Editorial on IJBM Special Issue—E-Health Interventions for Addictive Behaviors

Anne H. Berman^{1,2} · Mette Terp Høybye^{3,4} · Matthijs Blankers^{5,6,7}

Published online: 28 August 2017
© International Society of Behavioral Medicine 2017

Introduction

This work emerged from the research-oriented network on e-health interventions for ANTDG¹ behaviors, generously funded for 3 years by the Swedish Research Council on Health, Working Life and Welfare (<http://forte.se/en/>).² The network focused on developing the descriptive e-health intervention tool described in this issue, and on engaging in an ongoing discourse on the components, or “atoms” of alliance between the intervention user, the clinician, and the e-health intervention itself. Our discourse raised many questions

regarding alliance, methodology, and outcomes, many of which are discussed and partly answered in this special issue.

Some of the issues we continually returned to concerned language and methodology in relation to e-health interventions. We found ourselves alternately referring to the interventions as computer-based, e-health, m-health, Internet-based, web-based, Internet interventions, mobile phone interventions, smartphone interventions or apps, interactive voice response, or automated telephony. For the sake of simplicity, we are using “e-health interventions” as an umbrella term for all of these, but you will find a variety of descriptors in the titles and texts included in the issue. We were interested in how to develop effective interventions and compared our own methods of intervention development, including how we interact with technical experts. Another area we were fascinated and perplexed by was how to engage users so that they received the maximum benefit of the e-health interventions we were investigating the outcomes of. Finally, we were confounded by the variation in outcomes indicated by meta-analyses in the field, particularly the question of whether a guide or counselor added to outcome effects or not. We were fortunate to receive state-of-the-art submissions that addressed these issues.

The special issue before you thus begins with two articles offering a wide perspective on the field. One gives an overview of the empirical status of the field regarding outcomes for one of the behaviors we focused on, problematic alcohol use, in a systematic review of reviews [1]. The second offers a tool for describing e-health interventions, as a step towards standardized reporting of such interventions, to facilitate communication about them and comparison between them [2]. See Fig. 1 for an example of four visualizations from interventions described in this issue that contrast with one another. The main body of articles in the issue follows three key themes, with three articles focusing on the methodology of developing e-health interventions [3–5], six focusing on issues of alliance and engagement with e-health

¹ Alcohol, narcotics, tobacco, doping, and gambling.

² All network members participated in the issue work—as editors/co-editors, authors, reviewers, and/or experts in the field; all are co-authors on the paper by Bewick et al. 2017.

✉ Anne H. Berman
anne.h.berman@ki.se

¹ Centre for Psychiatry Research, Department of Clinical Neuroscience, Karolinska Institutet & Stockholm Health Care Services, Stockholm County Council, Norra Stationsgatan 69, Stockholm SE-11364, Sweden

² Stockholm Center for Dependency Disorders, Stockholm, Sweden

³ Interdisciplinary Research Unit, Elective Surgery Center, Regional Hospital Silkeborg, Silkeborg, Denmark

⁴ Department of Clinical medicine, Aarhus University, Aarhus, Denmark

⁵ Trimbos Institute, The Netherlands Institute of Mental Health and Addiction, Utrecht, The Netherlands

⁶ Arkin Mental Health Care, Amsterdam, The Netherlands

⁷ Department of Psychiatry, Academic Medical Center, University of Amsterdam, Amsterdam, The Netherlands

Example A: Just In Time intervention to prevent relapse in dietary behavior (Goldstein et al., 2017)

Example B: Web intervention to intervene with depression and alcohol/cannabis use (Kay-Lambkin et al., 2017)

Example C: DVD intervention to intervene with substance use (Bjelland et al., 2017)

Example D: App intervention for alcohol in a university setting (Gajek et al., 2017)

Fig. 1 Contrasting applications of the visualization tool on four interventions described in this special issue (see <http://ehealthclassification.org/>)

interventions [6–11], and five articles reporting on empirical outcomes [12–16]. While the focus throughout is addictive behaviors, much of the knowledge collected in the issue has clear relevance for other behaviors, both in the mental health field and in the management of somatic illness, where the user's behavior is essential for maintaining or improving health.

Methodologies for Developing E-Health Interventions

The three articles in this special issue concerning the specific methodology of developing e-health interventions are all descriptive articles taking on the challenge of refining and developing the methods of design and communication of e-health intervention to further advance the field, all from the USA [3–5]. These articles report on the development of specific app-based interventions for addictive behaviors using guided frameworks for complex interventions, and reflecting on particular methodological challenges of general concern to researchers and developers within the field of m-health [3–5]. The studies by Cerrada et al. [3] and Goldstein et al. [4] were guided by the JITAI (just-in-time adaptive intervention) framework for developing the mobile apps they report on, while the third study by Hoepfner et al. [5] employed the

framework of Intervention Mapping (IM) in the process of development.

The use of organized frameworks and theoretical models applied by the three empirical methodological studies in this issue reflects an advancement of the field of e-health interventions, where design methodologies have progressed as researchers in the field engage complex intervention frameworks more systematically while seeking to balance the need for design flexibility and rapid technological advance. The development work described in the three articles systematically makes use of ecological momentary assessment (EMA) data as a structured, data-guided approach to user feedback in the process [3–5]. At the same time, the studies all interacted with and engaged the target population at different levels in the design process [3–5]. This underlines the design process of e-health interventions as an inherently iterative process, employing multiple methods. It furthermore points to a methodological challenge in persuasive e-health intervention design, of striking a balance between the need for a somewhat structured design approach as Goldstein et al. point out [4], while also allowing for the flexibility stressed by Cerrada et al. [3] that seems essential to producing engaging products with the intended health outcomes. A methodological conundrum in persuasive e-health intervention design and systematic evaluation of outcomes is eloquently conveyed by Goldstein et al.,

who describe effective and efficient design methods as “moving targets due to the quick pace of technology growth” [4]. Some of the key methodological challenges outlined by three of the articles [3–5] revolve around how to get the right information and intervention elements delivered to the user at the right time, when the right time may vary even on an individual level, as Hoepfner et al. phrase it [5]. Such challenges stress the need for flexibility of e-health interventions as tailored and interactive tools that can adapt to the changing needs of users over time [3, 4]. All articles concerning methodology in this issue thus have, at heart, such recognition of the importance of the pace of technological development as a significant context for e-health methodology and health outcomes.

The methodological concerns and design reflections raised in the empirical and descriptive papers are all elements that are included as key descriptive components of the tool for visualizing and communicating e-health interventions developed by Bewick et al. [2]. This exemplifies the applicability of the tool and further substantiates the ranking of characteristics included in the tool. The visualization tool addresses an overarching challenge of communication within and between researchers and developers in the field of e-health interventions. While the empirical articles concerning methodology [3–5] rightly stress the development of e-interventions as an interdisciplinary team effort and the importance of a diverse methodological approach, Bewick et al. show how the tremendous diversity in reporting and describing key factors is partly due to disciplinary variation, making apparent the dire need for ways to communicate key characteristics in a more standardized fashion [2]. In sum, the visualization tool article by Bewick et al. takes on the ambitious challenge of defining key intervention characteristics in e-health interventions as an outset for proposing a tool that may facilitate more precise and accessible descriptions of e-health interventions across the interdisciplinary field of researchers, developers, and practitioners.

Significantly, we note that the methodological articles in this special issue take an explicitly open and sharing approach to design and development of e-health interventions. Hoepfner et al. used crowdsourcing data as input to the development process and are making their app freely available to users and researchers within the field [5]. Cerrada et al. address the transferability of the app they developed to other areas of behavior change [3], and Goldstein et al. describe a number of methodological issues with general application value to the field that arose while developing their app and generated recommendations to the general course of e-health design processes based on this [4]. Bewick et al. also drew on crowd feedback from experts to identify key intervention characteristics and have made the visualization tool openly available for use and feedback from developers and researchers in the field [2], see Fig. 1.

Engaging Users and Establishing a Working Alliance

The six articles in this special issue that focus on engagement and alliance do so from quite different perspectives and contexts, coming from Australia, Canada, Norway, Scotland, and Spain. Two are concerned with user engagement in relation to interventions that are pure self-help, and thus completely unguided: Wilson et al. evaluated the feasibility and appeal of a 2-hour program aiming to reduce relapse in drunken driving among 15 first-time DUI (driving under the influence) offenders [6], while Irvine et al. assessed engagement with a text message intervention among 411 socially disadvantaged men with problematic alcohol use [8]. The remaining four articles directly or indirectly involved a human guide or clinician in some way: Urbanoski et al. explored the role of health education moderators in an online community for 205 users of a self-help program for reducing problematic alcohol use [7]; Barrio et al. evaluated feasibility and satisfaction with an app for self-registration of alcohol consumption and medication adherence among 24 outpatients with alcohol use disorder [9]; Kay-Lambkin et al. found that alliance factors such as client initiative, perfectionism, and need for approval differentially moderated outcome for 274 participants with comorbid depression and alcohol/cannabis use, randomized to therapist-delivered CBT, supportive counseling, or computer-delivered therapy with brief therapist assistance [10]; and Bjelland et al. explored qualitative aspects of alliance following use of a self-help film in the early stages of addiction treatment among 12 patients and 22 therapists [11]. Three of the studies included small samples [6, 9, 11], while the other three analyzed larger samples, requiring quantitative analyses to complement the qualitative interpretation [7, 8, 10].

Preliminary indicators of positive factors for engagement include systematic and careful development processes and inclusion of avatars for engaging users [6]. The same held for the text message study, where the researchers invested highly in adapting the intervention to suit the habits and needs of socially disadvantaged men, succeeding in eliciting responses to most of the messages, frequently including sensitive personal information, and responding as intended to behavior change components in text messages [8]. Similarly, the Barrio et al. study suggested that regular monitoring and feedback in an attractive app package, as a complement to outpatient care, were perceived by participants as useful and helpful for achieving drinking goals (primarily controlled drinking) [9]. What these studies had in common was a high level of adaptation and attunement to user needs which, if perceived as expressions of empathy by the users, could constitute factors that have been demonstrated to be effective in psychotherapeutic processes [17].

Interestingly, when a therapist or counselor was part of the e-health equation, additional factors came into play.

Sustainability and stability of an online network for problem drinkers were achieved over a 5-year period. Although health educators were very important in monitoring the discussions as well as “strategically managing the community and enabling its growth and development over time,” analyses that excluded the health educators showed that the online community included highly active members who interacted with a large number of members, most of whom had a relatively low frequency of participation in the network. However, the health educators clearly contributed to the “density” of the network [7]. For patients with comorbid depression and substance use in the computer-delivered intervention with therapist assistance, it seemed that higher therapeutic “bond” was associated with lower cannabis use, and “perfectionism” was associated with reduced depression; the perfectionism variable is traditionally associated with poorer outcomes, possibly suggesting that e-health interventions might suit persons with perfectionism traits better than therapist-delivered interventions [10]. The Bjelland et al. study found that the use of a self-help film early in psychological treatment for problematic substance use had differing effects on patients and therapists; according to the authors’ “alliance process model,” if the patient established a positive appreciation of the film, the therapist also had a positive alliance with the film, but if the patient had a negative view of the film, the therapist also rejected the film as a complementary tool. The therapists adapted their response based on the patient’s response, regardless of the therapist’s *a priori* attitude [11].

In summary, establishment of engagement and alliance seems to be associated with the features of the e-health intervention and user perception of attunement by the developer/clinician/researcher to genuine user needs. In contrast, when a therapist is involved in the e-health-user equation, new aspects come into play, where the therapist adapts his or her role to the existence of the e-health intervention, if the user perceives the latter positively. More research is clearly in order if we are to better understand the complicated interplay of factors in the user-e-health intervention-therapist triad.

Empirical Findings

Five of the papers in this special issue address the feasibility and effectiveness of e-health interventions for addictive behaviors in Canada, Norway, and Sweden. Four of the five papers [13–16] are randomized controlled trials (RCTs), while the fifth paper presents a large naturalistic cohort study [12]. In the latter cohort study, Johansson et al. examined intervention use patterns and variables associated with reductions in alcohol consumption for 1043 Internet help-seekers. They found that being male, scoring higher on baseline readiness-to-change, completing the program, and accessing other forms

of support were factors associated with clinically significant change to a lower level of alcohol use at follow-up.

The RCT by Cunningham et al. [13] compared the effects of a brief Internet intervention for problem drinkers to a more extended version. A total of 490 participants were randomized and followed up at 6, 12, and 24 months. Somewhat surprisingly, the analyses revealed no differences between the interventions at any of the time points. This finding is somewhat in contrast with the conclusion in the review of reviews by Sundström et al. [1] in this special issue, where the general tendency is that longer interventions lead to larger effects. It is, however, in line with the longer-term findings of Brendryen et al. [14] in their RCT on brief versus intensive self-help for alcohol in the workplace setting. Although the study had limited power due to a small sample size ($n = 85$) according to the authors, there were indications of differences in effects to the advantage of more intensive self-help on the short term (2 months after baseline). Six months after baseline, however, none of the analyses found any differences between the brief and the extended self-help e-health intervention.

These two studies [13, 14] underline the fact that it remains relatively unclear what aspects of self-help interventions make them effective. This notion is further supported by the findings of Gajecki et al. [15] who evaluated the effectiveness of two smartphone apps for alcohol moderation among university students in an RCT. Problem drinkers who had used the first app (a blood-alcohol concentration feedback app) in a prior study for 6 weeks were offered the second app (an alcohol refusal training app) either immediately or after 6 weeks. Their drinking behavior was contrasted with an assessment-only control group. Both groups that used the second app reduced excessive drinking compared to the assessment-only control group. The differences between the immediate and the 6-week delayed app group were small and non-significant—hence the timing of providing the apps had no impact on their effects at 12 weeks follow-up.

All in all, what Andersson et al. [16] conclude, after not finding effects of an automated interactive voice response intervention as an add-on to psychotherapy for substance-dependent young people, applies to some extent to the other papers in this special issue addressing feasibility and effectiveness of e-health interventions. The addition of e-health technologies is a promising tool in alleviating symptoms during treatment, but more remains to be studied about its potential role, and moderators of this role, in treating substance use disorder or improving treatment alliance.

Conclusions

To conclude, this special issue contributes an extensive overview of intervention components and positive alliance elements to consider for design of effective e-health

interventions. The contributions testify to the importance of timing and the design context of e-health interventions. Also, the issue offers methodological discussions with insight into critical reflections by e-intervention developers and researchers who share crucial learning points that will inspire others in the field. It also presents work on the feasibility and effectiveness of e-health interventions for addictive behaviors, as well as associated moderators of effectiveness. Finally, it outlines key issues with regard to e-health intervention methods and engagement beyond the thematic specificity of ANTGD behaviors, relevant to a number of other chronic conditions. We hope the issue will be viewed as a significant contribution to the development of scientific knowledge on how to develop, enhance user engagement and alliance, and evaluate e-health interventions for addictive behaviors.

References

1. Sundström C, Blankers M, Khadjesari Z. Computer-based interventions for problematic alcohol use: a review of systematic reviews. *Int J Behav Med.* 2016; <https://doi.org/10.1007/s12529-016-9601-8>.
2. Bewick BM, Ondersma SJ, Høybye MT, et al. Key intervention characteristics in e-health: steps towards standardized communication. *Int J Behav Med.* 2017;1–6. <https://doi.org/10.1007/s12529-016-9630-3>.
3. Cerrada CJ, Dzibur E, Blackman KCA, Mays V, Shoptaw S, Huh J. Development of a just-in-time adaptive intervention for smoking cessation among Korean American emerging adults. *Int J Behav Med.* 2017; <https://doi.org/10.1007/s12529-016-9628-x>.
4. Goldstein SP, Evans BC, Flack D, et al. Return of the JITAI: applying a just-in-time adaptive intervention framework to the development of m-health solutions for addictive behaviors. *Int J Behav Med.* 2017; <https://doi.org/10.1007/s12529-016-9627-y>.
5. Hoepfner BB, Hoepfner SS, Kelly L, Schick M, Kelly JF. Smiling instead of smoking: development of a positive psychology smoking cessation smartphone app for non-daily smokers. *Int J Behav Med.* 2017; <https://doi.org/10.1007/s12529-017-9640-9>.
6. Wilson HJ, Palk G, Sheehan MC, 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.* 2017; <https://doi.org/10.1007/s12529-017-9664-1>.
7. 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.* 2016; <https://doi.org/10.1007/s12529-016-9591-6>.
8. Irvine L, Melson AJ, Williams B, 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.* 2017; <https://doi.org/10.1007/s12529-017-9666-z>.
9. Barrio P, Ortega L, López H, Gual A. Self-management and shared decision-making in alcohol dependence via a mobile app: a pilot study. *Int J Behav Med.* 2017; <https://doi.org/10.1007/s12529-017-9643-6>.
10. Kay-Lambkin F, Baker A, Palazzi K, Lewin T, Kelly B. Therapeutic alliance, client need for approval, and perfectionism as differential moderators of response to eHealth and traditionally delivered treatments for comorbid depression and substance use problems. *Int J Behav Med.* 2017.
11. Bjelland IE, Johansen A, Damell F, Brendryen H. Using a film intervention in early addiction treatment: a qualitative analysis of process. *Int J Behav Med.* 2017; <https://doi.org/10.1007/s12529-017-9654-3>.
12. Johansson M, Sinadinovic K, Hammarberg A, et al. Web-based self-help for problematic alcohol use: a large naturalistic study. *Int J Behav Med.* 2016. <https://doi.org/10.1007/s12529-016-9618-z>.
13. Cunningham JA, Shorter GW, Murphy M, Kushnir V, Rehm J, Hendershot CS. Randomized controlled trial of a brief versus extended Internet intervention for problem drinkers. *Int J Behav Med.* 2016; <https://doi.org/10.1007/s12529-016-9604-5>.
14. Brendryen H, Johansen A, Duckert F, Nesvåg S. A pilot randomized controlled trial of an Internet-based alcohol intervention in a workplace setting. *Int J Behav Med.* 2017; <https://doi.org/10.1007/s12529-017-9665-0>.
15. Gajecki M, Andersson C, Rosendahl I, Sinadinovic K, Fredriksson M, Berman AH. Skills training via smartphone app for university students with excessive alcohol consumption: a randomized controlled trial. *Int J Behav Med.* 2017. <https://doi.org/10.1007/s12529-016-9629-9>.
16. Andersson C, Öjehagen A, Olsson MO, Brådvik L, Håkansson A. Interactive voice response with feedback intervention in outpatient treatment of substance use problems in adolescents and young adults: a randomized controlled trial. *Int J Behav Med.* 2016; <https://doi.org/10.1007/s12529-016-9625-0>.
17. Norcross JC, Wampold BE. Evidence-based therapy relationships: research conclusions and clinical practices. *Psychother Theory Res Pract Train.* 2011;48(1):98–102. <https://doi.org/10.1037/a0022161>.