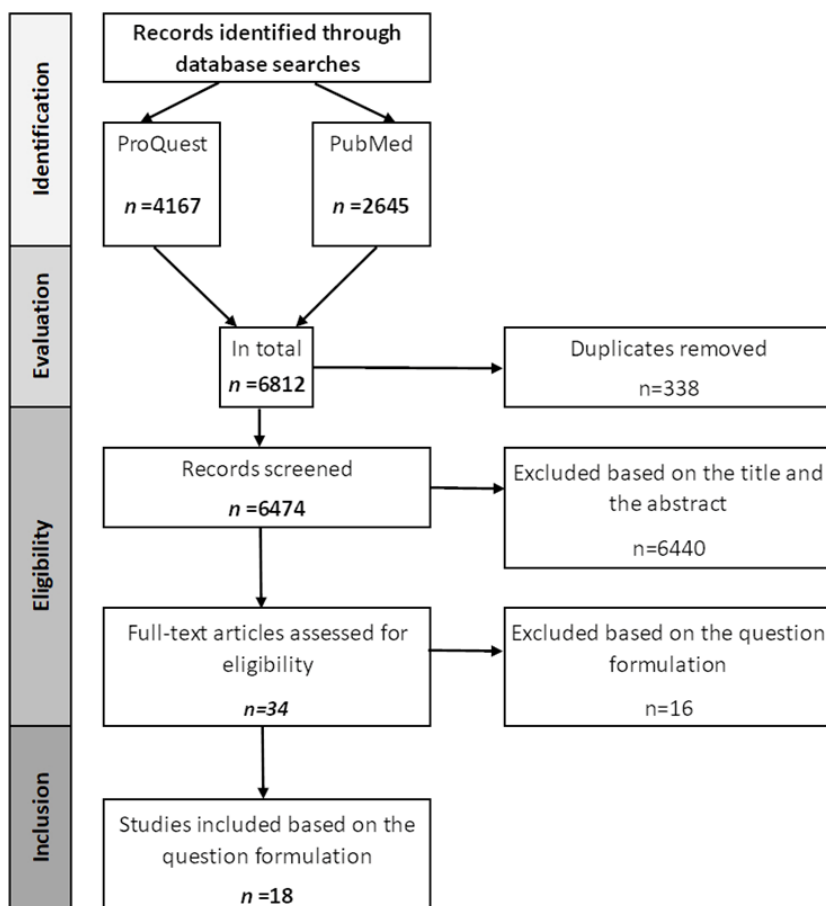
Focused on a specific (one or more) digital tool(s) supporting control of substance abuse and implementing self-care on a substance use sector

**Exclusion criteria**

Articles that were not empirical research articles in English, published before 2012 or after 2022, full text access not available

Did not focus on a specific (one or more) digital tool(s) supporting control of substance abuse and implementing self-care on a substance use sector

---



**Figure 1.** The PRISMA flowchart for literature search.

Seven of the studies had been accomplished in Europe and eight in North America. We also included one internationally implemented article and individual studies from South America and Australia. Eleven of the articles took a quantitative approach [54,56-59,62,63,65-68], four took a qualitative approach [60-61,64,69] and the remaining three used mixed methods [53,55,70]. In order to obtain a

many-sided picture of factors related to users, application and operating environments where digitalization was utilized, we included the views on self-care of both user-clients and professionals of the various applications and online services. Table 2 presents the principal content and research objects of the applications scrutinized.

**Table 2.** Applications and research objects in the data articles.

Article	Name of app and function/content	Research object
Adams et al. 2021, USA	Bright Path app: didactic content, interactive games; survival skills, substance use, mental health, communication and decision-making	Problems with substances and mental health; developing a user-based application and test results; users' and professionals' perspective
Augsburger et al. 2021, Switzerland	SELGE-net program: 8-week program, 10 care modules; cognitive-behavioural therapy (CBT) and motivational interview (MI) methods	Changes in alcohol use among app users and a control group
Bosse et al. 2022, North America	Boulder Care app: chat options, audiovisual visits, appointment calendar	Perceived usability of existing and planned features of the app
Carswell et al. 2022, North America	Continuing Care app: personalized tools, didactic modules; recovery management, cravings, stress reduction and positive support	Feasibility and acceptability of the app to meet the recovery and personal support needs of individuals under community supervision with SUDs
Elison et al. 2014, United Kingdom	Breaking Free Online: app-aided therapy in dual diagnoses, psychosocial interventions in various multimedia formats	Assessment of users' clinical and psychometric results (work and social adjustment, health, anxiety, substance abuse, fears)
Johansson et al. 2021, Sweden	eChange: program of at least 10 weeks; 8 modules CBT chapter and practice tasks	Users' characteristics, way of using interventions and variables to reduce alcohol use
Johansson et al. 2017, Sweden	Net-based CBT	Changes in alcohol use using net-based alcohol intervention app with or without therapist support
Lord et al. 2016, USA	A-CHESS (Addiction Comprehensive Health Enhancement Support System): therapeutic construction; information on relapses, desire to use, recovery; option to maintain contact with professional and peer support	Views of four treatment unit professionals on factors enhancing and inhibiting adoption of mobile app for people with problematic substance use
Lunde et al. 2022, Europe	A therapist-guided internet-delivered cognitive-behavioural intervention; MI principles and ICBT program	Participant experiences from the intervention programme for hazardous and harmful alcohol use
Malte et al. 2021, USA	Step Away mobile app: teaching on getting drinking and harms of alcohol under control, advice, goal-setting	Usability and acceptability of mobile app among war veterans; changes in alcohol use, psychological stress and quality of life
Manning et al. 2021, Australia	SWIPE smartphone app: game approach; upload images connected to use of alcohol and its cessation to change attitudes	Users' views on suitability, acceptability and efficacy of app, also changes in alcohol use and desire to drink
Neale & Bowen 2022, United Kingdom	SURE Recovery app: includes among other things monitoring of recovery and sleep, diary, recovery narratives	Users' opinions of using the app, development suggestions on adoption and commitment to it
Paquette et al. 2021, USA	LETS ACT app: based on activating behaviour; to activate behaviour utilizes brief therapy between group sessions	Using the app and combining with treatment: users' views on usability and acceptability
Schaub et al. 2021, Switzerland	The Alcohol e-Health program: utilizes CBT, MI and principles of self-control; includes evaluation and psychoeducation	Effects of using the app for alcohol use in low-income countries

Article	Name of app and function/content	Research object
Schaub et al. 2015, Switzerland	Can Reduce: CBT, MI, behavioural control	Use of the app with and without support from chat consultation; effects on cannabis use
Sugarman et al. 2020, USA	GSI (gender-specific intervention): app with psychoeducation for special needs of women, used in addition to conventional treatment intended for men and for women	Substance abusing women's views on the gender-specific content of the app and its significance
Tiburcio et al. 2016, Mexico	The PAADD: for risk-level drug users, takes account of depressive symptoms, based on CBT, setting 4-part treatment goal and contact to professional	Views of professionals and users of the usability of the app
Trudeau et al. 2012, USA	Relapse prevention program for juvenile intoxicant users	Views of professionals and juveniles on usability; opportunities to take (negative) account of effects of friendships at the beginning of recovery

The analysis was conducted first by one of the authors and later it was confirmed by other authors. The analysis started by carefully reading through the selected articles multiple times. After that, as our analytic frame of reference we used the four main dimensions of self-care proposed by El-Osta and others: 1) the dimension of an individual's knowledge base, health awareness, mental and physical condition, agency and risk avoidance; 2) the dimension of activation, motivation for self-care and change in behaviour; 3) the dimension of support for self-care and service needs; 4) social, political, economic and cultural considerations which challenge or promote the implementation of self-care [44]. From each article we identified 1 to 4 of these dimensions. Then we focused on each dimension and brought together information from articles they were identified from. The results section was constructed to adhere to the frame of reference.

## Results

Through our review we sought answers to the question of what factors in digital applications supporting management of substance abuse, in their users or operating environments exert influence in the implementation and success of self-care. In the 18 articles included in our review there were various digital applications and online services intended for people with problematic substance use. Relevant data from the perspective of the research question was not only in the findings presented in the articles but also in the variables and descriptions of the structure of the empirical data pertaining to the individuals participating.

### *Background situation, information and skills*

In many of the articles the background data collected included the age, gender, educational background and/or employment status of those using the application [56,58,61-64,68]. Rather than on changes in substance abuse, our research interest centred more on non-demographic factors predisposing to the use of the application even though research has shown that both gender [68] and age [53,70] frequently need to be considered regarding

the content of applications. Present and previous modes of substance abuse may also be of significance in the successful adoption of the application and of self-care [53,57,58,63,64,67]. For example, the substances abused, the duration of the abuse and the severity of the problem may be significant aspects and affect a person's avoidance of risk in substance abuse. Moreover, cognitive skills [53] and digital literacy [57,60,64] influence the use of digital applications. Mental health problems may also pose challenges to the implementation of digital self-care [53,57-59,62,67].

### ***Activating, motivating and behavioural changes***

Nine of the articles included in the data investigated changes in the substance abuse of individuals using the application [54,57-59,62,63,66,67]. In several of the applications scrutinized methods of cognitive behavioural therapy and/or motivational interview were applied [54,58,59,61,66,67,69]. These entail, as is general in substance abuse treatment, motivating, target setting, readiness for change and ensuring commitment. Processing of feelings is also important in identifying situations which increase the desire to resort to intoxicants, likewise ways of coping with these. Motivation and commitment to using the application are increased by the suitability of its content and its technical properties, which at their best support the fluency of use and user-friendliness. Expectations of the application [64] affect choices, especially in the initial phase. The content of the application may consist of various activities [66], and gaming and offering varying tasks increases teenagers' commitment to using the application [53]. Identifying with the content of the application is likewise important [64]. The basis of successful self-care is the person's own activity and readiness to change their behaviour. External factors may have both positive and negative influence on the implementation of self-care.

### ***The need for services and support***

The role of the service organization and of peers in the use of digital application varies, likewise the users' need for support. Applications vary as to whether they are used entirely independently, with the support of a professional, or whether they include the option to be in contact with peers and/or professionals [54-61,64,65,67-69]. Availability of other support and integration of the application into work accomplished in professional consultation may improve the prognosis for getting clean [58]. Automatic reminders, information and feedback [55,56,64,65,70] are technical properties which introduce greater interactivity into use. Trust in the application is strengthened by evidence-based knowledge of the usefulness of the application and of its acceptability among professionals [60,64] while credible assessments by users, professionals or social media [64] also serve to enhance faith in the application. The application being easy and convenient to use supports digitally supported self-care. Several of the articles [53,55,56,60-63,65,68-70] focused on the usability and user-friendliness of the application. Convenience of use is affected by the technical properties of the application, user instructions and technical support [53,60,64,69] are important to users of the application. The opportunity to test the application [60] may lower the threshold to adopting it.

### ***The social, political, economic and cultural environment***

The life situations of those using digital applications include several factors affecting self-care and how it succeeds. The ability to balance different social roles may promote or inhibit attending to different treatment goals [55]. Correspondingly social relationships [53] may support or undermine self-care. Limiting the circle of friends may serve to reduce substance abuse, which applies especially to young



people in the early stages of recovery [70]. Some people, due to their position in society, may not want to make use of public substance abuse services [67]. For the same reason the option for anonymity among those using the application [55,56,61,62,69] is important; seeking help through public services may be considered stigmatizing. Long distances or a hectic life stage may also be reasons for using digital applications to limit problematic substance use [55,62,69]. The extensive availability of applications, their cost-efficiency and their being independent of time and place are among their positive characteristics [61,69].

Digital applications developed to promote the recovery of individuals with problematic substance use may be governed by national and cultural norms or then by legislation. For example, the level of affluency in a state and the prevailing culture of substance abuse [66] constitute their own challenges to the implementation of digital applications. In some eastern European countries even heavy consumption of intoxicants is very rarely deemed problematic [66]. On the other hand, in low and middle-income states digital alternatives are a good option due to their low cost [69] and not all such countries even have a public system for the treatment of substance abuse. At the level of society, the options for and ways of using technology are influenced by the legislation [60], and this may be connected, for example, to data protection issues. In times of societal disruption, such as the COVID-19 pandemic, the adoption of digital tools also affects vulnerable client groups [54] increasing the value of self-care.

The notable characteristics of digital applications intended for problematic substance abuse users are linked to the users' demographic backgrounds, their histories of substance abuse and mental well-being, and their abilities. The heterogeneous

nature of people with problematic substance use puts them in differing positions in the implementation of self-care and creates a need for the segmentation of clients as the basis for the various contents of the application. Some application users need guidance in implementing self-care, which may to varying degrees be obtainable from professionals, peers or in the form of technical support. In any case, sufficient motivation to reduce substance abuse is decisive, also in the use of digital applications. The immediate social network, the support service system and societal factors may, however, contribute to the implementation of self-care when digital tools are involved.

## Discussion

In this literature review we considered what factors make a difference to the implementation of self-care in the control of substance abuse, among their users and operating environments. The findings suggest that the factors with bearing on applications are the technical usability of the service, the option for anonymity, the variation in content, active reminders and application feedback, gamification and identifying with others. Factors related to users were, alongside age and gender, the type of substance abuse, duration of history of substance abuse, severity of the problem, readiness to change, possible concomitant diagnoses, the ability to process one's own feelings, social relationships and digital literacy. According to the data, factors related to the operating environment included legislation governing substance abuse services, national culture relating to intoxicants, stigma attaching to substance abuse treatment, availability of support apart from the application and the restrictions imposed on face-to-face activity by the pandemic.

Those most likely to derive benefit from digital services are those whose problems with intoxicants are not yet very severe [58,61,62]. The significance of the applications may be considerable in preventing the need for services as they can help to reach large numbers of people in need of less intense support. However, this entails a commitment to the application [71]. When the substance abuse problems are minor it is important for professionals in social and health care to identify who is capable of digitally aided self-care and provide guidance in using applications [60]. An essential premise to the commitment to use the application is that it is sufficiently appealing and easy to use [53,55,64].

In cases of more serious substance abuse the share of self-care is initially less but increases as the client, after a period of inpatient treatment, transfers, for example, back to care in the community and to more independent coping. Digital application can support these transitions and the continuity of the recovery process [56,72]. The self-care approach and keeping problematic substance use under control through digitalization merits attention regardless of the stage of the problem evolving or when the client is recovering from addiction. For example, during inpatient treatment client's subjective well-being will improve, when the chances to take advantage of various self-care elements may be better than before the treatment [73].

It is important for those who develop applications to be conversant with the ways in which substances are abused and with the wide range of users [53]. In order to accommodate the diversity of needs and the changes in the recovery process, various user profiles should be utilized comprehensively. Through background questions users could be segmented to be part of optimally appropriate user groups. Each user's resources for self-care, their objectives, substance abuse history, state of health

and social situation can serve as bases for segmentation in addition to demographic variables. As the life situation or stage of recovery changes [35,36] user profiles could be updated.

In the pursuit of well-being, efficacy and cost control, digital innovations are a good option to support self-care due to their wide range and low costs [69,74]. To increase their use and acceptability, the app development needs to be constant, and it should be aiming for user-centeredness, thereby advancing the tailoring of content according to variations in the user group. In order to increase users' interest there should be versions of applications with content geared to various situations and objectives [53,56,60-62,64]. Yet so far there has been very little tailoring of applications although the technology for this is in place [43].

Digital applications will not resolve the problem of availability of substance abuse services, nor the lack of resources or the problem per se. At their best they can, however, serve importantly to prevent further harm or as an action model reducing harm when transferring between services, as a regular support for care or in those situations in which personal substance abuse service is no longer, or not yet, available and as a support in abandoning the use of intoxicants. In the assessment of the efficacy of applications attention needs to be paid not only to costs or changes in substance abuse habits but also to the wide significance of applications as a social technology processing the recovering individual's feelings and identity [64]. Similar observations have been made in several other studies [26-28].

The findings of this review emphasize paying attention to the diversity of people with problematic substance use and to individual needs, which is an important issue in the construction of new or the further development of existing substance abuse services, including digital applications. Research is

needed on the extent to which digital applications are used and what the advantages are in various groups of problem users. More also needs to be known about how social and health care personnel perceive the prospects of digital applications and their usability as a support in substance abuse work or when transferring between services. In future it will be necessary to ensure that the technological development does not lead to digital inequality among those in especially vulnerable groups [15–20].

### Limitations

The study was conducted as an integrative literature review, which has been subjected to criticism for its potential for bias and lack of rigour [52]. Effort was invested in minimizing these

methodological deficiencies by ensuring that the inclusion criteria and analytical process were reported openly. The study was conducted in such a way that the dimensions of self-care proposed by El-Osta and others [44] achieved new and qualitatively significant knowledge about the border conditions for and the acceptability of the use of digital tools in connection with substance abuse problems. The findings are not quantitatively generalizable, but they do have scientific and practical value for professionals and researchers in both substance abuse work and application development.

### Conflict of interest

The authors declare that they have no conflicts of interest.

### References

[1] Nutt DJ, King LA, Phillips LD. Drug harms in the UK: A multicriteria decision analysis. *The Lancet*. 2010;376(9752):1558–1565.

[https://doi.org/10.1016/S0140-6736\(10\)61462-6](https://doi.org/10.1016/S0140-6736(10)61462-6)

[2] Ramstedt M, Sundin E, Moan IS, Storvoll EE, Lund IO, Bloomfield K, Hope A, Kristjánsson S, Tigerstedt C. Harm experienced from the heavy drinking of family and friends in the general population: A comparative study of six northern European countries. *Subst Abuse*. 2016 Feb 3;9(Suppl 2):107–18. <https://doi.org/10.4137/SART.S23746>

[3] Terveysten ja hyvinvoinnin laitos. Päihdetilastollinen vuosikirja 2021: Alkoholi ja huumeet. Suomen virallinen tilasto [Yearbook of Alcohol and Drug Statistics 2021: Alcohol and drugs. Official Statistics of Finland]. Helsinki: THL; 2022. <https://urn.fi/URN:ISBN:978-952-343-817-0>

[4] Finnish Government. Programme of Prime Minister Sanna Marin's Government 10 December 2019. Inclusive and competent Finland - a socially, economically and ecologically sustainable society. Publications of the Finnish Government 2019:33. Helsinki: Finnish Government; 2019. <http://urn.fi/URN:ISBN:978-952-287-811-3>

[5] Vanjusov H. Saatavilla, mutta ei saavutettavissa? Sosiaalioikeudellinen tutkimus päihdepalveluihin pääsystä. [Available but not reachable? Social law research on access to services in substance abuse treatment]. Dissertations in Social Sciences and Business Studies No 281. Joensuu: University of Eastern Finland; 2022. <http://urn.fi/URN:ISBN:978-952-61-4625-6>

[6] Zidaru T, Morrow EM, Stockley R. Ensuring patient and public involvement in the transition to AI-assisted mental health care: A systematic scoping review and agenda for design justice. *Health Expect*. 2021;24(4):1072–1124. <https://doi.org/10.1111/hex.13299>

- [7] Mishna F, Milne B, Sanders J, Greenblatt A. Social work practice during COVID-19: Client needs and boundary challenges. *Glob Soc Welf.* 2022;9(2):113–120. <https://doi.org/10.1007/s40609-021-00219-2>
- [8] de Vargas D, Pereira CF, Volpato RJ, Lima AVC, da Silva Ferreira R, de Oliveira SR, Aguilar TF. Strategies adopted by addiction facilities during the coronavirus pandemic to support treatment for individuals in recovery or struggling with a substance use disorder: A scoping review. *Int J Environ Res Public Health.* 2021;18(22):12094. <https://doi.org/10.3390/ijerph182212094>
- [9] Zekan M, Goldstein N. Substance use disorder treatment via telemedicine during coronavirus disease 2019. *J Nurse Pract.* 2021;17(5):549–551. <https://doi.org/10.1016/j.nurpra.2021.01.018>
- [10] Kleykamp BA, Guille C, Barth KS, McClure EA. Substance use disorders and COVID-19: The role of telehealth in treatment and research. *J Soc Work Pract Addict.* 2020;20(3):248–253. <https://doi.org/10.1080/1533256X.2020.1793064>
- [11] Wallhed Finn S, Bakshi AS, Andréasson S. Alcohol consumption, dependence, and treatment barriers: Perceptions among nontreatment seekers with alcohol dependence. *Subst Use Misuse.* 2014;49(6):762–769. <https://doi.org/10.3109/10826084.2014.891616>
- [12] Swan AJ, Tyssen EG. Enhancing treatment access: Evaluation of an Australian web-based alcohol and drug counselling initiative. *Drug Alcohol Rev.* 2009;28:48–53. <https://doi.org/10.1111/j.1465-3362.2008.00006.x>
- [13] Johnston DC, Mathews WD, Maus A, Gustafson DH. Using smartphones to improve treatment retention among impoverished substance-using Appalachian women: A naturalistic study. *Subst Abuse.* 2019 Jul 8;13:1178221819861377. <https://doi.org/10.1177/1178221819861377>
- [14] Zaborska V, Amirie M, Mahil G, MacDonald S, Oviedo-Joekes E. Telemedicine use for treatment of opioid use disorder and other comorbidities during COVID-19: A case study. *UBC Med J.* 2021;12(2):30–32. <https://ojs.library.ubc.ca/index.php/ubcmj/article/view/193845>
- [15] Bertholet N, Cunningham JA. Information technology and addiction science: Promises and challenges. *Addict Sci Clin Pract.* 2021;16(1):7. <https://doi.org/10.1186/s13722-021-00216-y>
- [16] Nguyen MH, Hargittai E, Marler W. Digital inequality in communication during a time of physical distancing: The case of COVID-19. *Comput Human Behav.* 2021 Jul;120:106717. <https://doi.org/10.1016/j.chb.2021.106717>
- [17] Beaunoyer E, Dupéré S, Guitton MJ. COVID-19 and digital inequalities: Reciprocal impacts and mitigation strategies. *Comput human behav.* 2020;111(October 2020):106424. <https://doi.org/10.1016/j.chb.2020.106424>
- [18] Columb D, Hussain R, O’Gara C. Addiction psychiatry and COVID-19: Impact on patients and service provision. *Ir J Psychol Med.* 2020;37(3):164–168. <https://doi.org/10.1017/ipm.2020.47>
- [19] Farkas KJ, Romaniuk JR. Social work, ethics and vulnerable groups in the time of coronavirus and COVID-19. *Society Register* 2020;4(2):67–82. <https://doi.org/10.14746/sr.2020.4.2.05>
- [20] Melamed OC, Hauck TS, Buckley L, Selby P, Mulsant BH. COVID-19 and persons with substance use disorders: Inequities and mitigation strategies. *Subst Abuse.* 2020;41(3):286–291. <https://doi.org/10.1080/08897077.2020.1784363>
- [21] Kuusisto K. Kolme reittiä alkoholismista toipumiseen: Tutkimus muutoksesta hoidon ja vertais-tuen avulla sekä ilman professionaalista hoitoa.

- [Three routes to recovery from alcoholism: A study on change through professional treatment, mutual help and spontaneous recovery]. *Acta Universitatis Tamperensis* 1492. Tampere: Tampere University Press; 2010. <https://urn.fi/urn:isbn:978-951-44-7957-1>
- [22] Kuusisto K, Ekqvist E, Kalliomaa-Puha L. Eri-tyistä tukea tarvitsevat päihteitä ongelmallisesti käyttävät asiakkaat sosiaalityöntekijöiden tulkinnoissa [Social workers' interpretations of substance abusing clients in need of special support]. *Yhteiskuntapolitiikka*. 2021;86(4):419–430. <https://urn.fi/URN:NBN:fi-fe2021091546262>
- [23] Chong JL, Matchar DB, Tan Y, Sri Kumaran S, Gandhi M, Ong MEH, Wong KS. Population segmentation based on healthcare needs: Validation of a brief clinician-administered tool. *J Gen Intern Med*. 2021;36(1):9–16. <https://doi.org/10.1007/s11606-020-05962-4>
- [24] Chong JL, Lim KK, Matchar DB. Population segmentation based on healthcare needs: A systematic review. *Syst Rev*. 2019;8(1):202. <https://doi.org/10.1186/s13643-019-1105-6>
- [25] Riihimies R, Kosunen E, Koskela T. Experiences of Navigator, a Finnish patient-segmentation service, in primary care: A mixed-methods study. *FinJeHeW*. 2021;13(2):173–188. <https://doi.org/10.23996/fjhw.107245>
- [26] Ashford RD, Lynch K, Curtis B. Technology and social media use among patients enrolled in outpatient addiction treatment programs: Cross-sectional survey study. *J Med Internet Res*. 2018;20(3):e84. <https://doi.org/10.2196/jmir.9172>
- [27] Best D, Bliuc AM, Iqbal M, Upton K, Hodgkins S. Mapping social identity change in online networks of addiction recovery. *Addict Res Theory*. 2018;26(3):163–173. <https://doi.org/10.1080/16066359.2017.1347258>
- [28] Kornfield R, Sarma PK, Shah DV, McTavish F, Landucci G, Pe-Romashko K, Gustafson DH. Detecting recovery problems just in time: Application of automated linguistic analysis and supervised machine learning to an online substance abuse forum. *J Med Internet Res*. 2018;20(6):e10136. <https://doi.org/10.2196/10136>
- [29] Eikmeier G, von Heugel R, Lacroix A, Molkenin I, Rosenbrock T, Böttcher R, Paul A, Nachtigall J. Recovery orientation as a key element in addiction treatment: Preliminary results of a patient's survey. *Eur Psychiatry*. 2017;41(S1):S202. <https://doi.org/10.1016/j.eurpsy.2017.01.2154>
- [30] Çiftçi B, Yıldırım N, Şahin Altun Ö, Avşar G. What level of self-care agency in mental illness? The factors affecting self-care agency and self-care agency in patients with mental illness. *Arch Psychiatr Nurs*. 2015;29(6):372–376. <https://doi.org/10.1016/j.apnu.2015.06.007>
- [31] Gillard S, Adams K, Edwards C, Lucock M, Miller S, Simons L, Turner K, White R, White S, the Self Care in Mental Health research team. Informing the development of services supporting self-care for severe, long term mental health conditions: A mixed method study of community based mental health initiatives in England. *BMC Health Serv Res*. 2012;12(1):189. <https://doi.org/10.1186/1472-6963-12-189>
- [32] Lucock M, Gillard S, Adams K, Simons L, White R, Edwards C. Self-care in mental health services: A narrative review. *Health Soc Care Community*. 2011;19(6):602–616. <https://doi.org/10.1111/j.1365-2524.2011.01014.x>
- [33] World Health Organisation & United Nations Office on Drugs and Crime. International standards for the treatment of drug use disorders: Revised edition incorporating results of field-testing. World Health Organization; 2020. <https://apps.who.int/iris/handle/10665/331635>

- [34] Jones MC, MacGillivray S, Kroll T, Zohoor AR, Connaghan J. A thematic analysis of the conceptualisation of self-care, self-management and self-management support in the long-term conditions management literature. *J Nurs Healthc Chronic Illn.* 2011;3(3):174–185. <https://doi.org/10.1111/j.1752-9824.2011.01096.x>
- [35] Brownell KD, Marlatt GA, Lichtenstein E, Wilson, GT. Understanding and preventing relapse. *Am Psychol.* 1986;41(7):765–782. <https://doi.org/10.1037//0003-066X.41.7.765>
- [36] Connors GJ, Maisto SA, Donovan DM. Conceptualizations of relapse: A summary of psychological and psychobiological models. *Addiction.* 1996;91(Supplement):S5–S13. <https://doi.org/10.1046/j.1360-0443.91.12s1.17.x>
- [37] Jakob R, Harperink S, Rudolf AM, Fleisch E, Haug S, Mair JL, Salamanca-Sanabria A, Kowatsch T. Factors influencing adherence to mHealth apps for prevention or management of noncommunicable diseases: Systematic review. *J Med Internet Res.* 2022;24(5):e35371. <https://doi.org/10.2196/35371>
- [38] Smith JG, Alamiri NS, Biegger G, Frederick C, Halbert JP, Ingersoll KS. Think-aloud testing of a novel safer drinking app for college students during COVID-19: Usability study. *JMIR Form Res.* 2022;6(2):e32716. <https://doi.org/10.2196/32716>
- [39] Puddephatt JA, Leightley D, Palmer L, Jones N, Mahmoodi T, Drummond C, Rona RJ, Fear NT, Field M, Goodwin L. A qualitative evaluation of the acceptability of a tailored smartphone alcohol intervention for a military population: Information about drinking for ex-serving personnel (InDEX) app. *JMIR Mhealth Uhealth.* 2019;7(5):e12267. <https://doi.org/10.2196/12267>
- [40] Milward J, Deluca P, Drummond C, Kimergård A. Developing typologies of user engagement with the BRANCH alcohol-harm reduction smartphone app: Qualitative study. *JMIR mhealth uhealth.* 2018;6(12):e11692. <https://doi.org/10.2196/11692>
- [41] Perski O, Baretta D, Blandford A, West R, Michie S. Engagement features judged by excessive drinkers as most important to include in smartphone applications for alcohol reduction: A mixed-methods study. *Digit Health.* 2018;4:205520761878584. <https://doi.org/10.1177/2055207618785841>
- [42] Attwood S, Parke H, Larsen J, Morton KL. Using a mobile health application to reduce alcohol consumption: A mixed-methods evaluation of the Drinkaware track & calculate units application. *BMC Public Health.* 2017;17(1):394. <https://doi.org/10.1186/s12889-017-4358-9>
- [43] Hoepfner BB, Schick MR, Kelly LM, Hoepfner SS, Bergman B, Kelly JF. There is an app for that – or is there? A content analysis of publicly available smartphone apps for managing alcohol use. *J Subst Abuse Treat.* 2017;82:67–73. <https://doi.org/10.1016/j.jsat.2017.09.006>
- [44] El-Osta A, Webber D, Gnani S, Banarsee R, Mummery D, Majeed A, Smith P. The self-care matrix: A unifying framework for self-care. *SelfCare* 2019;10(3):38–56. <https://selfcarejournal.com/article/the-self-care-matrix-a-unifying-framework-for-self-care/>
- [45] Onyeka IN, Beynon CM, Uosukainen H, Korhonen MJ, Ilomäki J, Bell JS, Paasolainen M, Tasa N, Tiihonen J, Kauhanen J. Coexisting social conditions and health problems among clients seeking treatment for illicit drug use in Finland: The HUUTI study. *BMC Public Health.* 2013;13(1):380–389. <https://doi.org/10.1186/1471-2458-13-380>
- [46] Orford J, Kerr C, Copello A, Hodgson R, Alwyn T, Black R, Smith M, Thistlethwaite G, Westwood A,

- Slegg G. Why people enter treatment for alcohol problems: Findings from UK alcohol treatment trial pre-treatment interviews. *J Subst Use.* 2006;11(3):161–176.  
<https://doi.org/10.1080/14659890500246540>
- [47] Kuusisto K, Knuutila V, Saarnio P. Clients' Self-Efficacy and Outcome Expectations: Impact on Retention and Effectiveness in Outpatient Substance Abuse Treatment. *Addict Disord Their Treat.* 2011;10(4):157–168.  
<https://doi.org/10.1097/ADT.0b013e31820dd4ec>
- [48] Cooney NL, Babor TF, DiClemente CC, Del Boca FK. Clinical and scientific implications of project MATCH. In: Babor TF, Del Boca FK (Eds.). *Treatment matching in alcoholism.* Cambridge: Cambridge University Press; 2003. p. 222–237.
- [49] Benz MB, Cabrera KB, Kline N, Bishop LS, Palm Reed K. Fear of stigma mediates the relationship between internalized stigma and treatment-seeking among individuals with substance use problems. *Subst Use Misuse.* 2021;56(6):808–818.  
<https://doi.org/10.1080/10826084.2021.1899224>
- [50] Mattoo SK, Sarkar S, Gupta S, Nebhinani N, Parakh P, Basu D. Stigma towards substance use: Comparing treatment seeking alcohol and opioid dependent men. *Int J Ment Health Addict.* 2015;13(1):73–81.  
<https://doi.org/10.1007/s11469-014-9514-1>
- [51] Torraco RJ. Writing integrative literature reviews: Guidelines and examples. *Hum Resour Dev Rev.* 2005;4(3):356–367.  
<https://doi.org/10.1177/1534484305278283>
- [52] Whitemore R, Knafel K. The integrative review: Updated methodology. *J Adv Nurs.* 2005;52(5):546–553.  
<https://doi.org/10.1111/j.1365-2648.2005.03621.x>
- [53] \*Adams Z, Grant M, Hupp S, Scott T, Feagans A, Phillips ML, Bixler K, Nallam PT, La Putt D. Acceptability of an mHealth app for youth with substance use and mental health needs: Iterative, mixed methods design. *JMIR Form Res.* 2021;5(12):e30268.  
<https://doi.org/10.2196/30268>
- [54] \*Augsburger M, Kaal E, Ülesoo T, Wenger A, Blankers M, Haug S, Ebert DD, Riper H, Keough M, Noormets H, Schaub MP, Kilp K. Effects of a minimal-guided on-line intervention for alcohol misuse in Estonia: A randomized controlled trial. *Addiction.* 2021;117(1):108–117.  
<https://doi.org/10.1111/add.15633>
- [55] \*Bosse JD, Hoffman K, Wiest K, Korthuis PT, Petluri R, Pertl K, Martin SA. Patient evaluation of a smartphone application for telehealth care of opioid use disorder. *Addict Sci Clin Pract.* 2022;17(1):50. <https://doi.org/10.1186/s13722-022-00331-4>
- [56] \*Carswell SB, Gordon MS, Gryczynski J, Taxman FS, Schadegg M, Ferguson KN, Maher K. Continuing Care App for Probationers and Parolees with Substance use Disorders. *J Drug Educ.* 2022;51(1-2):32–48. <https://doi.org/10.1177/00472379221111541>
- [57] \*Elison S, Ward J, Davies G, Lidbetter N, Hulme D, Dagley M. An outcomes study of eTherapy for dual diagnosis using Breaking Free Online. *Adv Dual Diagn.* 2014;7(2):52–62.  
<https://doi.org/10.1108/ADD-11-2013-0025>
- [58] \*Johansson M, Berman AH, Sinadinovic K, Lindner P, Hermansson U, Andréasson S. Effects of internet-based cognitive behavioral therapy for harmful alcohol use and alcohol dependence as self-help or with therapist guidance: Three-armed randomized trial. *J Med Internet Res.* 2021;23(11):e29666.  
<https://doi.org/10.2196/29666>
- [59] \*Johansson M, Sinadinovic K, Hammarberg A, Sundström C, Hermansson U, Andreasson S,

- Berman AH. Web-Based Self-Help for Problematic Alcohol Use: A Large Naturalistic Study. *Int J Behav Med.* 2017;24(5):749–759. <https://doi.org/10.1007/s12529-016-9618-z>
- [60] \*Lord S, Moore SK, Ramsey A, Dinauer S, Johnson K. Implementation of a substance use recovery support mobile phone app in community settings: Qualitative study of clinician and staff perspectives of facilitators and barriers. *JMIR Ment Health.* 2016;3(2):e24. <https://doi.org/10.2196/mental.4927>
- [61] \*Lunde LH, Carlsen SEL, Repål A, Nordgreen T. Experiences of a therapist-guided internet-delivered intervention for hazardous and harmful drinking. A qualitative study. *Internet Interv.* 2022;28:100543. <https://doi.org/10.1016/j.invent.2022.100543>
- [62] \*Malte CA, Dulin PL, Baer JS, Fortney JC, Danner AN, Lott AMK, Hawkins EJ. Usability and acceptability of a mobile app for the self-management of alcohol misuse among veterans (Step Away): Pilot cohort study. *JMIR MHealth UHealth.* 2021;9(4):e25927. <https://doi.org/10.2196/25927>
- [63] \*Manning V, Piercy H, Garfield JBB, Clark SG, Andrabi MN, Lubman DI. A personalized approach bias modification smartphone app (“SWiPE”) to reduce alcohol use: Open-label feasibility, acceptability, and preliminary effectiveness study. *JMIR MHealth UHealth.* 2021;9(12):e31353. <https://doi.org/10.2196/31353>
- [64] \*Neale J, Bowen AM. Lessons for uptake and engagement of a smartphone app (SURE Recovery) for people in recovery from alcohol and other drug problems: Interview study of app users. *JMIR Hum Factors.* 2022;9(1):e33038. <https://doi.org/10.2196/33038>
- [65] \*Paquette CE, Rubalcava DT, Chen Y, Anand D, Daughters SB. A mobile app to enhance behavioral activation treatment for substance use disorder: App design, use, and integration into treatment in the context of a randomized controlled trial. *JMIR Form Res.* 2021;5(11):e25749. <https://doi.org/10.2196/21686>
- [66] \*Schaub MP, Tiburcio M, Martínez-Vélez N, Ambekar A, Bhad R, Wenger A, Baumgartner C, Padruchny D, Osipchik S, Poznyak V, Rekve D, Landi Moraes F, Monezi Andrade AL, Oliveira Souza-Formigoni ML, WHO E-Health Project On Alcohol And Health Investigators Group. The effectiveness of a web-based self-help program to reduce alcohol use among adults with drinking patterns considered harmful, hazardous, or suggestive of dependence in four low- and middle-income countries: Randomized controlled trial. *J Med Internet Res.* 2021;23(8):e21686. <https://doi.org/10.2196/21686>
- [67] \*Schaub MP, Wenger A, Berg O, Beck T, Stark L, Buehler E, Haug S. A web-based self-help intervention with and without chat counseling to reduce cannabis use in problematic cannabis users: Three-arm randomized controlled trial. *J Med Internet Res.* 2015;17(10):e232. <https://doi.org/10.2196/jmir.4860>
- [68] \*Sugarman DE, Meyer LE, Reilly ME, Greenfield SF. Feasibility and acceptability of a web-based, gender-specific intervention for women with substance use disorders. *J Women’s Health.* 2020;29(5):636–646. <https://doi.org/10.1089/jwh.2018.7519>
- [69] \*Tiburcio M, Lara MA, Aguilar Abrego A, Fernández M, Martínez Vélez N, Sánchez A. Web-based intervention to reduce substance abuse and depressive symptoms in Mexico: Development and usability test. *JMIR Ment Health.* 2016;3(3):e47. <https://doi.org/10.2196/mental.6001>
- [70] \*Trudeau KJ, Ainscough J, Charity S. Technology in treatment: Are adolescents and counselors



interested in online relapse prevention? *Child Youth Care Forum*. 2012;41(1):57–71. <https://doi.org/10.1007/s10566-011-9154-6>

[71] Greene K, Choi HJ, Glenn SD, Ray AE, Hecht ML. The role of engagement in effective, digital prevention interventions: The function of engagement in the REAL media substance use prevention curriculum. *Prev Sci*. 2021;22(2):247–258. <https://doi.org/10.1007/s11121-020-01181-9>

[72] Hussey D, Flynn, KC. The utility and impact of the Addiction Comprehensive Health Enhancement Support System (ACHES) on substance abuse treatment adherence among youth in an intensive outpatient program. *Psychiatry Res*.

2019;281:112580. <https://doi.org/10.1016/j.psychres.2019.112580>

[73] Ekqvist E, Kuusisto K. Changes in clients' well-being (ORS) and state hope (SHS) during inpatient substance abuse treatment. *Nord Stud Alcohol Dr*. 2020;37(4):384–399. <https://doi.org/10.1177/1455072520922025>

[74] Buntrock C, Kählke F, Smit F, Ebert DD. A systematic review of trial-based economic evaluations of internet- and mobile-based interventions for substance use disorders. *Eur J Public Health*. 2021;31(31 Suppl 1):i19–i28. <https://doi.org/10.1093/eurpub/ckz022>

\*= included in the data