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Internet Interventions for Mental Health and Addictions: Current Findings and Future Directions

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Abstract Over the last several years, there has been a substantial increase in the number of publications reporting on Internet interventions for mental health and addictions. This paper provides a summary of the recent research on Internet interventions for the most common mental health and addictions concerns—depression, anxiety, alcohol and smoking. There is considerable evidence for the effectiveness of Internet-based interventions targeting depression, anxiety disorders, alcohol use and smoking. Small to moderate effect sizes have been reported for interventions targeting depression, anxiety and alcohol use, and smoking interventions have shown large effects. The addition of human support to depression and anxiety interventions has generally resulted in larger treatments effects, but this trend has not been observed in trials of interventions targeting alcohol use. There is some evidence that online interventions can be as effective as face-to-face therapies, at least for anxiety disorders. Despite a proliferation of research activity in this area, gaps in knowledge remain. Future research should focus on the development and evaluation of interventions for different platforms (e.g. smartphone applications), examining the long-term impacts of these interventions, determining active intervention components and identifying methods for enhancing tailoring and engagement. Careful consideration should be given to the ongoing technical and clinical expertise required to ensure that Internet interventions are delivered safely and professionally in a rapidly changing technology environment.

Keywords Internet interventions · Review · Depression · Anxiety · Alcohol · Tobacco

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Introduction

Internet interventions for common mental health problems including addiction are beginning to enter the mainstream. Early examples of intervention websites appeared approximately 20 years ago and were first published on in the late 1990s and early 2000s [1–3]. Thus, it appears that Internet interventions, as with most other health-care innovations, have followed the knowledge translation path that it takes about 17 years for an innovation to achieve widespread acceptance [4, 5]. Evidence of this adoption can be seen through the availability of different numerous websites providing interventions and the existence of compendiums (online and others) that review and rate the quality of these websites (e.g., Beacon.anu.edu.au) and through evidence that consumers endorse the Internet as a common means of accessing health-care information [6–8].

Further evidence of the increased acceptance of Internet interventions is the explosion of research on their efficacy. The goal of this paper is to summarise some of these more recent findings for common mental health problems and addiction (depression, anxiety, alcohol and smoking).

Depression

Several reviews conducted within the last 5 years have amassed considerable evidence for the effectiveness of Internet interventions for depression in adults. Five meta-analyses [9, 10, 11•, 12, 13] and two systematic reviews [14, 15] have

examined randomised controlled trials (RCTs) evaluating predominantly Internet-based cognitive behaviour therapy (iCBT) interventions. Spek et al. [13] investigated studies comparing iCBT with waitlist, treatment as usual and attention placebo control groups and reported a mean Cohen's *d* effect size of 0.27 for depression symptoms. Andersson and Cuijpers [9] found an overall effect size of d=0.37 for Internet-based depression interventions relative to control groups overall, with smaller effects for interventions compared with treatment as usual control groups (d=0.23) and larger effects for interventions compared with waitlist controls (d=0.56). They also identified larger effect sizes for interventions with professional support (d=0.61), compared to interventions without professional support (d=0.18). In a meta-analysis, Andrews et al. [10] found a large overall effect of Hedge's g=0.78 for Internet-based depression interventions. All but one of the studies included in this meta-analysis involved therapist support. Cuijpers et al. [16] conducted a meta-analysis of purely self-guided depression Internet interventions and reported a small effect of d=0.28. A systematic review of online depression interventions targeting individuals with clinically significant symptoms found effect size differences between treatment and control groups ranging from 0.42 to 0.65 [14]. Overall, there appears to be at least a small to moderate effect associated with Internet-based depression interventions. The variability observed across meta-analyses is largely due to differences in study inclusion criteria. There is also evidence that the addition of professional support increases the effectiveness of Internet-based depression interventions, although this may only be true for individuals with more severe symptoms of depression [17] and support may not necessarily need to be provided by a therapist [18]. Two recent reviews [11•, 15] have examined the non-inferiority of online depression treatments to face-to-face treatments. Neither review reported robust evidence of the equivalence of iCBT and face-to-face CBT. However, one of the reviews included only studies of participants with a diagnosable mood disorder, and a recent trial [19] of general community members with mild to moderate depression symptoms found that iCBT is non-inferior to group-based face-to-face CBT. Other recent directions in Internet-based depression treatment research have focused on the development and evaluation of non-CBT-based treatments, such as psychodynamic psychotherapy [20], acceptance and commitment therapy and mindfulness [21]. Results from these preliminary studies are promising; however, the quality of this evidence to date has been rated as very low [11•].

Anxiety Interventions

There is considerable evidence for Internet interventions targeting anxiety with CBT identified as the dominant therapy [22, 23•]. Several reviews of Internet-based anxiety interventions have been conducted including a recent paper by Mewton et al. [23•] that reviewed 37 RCTs of iCBT interventions for anxiety. The majority of trials targeted social phobia and panic disorder, with substantially less focus on other disorders, which has also been reflected in other reviews [24, 25]. Mewton et al.'s [23•] study demonstrated that iCBT was effective in treating a range of anxiety disorders and showed overall between-group effect sizes of 0.27 to 1.47. iCBT was superior to all attention control groups and all but one waitlist control groups (effect size=0.38–2.53) and was also equivalent to other types of therapy including individual face-to-face therapy (effect size=0.01–0.19) [23•]. Similarly, a meta-analysis by Reger and Gahm [26] demonstrated that Internet-based or computerised therapy for anxiety across a range of disorders such as social phobia, specific phobia and panic disorder was superior to waitlist and attention control conditions (d=0.49–1.14) and also showed equivalent effects to therapist-delivered treatment. Another meta-analytic review by Cuijpers et al. [24] demonstrated a large overall mean effect size of 1.08 for Internet-based psychotherapy for anxiety disorders compared with control conditions. This review also indicated that Internet-based therapy was as effective as face-to-face therapy. Finally, a meta-analysis by Andrews et al. [27] for anxiety (GAD, panic and social phobia) demonstrated mean effect sizes (Hedge's g) ranging from 0.83 to 1.12 for iCBT. This evidence is strongly in support of the effectiveness of Internet-based anxiety interventions.

Overall, Internet-based anxiety interventions are efficacious and comparable to face-to-face therapy. However, there are some key areas of research that should be further developed including determining the optimal level of therapist support, increasing participant engagement and determining the effective elements of iCBT [23•]. Additionally, the development of mobile phone applications [23•] and further high-quality studies specifically including attention-control conditions with larger sample sizes are needed [26].

Alcohol

Recent years have seen a substantial growth in published RCTs evaluating Internet interventions for alcohol. While the majority of earlier reviews examined interventions targeting university students [28–31]—a potential problem when estimating the impact of such interventions in the general population—more recent publications have reported on a number of trials with non-student samples. A recent systematic review by Riper et al. [32•] identified 16 RCTs with general population samples. The meta-analysis found a modest effect size of these interventions on hazardous drinking (Hedge's g=0.20, 95 % confidence interval (CI) 0.13–0.27). Of note, there was no observable difference in the effect size

for trials incorporating clinician contact with an Internet intervention compared to trials that evaluated fully automated interventions. This finding emphasises that Internet interventions are amenable to application in a variety of different settings—whether directly accessed by problem drinkers who are not engaging with specialised care or in conjunction with existing health services. Topics requiring more research include the need to establish long-term impacts of Internet intervention for hazardous alcohol use as well as studies examining whether extended interventions can have an additional impact above and beyond brief, personalised feedback interventions—the latter being the focus of the majority of trials thus far. Finally, large-scale multisite trials, such as the recent publication by Kypri et al. [33] in university students, are needed to assess the effectiveness of Internet interventions for alcohol in the general population.

Smoking

The most recent systematic review of Internet interventions for smoking cessation included 28 RCTs [34] and identified a high level of statistical heterogeneity between trials. A post hoc subgroup analysis of tailored and interactive interventions found the interventions to be significantly more effective than usual care or written self-help materials (risk ratio=1.48, 95 % CI 1.11 to 2.78) [34]. A significant pooled effect was not found for tailored and interactive Internet interventions over their generic and static counterparts. The authors stated [34] that future research should focus on these factors as they show promise for engagement, particularly in young people.

Further research conducted since this review has investigated the "active ingredients" of smoking cessation Internet interventions [35, 36, 37•]. In a randomised factorial trial, reading content written in a motivational tone, ability to freely navigate the site and receiving proactive email reminders promoted greater engagement with the intervention in the first 2 months compared to the contrasted level of each factor. Tailored testimonials did not [36]. At 1 year, however, none of these factors significantly increased smoking cessation [37•]. The authors recommended that future research should continue to investigate active components of interventions. In addition, further factors to investigate include the dose-response relationship between abstinence and quantity of programme components [38] and the impact of an extraneous variable created by participants who use non-assigned Internet interventions in comparison conditions [39].

A novel research area for tobacco cessation is the dissemination of interventions via applications (apps) in Facebook. A survey of young adults (N=30) found one third of the sample said they would be willing to use Facebook to help quit smoking; however, there were concerns about privacy [40]. Five RCTs using the messaging functionality of mobile phones as part of an intervention have proven to be effective (risk ratio=1.71, 95 % CI 1.47 to 1.99) [41]. To date, there have been no RCTs which have investigated the use of a smartphone apps for smoking cessation [42].

Current Limitations and Future Directions

There are a number of high quality Internet interventions for the more common mental health and addictions concerns. Fast developing are Internet interventions for less prevalent concerns, although the evidence base for these newer interventions is understandably limited. Despite promising effectiveness evidence, there are a number of limitations of Internet interventions that will no doubt be addressed over the next several years. Primarily, common questions that are asked of health-care interventions need answering—how sustainable is the impact of the intervention, is the intervention generalizable (i.e. will it work for everyone or just some sub-groups—and if so, for whom), is the intervention scalable and/or customizable to specific populations and how cost effective is the delivery of interventions?

A potential limitation of Internet interventions that also needs to be considered is the intrinsic requirement for ongoing expertise and resources to adapt and securely deliver interventions within a technology environment that will change into the future. In order to protect user privacy (and hence public confidence in the use of Internet interventions), developers and designers of interventions must necessarily address a number of security issues [43], but even a well-considered intervention will require ongoing maintenance and possibly additional development or reimplementation throughout its delivery. Ongoing development of the intervention may be required in order to adapt to new security threats or to promote accessibility through compliance with new web standards, compatibility with new kinds of devices or interaction with emerging technology trends.

The requirement for ongoing technological adaptability is a limitation that can be overcome with appropriate resourcing, but highlights a key question for the future of Internet interventions—how is the delivery of Internet interventions funded on an ongoing basis? Internet interventions can clearly only move from research projects to publicly delivered mental health and addition services with adequate investment in technological as well as clinical capacity.

There are also important questions to be addressed regarding ways to improve the impact of Internet interventions. Firstly, how do we promote engagement with the interventions? Many research studies report lack of adherence and high user drop-out from Internet interventions compared to face-to-face interventions. Although some evidence points to improved adherence by the involvement of therapist support, it is clear that future development of Internet interventions

(guided and unguided) will need to focus on new ways to engage users in order to maximise exposure to the intervention. Additionally, can the interventions be made more accessible and available, in different languages and on different platforms? Researchers also need to explore which components of the interventions are most effective for different disorders or client sub-groups and how to ensure that the most appropriate intervention is offered to individual users. Unlike in face-to-face treatment where the therapeutic approach may be adjusted according to the client's changing circumstances, personal preferences or response to the intervention, Internet interventions rarely offer this level of continuous tailoring. Related to this is the complex question of how best to integrate Internet interventions with the larger continuum of health-care services provided to people with mental health and addictions concerns.

Surrounding all of these questions will be the opportunity to take advantage of new technological capabilities. Internet interventions of the future are likely to include increasingly sophisticated interactivity, more opportunities for tailoring to individuals' preferences or needs, new ways of monitoring and delivery and greater potential for integration within health care systems. Ongoing technological advances, combined with an ever-expanding Internet intervention research base, will drive the continued development of innovative ways of providing health care for mental health and addiction concerns.

Compliance With Ethics Guidelines

Conflict of Interest John A Cunningham, Amelia Gulliver, Lou Farrer, Kylie Bennett and Bradley Carron-Arthur declare that they have no conflict of interest.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

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