July 2019

Rapid Evidence Review
Digital interventions to reduce alcohol-related harm: a rapid horizon scanning review

Authors: Matt Field, Fiona Campbell, Emma Hock, Ruth Wong, University of Sheffield

Author details

Matt Field, Department of Psychology, University of Sheffield
Fiona Campbell, School of Health and Related Research, University of Sheffield
Emma Hock, School of Health and Related Research, University of Sheffield
Ruth Wong, School of Health and Related Research, University of Sheffield

Contact:
Professor Matt Field, Department of Psychology, Cathedral Court, 1 Vicar Lane, Sheffield, S1 2LT. Email: matt.field@sheffield.ac.uk

Institutional details

Department of Psychology and the School of Health and Related Research, University of Sheffield.

Conflicts of interest

Matt Field was involved in the development of the INDEX app. He is also currently involved in planned evaluations of the DrinkLess app, although was not involved in development of the app or any of the evaluations that have been conducted to date.

Foreword

In developing its future programme of grant-funded research, Alcohol Change UK wished to explore what is known, and what is yet to be understood, in a series of key areas, as follows:

Topic one   The role of alcohol in intimate partner relationships

Topic two   The impact of alcohol on the human brain

Topic three   Alcohol interventions and the criminal justice system

Topic four   The relationship between alcohol and mental health problems

Topic five   Drinking problems and interventions in black and minority ethnic communities

Topic six   Digital interventions to reduce alcohol related harm

These areas were selected through stakeholder engagement and consultation, as well as 'horizon-scanning' the research, policy and practice environment to identify where particular gaps appeared.

Rapid evidence reviews were commissioned on the six topics and their findings will allow Alcohol Change UK to synthesise knowledge on this particular range of subjects. This will help to inform its work, as well as leading to outward-facing publications that will allow the public, practitioners and policy-makers to better understand the research in these key areas.

Contents

Executive summary

Method

We conducted a rapid horizon scanning review of the published and grey literature on digital interventions to reduce alcohol-related harm covering the period January 2017 to April 2019. We had three broad aims:

1. To identify and describe innovations and newly emerging digital interventions that can be used to reduce alcohol-related harm.
2. To consider how these compare with existing digital interventions.
3. To identify potential gaps in the types of digital interventions that are being developed or subjected to rigorous evaluation.

Findings

There are many randomized controlled trials of digital interventions (at least 72 published between 2017 and 2019), but relatively few studies have used other methods to evaluate those interventions. Populations that are most at risk of alcohol-related harm have been understudied relative to community-dwelling and student populations. There were notable recent trends for digital interventions to be increasingly delivered via the internet and smartphone apps, sometimes in combination with biosensors, and for interventions for delivery in clinical and primary prevention settings. Alcohol reduction apps available in the app stores may increasingly be using interactive features rather than simply providing information.

Conclusions and recommendations

This is an active and rapidly evolving field of research and technological development. It is important to develop and evaluate digital interventions for populations that are most at risk of alcohol-related harm and use a range of research methods to evaluate newly emerging digital technologies. It is also important to ensure that the features of effective digital interventions are identified, and consider how these might differ depending on the population that is receiving the intervention. Given the speed of development in this field there is a need to keep the evidence base regularly updated.

Introduction

What are digital interventions to reduce alcohol-related harm?

Digital interventions are defined as those that are delivered through a computer or mobile device such as a laptop, mobile phone or tablet[1]. For example, mobile phone text-message (SMS) interventions, computer-delivered interventions administered on fixed computers or remotely via the internet, and, more recently, mobile phone applications ('apps'). Over the past few decades, a number of digital interventions for the reduction of alcohol-consumption and alcohol-related harm have been developed and evaluated.

Evidence standards for digital interventions

In March 2019, the National Institute for Health and Care Excellence (NICE) published their evidence framework for digital health technologies[2]. This is particularly applicable to digital interventions to reduce alcohol-related harm. In essence, the NICE evidence framework requires a higher standard of effectiveness evidence for digital interventions that pose a greater risk to users. In the case of alcohol digital interventions, those interventions that provide information or enable self-monitoring of alcohol consumption (tier 2) pose the lowest risk to users, and the minimum standard to assess evidence of their effectiveness is ongoing collection of usage and user satisfaction data.

Digital interventions that incorporate behaviour change and self-management techniques for public health issues including harmful and hazardous drinking (tier 3a) pose a higher risk to users, and therefore these types of interventions would *ideally* be assessed with a high-quality intervention study that includes a comparison group, preferably a randomized controlled trial (RCT). However, the *minimum* evidence standard for tier 3a interventions is high-quality observational or quasi-experimental studies. Finally, the highest risk category of digital interventions (tier 3b) includes those that are intended to treat (or form part of a treatment package for) a medical condition, which would include alcohol use disorders. The NICE guidance specifies that the *minimum* evidence standard for tier 3b digital interventions is a high-quality intervention study that demonstrates benefit for the digital intervention (versus control), ideally an RCT.

The NICE recommendation that RCTs are required to evaluate the efficacy of many types of digital interventions is not shared by all researchers who work in this area. This is because RCTs are inflexible, expensive, and they take a long time to complete, which may make them unsuitable for the evaluation of rapidly-evolving interventions such as digital interventions. Alternative methods, such as interrupted time-series, stepped-wedge, regression discontinuity, and N-of-1 designs may be

more appropriate for the evaluation of digital interventions. However, these evaluation methods are not widely used[3].

What is already known about the effectiveness of digital interventions to reduce alcohol-related harm?

The literature has been critically evaluated and summarised in a number of systematic and narrative reviews, although each of these reviews has a different focus and inclusion/exclusion criteria. A recent Cochrane review (Kaner *et al.*, 2017[1]) of personalized digital interventions for reducing hazardous and harmful alcohol consumption in community-dwelling populations included 57 RCTs. The primary finding was that participants who received a digital intervention drank 23g of alcohol (approximately 3 units) less per week than control participants (who received no or minimal intervention). Furthermore, this effect of digital interventions was indistinguishable from the effect of face-to-face interventions, although the latter conclusion was based on only four studies. Digital interventions also had small but statistically significant beneficial effects on other drinking outcomes including the frequency of drinking, frequency of binge drinking, and the volume of alcohol consumed on drinking days. This review also identified behaviour change techniques (BCTs) that were most frequently used in existing digital interventions, and identified those that were most reliably associated with reduced alcohol consumption: 'behaviour substitution', 'problem solving', and 'credible source' (see also[4]).

An update to this Cochrane review (searches conducted up until March 2018) was recently published online[5]. This update identified an additional 12 studies. This revealed a comparable effect of digital interventions (vs. control) on alcohol consumption to the published Cochrane review, although a slightly different pattern of findings regarding specific BCTs: in this analysis, 'goal setting (behaviour)', 'problem solving', 'social support (unspecified)', 'information about antecedents', and 'credible source' were significantly associated with the beneficial effect of digital interventions on alcohol consumption in unadjusted analyses; in an adjusted analysis, only 'credible source' and 'information about antecedents' emerged as robust predictors of alcohol consumption.

An earlier review (Black *et al.* 2016[6]) also considered RCTs in which digital interventions were compared with alcohol assessment only, but their inclusion criteria were broader than those employed in the Cochrane review: In particular, they included studies in which participants were recruited from school and healthcare settings, thereby including digital interventions that were aimed at primary prevention or the treatment of alcohol use disorders. Their analysis of 93 RCTs revealed small but statistically significant beneficial effects of digital interventions (compared to assessment-only control) on alcohol intake over extended time periods (e.g. weekly or monthly), frequency of drinking and frequency of binge drinking, and the volume of

alcohol consumed on drinking days. This is a similar pattern of results to that reported in the Cochrane review despite the considerably broader inclusion criteria.

In contrast to the Cochrane review, Black *et al.* identified different BCTs that were associated with positive outcomes in participants who received a digital intervention: 'providing normative information', 'prompting commitment and review of goals', and 'providing options for additional support'. An additional BCT, 'providing information on the consequences of alcohol consumption', was negatively associated with drinking outcomes. The discrepant BCT findings between the two studies might be attributed to the characteristics of the studies that were included, and / or the different BCT coding schemes that were used.

Riper *et al.* (2018)[7] conducted an individual patient meta-analysis of data from 19 RCTs that compared a digital intervention with a comparator in adults who drank in excess of low-risk drinking guidelines. This analysis also revealed an overall beneficial effect of digital interventions compared to control on alcohol consumption (mean of ~50g of alcohol less per week). Their primary novel findings were that, firstly, 'guided' (human supported) digital interventions yielded superior effects on drinking outcomes compared to 'unguided' (fully automated) interventions, and secondly, digital interventions that were based on personalized normative feedback were less likely to be effective than more comprehensive interventions that were based on integrated therapeutic principles. They also found stronger effects of digital interventions on alcohol intake in men (vs. women), and for lesser (versus higher) educated participants, and that older adults (aged over 55) were more likely to reduce drinking to low risk levels after receipt of a digital intervention than younger participants. However, individual differences in drinking profiles did not moderate the effectiveness of digital interventions. Finally, the beneficial effects of digital interventions were more pronounced when compared with a waitlist control rather than assessment-only or minimal intervention controls.

Nesvag & McKay (2018)[8] conducted a review and narrative synthesis of digital interventions that were intended to help people in recovery from substance use disorders, including alcohol use disorders. Their review included 43 articles that described and / or evaluated 28 unique digital interventions. Like the earlier reviews, they found evidence of small to medium sized beneficial effects of digital interventions on alcohol consumption, compared to control interventions. Although this review was limited by the absence of a quantitative synthesis, the broader pattern of findings is consistent with those reported in the other systematic reviews. This and other reviews with narrative summaries of the literature also considered other issues relevant to digital interventions aside from their effects on alcohol consumption and alcohol-related harm, including user satisfaction[8], engagement[9], integration with GPS devices and wearable sensors[10] and content analyses of publicly available smartphone apps[11,12].

Aims of the current review

The existing systematic reviews of the alcohol digital interventions literature were limited to RCTs, so they may have omitted many important studies that used other methods. Furthermore, this is a rapidly evolving field, so even the most recent reviews (published in 2018) are already out of date. This is a field in which technological developments that determine the modality of digital interventions are so rapid that novel approaches to evidence reviewing are required. Some promising digital interventions may have emerged in the last few years, but they will not yet have been subjected to rigorous or even preliminary evaluation. In the present review, we summarised the breadth of digital interventions to reduce alcohol-related harm, and we considered how these types of interventions might be evolving. We did not attempt to summarize the effectiveness or usability of different interventions, because these issues have been the subject of many other systematic reviews, all of which require regular updating given the pace at which new findings emerge.

Our specific review questions were:

1   To **identify** and **describe** innovations and newly emerging digital interventions that can be used to reduce alcohol-related harm.
2   To **consider how these compare** with existing digital interventions.
3   To **identify potential gaps** in the types of digital interventions that are being developed or subjected to rigorous evaluation.

Methods

Rapid Reviewing and Horizon Scanning Methods

Rapid reviews adapt and accelerate systematic review processes in order to meet shorter timescales. The extent to which these approaches compromise rigour by introducing bias and risk of error is not entirely clear from the literature[13], though there are risks that not all relevant studies will be located, and errors may arise in screening and data extraction. We also used horizon scanning methods that allowed us to look at the most recent developments in digital interventions.

Identifying the literature

Population: Alcohol consumers anywhere in the world. We took an inclusive approach, for example not including or excluding participants with a diagnosed alcohol use disorder and not including or excluding participants based on their self-reported alcohol consumption.

Intervention: Digital interventions to reduce alcohol-related harm that are emerging or are at the development stage.

Study Design: We included all types of study designs.

Comparator: For comparative studies (e.g. RCTs) we extracted information about the type of comparator.

Literature Searching

First, we updated the Cochrane review[1] search strategy in Medline (via Ovid) using relevant medical subject headings and free-text terms for 'alcohol drinking' and the various intervention keywords, initially with a randomized controlled trials search filter, and then repeated without that filter. Our search was limited to literature in English that was published between January 2017 and February 2019.

The decision on types of 'grey literature' to search beyond electronic databases was informed by reviewing existing and published Horizon scanning methodology approaches by health technology agencies such as CADTH Horizon Scanning in Canada (https://www.cadth.ca/about-cadth/what-we-do/products-services/horizon-scanning) and AHRQ Horizon Scans (https://effectivehealthcare.ahrq.gov/topics/horizon-scan/overview) in the US. Grey literature searches were conducted on the following sources and evidence types:

- trials registries
- grants
- patents
- new alerts
- app stores

The Dimensions AI Platform (Digital Science) was searched using terms for 'alcohol' and various intervention keywords to identify current grants, patents and trials (ongoing or completed but unpublished) from 2018 onwards.

Targeted keyword searches informed by previous reviews of the app stores[11,12] were performed in both Apple App Store and Google Play Store.

Weekly PubMed database and Google email alerts were set up to notify the team of new content between February and April 2019.

For the second stage search, high precision search strategies informed by the records retrieved in Stage 1 were developed in Medline to identify additional relevant

studies. The strategy included relevant medical subject headings and free-text terms for various interventions that were identified in the stage 1 search but not present in the Cochrane review, including transdermal alcohol sensors and ecological momentary intervention studies. The search was limited to retrieve literature published in English between February and April 2019.

Full search strategies for both published and grey literatures are shown in Appendices 1 and 2.

Evidence Selection

Published literature: Titles and abstracts were initially screened by one reviewer. All studies that were excluded at the full-text stage were checked by a second reviewer. See Appendix 3 for details of included and excluded studies, and reasons for exclusion.

Grey literature: Grants, patents and trials were screened by one reviewer on the basis of the title and the abstract/summary, Records were further screened during data extraction (see below).

Apps identified by the targeted keyword searches in the Apple App Store and Google Play Store were recorded in an Excel spreadsheet. The first 50 apps identified for each keyword/phrase within each app store were included in the review.

Data Extraction

A data extraction tool was developed, informed by the TIDieR checklist[14] for reporting of interventions. Due to the number of results identified we designed the data extraction tool to ensure we were able to provide a comprehensive map of the newly emerging interventions and their stage of evaluation. The data extraction process was undertaken in Excel. For both published and grey literatures, data was extracted from the full text by one reviewer. We also tabulated the findings from a search of the Apple App Store and Google Play Store on a separate Excel sheet. We did not download the apps so our description noted the name, source, purpose and as much detail as was available in the app description.

Data synthesis

We used a narrative synthesis approach to data analysis. First, we characterized the features of the published research including features of the interventions themselves, the population studied, the setting, and the type of evaluation. Where appropriate, we contrasted these features with those identified in the recent Cochrane review of the alcohol digital interventions literature[1] and with those features identified in the

grey literature (grants, trials and patents), in order to identify how digital interventions and research methods in this area may be evolving.
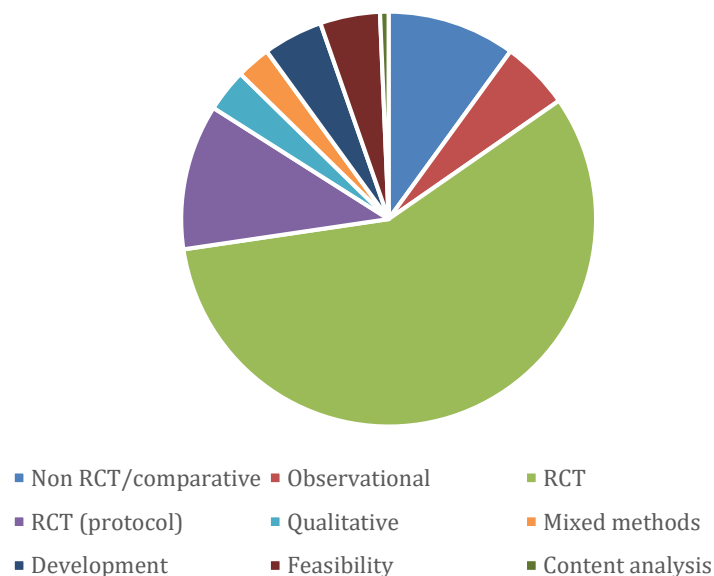
Findings

Characteristics of extracted data, including study design

Published literature

We identified and extracted data from 150 published studies. The majority of these were RCTs or RCT protocols that examined the effectiveness of digital technologies to reduce alcohol consumption. **Relatively few mixed methods evaluations or qualitative studies have been undertaken or are described in published protocols** (see Figure 1). This has implications for a more in depth understanding of the factors that may enhance or limit the effectiveness of digital interventions. **We also noted the relative absence of alternative evaluation methods such as interrupted time-series, stepped-wedge, regression discontinuity, and N-of-1 designs. Finally, we also note the lack of studies that explore ways to increase engagement with digital interventions, or to improve their implementation.**

Figure 1: Study design (published literature)

Legend: Non RCT/comparative, Observational, RCT, RCT (protocol), Qualitative, Mixed methods, Development, Feasibility, Content analysis

Grey literature

We identified and extracted data from 32 grants, 20 of which described development and preliminary evaluation (e.g. feasibility studies or pilot RCTs) of novel digital interventions, 10 described comparative studies (typically full RCTs), and two were focused on improving engagement with digital interventions rather than developing new apps or testing their effectiveness.

We identified and extracted data from 32 registered trials, the majority of which (25) described RCTs with the remainder (7) describing development and preliminary evaluation work.

We identified and extracted data from five patents, three for alcohol biosensors including those that can detect alcohol in interstitial space or through sweat. The others were for a behaviour change app that sends subliminal messages to the user, and another that uses smartphone location data to advise the user on the location of local treatment services.

Results of second stage search

The second stage high precision search identified a further 45 records. Following title and abstract screening of these records we would have extracted data from nine records (three RCTs, six non-RCTs). The update of the search using the search terms used in the Cochrane review, without the RCT filter and covering the period February to April 2019 identified a further 67 records, of which we would have extracted data from 19 (12 RCTs and 7 non-RCTs) after title and abstract screening.

Unfortunately, we did not have time to extract information from the records that were screened during the second stage search. The number of additional records identified in the Cochrane review update search (that spans a period of only two months) highlights the rapid pace at which research on digital alcohol interventions is being published. A consequence of this is that systematic reviews of this literature are likely to be out of date by the time that they are published in peer-reviewed journals. **A solution to this problem could be the commissioning of a 'living systematic review'**[15].

The setting: where is research on digital alcohol interventions conducted?

We identified the countries where published studies were conducted (or are proposed to be conducted, in the case of published protocols). The majority of the research on digital alcohol interventions was undertaken in the USA and Canada, followed by the UK, mainland Europe, and Australasia (see Figure 2). Aside from one study in Brazil, there were no studies undertaken in low and middle income countries (LMIC), and no evidence of research being undertaken in Africa or the Middle East. These trends are consistent with those reported in the Cochrane review [1], in which almost 60% of the studies were carried out in North America, and 28% in mainland Europe. The grey literature shows the same pattern with the majority of grants (87%) and registered trials (65%) being undertaken in North America, with a much smaller proportion being undertaken in the UK, mainland Europe, Asia and Australasia.

Figure 2: Where is the research done? (published literature)

Legend: ■ Australia and New Zealand ■ South America ■ Mainland Europe ■ UK ■ USA and Canada ■ Asia
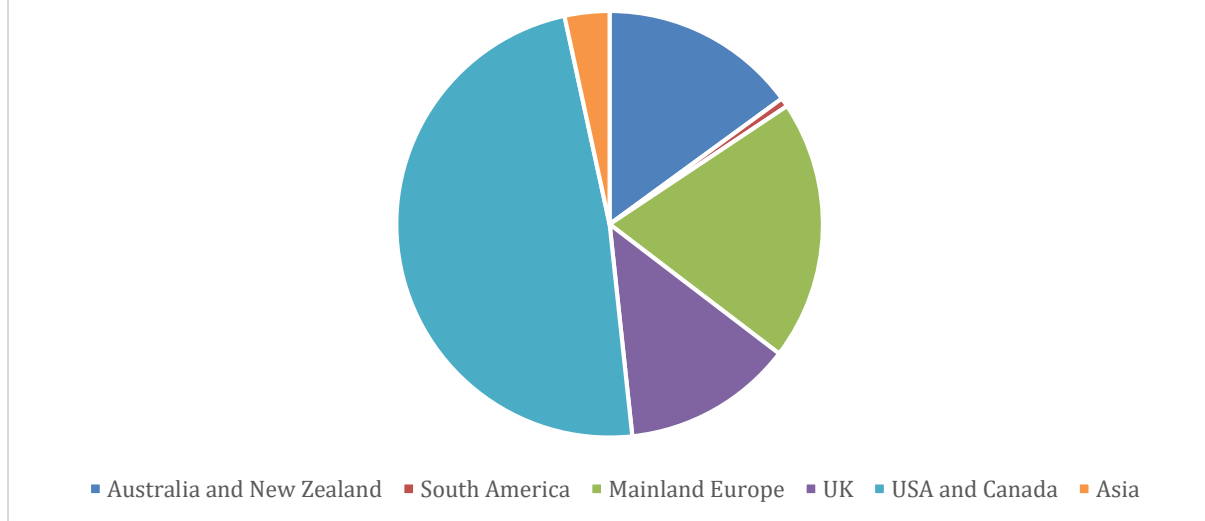
Target population: who receives digital alcohol interventions?

General characteristics of target populations

In the published literature, the most frequently targeted group were young adults, particularly University students, followed by the general population (see Figure 3). This trend mirrors that seen in existing reviews of the digital alcohol interventions literature[1,6]. The next most commonly represented groups were younger adolescents or people who were receiving specialist alcohol treatment. Small numbers of studies involved specific populations that may be particularly vulnerable to alcohol-related harm, including pregnant women, military veterans, and people with comorbid mental health conditions. There were no studies of digital interventions that were intended for people with disabilities. It appears that **the focus of much current research may be influenced by accessibility of participants rather than directed at those groups in whom the burden of alcohol use and associated harm are greater**.

However, this situation may be changing: the grey literature reveals an increasing proportion of digital alcohol interventions for people receiving specialist treatment for alcohol dependence and associated physical health problems, such as liver disease (34% of both grants and registered trials). There are also a number of planned or ongoing studies that explore the impact of digital interventions on minority groups, including people with hearing difficulties, people who are HIV positive, ethnic minority groups, and the homeless. **As the findings from these studies are published, it will be appropriate to conduct systematic reviews of the characteristics and effectiveness of digital interventions for these populations who may disproportionately experience alcohol-related harm.**

Figure 3: Who are the participants? (published literature)
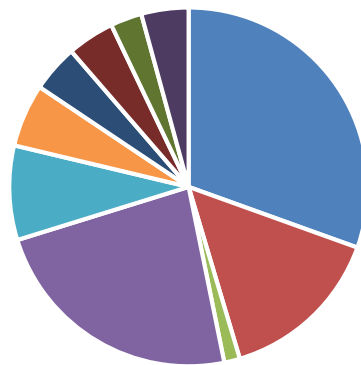
- Young adults / students
- Adolescents, pre-University
- Older adults
- General population
- Alcohol treatment services
- Military veterans
- Mental health co-morbidity
- Minority groups
- Pregnant women
- Other

Gender

The majority of published studies (132 of 150) included both men and women, whereas relatively few recruited females only (11 studies) or males only (7 studies). These ratios are consistent with earlier reviews[1,6].
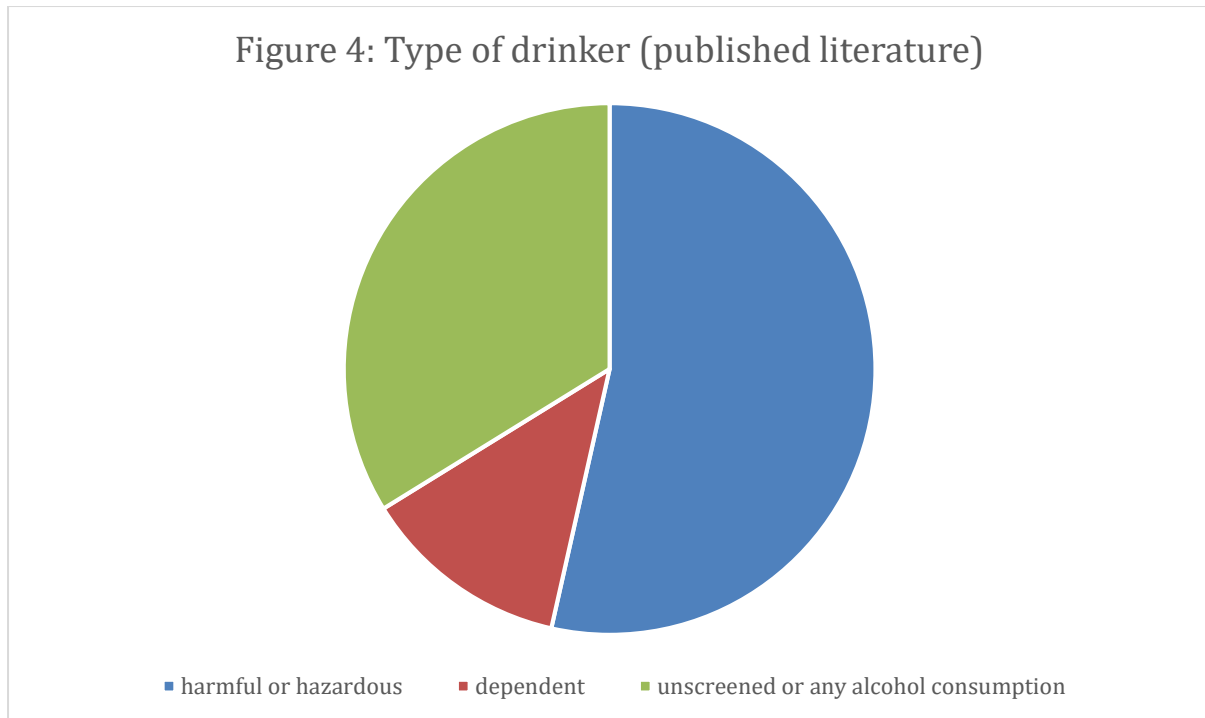
Type of drinker

Considering the published research, the majority of interventions were directed at people who had been identified as hazardous or harmful drinkers. This includes people who were screened and identified as hazardous or harmful drinkers after completing the AUDIT as well as people who attended accident and emergency as a result of drinking alcohol, those who were seeking help to reduce their drinking, and pregnant women. The next largest category of studies (unscreened or any alcohol consumption) included studies that directed the intervention at adults who consumed any alcohol (with the goal to prevent the development of harmful or hazardous drinking), or primary prevention interventions aimed at adolescents. As noted above, a relatively small proportion of studies targeted dependent drinkers. See Figure 4.

Regarding the grey literature, as noted previously, 34% of registered trials and grants were evaluating interventions for people with alcohol use disorders. Given that this population were excluded from the Cochrane review[1] and there were very few studies with this population in the earlier systematic review[6], **it would be valuable to conduct a systematic review of the effectiveness of digital interventions specifically for this population of dependent drinkers in treatment settings. It was also noticeable that there were few trials of digital**

interventions with young adolescents for primary prevention purposes in the grey literature (3 trials, 4 grants), which highlights a further gap in the evidence base that could be addressed.

Figure 4: Type of drinker (published literature)

- harmful or hazardous
- dependent
- unscreened or any alcohol consumption

Features of the intervention

Type of intervention / delivery mode

Regarding the published literature (see Figure 5), only 12 of 150 (8%) interventions were delivered on a fixed computer (location-specific). The majority were delivered via the internet, followed by smartphone apps and text message interventions, or some combination of these (e.g. internet or smartphone apps supplemented by text messages). We also noted the emergence of smartphone apps in combination with biosensors: two with cellular breathalysers, and one with a sensorband that provide the user with feedback on physiological changes. This contrasts with the type of interventions included in the Cochrane review [1], 35% of which were location-specific whereas 65% were delivered completely online, primarily via the internet.

Figure 5: Type of intervention / delivery mode (published literature)

Legend:
- Internet
- Smartphone app
- Text message
- Fixed computer
- Combination (e.g. web & text)
- App & biosensor (incl. breathalysers)
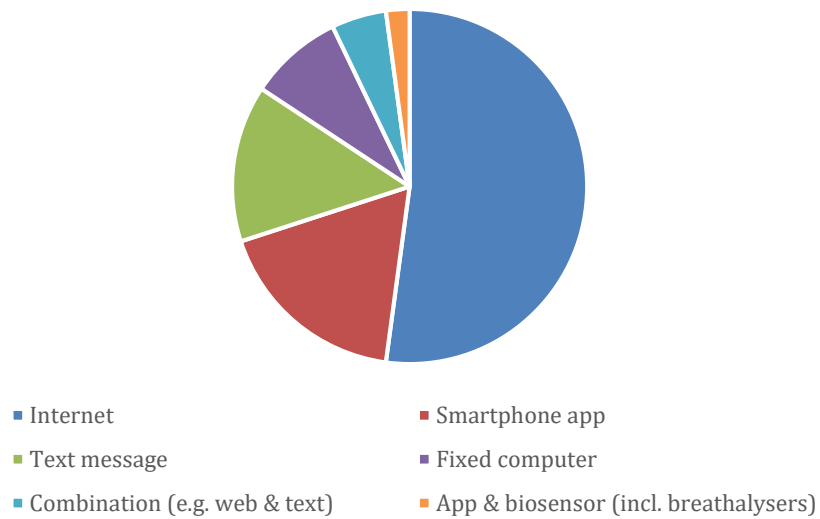
Evolution of the types of digital interventions being studied is also apparent from inspection of the grey literature. The majority of registered trials (Figure 6) were investigations of internet or smartphone app interventions. Grants (Figure 7) were also dominated by internet and smartphone app interventions, but the notable trend here was for research on biosensors, in particular cellular breathalyzers, transdermal alcohol monitors, and other alcohol biosensors including those that detect alcohol in interstitial space. Many of the funded projects seek to optimize and validate these biosensors, although an increasing number of projects aim to combine smartphone apps with biosensors in order to monitor and provide feedback on alcohol consumption, either to the user or to clinical / research teams.

Figure 6: Type of intervention / delivery mode (registered trials)

- ■ Internet
- ■ Smartphone app
- ■ Text message
- ■ Fixed computer
- ■ Combination (e.g. web & text)
- ■ App & biosensor (incl. breathalysers)
- ■ Biosensor (incl. breathalysers)
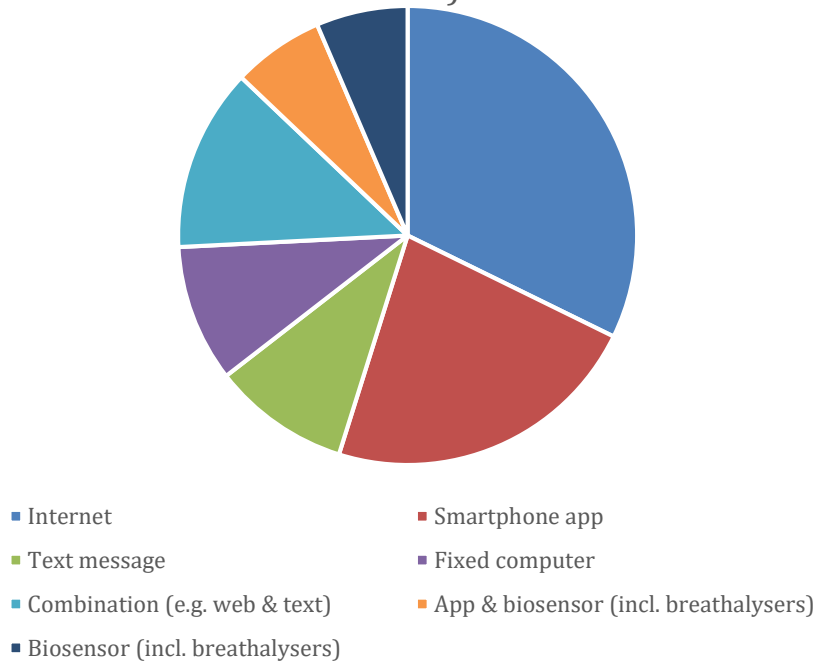
Figure 7: Type of intervention / delivery mode (grants)

- ■ Internet
- ■ Smartphone app
- ■ Text message
- ■ Fixed computer
- ■ Combination (e.g. web & text)
- ■ App & biosensor (incl. breathalysers)
- ■ Biosensor (incl. breathalysers)
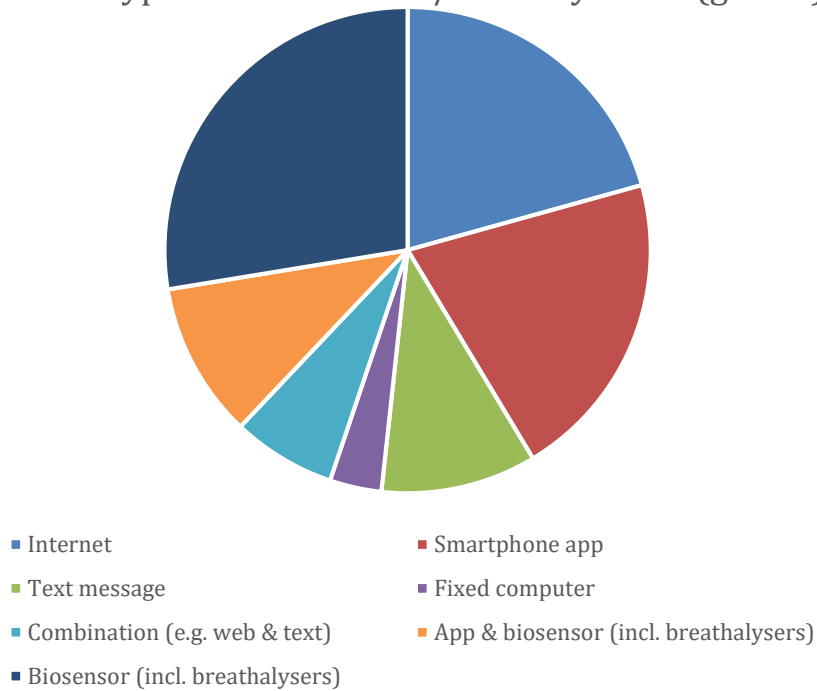
This trend was also mirrored in the patent search. Of five relevant records, three were for alcohol biosensors (including those that can detect alcohol in interstitial space, or through sweat (transdermal)). The others were for a behaviour change app

that sends subliminal messages to the user, and another that uses smartphone location data to advise the user on the location of local treatment services.

These observations about the types of interventions raise a number of questions for future research. Firstly, most of the existing RCTs of digital interventions evaluated interventions delivered on fixed computers, via the internet or text message. However, interventions are increasingly being delivered via the internet or smartphone apps, sometimes in combination with alcohol biosensors. This raises the question of **whether interventions developed for delivery in one format (e.g. on a fixed computer) can be implemented in other formats that may be more acceptable to users (e.g. smartphone apps).** The increasing use of biosensors raises a number of intriguing possibilities, including **can alcohol biosensors improve the validity of self-reported alcohol consumption, or increase compliance with scheduled assessments**? **Biosensors also raise the possibility of delivering personalized interventions based on changes in blood alcohol content.** The latter was recently highlighted as a future research priority[10].

Primary purpose of the intervention

Considering the published literature, the majority of interventions were intended to help people to reduce their drinking, with minorities having a specific focus on relapse prevention (for dependent patients seeking specialist alcohol treatment) or primary prevention (for young adolescents). This mirrors the findings described above regarding the type of drinkers that have been targeted by digital interventions. It was also notable that 5% of interventions target a specific aspect of alcohol-related harm such as drink-driving or sexual risk-taking, or are intended to have an indirect effect on alcohol consumption by influencing a comorbid symptom such as sleep disturbance. See Figure 8.

Figure 8: Primary purpose of intervention (published literature)
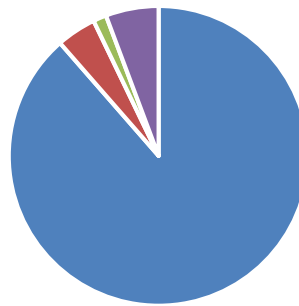
- Reduce drinking
- Primary prevention
- Relapse prevention
- Other, e.g. other mental health problems, drink-driving

Consideration of the grey literature reveals increasing diversity in the primary purpose of the digital interventions that are being studied. Although interventions to help people to reduce their drinking are still in the majority, there are increasing numbers of registered trials (Figure 9) and grants (Figure 10) of interventions that target specific aspects of alcohol-related harm (e.g. drink-driving), or comorbid mental health conditions. There are also several examples of **digital interventions that specifically aim to aid self-monitoring of alcohol consumption (largely attributable to alcohol biosensors, which are not currently being evaluated for their effects on alcohol consumption) and other digital interventions that aim to increase engagement in more conventional treatment. We recommend that these emerging interventions may be worthy of more intensive study.**

Figure 9: Primary purpose of intervention (registered trials)

- Reduce drinking
- Relapse prevention
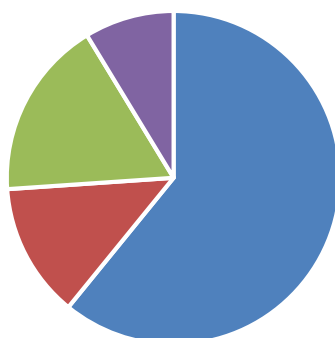- Other, e.g. other mental health problems, drink-driving
- Treatment engagement

Figure 10: Primary purpose of intervention (grants)

- Reduce drinking
- Primary prevention
- Relapse prevention
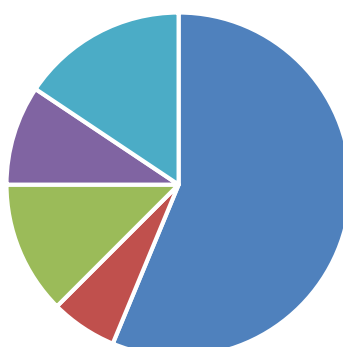- Other, e.g. other mental health problems, drink-driving
- Monitoring of alcohol consumption

Personalisation

In the published literature, approximately two thirds of digital interventions provided some personalisation of intervention content. Similarly, in the grey literature, the majority of interventions appeared to include some kind of personalisation. **It was not possible to systematically code the type or extent of personalisation, but this may be worth considering in the future.**

Use of theory

In the published literature, the theory or theories that underpinned the digital intervention were mentioned in the majority of published studies. This compares favourably with the 50% of trials that reported underpinning theory in the Cochrane review[1]. It was not possible to code the theoretical underpinnings of the grey literature, and it is beyond the scope of the current review to systematically code the type of theories that were most frequently cited in the published literature. However, coding of underpinning theory has been undertaken in previous systematic reviews of this literature[1,6]. **It is important to update these findings in order to track the influence of different theoretical perspectives over time.**

Behaviour Change Techniques (BCTs)

This is important because published systematic reviews[1,6] and a recent update of the Cochrane review[5] reached conflicting conclusions regarding which BCTs were associated with beneficial effects of digital interventions on drinking outcomes. Although it was beyond the scope of the present review to systematically code the presence of different BCTs, we conducted some superficial coding of probable BCTs in the published literature (this was not possible for the grey literature), and our sense is that the BCTs that occurred most frequently were the same as those that occurred most frequently in the published reviews[1,6]: social comparison / normative feedback, feedback on behaviour, feedback on outcomes of behaviour, and information about consequences. **Given the conflicting findings in the published literature, some important questions for a future focused systematic review are: has the popularity of specific BCTs changed over time? Is the presence of specific BCTs differentially associated with drinking outcomes? Do these patterns vary for different types of digital interventions, that are directed at different populations?**

Other features of digital interventions

Guided vs. unguided: A recent review concluded that digital interventions may be more effective if guided[7]. However, this is heavily confounded by other features such as the population and setting: interventions are more likely to be guided if administered to dependent drinkers in a clinical setting rather than if downloaded by hazardous drinkers from the internet. Given the pace at which research is being published, **this seems an important question for a future systematic review: To what extent do guided interventions reduce alcohol-related harm more than unguided interventions, and does this depend on the population, setting, and type of intervention? It would also be desirable to quantify the extent of 'guidance', i.e. the duration and frequency of contact between the user of the digital intervention and clinical / research staff, and investigate whether this is**

associated with the beneficial effects of digital interventions on drinking outcomes.

Frequency of engagement: This was not considered in the existing reviews because most of the included studies only had a single session[1,6]. However, with the move to **app-based interventions, with their inherent variability in frequency of engagement[16], this is an important topic for further study. A related question is the optimal method to increase engagement with digital interventions, for example with text messages, in-app prompts, or in response to feedback from biosensors, and how these techniques might be differentially effective for different populations etc[9].**

Features of the evaluation (limited to RCTs, including pilot RCTs and protocols)

Type of control

The majority of comparative studies compared digital interventions with another intervention (which could have been a face-to-face or another digital intervention), with no or minimal intervention, or with some form of 'active' control condition. See Figure 11. The number of comparative studies that included an active control or another intervention is an improvement on the characteristics of the studies included in the Cochrane review[1], most of which compared digital interventions with no intervention or a minimal intervention control. Similarly, in the earlier but more inclusive meta-analysis, all control conditions were assessment only or assessment plus an intervention for unrelated health behaviour[6].

Figure 11: Type of control in RCTs (published literature)

- Another intervention (including face-to-face)
- No or minimal intervention
- Active control
- Treatment as usual
- Waitlist
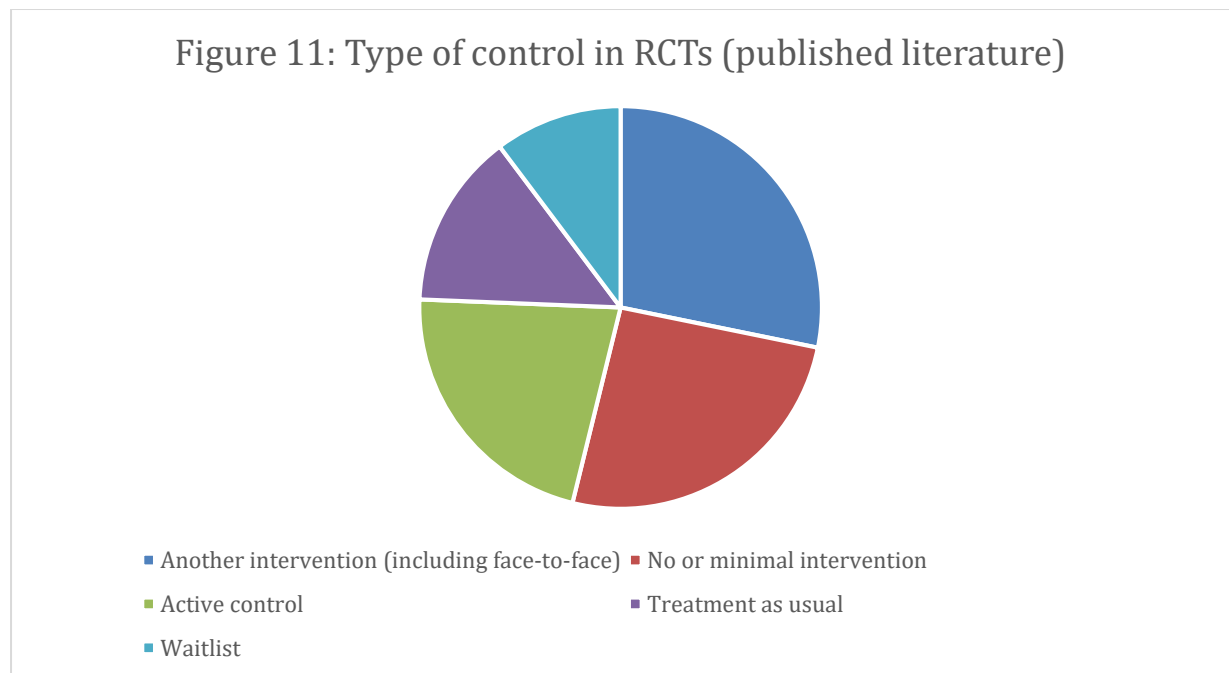
The grey literature reveals a trend to increasingly favour comparisons between digital interventions and other interventions rather than minimal or no intervention controls. The increasing variation in the types of control condition that are employed in comparative studies makes it desirable to **evaluate to what extent the choice of control condition could be obscuring or exaggerating any beneficial effect of digital interventions, as is the case for other types of interventions[17].** In addition, as more findings emerge in which digital interventions are compared with other interventions, it will be important to **conduct a cost effectiveness analysis of digital (versus non-digital) interventions based on this information.**

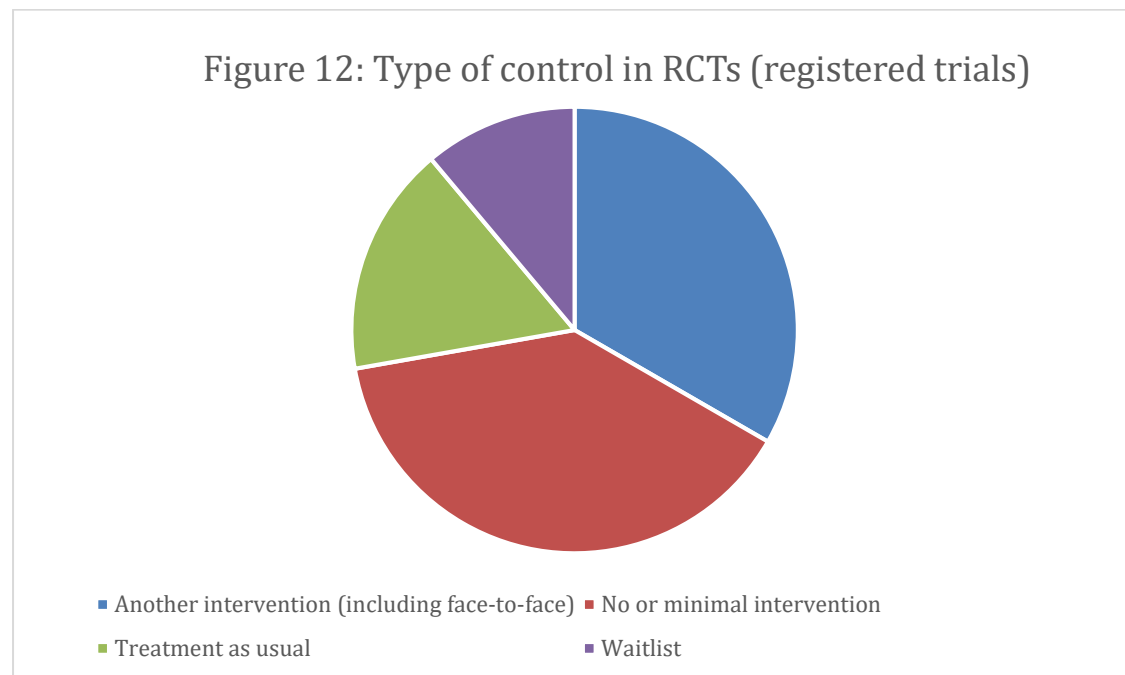Figure 12: Type of control in RCTs (registered trials)

- Another intervention (including face-to-face)
- No or minimal intervention
- Treatment as usual
- Waitlist

Figure 13: Type of control in RCTs (grants)

- Another intervention (including face-to-face)
- No or minimal intervention
- Active control
- Treatment as usual
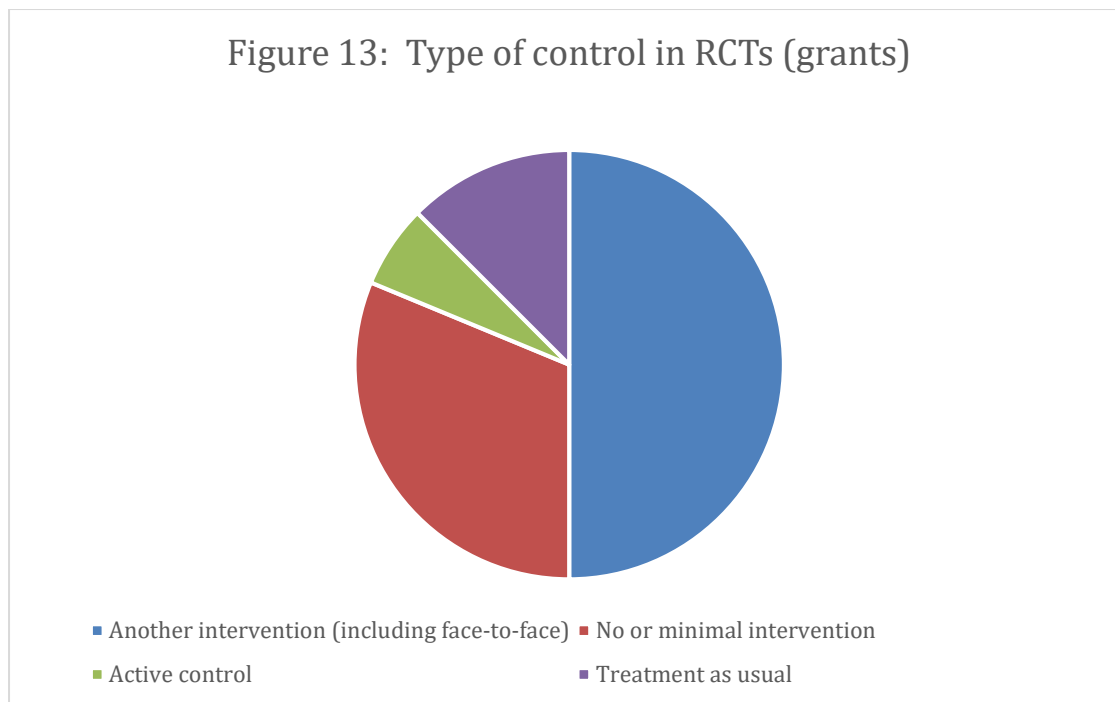
Duration of follow-up

In the published literature, the median follow-up time was 6 months (range 0-84 months). Regarding the grey literature, the median follow-up time was 6 months for registered trials and 7.5 months for grants. This is an improvement on the earlier published literature: in the Cochrane review [1], the median follow-up time was 3 months (range 1-24 months). This is an encouraging trend, and it highlights the importance of **systematically investigating the longevity of beneficial effects of digital interventions and comparing these with the longevity of other types of interventions**.

Characteristics of smartphone apps available in the App stores

In order to examine changing trends in features of freely available alcohol apps, we obtained information about apps that are currently available in the Apple and Google Play stores and compared this with Crane *et al*'s (2015)[11] search and categorization of alcohol-related apps available on the Apple App and Google Play Stores, and Hoeppner *et al*'s (2017)[12] similar study that was limited to the Google Play store. Crane *et al*. searched app stores for the terms "alcohol" and "drink", classified the first 200 apps from each term and each store, then downloaded those apps related to alcohol reduction in order to code the app content and functionality based on Michie *et al*'s taxonomy of behaviour change techniques (BCTs) for the reduction of excessive alcohol consumption[18]. Hoeppner *et al*. searched the Google Play store using the terms "drinking", "drink", "alcohol", "alcoholism" and "sobriety" and downloaded apps designed to support recovery from and prevention of problematic

alcohol use. They coded apps based on three overall domains: basic descriptors; functionality of the app; and use of dynamic features.

Our search, classification and coding differed from those of the previous studies in that our search terms were more specific (in an attempt to identify alcohol reduction apps only). We searched both app stores but, given our rapid review timescales, we coded apps based on their descriptions on the app store (rather than downloading them in order to systematically code BCTs). We examined the first 50 apps that triggered each search term in each app store. Thus, while our app review findings are not directly comparable with those of the earlier reviews, they will give some insight into trends over time. It is worth noting that Crane *et al.* classified breath alcohol content (BAC) calculators as distinct from alcohol reduction apps, whereas we included them in the category of alcohol reduction apps because they are a form of consumption monitoring, and also because BAC calculators were sometimes included as one of a number of components in some apps.

Of 1106 apps identified by searching the Apple App store and Google Play store, 543 were discrete apps (563 were duplicates). Of these, 276 (50.8%) focused on alcohol reduction and 69 (12.7%) focused on increasing alcohol consumption, including drinking games, recipes, ordering/delivery, drink ratings and bar/club finders. The remaining apps were not related to alcohol consumption. Twelve of the 276 apps that focused on alcohol reduction were also identified in the Crane *et al.* review. Some of the apps that were identified were also captured by our search of the published and grey literature. Table 1 compares the data across studies.

Table 1: Comparison of numbers and percentages of categories/BCTs in Crane *et al.* (2015), Hoeppner *et al.* (2017) and the current app review

Category/BCT	Crane *et al.* (2015)	Hoeppner *et al.* (2017)	Current app review
Alcohol reduction	91 (13.7%)[a,b]	266	276 (50.8%)[a,c]
Alcohol increase	357 (53.9%)[a]	-	69 (12.7%)
BAC measurement	125 (18.9%)[a]	98 (36.8%)	45 (16.3%)
Facilitate self-recording	33 (54.1%)	63 (23.7%)[d]	Consumption tracker: 20 (18.1%) Sobriety counter: 79 (28.6%) Both: 3 (1.1%)
Provide information on consequences of excessive alcohol use	26 (42.6%)	72 (27.1%)	3 (1.1%)

Provide feedback on performance	25 (41.0%)	59 (22.2%)[e]	43 (15.6%)
Give options for additional and later support	15 (24.6%)	-	16 (5.8%)
Offer/direct towards appropriate written materials	14 (23.0%)	-	2 (0.7%)
Social support	4 (6.6%)	-	Peer support: 38 (13.8%) Expert support: 7 (2.5%) Both: 2 (0.7%)
Facilitate action planning	3 (4.9%)	-	6 (2.2%)
Both action planning and feedback	0	-	2 (0.7%)
Provide normative information about others' behaviour and experiences	3 (4.9%)	5 (1.9%)	3 (1.1%)
Facilitate goal setting	7 (11.5%)	-	30 (10.9%)
Reminders or prompts	-	-	28 (10.1%)
Meditation/mindfulness/relaxation	-	-	34 (12.3%)
Gamification	-	5 (1.9%)[f]	7 (2.5%)
Geolocation	-	-	3 (1.1%)

[a] Percentage relates to percentage of all unique apps identified

[b] Not including BAC calculators

[c] Including BAC calculators

[d] Tracking calendar

[e] Drinking behaviour summaries

[f] Includes other distractions from craving

Observations

In Crane *et al*'s review of BCTs present in apps[11] the most frequently-occurring BCTs were (1) 'facilitate self-recording', (2) 'provide information on consequences of excessive alcohol use', (3) 'provide feedback on performance', (4) 'give options for additional and later support', and (5) 'offer / direct towards appropriate written materials'. Based on our search of the app stores, 'facilitate self-recording' and 'provide feedback on performance' continue to be relatively popular features of apps, although 'provide information on consequences of excessive alcohol use', 'give options for additional and later support', and 'offer / direct towards appropriate written

materials' now appear to be less common (see Table 1). Overall, it seems that **the proportion of apps with educational/informational and passive features is lower than at the time of the Crane *et al*. review.**

Crane *et al*. observed that many BCTs that feature frequently in other health behaviour change interventions were rarely used in the alcohol reduction apps. For example, 'social support' is a BCT that is frequently found in other interventions but was only used in 7% of alcohol apps in their review. By contrast, in our app review, we identified 38 apps (13.8%) that included peer support functionality, seven (2.5%) that provided support from an 'expert' and two (0.7%) included functionality for both types of support, indicating **a trend towards increasing use of social support within alcohol reduction apps**. Action planning combined with feedback is an effective behaviour change technique[18], but none of the apps in the Crane *et al*. review included both techniques. **We identified two (0.7%) apps that appeared to combine action planning functionality with feedback relating to some element of alcohol consumption.** Finally, 'provide normative information about others' behaviour and experiences', a BCT that is effective for the reduction of alcohol consumption[18], was identified in less than 5% of the apps identified by Crane *et al*. and only 1% of apps that we screened. **Given that personalized normative feedback interventions have been intensively studied in the published digital alcohol interventions literature, as described elsewhere in this report, it is important to understand why this feature does not regularly feature in commercially available apps.**

We also identified some novel features of apps that did not feature in the Crane *et al*. review, for example reminders or prompts (28 apps, 10.1%) and meditation, mindfulness or relaxation (34 apps, 12.3%). Crane *et al*. did not report if any apps included an element of gamification or geolocation, whereas we found that seven apps used some form of gamification (2.5%), and three (1.1%) used geolocation. **It is important to systematically code BCTs and features of existing apps in order to investigate if these apparent trends are robust, and if so to reconcile this with the broader literature on the effectiveness of these techniques for behaviour change, particularly the reduction of alcohol consumption.**

Limitations of our review

Rapid evidence reviews adapt and accelerate systematic review processes in order to meet shorter timescales. These adaptations may compromise rigour and increase the risk of errors and omissions[13]. For example, there is a risk that not all relevant studies were identified, and errors may have arisen in data screening, extraction, and quantitative synthesis. For this reason, many of our recommendations for future research relate to the importance of conducting rigorous systematic reviews in order to quantify and understand many of the characteristics and trends that we have identified.

In the process of conducting the review, we identified the following specific limitations. First, there was some overlap in the grey literature between grants and registered trials, which is why we reported summary details for them separately, where appropriate. Second, we originally planned to screen, extract and synthesize information from published abstracts from recent relevant conferences and records from the second stage searches, but we did not have the time to do this due to the high yield of relevant studies in the first stage searches. Third, we were unable to properly code behaviour change techniques (BCTs) in the published or grey literatures or on results from the app stores, so our observations and recommendations related to BCTs should be interpreted with caution.

The most important limitation of our review is that, given the volume of research, the pace of development of technology, and the rate at which new research is being funded, registered, and reported, our observations provide a snapshot of the current situation, but this snapshot will soon be out of date. However, our juxtaposition of findings from the published and grey literatures means that we were able to capture the nature of developments in this field and identify important trends.

Summary and recommendations

This is a rapidly evolving field in which new findings are being published, research is being funded and commissioned, and technology is constantly changing, to the extent that it was not possible for us to screen and extract data from all of the sources that we intended to. For this reason, **this literature is well-suited to a 'living systematic review'[15], which you might consider commissioning (recommendation 1).**

We identified a number of characteristics of digital interventions to reduce alcohol consumption and alcohol-related harm, and ways in which this research appears to be evolving. Regarding *methods of evaluation,* we note that there are many RCTs of digital interventions, and several systematic reviews of those RCTs, but a relative lack of research that uses other methods including mixed methods evaluations, qualitative studies, interrupted time-series, stepped-wedge, regression discontinuity, and N-of-1 designs, and research on engagement with digital interventions and their implementation. The high financial cost of RCTs may make it unfeasible for Alcohol Change to fund them, so **we recommend that you prioritize research on the development, evaluation and implementation of digital interventions that use some of these alternative methods, or combinations of them (recommendation 2).** We also **recommend that you commission systematic reviews on the longevity of the effects of digital interventions on alcohol consumption and alcohol-related harm, and on the extent to which beneficial effects of digital interventions might be obscured or exaggerated depending on the type of control / comparison condition (recommendation 3).**

Regarding the **target population,** we highlight the importance of **conducting a systematic review of digital interventions for alcohol-dependent patients in treatment settings (recommendation 4**), and for the need to **develop and evaluate digital interventions for populations who are most at risk of alcohol-related harm, for example adolescents, and people who are HIV positive or homeless (recommendation 5).**

Regarding **types of interventions and their mode of delivery,** we note the trend to deliver interventions via the internet and smartphone apps, often in combination with biosensors, rather than via fixed computers or text messages. It is important to **investigate whether interventions with demonstrable effectiveness when delivered in one format (e.g. fixed computer) can be implemented and are equally effective if delivered in another format (e.g. smartphone app) (recommendation 6).** The increasing use of biosensors, including transdermal alcohol sensors and cellular breathalysers raises a number of intriguing possibilities, including **can alcohol biosensors improve the validity of self-reported alcohol consumption, or increase compliance with scheduled assessments**?

Biosensors also raise the possibility of delivering personalized interventions based on changes in blood alcohol content. These research questions should be prioritized in future research (recommendation 7).

The vast majority of existing digital interventions have the intended purpose of helping people to reduce their alcohol consumption, but emerging trends are for **digital interventions that have a different primary purpose, for example to prevent specific instances of alcohol-related harm (e.g. drink-driving), promote engagement in treatment, or that facilitate self-monitoring of alcohol consumption. Research into these types of digital interventions should be prioritized (recommendation 8).**

Previous systematic reviews have considered the theories that underpin digital interventions and the type of behaviour change techniques (BCTs) used, and the relationship between these features and the effectiveness of digital interventions, but those reviews have yielded conflicting conclusions. It is important to understand which underpinning theories and associated BCTs are most effective for the reduction of alcohol consumption and alcohol-related harm, how this affects acceptability of interventions and engagement with them, and how this might vary depending on the type of intervention, its mode of delivery, and the target population, because this will minimize duplication of effort and ensure that resources are targeted at the interventions that are most likely to be effective for specific populations. **Therefore, it is important to regularly update these systematic reviews as new evidence emerges (recommendation 9).**

We note the importance of establishing the effectiveness of guided versus unguided digital interventions and how this might differ depending on the mode of delivery and the population under study, something that might best be achieved by regularly-updated focused systematic reviews **(recommendation 10).** Finally, as more evidence is published it will be important to **systematically investigate the relationship between engagement with digital interventions and their effectiveness, and identify factors that may increase engagement in different populations (see [9]) (recommendation 11).**

Our final recommendation concerns research on **mobile phone apps that are available to the public in app stores.** First, it is important to build on previous research that has coded the BCTs that are used in apps, in order to identify how this may be changing and to **identify discrepancies in the BCTs that are known to be effective for the reduction of alcohol-related harm, those that have been studied in RCTs of digital interventions, and those that are available in publicly available apps. A similar exercise could be conducted for other features that are appearing in commercially available apps such as geolocation, gamification, and techniques such as mindfulness, that do not appear to have**

been subjected to rigorous scrutiny in the published research (recommendation 12).

Appendix 1: Stage 1 search strategies

MEDLINE and Epub Ahead of Print, In-Process & Other Non-Indexed Citations
10th April 2019
672 records

#	Searches
1	exp Alcohol-Related Disorders/
2	exp Alcohol Drinking/
3	(alcohol* adj2 (drink* or intoxicat* or use* or abus* or misus* or risk* or consum* or withdraw* or detox* or treat* or therap* or excess* or reduc* or cessation or intervention*)).tw.
4	(drink* adj2 (excess or heavy or heavily or harm or harmful or hazard* or binge or harmful or problem*)).tw.
5	("alcohol use" or alcoholic*).tw.
6	or/1-5
7	Internet/
8	Blogging/
9	Social Media/
10	Computers/
11	exp Microcomputers/
12	Minicomputers/
13	Therapy, Computer-Assisted/
14	Computer-Assisted Instruction/
15	exp Cellular Phone/
16	Electronic Mail/
17	((email* or e-mail* or electronic mail* or text messag* or SMS or MMS or phone? or cellphone? or cell-phone? or smartphone? or smart-phone? or digital tablet? or pda or personal digital assistant? or social media or social networking or facebook or twitter or skyp* or app?) adj3 (deliver* or generat* or based or provid* or facilitat* or support* or treatment? or therap* or intervention? or program* or feedback)).ti,ab.
18	((Internet* or electronic* or digital* or technolog* or online or on-line or computer* or laptop? or software or web* or weblog* or blog* or CD? or CD-ROM?) adj3 (deliver* or generat* or based or provid* or facilitat* or support* or treatment? or therap* or intervention? or program* or feedback)).ti,ab.
19	(e-BI or e-SBI or ehealth or e-health or electronic health or mhealth or m-health or mobile health or virtual health or digital health or technological aid?).ti,ab.
20	or/7-19
21	6 and 20
22	limit 21 to (english language and yr="2016 -Current")
23	letter/
24	editorial/

25	news/
26	exp historical article/
27	anecdotes as topic/
28	comment/
29	case report/
30	(letter or comment*).ti.
31	or/23-30
32	randomized controlled trial/ or random*.ti,ab.
33	31 not 32
34	animals/ not humans/
35	exp animals, laboratory/
36	exp animal experimentation/
37	exp models, animal/
38	exp rodentia/
39	(rat or rats or mouse or mice).ti.
40	or/33-39
41	22 not 40
42	clinical trial.mp.
43	clinical trial.pt.
44	random:.mp.
45	tu.xs.
46	42 or 43 or 44 or 45
47	41 and 46
48	41 not 47

Dimensions AI search (https://www.dimensions.ai/)
20th February 2019
211 Trials
194 Grants
226 Patents

#	Searches
1	email
2	e-mail
3	text message
4	SMS
5	MMS
6	phone
7	cellphone
8	cell-phone
9	smartphone
10	smart-phone
11	digital tablet
12	pda
13	personal digital assistant

14	social media
15	social network
16	king
17	facebook
18	twitter
19	skype
20	app
21	Internet
22	electronic
23	digital
24	technology
25	online
26	on-line
27	computer
28	laptop
29	software
30	web
31	weblog
32	blog
33	CD
34	CD-ROM
35	e-BI
36	e-SBI
37	ehealth
38	e-health
39	electronic health
40	mhealth
41	m-health
42	mobile health
43	virtual health
44	digital health
45	technological aid

App store search

Apple App Store and Google Play Store
29th March to 9th April 2019

#	Searches
1	Alcohol tracker
2	Drink less
3	Sober
4	Sobriety
5	Quit drinking

6	Dry January
7	Alcohol units
8	Alcohol diary
9	Alcohol coach
10	Alcohol addiction
11	Alcohol use
12	Alcohol reduction
13	Alcohol counter
14	Alcohol meter

PubMed Weekly Alert (https://www.ncbi.nlm.nih.gov/pubmed/)

#	Searches
#1	Search (((((alcohol*[Title]) OR drink*[Title]) OR "alcohol use"[Title]) OR alcoholic*[Title])) AND (((((email*[Title] OR e-mail*[Title] OR electronic mail*[Title] OR text messag*[Title] OR SMS[Title] OR MMS[Title] OR phone*[Title] OR cellphone*[Title] OR cell-phone*[Title] OR smartphone*[Title] OR smart-phone*[Title] OR digital tablet*[Title] OR pda[Title] OR personal digital assistant*[Title] OR social media[Title] OR social networking[Title] OR facebook[Title] OR twitter[Title] OR skyp*[Title] OR app[Title])) OR (Internet*[Title] OR electronic*[Title] OR digital*[Title] OR technolog*[Title] OR online[Title] OR on-line[Title] OR computer*[Title] OR laptop*[Title] OR software[Title] OR web*[Title] OR weblog*[Title] OR blog*[Title] OR CD[Title] OR CD-ROM*[Title])) OR (e-BI[Title] OR e-SBI[Title] OR ehealth[Title] OR e-health[Title] OR electronic health[Title] OR mhealth[Title] OR m-health[Title] OR mobile health[Title] OR virtual health[Title] OR digital health[Title] OR technological aid*[Title])) AND ((Clinical Trial[ptyp] OR Controlled Clinical Trial[ptyp] OR Observational Study[ptyp]) AND ("2016/01/01"[PDat] : "3000/12/31"[PDat]) AND English[lang])

Google News Alert (https://www.google.co.uk/alerts)

To search for keyword: 'Alcohol'
How often: At most once a week
Sources: News
Language: English

Appendix 2: Stage 2 search strategy

MEDLINE and Epub Ahead of Print, In-Process & Other Non-Indexed Citations
10th April 2019
58 records

#	Searches
1	exp Alcohol-Related Disorders/
2	exp Alcohol Drinking/
3	(alcohol* adj2 (drink* or intoxicat* or use* or abus* or misus* or risk* or consum* or withdraw* or detox* or treat* or therap* or excess* or reduc* or cessation or intervention*)).tw.
4	(drink* adj2 (excess or heavy or heavily or harm or harmful or hazard* or binge or harmful or problem*)).tw.
5	("alcohol use" or alcoholic*).tw.
6	or/1-5
7	Internet/
8	Blogging/
9	Social Media/
10	Computers/
11	exp Microcomputers/
12	Minicomputers/
13	Therapy, Computer-Assisted/
14	Computer-Assisted Instruction/
15	exp Cellular Phone/
16	Electronic Mail/
17	((email* or e-mail* or electronic mail* or text messag* or SMS or MMS or phone? or cellphone? or cell-phone? or smartphone? or smart-phone? or digital tablet? or pda or personal digital assistant? or social media or social networking or facebook or twitter or skyp* or app?) adj3 (deliver* or generat* or based or provid* or facilitat* or support* or treatment? or therap* or intervention? or program* or feedback)).ti,ab.
18	((Internet* or electronic* or digital* or technolog* or online or on-line or computer* or laptop? or software or web* or weblog* or blog* or CD? or CD-ROM?) adj3 (deliver* or generat* or based or provid* or facilitat* or support* or treatment? or therap* or intervention? or program* or feedback)).ti,ab.
19	(e-BI or e-SBI or ehealth or e-health or electronic health or mhealth or m-health or mobile health or virtual health or digital health or technological aid?).ti,ab.
20	or/7-19
21	6 and 20
22	letter/
23	editorial/
24	news/
25	exp historical article/

26	anecdotes as topic/
27	comment/
28	case report/
29	(letter or comment*).ti.
30	or/22-29
31	randomized controlled trial/ or random*.ti,ab.
32	30 not 31
33	animals/ not humans/
34	exp animals, laboratory/
35	exp animal experimentation/
36	exp models, animal/
37	exp rodentia/
38	(rat or rats or mouse or mice).ti.
39	or/32-38
40	21 not 39
41	clinical trial.mp.
42	clinical trial.pt.
43	random:.mp.
44	tu.xs.
45	or/41-44
46	40 and 45
47	limit 46 to yr="2019 -Current"
48	*Wearable Electronic Devices/
49	*Big Data/
50	*Machine Learning/
51	(wearable* or transdermal or gps or "big data" or "machine learning" or "internet of things" or "ecological momentary" or achess or "addiction chess project" or "mobile serious" or lbmia or "location based monitoring").ti.
52	or/48-51
53	6 and 52
54	53 not 39
55	45 and 54
56	limit 55 to yr="2017 -Current"
57	limit 54 to yr="2017 -Current"

Appendix 3: Details of Included and excluded studies and records

Table A1: Included studies and records

Study/record	Type
Bernstein 2018 [19]	RCT
Bertholet 2017 [20]	Pilot study
Bertholet 2018a [21]	RCT
Bertholet 2018b [22]	RCT
Birrell 2018 [23]	Cluster RCT (protocol)
Bos 2018 [24]	RCT
Bountress 2017 [25]	RCT (secondary analyses)
Boyle 2018 [26]	RCT
Braitman 2018 [27]	RCT
Bratti-van der Werf 2018 [28]	RCT (protocol)
Brendryen 2017 [29]	Pilot RCT
Brick 2017 [30]	cluster RCT
Brief 2018 [31]	Cohort study from an RCT
Byrnes 2019 [32]	RCT
Cadigan 2018 [33]	RCT
Carey 2018 [34]	RCT
Caudwell 2018 [35]	RCT
Chow 2017 [36]	RCT
Coughlin 2017 [37]	Development and testing of an app
Crombie 2017 [38]	Pilot (feasibility)
Crombie 2018a [39]	RCT
Crombie 2018b [40]	RCT
Cunningham 2018a [41]	RCT protocol
Cunningham 2018b [42]	RCT protocol
Cunningham 2017 [43]	RCT
Davies 2017 [44]	RCT
DeMartini 2018 [45]	Pilot (feasibility)
Diestelkamp 2019 [46]	RCT protocol
Doumas 2017 [47]	RCT
Dvorak 2017 [48]	RCT
Earle 2018 [49]	RCT (pilot)
Elison-Davies 2018 [50]	RCT protocol
Ellis 2017 [51]	RCT
Frohlich 2018 [52]	RCT protocol
Gajecki 2017 [53]	RCT
Ganz 2018 [54]	RCT
Gilbertson 2018 [55]	RCT
Gilmore 2018 [56]	Secondary data analysis of RCT data
Glass 2017 [57]	Secondary data analysis of RCT data
Gordon 2017 [58]	Cluster RCT
Guillemont 2017 [59]	RCT
Hamamura 2018 [60]	RCT protocol

Hamilton 2017 [61]	Randomized controlled feasibility trial
Hamilton 2018 [62]	Randomized controlled feasibility trial
Hartnett 2017 [63]	RCT
Haskins 2017 [64]	RCT
Haug 2017a [65]	Cluster RCT
Haug 2017b [66]	Cluster RCT
Haug 2018 [67]	Cluster RCT
Heitman 2017 [68]	RCT
Hides 2018 [69]	RCT
Ingersoll 2018 [70]	RCT (pilot)
Irvine 2017 [71]	Cohort study using data from an RCT
Jaffe 2018 [72]	RCT (engagement and evaluation)
Johnson 2018a [73]	RCT (pilot)
Johnson 2018b [74]	RCT
Jones 2018 [75]	RCT
Kahler 2017 [76]	RCT
Kiluk 2018 [77]	RCT
Lewis 2018 [78]	RCT
Lima-Serrano 2018 [79]	RCT protocol
McKay 2018 [80]	RCT - protocol
Mellentin 2017 [81]	RCT - description of app
Miller 2018 [82]	RCT
Milward 2018 [83]	RCT - qual interviews
Muench 2017 [84]	RCT pilot study
Mujcic 2018 [85]	RCT - protocol
Müssener 2018 [86]	RCT
Neale 2018 [87]	Non-RCT
Neighbors 2018a [88]	RCT
Newton 2017 [89]	RCT
Newton 2018 [90]	RCT
Ngo 2018 [91]	RCT
Norman 2018 [92]	RCT
Osilla 2018 [93]	RCT
Paz Castro 2017 [94]	RCT
Pedersen 2017a [95]	RCT
Pedersen 2017b [95]	RCT
Possemato 2018 [96]	Pilot RCT
Rabbi 2018 [97]	RCT - protocol
Radtke 2017 [98]	RCT
Ramo 2018 [99]	Protocol for RCT
Ranney 2017 [100]	RCT
Riordan 2018 [101]	Protocol
Satre 2017 [102]	Protocol and pilot
Schaub 2018 [103]	Protocol
Schwinn 2018 [104]	Pre and post test
Scott 2017 [105]	RCT
Shin 2018 [106]	RCT
Suffoletto 2018 [107]	Non-RCT

Suffoletto 2019 [108]	Pilot/Feasibility Study
Sundstrom 2017 [109]	Pilot/Feasibility Study
Tahaney 2017 [110]	RCT-preliminary
Tait 2018 [111]	RCT
Teeters 2018 [112]	RCT
Thomas 2018 [113]	RCT
Thompson 2018 [114]	RCT
Tzilos Wernette 2018 [115]	Pilot/Feasibility Study
Verbiest 2018 [116]	Protocol
Viskovich 2018 [117]	Pilot/Feasibility Study
Wallace 2017 [118]	RCT
Walton 2017 [119]	RCT
Washio 2017 [120]	Pilot
Wild 2018 [121]	RCT - protocol
Wilks 2018 [122]	RCT
Wray 2019 [123]	RCT
Wright 2018 [124]	RCT
Attwood 2017 [125]	Mixed methods - sequential explanatory design (routinely collected app usage data followed by in-depth interviews)
Bradshaw 2018 [126]	Before and after study
Carah 2017 [127]	Text analysis of blog posts on HSM website
Celio 2017 [128]	Proof of concept pilot study (mixed qual and quant)
Chambers 2017 [129]	Qualitative (in-depth interviews)
Crane 2017 [130]	Two usability studies - 'think aloud' and semistructured interviews.
Cucciare 2017 [131]	Acceptability, usability (uncontrolled)
Davies 2017 [132]	Think aloud' interview approach
Dulin 2017 [133]	Before and after study (pilot of a smartphone intervention)
Dulin 2017 [134]	Before and after study (focusing on effectiveness of strategies for dealing with a cued craving on reducing subsequent drinking)
Ferguson 2017 [135]	Intervention development
Garnett 2018 [136]	Intervention development
Garnett 2017 [137]	Comparative study of users of different interventions and general population of drinkers (using data from the app/website use)
Hamamura 2018 [138]	Piot non-randomized controlled trial
Han 2018 [139]	Cross-sectional study
Hickman 2018 [140]	Evaluate responses and satisfaction
Johansson 2017 [141]	Observational study (before and after study)
Kazemi 2018 [142]	App development and testing
Kirkman 2018 [143]	Before and after study

Kizakevich 2018 [144]	Useability and health assessment research
Knight 2018 [145]	Repeated measures (TAU first then intervention)
Kuerbis 2017 [146]	Quasi-experimental pilot study
Lee 2018a [147]	App development study
Leightley 2018a [148]	Development and feasibility study
Leightley 2018b [149]	This paper just contains more detailed information about the app
Leonard 2017 [150]	Acceptability and feasibility study
Mello 2018 [151]	Acceptability and feasibility study
Nehlin 2018 [152]	Interviews about using the technology
Parackal 2017 [153]	Assess engagement in a Facebook advertising based intervention
Paz Castro 2017 [154]	Non-randomized controlled trial
Pennay 2018 [155]	Content analysis of blog data
Riordan 2017 [156]	RCT
Robinson 2018 [157]	Cross-sectional study
Shell 2018 [158]	Comparative cohort study
Smith 2017 [159]	App development & preliminary feasibility study
Suffoletto 2018a [160]	Study to examine feasibility of collecting gait-related data
Tello 2018 [161]	RCT
Urbanoski 2017 [162]	Cross-sectional/retrospective - content analysis
Wilson 2017 [163]	Programme piloting and evaluation
You 2017 [164]	Before and after study
Zhang 2018 [165]	Protocol for feasibility study
ANZCTR [166] (Effectiveness of a Combined Web-Based and Ecological Momentary Intervention for Incoming First Year University Students: A three-armed Randomized Controlled Trial)	Trial
ANZCTR [167] (An internet-delivered, evidenced-based treatment program for mental health and alcohol use in contemporary Veterans - SHADE)	Trial
ANZCTR Newton [168] (The Climate Schools Plus (CSP) intervention: An online, combined student-parent substance use program to prevent substance use and related harms in Australian adolescents, aged 13 to 16 years.)	Trial
ClinicalTrials.gov [169] (Cognitive Behavioral Treatment by Phone to	Trial

Promote Use of Alcohol-Related Care and Reduce Drinking)	
ClinicalTrials.gov [170] (Reducing Risky Alcohol Consumption Using Skills-training in the App-form: A Randomized Controlled Study in the General Population)	Trial
ClinicalTrials.gov [171] (Feasibility of a Smart-phone Based Support System for Hazardous Drinkers)	Feasibility study
ClinicalTrials.gov [172] (Development and Testing of a Just-in-Time Adaptive Smart Phone Intervention)	Trial
ClinicalTrials.gov [173] (Using Addiction Comprehensive Health Enhancement Support System (ACHESS) in an Alcoholic Liver Disease Population)	Pilot study
ClinicalTrials.gov [174] (Integrating Contingency Management Into Routine Care for Alcohol Use Disorder)	Trial
ClinicalTrials.gov [175] (Ambulatory Alcohol Detoxification With Remote Monitoring)	Feasibility study
ClinicalTrials.gov [176] (Understanding and Intervening With Heavy Drinking Among Patients With HIV and HCV: Clinical Trial)	Trial
ClinicalTrials.gov [177] (Personalized Booster Feedback After Alcohol Health Education)	Trial
ClinicalTrials.gov [178] (Using Assistance From a Health Educator to Increase Effectiveness of an Internet Intervention for Alcohol Problems. A Randomized Controlled Trial)	Trial
ClinicalTrials.gov [179] (Mindfulness Mobile App to Reduce Adolescent Substance Use)	Pilot study
ClinicalTrials.gov [180] (Evaluation of an Interactive Text-Message Based Brief Intervention to Reduce Substance-Impaired Driving Among College Students)	Trial
ClinicalTrials.gov [181] (Alcohol and Implicit Process in Sexual Risk Behavior in MSM Supplement)	Pilot study
ClinicalTrials.gov [182] (A Targeted, Real-Time, Technology-Supported	Trial

Intervention for Patients With Alcohol Use Disorder on Disulfiram)	
ClinicalTrials.gov [183] (Tailored Adaptive Mobile Messaging to Reduce Problem Drinking)	Trial
ClinicalTrials.gov [184] (Does Providing a Brief Internet Intervention for Hazardous Alcohol Use to People Seeking Online Help for Depression Reduce Both Alcohol Use and Depression Symptoms Among Participants With These Co-occurring Disorders? Randomized Controlled Trial)	Trial
ClinicalTrials.gov [185] (Adapting an Effective CBT for Comorbidity to a Computer-Delivered Format)	Trial
ClinicalTrials.gov [186] (Development of LabPatch-alcohol: A Wearable Biosensor for Detecting Alcohol in Interstitial Fluid)	Development
ClinicalTrials.gov [187] (Development of a Multimodal Sleep Intervention Using Wearable Technology to Reduce Heavy Drinking in Young Adults)	Trial
ClinicalTrials.gov [188] (An Emotion Regulation Intervention for Early Adolescent Risk Behavior Prevention)	Development and trial
ClinicalTrials.gov [189] (Validation of a Computer-based Training Program for Patients With Alcohol Use Disorder)	Trial
ClinicalTrials.gov [190] (Computer-based Alcohol Reduction Intervention for Alcohol-using HIV/HCV+ Russian Women in Clinical Care)	Trial
ClinicalTrials.gov [191] (Enhancing the Efficacy and Duration of a Brief Alcohol Intervention Using Self-Affirmation)	Trial
ClinicalTrials.gov [192] (Efficacy of a Web-Based Alcohol Intervention for High School Students)	Unclear
ClinicalTrials.gov [193] (RealConsent: A Web-based Program to Reduce College Women's Risk of Sexual Violence by Targeting Alcohol Use,	Trial

Communication and Consent, and Building Supportive Networks)	
GCTR 2018 [194] (Reducing stress, alcohol and tobacco use in pregnant women to improve the children's later mental health)	Trial
GCTR 2018 [195] (Effectiveness of a self-help approach (Retraining in vivo) to reduce alcohol consumption)	Trial
GCTR 2018 [196] (Combining avoidance training and go/no-go training to prevent relapse in alcohol-dependent patients)	Trial
UMIN-CTR 2018 [197] (Development and a pilot trial of an internet-based educational program for reducing heavy drinking)	Trial
Alvarez 2018 [198]	Developing tool
Anderson 2018 [199]	Developing and pilot trial
Arleklo 2018 [200]	Pilot
Bergman 2018 [201]	Exploring ways to use social networking platforms
Bertholet 2018 [202]	Development and then RCT
Blevins 2018 [203]	Evaluate
Conner 2018 [204]	Explore if promoting engagement improves outcomes
DiCarmine 2018 [205]	Development
DiMartini 2018 [206]	Evaluation (pilot RCT)
Dulin 2018 [207]	Further app development and evaluation (pilot)
Dworkin 2018 [208,209]	Development and evaluation (pilot)
Fucito 2018	Development and evaluation (pilot)
Gustafson 2018 [210]	Development and evaluation (pilot)
Haug 2018 [211]	Evaluation (RCT)
Johnson 2018 [212]	Evaluation
Kaufman 2018 [213]	Development and evaluation (pilot and RCT)
Koffarnus 2018 [214]	Post-evaluation development (for wider dissemination)
Labrie 2018a [215]	Evaluation
Labrie 2018b [216]	Development and evaluation (RCT and feasibility of the intervention)
Lauckner 2018 [217]	Development and evaluation (pilot trial)
Litt 2018 [218]	Development, refinement and evaluation (piloting)
Maier 2018 [219]	Evaluation (pilot RCT)
Pedersen 2018 [220]	Development (including beta-testing and feasibility) and evaluation (RCT)
Petillo 2018 [221]	Development

Quanbeck 2018[222]	Evaluation (RCT)
Sanchez 2018[223]	Development/refinement
Schmidle 2018[224]	Development
Soltis 2018[225]	Evaluation (pilot RCT)
Walsh 2018[226]	Evaluation
Walters 2018[227]	Development
Wang 2018[228]	Validation (of the technology for research use)
Wernette 2018[229]	Evaluation
GLASS ARTHUR 2018[230]	Patent application
3M INNOVATIVE PROPERTIES CO 2018[231]	Patent application
DELTA TOOLING CO LTD 2018[232]	Patent application
KAPPELER MATTHIAS 2018[233]	Patent application
Richards, Scott Albert MR 2018[234]	Patent application

Table A2: Studies and records excluded at full text

Study/record	Reason for exclusion
Bauman 2018a[235]	Not a digital intervention
Bauman 2017a[236]	Not a digital intervention
Bauman 2017b[237]	Not a digital intervention
Bauman 2018b[238]	Not a digital intervention
Brooks 2018[239]	Not alcohol-related intervention
Cougle 2017[240]	Not alcohol-related intervention
Dickson 2017[241]	Not alcohol-related intervention
Freyer-Adam 2018[242]	Not a digital intervention
Fucito 2017[243]	Not alcohol-related intervention
Glass 2018[244]	Not a digital intervention
Hunter 2017[245]	Cost effectiveness analysis only
Lee 2018[246]	Not alcohol-related intervention
McFadyen 2018[247]	Intervention not targeted at individuals
Minian 2017[248]	Intervention not targeted at individuals
Neighbors 2018b[249]	Study focused on recruitment
Newton 2018[89]	Superseded by RCT published in 2017
Nyamathi 2017[250]	Not a digital intervention
Palacio‑Vieira 2018[251]	Assessing accuracy of AUDIT-C
Palmer 2017[252]	Systematic review
Prabhakaran 2018[253]	Intervention not targeted at individuals
Puijk-Hekman 2017[254]	Not alcohol-related intervention
Rodriguez 2017[249]	Not targeting drinking behaviours among participants
Santo 2018[255]	Not alcohol-related intervention
Shulman 2018[256]	Not alcohol-related intervention
Suffoletto 2017[257]	Not a digital intervention
Thomas 2017[258]	Protocol for a published study
Toomey 2017[259]	Intervention not targeted at individuals
Wilks 2017[122]	Protocol for a published study

Woodall 2018[260]	Intervention not targeted at individuals
Wright 2017[261]	Protocol for a published study
Bachhuber 2017[262]	Intervention not targeted at individuals
Bacidore 2017[263]	Can't access full text
Barbieri 2018[264]	Focus on drinking games increasing consumption
Benitez 2018[265]	Intervention not targeted at individuals
Beyer 2018[266]	Review and meta-analysis
Burdick 2017[267]	Intervention not targeted at individuals
Connolly 2018[268]	Not alcohol-related intervention
Dermody 2018[269]	Not alcohol-related intervention
Gullo 2018[270]	Not alcohol-related intervention
Hargraves 2017[271]	Not a digital intervention
Haug 2017[272]	Not alcohol-related intervention
Hoggatt 2018[273]	Not a digital intervention
Jensen 2018[274]	Focuses on digital tools to facilitate not reduce alcohol consumption
Jernigan 2017[275]	Focuses on exposure to alcohol marketing
Lee 2018b[147]	Correction (to an author's name)
Lelutiu-Weinberger 2018[276]	Not alcohol-related intervention
McFadyen 2017[277]	Intervention not targeted at individuals
Nattala 2018[278]	Not a digital intervention
Nesvag 2018[279]	Systematic review
Osilla 2018[280]	Intervention not targeted at individuals
Pedersen 2017[281]	Not a digital intervention
Perski 2017[282]	No details on intervention/s reported
Petticrew 2017[283]	Not a digital intervention
Rossa-Roccor 2017[284]	Not a digital intervention
Sharpe 2018[285]	No details on intervention/s reported
Suffoletto 2018b[286]	Narrative review/commentary
Swabri 2018[287]	Not a digital intervention
Theall 2018[288]	Use of GPS tracking as a research tool, not a digital intervention
Thompson 2019[289]	Intervention not targeted at target population
Wright 2017[290]	No details on intervention/s reported
ClinicalTrials.gov[291] (Improving Outcomes Among Medical/Surgical inpatients with Alcohol Use Disorders)	Not a digital intervention
ClinicalTrials.gov (Identification of Excessive Substance Use to Encourage Behaviour Change Among Young People in Primary Care: Pilot Study in Preparation for a Randomized Trial)	Not a digital intervention
ClinicalTrials.gov[292] (The Heroes Circle Opioid Project)	Not alcohol-related intervention
ClinicalTrials.gov[293] (Strategies for Preventing Underage Drinking and Other	Not a digital intervention

Substance Use in Native American Tribal Communities)	
ClinicalTrials.gov[294] (Phased Multisite Cluster Randomized Trial Testing Screening, Brief Intervention, Referral to Treatment for People That Use Tobacco, Alcohol, and Non-prescription Drugs)	Not a digital intervention
ClinicalTrials.gov[295] (Long-term Follow-up Study of Substance Abuse Screening and Intervention in Multi Primary Care Centers)	Not a digital intervention
CTRI 2018[296] (Efficacy of Body-Mind-Spirit based relapse prevention among individuals with alcohol use)	Not a digital intervention
GCTR 2018[297] (Prevention of Alcohol and Tabacco Consumption Using Interventions Based on Mindfulness in Boys with Mild to Borderline Intellectual Disabilities (MBID))	Not a digital intervention
GCTR 2018[298] (ProHEAD: Promoting Help-seeking using E-technology for Adolescents with Mental Health Problems; Sub-Project No. 1: Online intervention)	Not alcohol-related intervention
GCTR 2018[299] (Testing a proactive expert system intervention to prevent and to quit at-risk alcohol use)	Not a digital intervention
Anderson 2018[300]	Not a digital intervention
Carson-Chahhoud 2018[301]	Not alcohol-related intervention
Epstein 2018[302]	Not alcohol-related intervention
Hyde 2018[303]	Not alcohol-related intervention
Janssen 2018[304]	Not a digital intervention
Lof 2018[305]	Not alcohol-related intervention
Smith & van Ryzin 2018[306]	Intervention not targeted at target population
Snider 2018[307]	Intervention not targeted at target population
So 2018[308]	Not an intervention
Wong 2018[309]	Not an intervention

References

1   Kaner, E. F. S. *et al.* Personalised digital interventions for reducing hazardous and harmful alcohol consumption in community-dwelling populations. *Cochrane Database Syst Rev* **2017**, doi:10.1002/14651858.CD011479.pub2 (2017).

2   NICE. EVIDENCE STANDARDS FRAMEWORK FOR DIGITAL HEALTH TECHNOLOGIES. (2019).

3   Pham, Q., Wiljer, D. & Cafazzo, J. A. Beyond the Randomized Controlled Trial: A Review of Alternatives in mHealth Clinical Trial Methods. *JMIR Mhealth Uhealth* **4**, e107, doi:10.2196/mhealth.5720 (2016).

4   Garnett, C. V. *et al.* Behavior change techniques used in digital behavior change interventions to reduce excessive alcohol consumption: A meta-regression. *Ann Behav Med* **52**, 530-543, doi:10.1093/abm/kax029 (2018).

5   Garnett, C. *Rapid update of systematic review of digital alcohol reduction interventions* (2018).

6   Black, N., Mullan, B. & Sharpe, L. Computer-delivered interventions for reducing alcohol consumption: meta-analysis and meta-regression using behaviour change techniques and theory. *Health Psychology Review* **10**, 341-357, doi:10.1080/17437199.2016.1168268 (2016).

7   Riper, H. *et al.* Effectiveness and treatment moderators of internet interventions for adult problem drinking: An individual patient data meta-analysis of 19 randomized controlled trials. *PLoS Medicine* **15**, doi:10.1371/journal.pmed.1002714 (2018).

8   Nesvåg, S. & McKay, J. R. Feasibility and effects of digital interventions to support people in recovery from substance use disorders: Systematic review. *J Med Internet Res* **20**, doi:10.2196/jmir.9873 (2018).

9   Milward, J., Drummond, C., Fincham-Campbell, S. & De Luca, P. What makes online substance-use interventions engaging? A systematic review and narrative synthesis. *Digit Health* **4**, 1-25 (2018).

10   Carreiro, S. *et al.* mHealth for the Detection and Intervention in Adolescent and Young Adult Substance Use Disorder. *Curr Addict Rep* **5**, 110-119 (2018).

11   Crane, D., Garnett, C., Brown, J., West, R. & Michie, S. Behavior change techniques in popular alcohol reduction apps: Content analysis. *J Med Internet Res* **17**, doi:10.2196/jmir.4060 (2015).

12   Hoeppner, B. B. *et al.* 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* **82**, 67-73, doi:https://dx.doi.org/10.1016/j.jsat.2017.09.006 (2017).

13   Ganann, R., Ciliska, D. & Thomas, H. Expediting systematic reviews: Methods and implications of rapid reviews. *Implement Sci* **5**, doi:10.1186/1748-5908-5-56 (2010).

14   Hoffmann, T. C. *et al.* Better reporting of interventions: template for intervention description and replication (TIDieR) checklist and guide. *BMJ : British Medical Journal* **348**, g1687, doi:10.1136/bmj.g1687 (2014).

15   Elliott, J. H. *et al.* Living Systematic Reviews: An Emerging Opportunity to Narrow the Evidence-Practice Gap. *PLoS Medicine* **11**, doi:10.1371/journal.pmed.1001603 (2014).

16   Garnett, C. *et al.* Predictors of engagement, response to follow up, and extent of alcohol reduction in users of a smartphone app (Drink less): Secondary analysis of a factorial randomized controlled trial. *JMIR Mhealth Uhealth* **6**, doi:10.2196/11175 (2018).

17   de Bruin, M., Viechtbauer, W., Hospers, H. J., Schaalma, H. P. & Kok, G. Standard Care Quality Determines Treatment Outcomes in Control Groups of HAART-Adherence Intervention Studies: Implications for the Interpretation and Comparison of Intervention Effects. *Health Psychol* **28**, 668-674, doi:10.1037/a0015989 (2009).

18   Michie, S. *et al.* Identification of behaviour change techniques to reduce excessive alcohol consumption. *Addiction* **107**, 1431-1440 (2012).

19   Bernstein, M. H. *et al.* A text message intervention to reduce 21st birthday alcohol consumption: Evaluation of a two-group randomized controlled trial. *Psychol Addict Behav* **32**, 149-161, doi:https://dx.doi.org/10.1037/adb0000342 (2018).

20   Bertholet, N., Daeppen, J. B., McNeely, J., Kushnir, V. & Cunningham, J. A. Smartphone application for unhealthy alcohol use: A pilot study. *Subst Abus* **38**, 285-291, doi:https://dx.doi.org/10.1080/08897077.2017.1281860 (2017).

21   Bertholet, N., Godinho, A. & Cunningham, J. A. Smartphone application for unhealthy alcohol use: Pilot randomized controlled trial in the general population. *Drug Alcohol Depend* **195**, 101-105, doi:https://dx.doi.org/10.1016/j.drugalcdep.2018.12.002 (2018).

22   Bertholet, N. *et al.* Four-year follow-up of an internet-based brief intervention for unhealthy alcohol use in young men. *Addiction* **113**, 1517-1521, doi:https://dx.doi.org/10.1111/add.14179 (2018).

23   Birrell, L. *et al.* Evaluating the Long-Term Effectiveness of School-Based Depression, Anxiety, and Substance Use Prevention Into Young Adulthood: Protocol for the Climate School Combined Study. *JMIR Res Protoc* **7**, e11372, doi:https://dx.doi.org/10.2196/11372 (2018).

24   Bos, L. *et al.* Efficacy of a web-based intervention with and without guidance for employees with risky drinking: results of a three-arm randomized controlled trial. *Addiction* **113**, 635-646, doi:https://dx.doi.org/10.1111/add.14085 (2018).

25   Bountress, K. E., Metzger, I. W., Maples-Keller, J. L. & Gilmore, A. K. Reducing sexual risk behaviors: secondary analyses from a randomized controlled trial of a brief web-based alcohol intervention for underage, heavy episodic drinking college women. *Addict Res Theory* **25**, 302-309, doi:https://dx.doi.org/10.1080/16066359.2016.1271416 (2017).

26   Boyle, S. C., Earle, A. M., McCabe, N. & LaBrie, J. W. Increasing Chance-Based Uncertainty Reduces Heavy Drinkers' Cognitive Reactance to Web-Based Personalized Normative Feedback. *J Stud Alcohol* **79**, 601-610, doi:https://www.jsad.com/doi/pdf/10.15288/jsad.2018.79.601 (2018).

27   Braitman, A. L. & Lau-Barraco, C. Personalized Boosters After a Computerized Intervention Targeting College Drinking: A Randomized Controlled Trial. *Alcohol Clin Exp Res* **42**, 1735-1747, doi:https://dx.doi.org/10.1111/acer.13815 (2018).

28   Bratti-van der Werf, M. K. *et al.* Augmenting Outpatient Alcohol Treatment as Usual With Online Alcohol Avoidance Training: Protocol for a Double-Blind Randomized Controlled Trial. *JMIR Res Protoc* **7**, e55, doi:https://dx.doi.org/10.2196/resprot.9287 (2018).

29   Brendryen, H., Johansen, A., Duckert, F. & Nesvag, S. A Pilot Randomized Controlled Trial of an Internet-Based Alcohol Intervention in a Workplace Setting. *Int J Behav Med* **24**, 768-777, doi:https://dx.doi.org/10.1007/s12529-017-9665-0 (2017).

30   Brick, L. A., Redding, C. A., Paiva, A. L. & Velicer, W. F. Intervention effects on stage transitions for adolescent smoking and alcohol use acquisition. *Psychol Addict Behav* **31**, 614-624, doi:https://dx.doi.org/10.1037/adb0000302 (2017).

31   Brief, D. J. *et al.* Web-based alcohol intervention for veterans: PTSD, combat exposure, and alcohol outcomes. *Psychol Trauma* **10**, 154-162, doi:https://dx.doi.org/10.1037/tra0000281 (2018).

32   Byrnes, H. F. *et al.* Prevention of alcohol use in older teens: A randomized trial of an online family prevention program. *Psychol Addict Behav* **14**, 14, doi:https://dx.doi.org/10.1037/adb0000442 (2019).

33   Cadigan, J. M., Martens, M. P., Dworkin, E. R. & Sher, K. J. The Efficacy of an Event-Specific, Text Message, Personalized Drinking Feedback Intervention. *Prev Sci* **27**, 27, doi:https://dx.doi.org/10.1007/s11121-018-0939-9 (2018).

34   Carey, K. B. *et al.* Using e-mail boosters to maintain change after brief alcohol interventions for mandated college students: A randomized controlled trial. *J Consult Clin Psychol* **86**, 787-798, doi:https://dx.doi.org/10.1037/ccp0000339 (2018).

35   Caudwell, K. M., Mullan, B. A. & Hagger, M. S. Testing an Online, Theory-Based Intervention to Reduce Pre-drinking Alcohol Consumption and Alcohol-Related Harm in Undergraduates: a Randomized Controlled Trial. *Int J Behav Med* **12**, 12, doi:https://dx.doi.org/10.1007/s12529-018-9736-x (2018).

36   Chow, P. I., Lord, H. R., MacDonnell, K., Ritterband, L. M. & Ingersoll, K. S. Convergence of online daily diaries and timeline followback among women at risk for alcohol exposed pregnancy. *J Subst Abuse Treat* **82**, 7-11, doi:https://dx.doi.org/10.1016/j.jsat.2017.08.004 (2017).

37   Coughlin, S. S., Besenyi, G. M., Bowen, D. & De Leo, G. Development of the Physical activity and Your Nutrition for Cancer (PYNC) smartphone app for preventing breast cancer in women. *Mhealth* **3**, 5, doi:https://dx.doi.org/10.21037/mhealth.2017.02.02 (2017).

38   Crombie, I. K. *et al.* Modifying Alcohol Consumption to Reduce Obesity (MACRO): development and feasibility trial of a complex community-based intervention for men. *Health Technol Assess* **21**, 1-150, doi:https://dx.doi.org/10.3310/hta21190 (2017).

39   Crombie, I. K. *et al.* Texting to Reduce Alcohol Misuse (TRAM): main findings from a randomized controlled trial of a text message intervention to reduce binge drinking among disadvantaged men. *Addiction* **01**, 01, doi:https://dx.doi.org/10.1111/add.14229 (2018).

40   Crombie, I. K. *et al.* Text message intervention to reduce frequency of binge drinking among disadvantaged men: the TRAM RCT. *NIHR Journals Library* **6**, 6, doi:https://dx.doi.org/10.3310/phr06060 (2018).

41   Cunningham, J. A. *et al.* Does providing a brief internet intervention for hazardous alcohol use to people seeking online help for depression reduce both alcohol use and depression symptoms among participants with these co-occurring disorders? Study protocol for a randomized controlled trial. *BMJ Open* **8**, e022412, doi:https://dx.doi.org/10.1136/bmjopen-2018-022412 (2018).

42   Cunningham, J. A. *et al.* Online interventions for problem gamblers with and without co-occurring problem drinking: study protocol of a randomized controlled trial. *Trials* **19**, 295, doi:https://dx.doi.org/10.1186/s13063-018-2672-x (2018).

43   Cunningham, J. A. *et al.* Randomized Controlled Trial of a Brief Versus Extended Internet Intervention for Problem Drinkers. *Int J Behav Med* **24**, 760-767, doi:https://dx.doi.org/10.1007/s12529-016-9604-5 (2017).

44   Davies, E. L., Lonsdale, A. J., Hennelly, S. E., Winstock, A. R. & Foxcroft, D. R. Personalized Digital Interventions Showed no Impact on Risky Drinking in Young Adults: A Pilot Randomized Controlled Trial. *Alcohol Alcohol* **52**, 671-676, doi:https://dx.doi.org/10.1093/alcalc/agx051 (2017).

45   DeMartini, K. S. *et al.* Text Messaging to Reduce Alcohol Relapse in Prelisting Liver Transplant Candidates: A Pilot Feasibility Study. *Alcohol Clin Exp Res* **42**, 761-769, doi:https://dx.doi.org/10.1111/acer.13603 (2018).

46   Diestelkamp, S. *et al.* Effectiveness of a web-based screening and brief intervention with weekly text-message-initiated individualised prompts for reducing risky alcohol use among teenagers: study protocol of a randomized controlled trial within the ProHEAD consortium. *Trials* **20**, 73, doi:https://dx.doi.org/10.1186/s13063-018-3160-z (2019).

47   Doumas, D. M., Esp, S., Flay, B. & Bond, L. A Randomized Controlled Trial Testing the Efficacy of a Brief Online Alcohol Intervention for High School Seniors. *J Stud Alcohol* **78**, 706-715, doi:https://www.jsad.com/doi/pdf/10.15288/jsad.2017.78.706 (2017).

48   Dvorak, R. D., Kramer, M. P., Stevenson, B. L., Sargent, E. M. & Kilwein, T. M. An application of deviance regulation theory to reduce alcohol-related problems among college women during spring break. *Psychol Addict Behav* **31**, 295-306, doi:https://dx.doi.org/10.1037/adb0000258 (2017).

49   Earle, A. M., LaBrie, J. W., Boyle, S. C. & Smith, D. In pursuit of a self-sustaining college alcohol intervention: Deploying gamified PNF in the real world. *Addict Behav* **80**, 71-81, doi:https://dx.doi.org/10.1016/j.addbeh.2018.01.005 (2018).

50   Elison-Davies, S. *et al.* Protocol for a randomized controlled trial of the Breaking Free Online Health and Justice program for substance misuse in prison settings. *Health justice* **6**, 20, doi:https://dx.doi.org/10.1186/s40352-018-0078-1 (2018).

51   Ellis, J. D. *et al.* Effects of narrator empathy in a computer delivered brief intervention for alcohol use. *Contemp Clin Trials* **61**, 29-32, doi:https://dx.doi.org/10.1016/j.cct.2017.07.014 (2017).

52   Frohlich, J. R. *et al.* Efficacy of an Online Self-Help Treatment for Comorbid Alcohol Misuse and Emotional Problems in Young Adults: Protocol for a Randomized Controlled Trial. *JMIR Res Protoc* **7**, e11298, doi:https://dx.doi.org/10.2196/11298 (2018).

53   Gajecki, M. *et al.* Skills Training via Smartphone App for University Students with Excessive Alcohol Consumption: a Randomized Controlled Trial. *Int J Behav Med* **24**, 778-788, doi:https://dx.doi.org/10.1007/s12529-016-9629-9 (2017).

54   Ganz, T. *et al.* Effects of a stand-alone web-based electronic screening and brief intervention targeting alcohol use in university students of legal drinking age: A randomized controlled trial. *Addict Behav* **77**, 81-88, doi:https://dx.doi.org/10.1016/j.addbeh.2017.09.017 (2018).

55   Gilbertson, R. J., Norton, T. R., Beery, S. H. & Lee, K. R. Web-Based Alcohol Intervention in First-Year College Students: Efficacy of Full-Program Administration Prior to Second Semester. *Subst Use Misuse* **53**, 1021-1029, doi:https://dx.doi.org/10.1080/10826084.2017.1392979 (2018).

56   Gilmore, A. K., Bountress, K. E., Selmanoff, M. & George, W. H. Reducing Heavy Episodic Drinking, Incapacitation, and Alcohol-Induced Blackouts: Secondary Outcomes of a Web-Based Combined Alcohol Use and Sexual Assault Risk Reduction Intervention. *Violence Against Women* **24**, 1299-1313, doi:https://dx.doi.org/10.1177/1077801218787934 (2018).

57   Glass, J. E. *et al.* Treatment seeking as a mechanism of change in a randomized controlled trial of a mobile health intervention to support recovery from alcohol use disorders. *J Subst Abuse Treat* **77**, 57-66, doi:https://dx.doi.org/10.1016/j.jsat.2017.03.011 (2017).

58   Gordon, J. S. *et al.* Postintervention Effects of Click City : Alcohol on Changing Etiological Mechanisms Related to the Onset of Heavy Drinking. *Health Educ Behav* **44**, 626-637, doi:https://dx.doi.org/10.1177/1090198116683678 (2017).

59   Guillemont, J. *et al.* Effectiveness of a web-based intervention to reduce alcohol consumption among French hazardous drinkers: a randomized controlled trial. *Health Educ Res* **32**, 332-342, doi:https://dx.doi.org/10.1093/her/cyx052 (2017).

60   Hamamura, T., Suganuma, S., Takano, A., Matsumoto, T. & Shimoyama, H. The Efficacy of a Web-Based Screening and Brief Intervention for Reducing Alcohol

Consumption Among Japanese Problem Drinkers: Protocol for a Single-Blind Randomized Controlled Trial. *JMIR Res Protoc* **7**, e10650, doi:https://dx.doi.org/10.2196/10650 (2018).

61   Hamilton, F. L. *et al.* DIAMOND (DIgital Alcohol Management ON Demand): a mixed methods feasibility RCT and embedded process evaluation of a digital health intervention to reduce hazardous and harmful alcohol use. *Pilot feasibility stud* **3**, 34, doi:https://dx.doi.org/10.1186/s40814-017-0177-0 (2017).

62   Hamilton, F. L. *et al.* DIAMOND (DIgital Alcohol Management ON Demand): a feasibility RCT and embedded process evaluation of a digital health intervention to reduce hazardous and harmful alcohol use recruiting in hospital emergency departments and online. *Pilot feasibility stud* **4**, 114, doi:https://dx.doi.org/10.1186/s40814-018-0303-7 (2018).

63   Hartnett, D. *et al.* Supportive text messages for patients with alcohol use disorder and a comorbid depression: a protocol for a single-blind randomized controlled aftercare trial. *BMJ Open* **7**, e013587, doi:https://dx.doi.org/10.1136/bmjopen-2016-013587 (2017).

64   Haskins, B. L. *et al.* Health Evaluation and Referral Assistant: A Randomized Controlled Trial of a Web-Based Screening, Brief Intervention, and Referral to Treatment System to Reduce Risky Alcohol Use Among Emergency Department Patients. *J Med Internet Res* **19**, e119, doi:https://dx.doi.org/10.2196/jmir.6812 (2017).

65   Haug, S. *et al.* Efficacy of a web- and text messaging-based intervention to reduce problem drinking in adolescents: Results of a cluster-randomized controlled trial. *J Consult Clin Psychol* **85**, 147-159, doi:https://dx.doi.org/10.1037/ccp0000138 (2017).

66   Haug, S., Paz Castro, R., Kowatsch, T., Filler, A. & Schaub, M. P. Efficacy of a technology-based, integrated smoking cessation and alcohol intervention for smoking cessation in adolescents: Results of a cluster-randomized controlled trial. *J Subst Abuse Treat* **82**, 55-66, doi:https://dx.doi.org/10.1016/j.jsat.2017.09.008 (2017).

67   Haug, S., Paz Castro, R., Wenger, A. & Schaub, M. P. Efficacy of a mobile phone-based life-skills training program for substance use prevention among adolescents: study protocol of a cluster-randomized controlled trial. *BMC Public Health* **18**, 1102, doi:https://dx.doi.org/10.1186/s12889-018-5969-5 (2018).

68   Heitmann, J. *et al.* Internet-based attentional bias modification training as add-on to regular treatment in alcohol and cannabis dependent outpatients: a study protocol of a randomized control trial. *BMC Psychiatry* **17**, 193, doi:https://dx.doi.org/10.1186/s12888-017-1359-2 (2017).

69   Hides, L. *et al.* Efficacy and outcomes of a mobile app targeting alcohol use in young people. *Addict Behav* **77**, 89-95, doi:https://dx.doi.org/10.1016/j.addbeh.2017.09.020 (2018).

70   Ingersoll, K. *et al.* A Pilot RCT of an Internet Intervention to Reduce the Risk of Alcohol-Exposed Pregnancy. *Alcohol Clin Exp Res* **42**, 1132-1144, doi:https://dx.doi.org/10.1111/acer.13635 (2018).

71   Irvine, L. *et al.* Real Time Monitoring of Engagement with a Text Message Intervention to Reduce Binge Drinking Among Men Living in Socially Disadvantaged Areas of Scotland. *Int J Behav Med* **24**, 713-721, doi:https://dx.doi.org/10.1007/s12529-017-9666-z (2017).

72   Jaffe, A. E. *et al.* Student engagement and comfort during a web-based personalized feedback intervention for alcohol and sexual assault. *Addict Behav* **82**, 23-27, doi:https://dx.doi.org/10.1016/j.addbeh.2018.02.020 (2018).

73   Johnson, N. A. *et al.* Effect of electronic brief intervention on uptake of specialty treatment in hospital outpatients with likely alcohol dependence: Pilot randomized trial and qualitative interviews. *Drug Alcohol Depend* **183**, 253-260, doi:https://dx.doi.org/10.1016/j.drugalcdep.2017.11.016 (2018).

74   Johnson, N. A. *et al.* Effect of electronic screening and brief intervention on hazardous or harmful drinking among adults in the hospital outpatient setting: A randomized, double-blind, controlled trial. *Drug Alcohol Depend* **191**, 78-85, doi:https://dx.doi.org/10.1016/j.drugalcdep.2018.06.030 (2018).

75   Jones, A. *et al.* A randomized controlled trial of inhibitory control training for the reduction of alcohol consumption in problem drinkers. *J Consult Clin Psychol* **86**, 991-1004, doi:https://dx.doi.org/10.1037/ccp0000312 (2018).

76   Kahler, C. W., Lechner, W. J., MacGlashan, J., Wray, T. B. & Littman, M. L. Initial Progress Toward Development of a Voice-Based Computer-Delivered Motivational Intervention for Heavy Drinking College Students: An Experimental Study. *JMIR Ment Health* **4**, e25, doi:https://dx.doi.org/10.2196/mental.7571 (2017).

77   Kiluk, B. D., Frankforter, T. L., Cusumano, M., Nich, C. & Carroll, K. M. Change in DSM-5 Alcohol Use Disorder Criteria Count and Severity Level as a Treatment Outcome Indicator: Results from a Randomized Trial. *Alcohol Clin Exp Res* **05**, 05, doi:https://dx.doi.org/10.1111/acer.13807 (2018).

78   Lewis, M. A. *et al.* Evaluating Personalized Feedback Intervention Framing with a Randomized Controlled Trial to Reduce Young Adult Alcohol-Related Sexual Risk Taking. *Prev Sci* **06**, 06, doi:https://dx.doi.org/10.1007/s11121-018-0879-4 (2018).

79   Lima-Serrano, M., Martinez-Montilla, J. M., Lima-Rodriguez, J. S., Mercken, L. & de Vries, H. Design, implementation and evaluation of a web-based computer-tailored intervention to prevent binge drinking in adolescents: study protocol. *BMC Public Health* **18**, 449, doi:https://dx.doi.org/10.1186/s12889-018-5346-4 (2018).

80   McKay, J. R. *et al.* Effects of automated smartphone mobile recovery support and telephone continuing care in the treatment of alcohol use disorder: study protocol for a randomized controlled trial. *Trials* **19**, 82, doi:https://dx.doi.org/10.1186/s13063-018-2466-1 (2018).

81   Mellentin, A. I., Stenager, E., Nielsen, B., Nielsen, A. S. & Yu, F. A Smarter Pathway for Delivering Cue Exposure Therapy? The Design and Development of a Smartphone App Targeting Alcohol Use Disorder. *JMIR Mhealth Uhealth* **5**, e5, doi:https://dx.doi.org/10.2196/mhealth.6500 (2017).

82   Miller, M. B., DiBello, A. M., Carey, K. B. & Pedersen, E. R. Blackouts as a Moderator of Young Adult Veteran Response to Personalized Normative Feedback for Heavy Drinking. *Alcohol Clin Exp Res* **42**, 1145-1153, doi:https://dx.doi.org/10.1111/acer.13637 (2018).

83   Milward, J., Deluca, P., Drummond, C. & Kimergard, A. Developing Typologies of User Engagement With the BRANCH Alcohol-Harm Reduction Smartphone App: Qualitative Study. *JMIR Mhealth Uhealth* **6**, e11692, doi:https://dx.doi.org/10.2196/11692 (2018).

84   Muench, F. *et al.* A Randomized Controlled Pilot Trial of Different Mobile Messaging Interventions for Problem Drinking Compared to Weekly Drink Tracking. *PLoS ONE* **12**, e0167900, doi:https://dx.doi.org/10.1371/journal.pone.0167900 (2017).

85   Mujcic, A., Blankers, M., Boon, B., Engels, R. & van Laar, M. Internet-based self-help smoking cessation and alcohol moderation interventions for cancer survivors: a study protocol of two RCTs. *BMC Cancer* **18**, 364, doi:https://dx.doi.org/10.1186/s12885-018-4206-z (2018).

86   Mussener, U., Thomas, K., Linderoth, C., Leijon, M. & Bendtsen, M. A Text Message-Based Intervention Targeting Alcohol Consumption Among University Students: User Satisfaction and Acceptability Study. *JMIR Hum Factors* **5**, e23, doi:https://dx.doi.org/10.2196/humanfactors.9641 (2018).

87   Neale, Z. E. *et al.* The Utility of a Brief Web-Based Prevention Intervention as a Universal Approach for Risky Alcohol Use in College Students: Evidence of Moderation by Family History. *Front Psychol* **9**, 747, doi:https://dx.doi.org/10.3389/fpsyg.2018.00747 (2018).

88   Neighbors, C. *et al.* Personalized normative feedback for heavy drinking: An application of deviance regulation theory. *Behav Res Ther* **13**, 13, doi:https://dx.doi.org/10.1016/j.brat.2018.11.004 (2018).

89   Newton, A. S. *et al.* A randomized controlled pilot trial evaluating feasibility and acceptability of a computer-based tool to identify and reduce harmful and hazardous drinking among adolescents with alcohol-related presentations in Canadian pediatric emergency departments. *BMJ Open* **7**, e015423, doi:https://dx.doi.org/10.1136/bmjopen-2016-015423 (2017).

90   Newton, N. C. *et al.* Internet-Based Universal Prevention for Students and Parents to Prevent Alcohol and Cannabis Use Among Adolescents: Protocol for the Randomized Controlled Trial of Climate Schools Plus. *JMIR Res Protoc* **7**, e10849, doi:https://dx.doi.org/10.2196/10849 (2018).

91   Ngo, Q. M. *et al.* Emergency Department Alcohol Intervention: Effects on Dating Violence and Depression. *Pediatrics* **142**, doi:https://dx.doi.org/10.1542/peds.2017-3525 (2018).

92   Norman, P. *et al.* A randomized controlled trial of a brief online intervention to reduce alcohol consumption in new university students: Combining self-affirmation, theory of planned behaviour messages, and implementation intentions. *Br J Health Psychol* **23**, 108-127, doi:https://dx.doi.org/10.1111/bjhp.12277 (2018).

93   Osilla, K. C. *et al.* Efficacy of a Web-based Intervention for Concerned Spouses of Service Members and Veterans with Alcohol Misuse. *J Marital Fam Ther* **44**, 292-306, doi:https://dx.doi.org/10.1111/jmft.12279 (2018).

94   Paz Castro, R., Haug, S., Kowatsch, T., Filler, A. & Schaub, M. P. Moderators of outcome in a technology-based intervention to prevent and reduce problem drinking among adolescents. *Addict Behav* **72**, 64-71, doi:https://dx.doi.org/10.1016/j.addbeh.2017.03.013 (2017).

95   Pedersen, E. R., Parast, L., Marshall, G. N., Schell, T. L. & Neighbors, C. A randomized controlled trial of a web-based, personalized normative feedback alcohol intervention for young-adult veterans. *J Consult Clin Psychol* **85**, 459-470, doi:https://dx.doi.org/10.1037/ccp0000187 (2017).

96   Possemato, K. *et al.* A pilot study comparing peer supported web-based CBT to self-managed web CBT for primary care veterans with PTSD and hazardous alcohol use. *Psychiatr Rehabil J* **11**, 29, doi:https://dx.doi.org/10.1037/prj0000334 (2018).

97   Rabbi, M. *et al.* Toward Increasing Engagement in Substance Use Data Collection: Development of the Substance Abuse Research Assistant App and Protocol for a Microrandomized Trial Using Adolescents and Emerging Adults. *JMIR Res Protoc* **7**, e166, doi:https://dx.doi.org/10.2196/resprot.9850 (2018).

98   Radtke, T., Ostergaard, M., Cooke, R. & Scholz, U. Web-Based Alcohol Intervention: Study of Systematic Attrition of Heavy Drinkers. *J Med Internet Res* **19**, e217, doi:https://dx.doi.org/10.2196/jmir.6780 (2017).

99   Ramo, D. E. *et al.* Using Facebook to address smoking and heavy drinking in young adults: Protocol for a randomized, controlled trial. *Contemp Clin Trials* **68**, 52-60, doi:https://dx.doi.org/10.1016/j.cct.2018.02.014 (2018).

100   Ranney, M. L. *et al.* Effects of a brief ED-based alcohol and violence intervention on depressive symptoms. *Gen Hosp Psychiatry* **46**, 44-48, doi:https://dx.doi.org/10.1016/j.genhosppsych.2017.01.008 (2017).

101   Riordan, B. C. *et al.* Effectiveness of a Combined Web-Based and Ecological Momentary Intervention for Incoming First-Year University Students: Protocol for a 3-Arm Randomized Controlled Trial. *JMIR Res Protoc* **7**, e10164, doi:https://dx.doi.org/10.2196/10164 (2018).

102   Satre, D. D., Ly, K., Wamsley, M., Curtis, A. & Satterfield, J. A Digital Tool to Promote Alcohol and Drug Use Screening, Brief Intervention, and Referral to Treatment Skill Translation: A Mobile App Development and Randomized Controlled Trial Protocol. *JMIR Res Protoc* **6**, e55, doi:https://dx.doi.org/10.2196/resprot.7070 (2017).

103   Schaub, M. P. *et al.* Alcohol e-Help: study protocol for a web-based self-help program to reduce alcohol use in adults with drinking patterns considered harmful,

hazardous or suggestive of dependence in middle-income countries. *Addiction* **113**, 346-352, doi:https://dx.doi.org/10.1111/add.14034 (2018).

104   Schwinn, T. M., Schinke, S. P., Hopkins, J., Keller, B. & Liu, X. An Online Drug Abuse Prevention Program for Adolescent Girls: Posttest and 1-Year Outcomes. *J Youth Adolesc* **47**, 490-500, doi:https://dx.doi.org/10.1007/s10964-017-0714-4 (2018).

105   Scott, C. K., Dennis, M. L. & Gustafson, D. H. Using smartphones to decrease substance use via self-monitoring and recovery support: study protocol for a randomized control trial. *Trials* **18**, 374, doi:https://dx.doi.org/10.1186/s13063-017-2096-z (2017).

106   Shin, Y., Miller-Day, M., Hecht, M. L. & Krieger, J. L. Entertainment-Education Videos as a Persuasive Tool in the Substance Use Prevention Intervention "keepin' it REAL". *Health Commun* **33**, 896-906, doi:https://dx.doi.org/10.1080/10410236.2017.1321163 (2018).

107   Suffoletto, B., Chung, T., Muench, F., Monti, P. & Clark, D. B. A Text Message Intervention with Adaptive Goal Support to Reduce Alcohol Consumption Among Non-Treatment-Seeking Young Adults: Non-Randomized Clinical Trial with Voluntary Length of Enrollment. *JMIR Mhealth Uhealth* **6**, e35, doi:https://dx.doi.org/10.2196/mhealth.8530 (2018).

108   Suffoletto, B., Kirisci, L., Clark, D. B. & Chung, T. Which behavior change techniques help young adults reduce binge drinking? A pilot randomized clinical trial of 5 text message interventions. *Addict Behav* **92**, 161-167, doi:https://dx.doi.org/10.1016/j.addbeh.2019.01.006 (2019).

109   Sundstrom, C., Blankers, M. & Khadjesari, Z. Computer-Based Interventions for Problematic Alcohol Use: a Review of Systematic Reviews. *Int J Behav Med* **24**, 646-658, doi:https://dx.doi.org/10.1007/s12529-016-9601-8 (2017).

110   Tahaney, K. D. & Palfai, T. P. Text messaging as an adjunct to a web-based intervention for college student alcohol use: A preliminary study. *Addict Behav* **73**, 63-66, doi:https://dx.doi.org/10.1016/j.addbeh.2017.04.018 (2017).

111   Tait, R. J., Kirkman, J. J. L. & Schaub, M. P. A Participatory Health Promotion Mobile App Addressing Alcohol Use Problems (The Daybreak Program): Protocol for a Randomized Controlled Trial. *JMIR Res Protoc* **7**, e148, doi:https://dx.doi.org/10.2196/resprot.9982 (2018).

112   Teeters, J. B., Soltis, K. E. & Murphy, J. G. A Mobile Phone-Based Brief Intervention With Personalized Feedback and Text Messaging Is Associated With Reductions in Driving After Drinking Among College Drinkers. *J Stud Alcohol* **79**, 710-719 (2018).

113   Thomas, K. *et al.* Effectiveness of a Text Messaging-Based Intervention Targeting Alcohol Consumption Among University Students: Randomized Controlled Trial. *JMIR Mhealth Uhealth* **6**, e146, doi:https://dx.doi.org/10.2196/mhealth.9642 (2018).

114   Thompson, K., Burgess, J. & MacNevin, P. D. An Evaluation of e-CHECKUP TO GO in Canada: The Mediating Role of Changes in Social Norm Misperceptions. *Subst*

Use Misuse **53**, 1849-1858,
doi:https://dx.doi.org/10.1080/10826084.2018.1441306 (2018).

115 Tzilos Wernette, G., Plegue, M., Kahler, C. W., Sen, A. & Zlotnick, C. A Pilot
Randomized Controlled Trial of a Computer-Delivered Brief Intervention for
Substance Use and Risky Sex During Pregnancy. *J Womens Health (Larchmt)* **27**,
83-92, doi:https://dx.doi.org/10.1089/jwh.2017.6408 (2018).

116 Verbiest, M. *et al.* A Co-Designed, Culturally-Tailored mHealth Tool to Support
Healthy Lifestyles in Maori and Pasifika Communities in New Zealand: Protocol for a
Cluster Randomized Controlled Trial. *JMIR Res Protoc* **7**, e10789,
doi:https://dx.doi.org/10.2196/10789 (2018).

117 Viskovich, S. & Pakenham, K. I. Pilot evaluation of a web-based acceptance and
commitment therapy program to promote mental health skills in university students. *J
Clin Psychol* **74**, 2047-2069, doi:https://dx.doi.org/10.1002/jclp.22656 (2018).

118 Wallace, P. *et al.* Randomized controlled non-inferiority trial of primary care-based
facilitated access to an alcohol reduction website. *BMJ Open* **7**, e014576,
doi:https://dx.doi.org/10.1136/bmjopen-2016-014576 (2017).

119 Walton, M. A. *et al.* Understanding Mechanisms of Change for Brief Alcohol
Interventions Among Youth: Examination of Within-Session Interactions. *J Stud
Alcohol* **78**, 725-734 (2017).

120 Washio, Y., Frederick, J., Archibald, A., Bertram, N. & Crowe, J. A. Community-I
nitiated Pilot Program "My Baby's Breath" to Reduce Prenatal Alcohol Use. *Del Med
J* **89**, 46-51 (2017).

121 Wild, J. *et al.* Preventing PTSD, depression and associated health problems in
student paramedics: protocol for PREVENT-PTSD, a randomized controlled trial of
supported online cognitive training for resilience versus alternative online training and
standard practice. *BMJ Open* **8**, e022292, doi:https://dx.doi.org/10.1136/bmjopen-
2018-022292 (2018).

122 Wilks, C. *et al.* Internet-Delivered Dialectical Behavioral Therapy Skills Training for
Suicidal and Heavy Episodic Drinkers: Protocol and Preliminary Results of a
Randomized Controlled Trial. *JMIR Res Protoc* **6**, e207,
doi:https://dx.doi.org/10.2196/resprot.7767 (2017).

123 Wray, T. B., Kahler, C. W., Simpanen, E. M. & Operario, D. A Preliminary
Randomized Controlled Trial of Game Plan, A Web Application to Help Men Who
Have Sex with Men Reduce Their HIV Risk and Alcohol Use. *Aids Behav* **22**, 22,
doi:https://dx.doi.org/10.1007/s10461-019-02396-w (2019).

124 Wright, C. *et al.* Mobile Phone-Based Ecological Momentary Intervention to Reduce
Young Adults' Alcohol Use in the Event: A Three-Armed Randomized Controlled
Trial. *JMIR Mhealth Uhealth* **6**, e149, doi:https://dx.doi.org/10.2196/mhealth.9324
(2018).

125 Attwood, S., Parke, H., Larsen, J. & Morton, K. L. Using a mobile health application
to reduce alcohol consumption: a mixed-methods evaluation of the drinkaware track

&calculate units application. *BMC Public Health* **17**, 394, doi:https://dx.doi.org/10.1186/s12889-017-4358-9 (2017).

126   Bradshaw, E. L., Sahdra, B. K., Calvo, R. A., Mrvaljevich, A. & Ryan, R. M. Users' Intrinsic Goals Linked to Alcohol Dependence Risk Level and Engagement With a Health Promotion Website (Hello Sunday Morning): Observational Study. *JMIR Ment Health* **5**, e10022, doi:https://dx.doi.org/10.2196/10022 (2018).

127   Carah, N., Meurk, C. & Angus, D. Online self-expression and experimentation as 'reflectivism': Using text analytics to examine the participatory forum Hello Sunday Morning. *Health (Lond)* **21**, 119-135, doi:https://dx.doi.org/10.1177/1363459315596799 (2017).

128   Celio, M. A. *et al.* Using Video Conferencing to Deliver a Brief Motivational Intervention for Alcohol and Sex Risk to Emergency Department Patients: A Proof-of-Concept Pilot Study. *Addict Res Theory* **25**, 318-325, doi:https://dx.doi.org/10.1080/16066359.2016.1276902 (2017).

129   Chambers, S. E., Canvin, K., Baldwin, D. S. & Sinclair, J. M. A. Identity in recovery from problematic alcohol use: A qualitative study of online mutual aid. *Drug Alcohol Depend* **174**, 17-22, doi:https://dx.doi.org/10.1016/j.drugalcdep.2017.01.009 (2017).

130   Crane, D., Garnett, C., Brown, J., West, R. & Michie, S. Factors Influencing Usability of a Smartphone App to Reduce Excessive Alcohol Consumption: Think Aloud and Interview Studies. *Front* **5**, 39, doi:https://dx.doi.org/10.3389/fpubh.2017.00039 (2017).

131   Cucciare, M. A. *et al.* Adapting a computer-delivered brief alcohol intervention for veterans with Hepatitis C. *Inform Health Soc Care* **42**, 378-392, doi:https://dx.doi.org/10.1080/17538157.2016.1255628 (2017).

132   Davies, E. L., Law, C., Hennelly, S. E. & Winstock, A. R. Acceptability of targeting social embarrassment in a digital intervention to reduce student alcohol consumption: A qualitative think aloud study. *Digit Health* **3**, 2055207617733405, doi:https://dx.doi.org/10.1177/2055207617733405 (2017).

133   Dulin, P. L., Alvarado, C. E., Fitterling, J. M. & Gonzalez, V. M. Comparisons of Alcohol Consumption by Time-Line Follow Back vs. Smartphone-Based Daily Interviews. *Addict Res Theory* **25**, 195-200, doi:https://dx.doi.org/10.1080/16066359.2016.1239081 (2017).

134   Dulin, P. L. & Gonzalez, V. M. Smartphone-based, momentary intervention for alcohol cravings amongst individuals with an alcohol use disorder. *Psychol Addict Behav* **31**, 601-607, doi:https://dx.doi.org/10.1037/adb0000292 (2017).

135   Ferguson, N., Savic, M., Manning, V. & Lubman, D. #WaysToRelax: developing an online alcohol-related health promotion animation for people aged 55 and older. *Public health res* **27**, 27, doi:https://dx.doi.org/10.17061/phrp2721718 (2017).

136   Garnett, C., Crane, D., West, R., Brown, J. & Michie, S. The development of Drink Less: an alcohol reduction smartphone app for excessive drinkers. *Transl Behav Med* **04**, 04, doi:https://dx.doi.org/10.1093/tbm/iby043 (2018).

137   Garnett, C. *et al.* User characteristics of a smartphone app to reduce alcohol consumption. *Transl Behav Med* **7**, 845-853, doi:https://dx.doi.org/10.1007/s13142-017-0477-1 (2017).

138   Hamamura, T., Suganuma, S., Ueda, M., Mearns, J. & Shimoyama, H. Standalone Effects of a Cognitive Behavioral Intervention Using a Mobile Phone App on Psychological Distress and Alcohol Consumption Among Japanese Workers: Pilot Nonrandomized Controlled Trial. *JMIR Ment Health* **5**, e24, doi:https://dx.doi.org/10.2196/mental.8984 (2018).

139   Han, B. H. *et al.* Use of web-based screening and brief intervention for unhealthy alcohol use by older adults. *J Subst Abuse Treat* **86**, 70-77, doi:https://dx.doi.org/10.1016/j.jsat.2018.01.002 (2018).

140   Hickman, N. E. & Schaar, G. Impact of an Educational Text Message Intervention on Adolescents' Knowledge and High-Risk Behaviors. *Compr* **41**, 71-82, doi:https://dx.doi.org/10.1080/24694193.2017.1323979 (2018).

141   Johansson, M. *et al.* Web-Based Self-Help for Problematic Alcohol Use: a Large Naturalistic Study. *Int J Behav Med* **24**, 749-759, doi:https://dx.doi.org/10.1007/s12529-016-9618-z (2017).

142   Kazemi, D. M. *et al.* Real-time demonstration of a mHealth app designed to reduce college students hazardous drinking. *Psychol Serv* **08**, 08, doi:https://dx.doi.org/10.1037/ser0000310 (2018).

143   Kirkman, J. J. L., Leo, B. & Moore, J. C. Alcohol Consumption Reduction Among a Web-Based Supportive Community Using the Hello Sunday Morning Blog Platform: Observational Study. *J Med Internet Res* **20**, e196, doi:https://dx.doi.org/10.2196/jmir.9605 (2018).

144   Kizakevich, P. N. *et al.* PHIT for Duty, a Mobile Application for Stress Reduction, Sleep Improvement, and Alcohol Moderation. *Mil Med* **183**, 353-363, doi:https://dx.doi.org/10.1093/milmed/usx157 (2018).

145   Knight, J. R. *et al.* Computer-Facilitated Screening and Brief Advice to Reduce Adolescents' Heavy Episodic Drinking: A Study in Two Countries. *J Adolesc Health* **62**, 118-120, doi:https://dx.doi.org/10.1016/j.jadohealth.2017.08.013 (2018).

146   Kuerbis, A. N., Hail, L., Moore, A. A. & Muench, F. J. A pilot study of online feedback for adult drinkers 50 and older: Feasibility, efficacy, and preferences for intervention. *J Subst Abuse Treat* **77**, 126-132, doi:https://dx.doi.org/10.1016/j.jsat.2017.04.004 (2017).

147   Lee, K. S. K. *et al.* Developing a tablet computer-based application ('App') to measure self-reported alcohol consumption in Indigenous Australians. *BMC Med Inf Decis Mak* **18**, 8, doi:https://dx.doi.org/10.1186/s12911-018-0583-0 (2018).

148   Leightley, D., Puddephatt, J. A., Goodwin, L., Rona, R. & Fear, N. T. InDEx: Open Source iOS and Android Software for Self-Reporting and Monitoring of Alcohol Consumption. *J Open Res Softw* **6**, 13, doi:https://dx.doi.org/10.5334/jors.207 (2018).

149   Leightley, D. *et al.* A Smartphone App and Personalized Text Messaging Framework (InDEx) to Monitor and Reduce Alcohol Use in Ex-Serving Personnel: Development and Feasibility Study. *JMIR Mhealth Uhealth* **6**, e10074, doi:https://dx.doi.org/10.2196/10074 (2018).

150   Leonard, N. R. *et al.* Mobile Health Technology Using a Wearable Sensorband for Female College Students With Problem Drinking: An Acceptability and Feasibility Study. *JMIR Mhealth Uhealth* **5**, e90, doi:https://dx.doi.org/10.2196/mhealth.7399 (2017).

151   Mello, M. J. *et al.* Feasibility and Acceptability of an Electronic Parenting Skills Intervention for Parents of Alcohol-Using Adolescent Trauma Patients. *Telemedicine Journal & E Health* **28**, 28, doi:https://dx.doi.org/10.1089/tmj.2018.0201 (2018).

152   Nehlin, C., Carlsson, K. & Oster, C. Patients' Experiences of Using a Cellular Photo Digital Breathalyzer for Treatment Purposes. *J Addict Med* **12**, 107-112, doi:https://dx.doi.org/10.1097/ADM.0000000000000373 (2018).

153   Parackal, M., Parackal, S., Eusebius, S. & Mather, D. The Use of Facebook Advertising for Communicating Public Health Messages: A Campaign Against Drinking During Pregnancy in New Zealand. *JMIR Public Health Surveill* **3**, e49, doi:https://dx.doi.org/10.2196/publichealth.7032 (2017).

154   Paz Castro, R., Haug, S., Filler, A., Kowatsch, T. & Schaub, M. P. Engagement Within a Mobile Phone-Based Smoking Cessation Intervention for Adolescents and its Association With Participant Characteristics and Outcomes. *J Med Internet Res* **19**, e356, doi:https://dx.doi.org/10.2196/jmir.7928 (2017).

155   Pennay, A., MacLean, S., Rankin, G. & O'Rourke, S. Hello Sunday Morning: Strategies used to support temporary alcohol abstinence through participation in an online health promotion program. *Health Promot J Aust* **29**, 321-327, doi:https://dx.doi.org/10.1002/hpja.22 (2018).

156   Riordan, B. C., Conner, T. S., Flett, J. A. & Scarf, D. A text message intervention to reduce first year university students' alcohol use: A pilot experimental study. *Digit Health* **3**, 2055207617707627, doi:https://dx.doi.org/10.1177/2055207617707627 (2017).

157   Robinson, M. *et al.* Alcohol Text Messages: A Developmental Study. *Int J Ment Health Addict* **16**, 1125-1139, doi:https://dx.doi.org/10.1007/s11469-017-9835-y (2018).

158   Shell, D. F. & Newman, I. M. Effects of a web-based pre-enrollment alcohol brief motivational intervention on college student retention and alcohol-related violations. *J Am Coll Health*, 1-12, doi:https://dx.doi.org/10.1080/07448481.2018.1481072 (2018).

159   Smith, A., de Salas, K., Lewis, I. & Schuz, B. Developing smartphone apps for behavioural studies: The AlcoRisk app case study. *J Biomed Inform* **72**, 108-119, doi:https://dx.doi.org/10.1016/j.jbi.2017.07.007 (2017).

160   Suffoletto, B., Gharani, P., Chung, T. & Karimi, H. Using phone sensors and an artificial neural network to detect gait changes during drinking episodes in the natural

environment. *Gait Posture* **60**, 116-121, doi:https://dx.doi.org/10.1016/j.gaitpost.2017.11.019 (2018).

161   Tello, N., Bocage-Barthelemy, Y., Dandaba, M., Jaafari, N. & Chatard, A. Evaluative conditioning: A brief computer-delivered intervention to reduce college student drinking. *Addict Behav* **82**, 14-18, doi:https://dx.doi.org/10.1016/j.addbeh.2018.02.018 (2018).

162   Urbanoski, K., van Mierlo, T. & Cunningham, J. Investigating Patterns of Participation in an Online Support Group for Problem Drinking: a Social Network Analysis. *Int J Behav Med* **24**, 703-712, doi:https://dx.doi.org/10.1007/s12529-016-9591-6 (2017).

163   Wilson, H. J., Palk, G., Sheehan, M. C., Wishart, D. & Watson, B. Steering Clear of Driving After Drinking: a Tailored e-Health Intervention for Reducing Repeat Offending and Modifying Alcohol Use in a High-Risk Cohort. *Int J Behav Med* **24**, 694-702, doi:https://dx.doi.org/10.1007/s12529-017-9664-1 (2017).

164   You, C. W. *et al.* Smartphone-based support system (SoberDiary) coupled with a Bluetooth breathalyser for treatment-seeking alcohol-dependent patients. *Addict Behav* **65**, 174-178, doi:https://dx.doi.org/10.1016/j.addbeh.2016.10.017 (2017).

165   Zhang, M. *et al.* A Smartphone Attention Bias Intervention for Individuals With Addictive Disorders: Protocol for a Feasibility Study. *JMIR Res Protoc* **7**, e11822, doi:https://dx.doi.org/10.2196/11822 (2018).

166   ANZCTR. Effectiveness of a Combined Web-Based and Ecological Momentary Intervention for Incoming First Year University Students: A three-armed Randomized Controlled Trial. (University of Otago; Health Research Council of New Zealand, New Zealand; New Zealand, 2018).

167   ANZCTR. "An internet-delivered, evidenced-based treatment program for mental health and alcohol use in contemporary Veterans - SHADE". (University of Newcastle Australia; Defence Health Foundation, Australia; Australia, 2018).

168   ANZCTR. "The Climate Schools Plus (CSP) intervention: An online, combined student-parent substance use program to prevent substance use and related harms in Australian adolescents, aged 13 to 16 years.". (A/Prof Nicola Newton; UNSW Australia; Australian Government; Society for Mental Health Research, Australia; Australia; Australia; Australia, 2018).

169   ClinicalTrials.gov. Cognitive Behavioral Treatment by Phone to Promote Use of Alcohol Related Care and Reduce Drinking. (University of Rochester; National Institutes of Health; Medical University of South Carolina; Syracuse University; University of Rochester, United States; United States; United States; United States; United States, 2018).

170   ClinicalTrials.gov. Reducing Risky Alcohol Consumption Using Skills-training in the App-form: A Randomized Controlled Study in the General Population. (Karolinska Institute; Karolinska Institute, Sweden; Sweden, 2018).

171   ClinicalTrials.gov. Feasibility of a Smart-phone Based Support System for Hazardous Drinkers. (University of Auckland; Waitemata District Health Board; University of

Alaska Anchorage; University of Auckland, New Zealand; New Zealand; United States; New Zealand, 2018).

172   ClinicalTrials.gov. Development and Testing of a Just-in-Time Adaptive Smart Phone Intervention. (University of North Texas Health Science Center; University of Oklahoma; Bridge Homeless Recovery Center, United States; United States; United States, 2018).

173   ClinicalTrials.gov. Using Addiction Comprehensive Health Enhancement Support System (ACHESS) in an Alcoholic Liver Disease Population. (NewYork–Presbyterian Hospital; University of Wisconsin–Madison; NewYork–Presbyterian Hospital, United States; United States; United States, 2018).

174   ClinicalTrials.gov. Integrating Contingency Management Into Routine Care for Alcohol Use Disorder. (DynamiCare Health; Johns Hopkins University; Gosnold on Cape Cod; Gosnold, ; United States; ,, 2018).

175   ClinicalTrials.gov. Ambulatory Alcohol Detoxification With Remote Monitoring. ("Stanford University; SoberLink LLC; Stanford Addiction Medicine and Dual Diagnosis Clinic", United States; ; United States, 2018).

176   ClinicalTrials.gov. Understanding and Intervening With Heavy Drinking Among Patients With HIV and HCV: Clinical Trial. (NewYork–Presbyterian Hospital; National Institute On Alcohol Abuse and Alcoholism; Columbia University Medical Center, United States; United States; United States, 2018).

177   ClinicalTrials.gov. Personalized Booster Feedback After Alcohol Health Education. (Abby Braitman; National Institute On Alcohol Abuse and Alcoholism; Old Dominion University, ; United States; United States, 2018).

178   ClinicalTrials.gov. Using Assistance From a Health Educator to Increase Effectiveness of an Internet Intervention for Alcohol Problems. A Randomized Controlled Trial. (Centre for Addiction and Mental Health; Centre for Addiction and Mental Health, Canada; Canada, 2018).

179   ClinicalTrials.gov. Mindfulness Mobile App to Reduce Adolescent Substance Use. ("Oregon Research Behavioral Intervention Strategies Inc.; ORBIS/Oregon Research Institute", ; United States, 2018).

180   ClinicalTrials.gov. Evaluation of an Interactive Text-Message Based Brief Intervention to Reduce Substance-Impaired Driving Among College Students. (Western Kentucky University; Gary Ransdell Hall, United States; United States, 2018).

181   ClinicalTrials.gov. Alcohol and Implicit Process in Sexual Risk Behavior in MSM Supplement. (Boston University; National Institute On Alcohol Abuse and Alcoholism; Boston University, United States; United States; United States, 2018).

182   ClinicalTrials.gov. "A Targeted, Real-Time, Technology-Supported Intervention for Patients With Alcohol Use Disorder on Disulfiram". (Butler Hospital; Butler Hospital, United States; United States, 2018).

183   ClinicalTrials.gov. Tailored Adaptive Mobile Messaging to Reduce Problem Drinking. (Partnership for Drug-Free Kids; Feinstein Institute for Medical Research, United States; United States, 2018).

184   ClinicalTrials.gov. Does Providing a Brief Internet Intervention for Hazardous Alcohol Use to People Seeking Online Help for Depression Reduce Both Alcohol Use and Depression Symptoms Among Participants With These Co-occurring Disorders? Randomized Controlled Trial. (Centre for Addiction and Mental Health; Centre for Addiction and Mental Health, Canada; Canada, 2018).

185   ClinicalTrials.gov. Adapting an Effective CBT for Comorbidity to a Computer-Delivered Format. (University of Minnesota; University of Minnesota, United States; United States, 2018).

186   ClinicalTrials.gov. Development of LabPatch-alcohol: A Wearable Biosensor for Detecting Alcohol in Interstitial Fluid. (McLean Hospital; McLean Hospital, United States; United States, 2018).

187   ClinicalTrials.gov. Development of a Multimodal Sleep Intervention Using Wearable Technology to Reduce Heavy Drinking in Young Adults. (Yale University; National Institute On Alcohol Abuse and Alcoholism; Yale University, United States; United States; United States, 2018).

188   ClinicalTrials.gov. An Emotion Regulation Intervention for Early Adolescent Risk Behavior Prevention. (Rhode Island Hospital; National Institute of Child Health and Human Development; Rhode Island Hospital, United States; United States; United States, 2018).

189   ClinicalTrials.gov. Validation of a Computer-based Training Program for Patients With Alcohol Use Disorder. (Central Institute of Mental Health; Central Institute of Mental Health, Germany; Germany, 2018).

190   ClinicalTrials.gov. Computer-based Alcohol Reduction Intervention for Alcohol-using HIV/HCV+ Russian Women in Clinical Care. (Emory University; National Institute On Alcohol Abuse and Alcoholism; Emory University; North West District AIDS Center, United States; United States; United States; Russian Federation, 2018).

191   ClinicalTrials.gov. Enhancing the Efficacy and Duration of a Brief Alcohol Intervention Using Self-Affirmation. (Brown University; National Institute On Alcohol Abuse and Alcoholism; Binghamton University; Brown University, United States; United States; United States; United States, 2018).

192   ClinicalTrials.gov. Efficacy of a Web-Based Alcohol Intervention for High School Students. (Boise State University; National Institutes of Health; National Institute On Alcohol Abuse and Alcoholism; Boise State University, United States; United States; United States; United States, 2018).

193   ClinicalTrials.gov. "RealConsent: A Web-based Program to Reduce College Women's Risk of Sexual Violence by Targeting Alcohol Use, Communication and Consent, and Building Supportive Networks". ("Georgia State University; Behavioral Science Technologies LLC; Georgia State University", United States; ; United States, 2018).

194   GCTR. "Reducing stress, alcohol and tobacco use in pregnant women to improve the children's later mental health". (Universitätsklinikum Erlangen; Federal Ministry of Education and Research, Germany; Germany, 2018).

195   GCTR. Effectiveness of a self-help approach (Retraining in vivo) to reduce alcohol consumption. (University Medical Center Hamburg-Eppendorf; University Medical Center Hamburg-Eppendorf, Germany; Germany, 2018).

196   GCTR. Combining avoidance training and go/no-go training to prevent relapse in alcohol-dependent patients. (Radboud University Nijmegen; Salus Klinik; Radboud University Nijmegen, Netherlands; Germany; Netherlands, 2018).

197   UMIN-CTR. Development and a pilot trial of an internet-based educational program for reducing heavy drinking. (University of Tokyo; Japan Society for the Promotion of Science, Japan; Japan, 2018).

198   ALVAREZ, C. E. O. Alcohol consumption monitoring via a power-free wearable biosensor. (2018).

199   ANDERSON, J. C. Text message intervention for alcohol use and sexual violence in college students. (Pennsylvania State University, United States, 2018).

200   Arleklo, L. "Pilot testing - deDrink, digital treatment for the at-risk alcohol drinking". (2018).

201   BERGMAN, B. G. Expanding recovery support for emerging adults with alcohol use disorder: Training in the science of social network sites. (Massachusetts General Hospital, United States, 2018).

202   Bertholet, N. Smartphone-based intervention for students with unhealthy alcohol use. (University of Lausanne; University Hospital of Lausanne, Switzerland; Switzerland, 2018).

203   BLEVINS, C. & ABRANTES, A. M. "A targeted, real-time, technology-supported intervention for patients with alcohol use disorder on disulfiram". (Butler Hospital, United States, 2018).

204   CONNER, K. R. & STECKER, T. A. CBT by Phone to Promote Use of Alcohol Related Care and Reduce Drinking. (University of Rochester, United States, 2018).

205   DICARMINE, P. "Wearable, Real-time Blood Alcohol Monitor based on Non-enzymatic Chemistry". (Intelligent Optical Systems (United States), United States, 2018).

206   DIMARTINI, A. F. Alcohol Biosensor Monitoring for Alcoholic Liver Disease. (University of Pittsburgh, United States, 2018).

207   DULIN, P. L. Can a Chatbot-delivered Alcohol Intervention Engage Users and Enhance Outcomes Over a Smartphone App? Development and Feasibility Testing of a StepAway 'Bot'. (University of Alaska Anchorage, United States, 2018).

208   DWORKIN, E. R. Engaging Social Support to Prevent High-Risk Drinking and Posttraumatic Stress After Sexual Assault: Developing and Testing a Web-Based Intervention. (University of Washington, United States, 2018).

209   FUCITO, L. M. Development of a Multimodal Mobile Sleep Intervention Using Wearable Technology to Reduce Heavy Drinking in Young Adults. (Yale University, United States, 2018).

210   GUSTAFSON, D. H. Building and pilot testing a couples-based smartphone systems to address alcohol use disorder. (University of Wisconsin–Madison, United States, 2018).

211   Haug, S. Efficacy of a mobile phone-based life-skills training program for substance use prevention among adolescents. (University of Zurich, Switzerland, 2018).

212   JOHNSON, R. K., MCPHERSON, S. M. & MCDONELL, M. G. Automated Contingency Management System for Reduction of Alcohol Use. (2018).

213   KAUFMAN, C. E. & SARCHE, M. C. Preventing Alcohol Exposed Pregnancy among Urban Native Young Women: Mobile CHOICES. (University of Colorado Anschutz Medical Campus, United States, 2018).

214   KOFFARNUS, M. N. Remote alcohol monitoring to facilitate abstinence reinforcement with an underserved population. (Virginia Tech, United States, 2018).

215   LABRIE, J. W. "PNF 2.0: A Novel, Gamified, Facebook-Integrated Personalized Normative Feedback Intervention to Reduce Alcohol Use and Negative Consequences among Sexual Minority Women". (Loyola Marymount University, United States, 2018).

216   LABRIE, J. W. Extension and Online Adaptation of the FITSTART parent-based intervention to reduce drinking among first-year students. (Loyola Marymount University, United States, 2018).

217   LAUCKNER, C. A Telemedicine and mHealth Intervention for Reducing Alcohol Consumption among People Living with HIV/AIDS. (University of Georgia, United States, 2018).

218   LITT, D. M. Refining and piloting a text messaging intervention to delay alcohol initiation and reduce alcohol use escalation among abstainer and lighter drinker college students. (University of North Texas Health Science Center, United States, 2018).

219   Maier, L. Youth substance use - efficacy of social media interventions to reduce use and impact of state-level drug policies. (2018).

220   PEDERSEN, E. R. Mobile Application Intervention Targeting the High Risk Drinking Practice of Prepartying. (RAND Corporation, United States, 2018).

221   PETILLO, P. A. Development of a Wearable Band-Aid Biosensor System for Alcohol Monitoring. (2018).

222   QUANBECK, A. Integrating mHealth for Alcohol Use Disorders into Clinical Practice. (University of Wisconsin–Madison, United States, 2018).

223   SANCHEZ, K. "TAPS-ESP: Tobacco, Alcohol, Prescription Drug, and Illicit Substance Use - Electronic Spanish Platform: Technologies to Increase Screening in Primary Care to Reduce Behavioral Health Disparities". (COG Analytics (United States), United States, 2018).

224   Schmidle, P. "SBIR Phase II: Modernizing the diagnosis, monitoring, and treating of substance use disorders via an integrated technology platform". (2018).

225   SOLTIS, K. A Mobile-based Behavioral Economic Intervention to Reduce Young Adult Alcohol Misuse. (University of Memphis, United States, 2018).

226   WALSH, D. D. Efficacy of a Web-Based Alcohol Intervention for High School Students. (Boise State University, United States, 2018).

227   WALTERS, S. T. & BUSINELLE, M. S. Development and Testing of a Just-in-Time Adaptive Smart Phone Intervention to Reduce Drinking among Homeless Adults. (University of North Texas Health Science Center, United States, 2018).

228   WANG, Y. Laboratory and field validation of a wrist worn alcohol biosensor among persons living with HIV. (University of Florida, United States, 2018).

229   WERNETTE, G. K. T. Technology-Based Intervention For Reducing Sexually Transmitted Infections and Substance Use During Pregnancy. (University of Michigan, United States, 2018).

230   ARTHUR, G. Method of delivering subliminal messages. (Us, 2018).

231   CO, M. I. P. Wrist Worn Mobile Alcohol and Offender Monitoring System. (Us, 2018).

232   LTD, D. T. C. Drinking Detection System and Computer Program. (Ep, 2018).

233   MATTHIAS, K. A process for the evaluation of data to an alcohol level. (De, 2018).

234   Richards, S. A. M. "The mental health services App which will allow people who are in need of services from doctors, health specialists , drug and alcohol councilors, emergency accommodation and emergency food parcels to be able to access where they need help via their geographical location at the touch of a button worldwide. It will empower people in need to make their own decisions and take the first step in getting help with their concern and link them with the services that will help them overcome their situation .". (Au, 2018).

235   Baumann, S. *et al.* How alcohol use problem severity affects the outcome of brief intervention delivered in-person versus through computer-generated feedback letters. *Drug Alcohol Depend* **183**, 82-88, doi:https://dx.doi.org/10.1016/j.drugalcdep.2017.10.032 (2018).

236   Baumann, S. *et al.* Who benefits from computer-based brief alcohol intervention? Day-to-day drinking patterns as a moderator of intervention efficacy. *Drug Alcohol Depend* **175**, 119-126, doi:https://dx.doi.org/10.1016/j.drugalcdep.2017.01.040 (2017).

237   Baumann, S. *et al.* Does impaired mental health interfere with the outcome of brief alcohol intervention at general hospitals? *J Consult Clin Psychol* **85**, 562-573, doi:https://dx.doi.org/10.1037/ccp0000201 (2017).

238   Baumann, S., Staudt, A., Freyer-Adam, J. & John, U. Proactive expert system intervention to prevent or quit at-risk alcohol use (PRINT): study protocol of a randomized controlled trial. *BMC Public Health* **18**, 851, doi:https://dx.doi.org/10.1186/s12889-018-5774-1 (2018).

239   Brooks, A. T. *et al.* Online cognitive behavioral therapy for insomnia (CBT-I) for the treatment of insomnia among individuals with alcohol use disorder: study protocol for

a randomized controlled trial. *Pilot feasibility stud* **4**, 183, doi:https://dx.doi.org/10.1186/s40814-018-0376-3 (2018).

240   Cougle, J. R. *et al.* Hostile interpretation training for individuals with alcohol use disorder and elevated trait anger: A controlled trial of a web-based intervention. *Behav Res Ther* **99**, 57-66, doi:https://dx.doi.org/10.1016/j.brat.2017.09.004 (2017).

241   Dickson, M. F. *et al.* A Facebook Follow-Up Strategy for Rural Drug-Using Women. *J Rural Health* **33**, 250-256, doi:https://dx.doi.org/10.1111/jrh.12198 (2017).

242   Freyer-Adam, J. *et al.* In-person alcohol counseling versus computer-generated feedback: Results from a randomized controlled trial. *Health Psychol* **37**, 70-80, doi:https://dx.doi.org/10.1037/hea0000556 (2018).

243   Fucito, L. M. *et al.* Using Sleep Interventions to Engage and Treat Heavy-Drinking College Students: A Randomized Pilot Study. *Alcohol Clin Exp Res* **41**, 798-809, doi:https://dx.doi.org/10.1111/acer.13342 (2017).

244   Glass, J. E. *et al.* Study protocol: a cluster-randomized trial implementing Sustained Patient-centered Alcohol-related Care (SPARC trial). *Implement Sci* **13**, 108, doi:https://dx.doi.org/10.1186/s13012-018-0795-9 (2018).

245   Hunter, R. *et al.* Randomized controlled non-inferiority trial of primary care-based facilitated access to an alcohol reduction website: cost-effectiveness analysis. *BMJ Open* **7**, e014577, doi:https://dx.doi.org/10.1136/bmjopen-2016-014577 (2017).

246   Lee, C. H., Cheung, B., Yi, G. H., Oh, B. & Oh, Y. H. Mobile health, physical activity, and obesity: Subanalysis of a randomized controlled trial. *Medicine (Baltimore)* **97**, e12309, doi:https://dx.doi.org/10.1097/MD.0000000000012309 (2018).

247   McFadyen, T. *et al.* Randomized controlled trial of a web-based programme in sustaining best practice alcohol management practices at community sports clubs: a study protocol. *BMJ Open* **8**, e017796, doi:https://dx.doi.org/10.1136/bmjopen-2017-017796 (2018).

248   Minian, N. *et al.* Combining alcohol interventions with tobacco addictions treatment in primary care-the COMBAT study: a pragmatic cluster randomized trial. *Implement Sci* **12**, 65, doi:https://dx.doi.org/10.1186/s13012-017-0595-7 (2017).

249   Neighbors, C., Rodriguez, L. M., Garey, L. & Tomkins, M. M. Testing a motivational model of delivery modality and incentives on participation in a brief alcohol intervention. *Addict Behav* **84**, 131-138, doi:https://dx.doi.org/10.1016/j.addbeh.2018.03.030 (2018).

250   Nyamathi, A. M. *et al.* Achieving Drug and Alcohol Abstinence Among Recently Incarcerated Homeless Women: A Randomized Controlled Trial Comparing Dialectical Behavioral Therapy-Case Management With a Health Promotion Program. *Nurs Res* **66**, 432-441, doi:https://dx.doi.org/10.1097/NNR.0000000000000249 (2017).

251 Palacio-Vieira, J. *et al.* Improving screening and brief intervention activities in primary health care: Secondary analysis of professional accuracy based on the AUDIT-C. *J Eval Clin Pract* **24**, 369-374, doi:https://dx.doi.org/10.1111/jep.12854 (2018).

252 Palmer, M. *et al.* The effectiveness of smoking cessation, physical activity/diet and alcohol reduction interventions delivered by mobile phones for the prevention of non-communicable diseases: A systematic review of randomized controlled trials. *PLoS ONE* **13**, e0189801, doi:https://dx.doi.org/10.1371/journal.pone.0189801 (2018).

253 Prabhakaran, D. *et al.* Effectiveness of an mHealth-Based Electronic Decision Support System for Integrated Management of Chronic Conditions in Primary Care: The mWellcare Cluster-Randomized Controlled Trial. *Circulation* **10**, 10, doi:https://dx.doi.org/10.1161/CIRCULATIONAHA.118.038192 (2018).

254 Puijk-Hekman, S., van Gaal, B. G., Bredie, S. J., Nijhuis-van der Sanden, M. W. & van Dulmen, S. Self-Management Support Program for Patients With Cardiovascular Diseases: User-Centered Development of the Tailored, Web-Based Program Vascular View. *JMIR Res Protoc* **6**, e18, doi:https://dx.doi.org/10.2196/resprot.6352 (2017).

255 Santo, K. *et al.* The effects of a lifestyle-focused text-messaging intervention on adherence to dietary guideline recommendations in patients with coronary heart disease: an analysis of the TEXT ME study. *International Journal of Behavioral Nutrition & Physical Activity* **15**, 45, doi:https://dx.doi.org/10.1186/s12966-018-0677-1 (2018).

256 Shulman, M. *et al.* Cognitive functioning and treatment outcomes in a randomized controlled trial of internet-delivered drug and alcohol treatment. *Am J Addict* **27**, 509-515, doi:https://dx.doi.org/10.1111/ajad.12769 (2018).

257 Suffoletto, B., Goyal, A., Puyana, J. C. & Chung, T. Can an app help identify psychomotor function impairments during drinking occasions in the real world? A mixed-method pilot study. *Subst Abus* **38**, 438-449, doi:https://dx.doi.org/10.1080/08897077.2017.1356797 (2017).

258 Thomas, K. *et al.* Short message service (SMS)-based intervention targeting alcohol consumption among university students: study protocol of a randomized controlled trial. *Trials* **18**, 156, doi:https://dx.doi.org/10.1186/s13063-017-1898-3 (2017).

259 Toomey, T. L. *et al.* Effects of a Hybrid Online and In-Person Training Program Designed to Reduce Alcohol Sales to Obviously Intoxicated Patrons. *J Stud Alcohol* **78**, 268-275 (2017).

260 Woodall, W. G., Starling, R., Saltz, R. F., Buller, D. B. & Stanghetta, P. Results of a Randomized Trial of Web-Based Retail Onsite Responsible Beverage Service Training: WayToServe. *J Stud Alcohol* **79**, 672-679, doi:https://www.jsad.com/doi/pdf/10.15288/jsad.2018.79.672 (2018).

261 Wright, C. J. *et al.* An Ecological Momentary Intervention to Reduce Alcohol Consumption in Young Adults Delivered During Drinking Events: Protocol for a Pilot Randomized Controlled Trial. *JMIR Res Protoc* **6**, e95, doi:https://dx.doi.org/10.2196/resprot.6760 (2017).

262   Bachhuber, M. A. *et al.* Delivery of screening and brief intervention for unhealthy alcohol use in an urban academic Federally Qualified Health Center. *Addict Sci Clin Pract* **12**, 33, doi:https://dx.doi.org/10.1186/s13722-017-0100-2 (2017).

263   Bacidore, V., Letizia, M. & Mitchel, A. M. Implementing Interprofessional Alcohol Screening, Brief Intervention, and Referral to Treatment in the Emergency Department: An Evidence-Based Quality Improvement Initiative. *Adv* **39**, 199-216, doi:https://dx.doi.org/10.1097/TME.0000000000000151 (2017).

264   Barbieri, S. *et al.* A Social Media-Based Acute Alcohol Consumption Behavior (NekNomination): Case Series in Italian Emergency Departments. *Interact J Med Res* **7**, e2, doi:https://dx.doi.org/10.2196/ijmr.6573 (2018).

265   Benitez, J. A. *et al.* A Web-Based Tool for Automatic Data Collection, Curation, and Visualization of Complex Healthcare Survey Studies including Social Network Analysis. *Comput* **2017**, 2579848, doi:https://dx.doi.org/10.1155/2017/2579848 (2017).

266   Beyer, F., Lynch, E. & Kaner, E. Brief Interventions in Primary Care: an Evidence Overview of Practitioner and Digital Intervention Programmes. *Curr Addict Rep* **5**, 265-273, doi:https://dx.doi.org/10.1007/s40429-018-0198-7 (2018).

267   Burdick, T. E. & Kessler, R. S. Development and use of a clinical decision support tool for behavioral health screening in primary care clinics. *Appl Clin Inform* **8**, 412-429, doi:https://dx.doi.org/10.4338/ACI-2016-04-RA-0068 (2017).

268   Connolly, S. L. *et al.* Veterans' Attitudes Toward Smartphone App Use for Mental Health Care: Qualitative Study of Rurality and Age Differences. *JMIR Mhealth Uhealth* **6**, e10748, doi:https://dx.doi.org/10.2196/10748 (2018).

269   Dermody, S. S., Wardell, J. D., Stoner, S. A. & Hendershot, C. S. Predictors of Daily Adherence to Naltrexone for Alcohol Use Disorder Treatment During a Mobile Health Intervention. *Ann Behav Med* **52**, 787-797, doi:https://dx.doi.org/10.1093/abm/kax053 (2018).

270   Gullo, M. J., Irvine, K., Feeney, G. F. X. & Connor, J. P. Short message service (SMS) reminders improve treatment attendance in alcohol dependence, but are less effective for patients high in impulsivity. *Addict Behav* **87**, 97-100, doi:https://dx.doi.org/10.1016/j.addbeh.2018.06.025 (2018).

271   Hargraves, D. *et al.* Implementing SBIRT (Screening, Brief Intervention and Referral to Treatment) in primary care: lessons learned from a multi-practice evaluation portfolio. *Public Health Rev* **38**, 31, doi:https://dx.doi.org/10.1186/s40985-017-0077-0 (2017).

272   Haug, S. *et al.* A Mobile Phone-Based Life Skills Training Program for Substance Use Prevention Among Adolescents: Pre-Post Study on the Acceptance and Potential Effectiveness of the Program, Ready4life. *JMIR Mhealth Uhealth* **5**, e143, doi:https://dx.doi.org/10.2196/mhealth.8474 (2017).

273   Hoggatt, K. J. & Hepner, K. A. Assessing Brief Intervention for Unhealthy Alcohol Use: A Comparison of Electronic Health Record Documentation and Patient Self-Report. *J Stud Alcohol* **79**, 697-701 (2018).

274   Jensen, M., Hussong, A. M. & Baik, J. Text Messaging and Social Network Site Use to Facilitate Alcohol Involvement: A Comparison of U.S. and Korean College Students. *Cyberpsychol Behav Soc Netw* **21**, 311-317, doi:https://dx.doi.org/10.1089/cyber.2017.0616 (2018).

275   Jernigan, D. H., Padon, A., Ross, C. & Borzekowski, D. Self-Reported Youth and Adult Exposure to Alcohol Marketing in Traditional and Digital Media: Results of a Pilot Survey. *Alcohol Clin Exp Res* **41**, 618-625, doi:https://dx.doi.org/10.1111/acer.13331 (2017).

276   Lelutiu-Weinberger, C. *et al.* An mHealth Intervention to Improve Young Gay and Bisexual Men's Sexual, Behavioral, and Mental Health in a Structurally Stigmatizing National Context. *JMIR Mhealth Uhealth* **6**, e183, doi:https://dx.doi.org/10.2196/mhealth.9283 (2018).

277   McFadyen, T. *et al.* The Feasibility and Acceptability of a Web-Based Alcohol Management Intervention in Community Sports Clubs: A Cross-Sectional Study. *JMIR Res Protoc* **6**, e123, doi:https://dx.doi.org/10.2196/resprot.6859 (2017).

278   Nattala, P., Murthy, P., Leung, K. S., Rentala, S. & Ramakrishna, J. Video-enabled cue-exposure-based intervention improves postdischarge drinking outcomes among alcohol-dependent men: A prospective study at a government addiction treatment setting in India. *J Ethn Subst Abuse* **17**, 532-547, doi:https://dx.doi.org/10.1080/15332640.2017.1310641 (2018).

279   Nesvag, S. & McKay, J. R. Feasibility and Effects of Digital Interventions to Support People in Recovery From Substance Use Disorders: Systematic Review. *J Med Internet Res* **20**, e255, doi:https://dx.doi.org/10.2196/jmir.9873 (2018).

280   Osilla, K. C. *et al.* The Feasibility of a Web Intervention for Military and Veteran Spouses Concerned About Their Partner's Alcohol Misuse. *J Behav Health Serv Res* **45**, 57-73, doi:https://dx.doi.org/10.1007/s11414-016-9546-3 (2018).

281   Pedersen, E. R., Naranjo, D. & Marshall, G. N. Recruitment and retention of young adult veteran drinkers using Facebook. *PLoS ONE* **12**, e0172972, doi:https://dx.doi.org/10.1371/journal.pone.0172972 (2017).

282   Perski, O., Blandford, A., Ubhi, H. K., West, R. & Michie, S. Smokers' and drinkers' choice of smartphone applications and expectations of engagement: a think aloud and interview study. *BMC Med Inf Decis Mak* **17**, 25, doi:https://dx.doi.org/10.1186/s12911-017-0422-8 (2017).

283   Petticrew, M. *et al.* Provision of information to consumers about the calorie content of alcoholic drinks: did the Responsibility Deal pledge by alcohol retailers and producers increase the availability of calorie information? *Public Health* **149**, 159-166, doi:https://dx.doi.org/10.1016/j.puhe.2017.04.020 (2017).

284   Rossa-Roccor, V., Malatskey, L. & Frank, E. NextGenU.org's Free, Globally Available Online Training in Lifestyle Medicine. *Am J Lifestyle Med* **11**, 132-133, doi:https://dx.doi.org/10.1177/1559827616682444 (2017).

285   Sharpe, J. D. *et al.* Interest in using mobile technology to help self-manage alcohol use among persons living with the human immunodeficiency virus: A Florida Cohort

cross-sectional study. *Subst Abus* **39**, 77-82, doi:https://dx.doi.org/10.1080/08897077.2017.1356793 (2018).

286   Suffoletto, B. & Scaglione, S. Using Digital Interventions to Support Individuals with Alcohol Use Disorder and Advanced Liver Disease: A Bridge Over Troubled Waters. *Alcohol Clin Exp Res* **42**, 1160-1165, doi:https://dx.doi.org/10.1111/acer.13771 (2018).

287   Swabri, J., Uzor, C., Laird, E. & O'Carroll, A. Health status of the homeless in Dublin: does the mobile health clinic improve access to primary healthcare for its users? *Ir J Med Sci* **03**, 03, doi:https://dx.doi.org/10.1007/s11845-018-1892-0 (2018).

288   Theall, K. P. *et al.* Considering high alcohol and violence neighborhood context using daily diaries and GPS: A pilot study among people living with HIV. *Drug Alcohol Depend* **187**, 236-241, doi:https://dx.doi.org/10.1016/j.drugalcdep.2018.03.005 (2018).

289   Thompson, C. *et al.* Evaluation of a Web-based Educational Program to Teach the Identification and Management of Alcohol Withdrawal in the Emergency Department. *AEM educ* **3**, 50-57, doi:https://dx.doi.org/10.1002/aet2.10202 (2019).

290   Wright, C. J. C., Dietze, P. M. & Lim, M. S. C. Beyond Basic Feedback in Mobile Brief Interventions: Designing SMS Message Content for Delivery to Young Adults During Risky Drinking Events. *JMIR Mhealth Uhealth* **5**, e79, doi:https://dx.doi.org/10.2196/mhealth.6497 (2017).

291   ClinicalTrials.gov. Improving Outcomes Among Medical/Surgical inpatients with Alcohol Use Disorders

. (VA Office of Research and Development; VA Palo Alto Health Care System; VA Ann Arbor Healthcare System, United States; United States; United States, 2018).

292   ClinicalTrials.gov. The Heroes Circle Opioid Project. (Wayne State University; Wayne State University, United States; United States, 2018).

293   ClinicalTrials.gov. Strategies for Preventing Underage Drinking and Other Substance Use in Native American Tribal Communities. (Pacific Institute For Research and Evaluation; National Institute On Alcohol Abuse and Alcoholism; Scripps Research Institute; Southern California Tribal Health Center, United States; United States; United States; United States, 2018).

294   ClinicalTrials.gov. "Phased Multisite Cluster Randomized Trial Testing Screening, Brief Intervention, Referral to Treatment for People That Use Tobacco, Alcohol, and Non-prescription Drugs". (Indiana University System; Indiana University – Purdue University Indianapolis, United States; United States, 2018).

295   ClinicalTrials.gov. Long-term Follow-up Study of Substance Abuse Screening and Intervention in Multi Primary Care Centers. (Shanghai Mental Health Center, China, 2018).

296   CTRI. Efficacy of Body-Mind-Spirit based relapse prevention among individuals with alcohol use. (To improve quality of life among alcohol dependent individuals", "University of Hong Kong; Dharwad Institute of mental Health and neurosciences, Dharwad, karnataka, India", 2018).

297   GCTR. Prevention of Alcohol and Tabacco Consumption Using Interventions Based on Mindfulness in Boys with Mild to Borderline Intellectual Disabilities (MBID). (University of Rostock; Federal Ministry of Education and Research, Germany; Germany, 2018).

298   GCTR. ProHEAD: Promoting Help-seeking using E-technology for Adolescents with Mental Health Problems; Sub-Project No. 1: Online intervention. (University Hospital Heidelberg; Federal Ministry of Education and Research; University Hospital Heidelberg, Germany; Germany; Germany, 2018).

299   GCTR. Testing a proactive expert system intervention to prevent and to quit at-risk alcohol use. (University of Greifswald; Deutsche Forschungsgemeinschaft, Germany; Germany, 2018).

300   ANDERSON, M. L. Piloting Signs of Safety: A Deaf-Accessible Therapy Toolkit for Alcohol Use Disorder and Trauma. (University of Massachusetts Medical School, United States, 2018).

301   Carson, K. & Carson-Chahhoud, K. "iSNAP (interactive Smoking, Nutrition, Alcohol and Physical activity) program for youth". (University of South Australia; University of South Australia, Australia; Australia, 2018).

302   EPSTEIN, D. New approaches to addiction treatment. (National Institute on Drug Abuse, United States, 2018).

303   Hyde, P. Virtual Reality in Education: Exploring Risk-Taking Behaviours and Prevention. (2018).

304   JANSSEN, T. Informing treatment adaptation based on the interplay between behavioral undercontrol and context: an event-level study. (Brown University, United States, 2018).

305   Löf, M. *et al.* mHealth Multiple Lifestyle Behaviors- interventions through mobile phones delivered by health care to promote a helthy lifestyle across the lifespan. (Linköping University, Sweden, 2018).

306   SMITH, D. R. & RYZIN, M. V. Automating Peer Learning to Reduce Alcohol Use and Related Deviant Behavior in Middle School. (2018).

307   SNIDER, S. E. Technology transfer of behavioral economic tasks for assessing alcohol reinforcer pathology: Development and feasibility of a commercially-available tool for clinical practice. (2018).

308   SO, B. M.-k. Smart Optical Sensing Technology for Driver Blood Alcohol Concentration (BAC) Detection Applicable for Steering Wheel. (Hong Kong Productivity Council, China, 2018).

309   WONG, S. Y.-s. Smart Optical Sensing Technology for Driver Blood Alcohol Concentration (BAC) Detection Applicable for Steering Wheel. (Hong Kong Productivity Council, China, 2018).