



Opportunities and challenges for digital interventions in the prevention of depression

Major Depressive Disorder (commonly just called depression) is a mental health condition characterized by persistent feelings of sadness or a lack of interest in activities, along with other symptoms, such as changes in appetite, sleep patterns, and energy levels over a course of at least two weeks. The disorder is associated with a high burden on the individual with overall increased mortality. At the same time it also causes a high societal burden with reduced productivity and costs associated to sick leave (Bromet et al., 2018).

One in every ten adults experience an episode of depression during their lifetime (Bromet et al., 2018). Although evidence-based treatments for depression exist, structural barriers (e.g., limited service providers and long waiting times) and attitudinal barriers (e.g., perceived stigma and preference to solve one's problems alone) limit their use and effectiveness. Only 1 out of 5 individuals with a depression receives adequate specialist care for their condition (Bromet et al., 2018). In order to reduce the burden associated with depression it is important to find ways to prevent depression, where possible by offering low-threshold support.

Opportunities and challenges for digital interventions in the prevention

My dissertation *Opportunities and challenges for digital interventions in the prevention* reports on the possibilities of the use of digital interventions to offer low-threshold preventive interventions especially to people who already show first symptoms of depression without 'qualifying' for a diagnosis. This stage is called a sub-threshold depression and forms the starting point for indicated prevention.

Indicated prevention has shown to significantly reduce depressive symptom severity and the onset of new full-blown depression cases both in in-person contact (Cuijpers et al., 2021) as well as in online-interventions (Reins et al., 2021). Digital interventions also have additional advantages, such as being mostly independent of time and location, the elimination of travel time and that they can be more anonymous and scalable. At the same time, however, they require more digital literacy and differ widely in the amount of contact with a professional health care provider. Therefore, the first part of my dissertation focused on the opportunities that come with offering further digital interventions for indicated prevention using an example of telephone coaching for farmers in Germany. The second part addresses some of the challenges with regard to providing effective interventions.

Effectiveness of telephone coaching for German farmers

The first part of my dissertation highlighted the opportunities for digital prevention by addressing the question 'How effective is telephone coaching for German

farmers compared to treatment as usual in the reduction of depressive symptom severity after 6, 12 and 18 months after study begin?' This question was answered in the project 'With us in balance', aiming at evaluating and implementing different digital solutions for depression preventions for farmers and related professions in Germany. The study included an evaluation of the effectiveness of the telephone coaching in a randomized controlled trial (RCT), whereby participants were randomly assigned to receive up to 850 minutes of personalized telephone coaching or one-time psycho-educational material via e-mail. The primary outcome measure was depressive symptom severity measured with the QIDS-SR16 questionnaire.

The telephone coaching showed to reduce overall depressive symptom severity in the participants, according to an intention-to-treat analysis. It further improved secondary mental health outcomes such as stress, anxiety, and quality of life. The observed effect was comparable to what could be expected based on findings from online and in-person indicated prevention. However, the generalizability of the effectiveness of telephone coaching is limited by the high degree of personalization and the restriction to one occupational group.

An accompanying qualitative interview study with users of the telephone coaching depicted the following. The perceived low effort, the good relationship with the coach and the overall personalization and consideration of the occupational background positively influenced acceptance and satisfaction. It can therefore be concluded that the telephone forms another potential path to deliver preventive interventions. This might especially be the case if occupational circumstances ask for extra personalization.

Explaining effectiveness

The second part of my dissertation addressed the questions 'How can we increase (overall) effectiveness' and 'For whom existing interventions are most effective?' Besides increased evidence for indicated prevention resulting in positive effects averaged across the study populations, it cannot be neglected that not everyone profits (to the same extent) from such an intervention. These challenges were addressed and

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investigated in more standardized web-based interventions, which offer unique opportunities to study these aspects. For these questions, I combined and reanalyzed existing data from RCTs using a method called individual-participant-data (meta-)analysis.

How to make digital interventions more effective?
When looking for methods to increase intervention effectiveness, one starting point is to look at predictors of treatment outcomes. A well-known example in face-to-face therapy is outcome expectancy. However, it is rarely explored in preventive or digital settings. Using data from two RCTs on an indicated prevention online intervention (GET.ON Mood Enhancer) I explored the role of outcome expectancy as a predictor for depressive symptom severity after digital preventive intervention. The effect that outcome expectancy can have on depression outcomes after using a digital prevention intervention was inconclusive but indicated a potential influence in the long run. It becomes apparent that simply transferring elements from face-to-face psychotherapy to digital prevention might be too simplistic and ignores the unique aspects of both prevention and of digital interventions. Since more methodologically sound studies are needed in the new context before building on it to enhance the effectiveness of digital interventions, the corresponding article draws up a research agenda for exploring outcome expectancy in digital prevention. It also raises the question 'what do people expect from (digital) prevention', which has to be answered first.

For whom do digital interventions work?

Besides making intervention more effective as a whole, a step in-between is to identify for whom they already work well. I was especially interested to answer that question in the context of an emerging paradigm called 'indirect prevention' for depression. In indirect prevention, a common, less stigmatized problem like stress, procrastination or – in my study – sleep is addressed, and by improving it this can positively affect depression. In an individual participant data meta-analysis of four web-based sleep intervention trials for employees with insomnia, the indirect approach was shown to reduce depressive symptoms. Most notably, multivariable moderation analysis revealed that from a wide range of sociodemographic, clinical and work-related variables, only depressive symptom severity at baseline showed to moderate the treatment effect. Given that most participants in the trial already had a level of depressive symptom severity that suggests a manifest disorder, it was crucial to see that all effect sizes were comparable to (online) depression treatment as well. The underlying article highlights the need to further look into the mechanisms in interventions to prioritize intervention components for comorbid problems.

Looking ahead

Overall, all studies support the idea of using digital interventions for reducing depressive symptom severity in different populations (i.e. general population, farmers, employees) and were generally in line with prior research. Following a general trend, the importance of finding new ways to personalize preventive offers and target them to the individual situation and needs of participants was noticeable across all studies. In order to enhance the effectiveness of interventions, however, it needs to be clearer when and what needs to be personalized. The interview study on farmers showed that offering them a telephone intervention was a great fit to their needs, given the occupational circumstances. However, this is unlikely to be the first choice of modality for everyone. On the other hand, offering insomnia treatment for individuals with comorbid depression problems seemed beneficial for all employees included in the studies. This indicates a potential to personalize interventions based on clinical characteristics. In conclusion, clarifying what people expect from a preventive intervention could offer much more insight and ways to personalize interventions. While it feels like going back to the start, focusing on what kind of support individuals want, and need, and when they do so, might be the best step forward for (digital) prevention. This asks for more, and serious participatory research, oriented on the user's needs, as well as closer working together between different disciplines in the mental health domain.

This text is an adapted version of the summary and discussion of my dissertation. If you are interested in reading the articles included in my dissertation, please get in touch (Janika.Thielecke@tno.nl) or visit my researchgate profile (www.researchgate.net/profile/Janika-Thielecke). The dissertation itself is under embargo until November this year due to unpublished data. After that it will be publicly available.

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