Summary
SUMMARY

Primary research questions (chapter 1)
The central question in this book is whether problem drinking can be curbed by using a new generation of motivational and cognitive-behavioural digital self-help interventions.

Background
Problem drinking is multi-faceted in nature, and so is the problem-drinking population. An estimated 10% of Dutch adults qualify as problem drinkers year by year. They exceed the recommended guidelines for low-risk drinking and may experience psychological, physical or social problems as a consequence. Alcohol misuse is associated with elevated morbidity and mortality levels, and it has considerable social and economic ramifications. At the same time, general and specialised health service uptake by problem drinkers remains low at about 10%.

Although problem drinking has reasonably high rates of natural remission, many problem drinkers still have unmet needs. They often experience high access barriers to health services, attributable partly to fears of stigmatisation, loss of privacy or problems in work or family, and partly to a lack of motivation to change their behaviour. Meta-analyses show that opportunistic screening and brief intervention in primary care settings can be effective strategies for overcoming low service uptake and reducing alcohol consumption among people who use primary care. Yet many problem drinkers are not in contact with primary care services, or they are not recognised there as problem drinkers. Moreover, brief interventions are only sparsely available in routine primary care practice, and this seriously limits the public health impact of brief interventions for problem drinking. Alternative ways of reaching out to problem drinkers are therefore needed. Digital self-help interventions aimed at the general population are one such alternative.
Is web-based self-help cost-effective and for whom? (chapter 2-4)

Drinking Less (DL) is an interactive web-based self-help intervention without therapeutic guidance. It assists problem drinkers in their attempts to moderate their alcohol consumption. Our first hypothesis was that DL would be more effective than an online psychoeducational brochure in reducing problem drinking six and twelve months later. Participants \( (N = 261) \) were included in the study as ‘problem drinkers’ if they were exceeding the limits specified by the Dutch guidelines for low-risk drinking (male/female > 21/14 standard units of alcohol per week or \( \geq 6/4 \) units at least one day a week for the past three months). They were randomly allocated to the DL intervention condition \( (n = 130) \) or the psychoeducation control condition \( (n = 131) \). The vast majority had never received professional help for their problem drinking.

Six months after baseline, significantly more participants in the DL condition (17.2%) than controls (5.4%) were drinking within the guideline levels (OR = 3.66; 95% CI 1.3–10.8; \( P = .006; \) NNT = 8.5). DL was also effective in decreasing mean weekly alcohol intake (by 15 units) relative to the control condition (2.9 units; \( d = 0.40; \) 95% CI 5.9–18.1; \( P < .001 \)). This six-month effectiveness of DL is comparable to that found in meta-analyses for brief interventions, and the NNT of 8.5 is comparable to the figures of 7 to 8 achieved by brief face-to-face advice in primary care (chapter 2).

Cost-effectiveness is another important indicator of the potential for widespread implementation of DL into daily practice. As no cost-effectiveness studies of digital self-help interventions for problem drinkers had yet been done, we conducted an economic evaluation of DL treatment response in terms of drinking within the low-risk guideline levels twelve months after starting the intervention (chapter 3). The hypotheses were that DL would not significantly lower the costs of health care utilisation (because the group of problem drinkers interested in self-help would not make much use of such services anyway) but that cost reductions would nevertheless be achieved by curbing production
losses due to absenteeism (work-loss days) and poor job performance (work-cutback days).

Although the difference between the experimental and control conditions in terms of low-risk drinking according to the guideline was no longer statistically significant at the twelve-month follow-up (OR = 1.74; \( P = .30 \)), DL was nonetheless associated with favourable economic effects. The intervention showed a robust 73% probability of being acceptable from a cost-effectiveness point of view. The slightly higher costs of DL in comparison to the psychoeducational control intervention were more than offset by lower costs elsewhere, mainly by virtue of reduced production losses through better work performance.

Subsequently we asked whether specific baseline characteristics of DL users could be identified as predictors of positive response in terms of reduced alcohol consumption (chapter 4). To this end we conducted a secondary analysis of the DL trial data, designating six baseline participant characteristics as putative predictors of treatment response: (1) gender, (2) education, (3) Internet competence, (4) mean weekly alcohol intake, (5) prior professional help for alcohol problems, and (6) participants’ expectancies of web-based interventions for problem drinking.

At twelve months, female gender (beta = .22, \( P = .045, R^2 = .02 \)) and higher level of education had modest predictive power (beta = .33, \( P = .01, R^2 = .03 \)). These results suggest that web-based self-help without therapeutic guidance may hold a slightly stronger attraction for female or more highly educated problem drinkers. These are also population segments that might be difficult to reach with face-to-face brief interventions. At the same time, since none of these baseline characteristics persuasively predicted a favourable treatment outcome, the intervention may still be deemed well suited for a heterogeneous group of problem drinkers.
Effectiveness of web-based self-help in daily practice (chapter 5)

Little is known about how to translate the new generation of digital self-help interventions tested in randomised trials into routine daily practice. We assessed whether the improved six-month drinking response found in our Drinking Less randomised trial (DL-RCT) would be sustained when DL was implemented into routine practice (DL-RP). For this purpose, we gave the general public anonymous, free access to DL on a 24/7 basis and conducted an online pragmatic cohort study. A total of 378 of the 1,625 people who registered for DL from May to November 2007 took part. Primary outcome measures were identical to those of the DL-RCT study.

In the DL-RP condition, 18.8% of participants ($n = 71$) were drinking successfully within the prescribed limits at six months after baseline; the DL-RP group had also decreased its mean weekly alcohol intake by 7.4 units ($d = 0.29$, $P < .001$). The alcohol reduction in DL-RP was of a similar magnitude to that in DL-RCT in terms of drinking within the guidelines and mean weekly intake. The results demonstrate that web-based self-help without therapeutic guidance is feasible, well accepted and effective in treating adult problem drinking in daily practice.

Effectiveness of a television-based self-help intervention (chapter 6)

Television, like the Internet, could potentially enable low-threshold, low-cost dissemination of interventions for problem drinking. We therefore investigated the effectiveness of a televised self-help course. We hypothesised a beneficial posttreatment effect in terms of reduced alcohol consumption as compared to a waitlisted control condition. To our knowledge this was one of the first randomised controlled trials of a television-based self-help intervention for problem drinking in the general population.

Dutch television viewers ($N = 181$) who were drinking in excess of the low-risk alcohol guidelines were included in the study. They were randomly assigned either to the Drinking Less self-help course (consisting of five televised sessions,
a self-help manual and an associated self-help website) or to a waitlisted control group. To ensure that the control group had no access to the intervention during the trial, broadcast delivery was mimicked beforehand by sending course participants five weekly DVDs in advance of the actual telecasts in 2006. At the five-week posttest, intervention participants were significantly more likely to be adhering to the guidelines than those in the waitlist group: 36 participants (40%) versus 6 controls (6.6%; OR = 9.4, \( P < .001 \)). Intervention participants had also moderated their mean weekly alcohol consumption by a significantly greater amount than the controls. The between-group difference showed a large, clinically important standardised differential effect size \( (d = 0.90, \ P < .001) \). The effects were maintained in the intervention group at three months. The television-based course *Drinking Less* thus appears effective in reducing alcohol consumption in the short term.

**How minimal and non-intrusive can self-help interventions be?**

*(chapter 7)*

The results of our studies led us to ask how brief one could actually make self-help interventions for problem drinkers and still have them be effective. We therefore conducted a meta-analysis on the effectiveness of single-session, personalised feedback without therapeutic guidance (PF) in reducing problem drinking. No such meta-analysis had previously been carried out. PF interventions provide personal feedback on an individual’s alcohol consumption patterns. The feedback may consist of different components, such as an overview of mean weekly alcohol intake, blood alcohol concentrations, associated health and social risks of excessive alcohol use, and normative feedback. Our expectation was that PF interventions would be more effective than non-intervention in reducing problem drinking.

The relevant studies were identified in 2008 through systematic searches in various bibliographical databases. The pooled standardised effect size (14 studies, 15 comparisons) for reduced alcohol consumption at post-
intervention was \( d = 0.22 \) (95% CI: 0.16–0.29; NNT 8.06). Single-session PF without therapeutic guidance thus appears to be a viable, and probably cost-effective, option to curb problem drinking in student and general populations. The Internet offers ample opportunities to deliver PF on a broad scale.

**Limitations of the studies**

It is important to critically evaluate the results reported here in the light of limitations of the underlying studies. The most important of these limitations are summarised below.

**Public health perspective**

The first limitation relates to the public health strategy we chose for tackling problem drinking in the adult general population. Our focus was on digital self-help interventions. The impact of other intervention strategies such as tax legislation, drink-driving laws or alcohol advertising bans was not studied. Behavioural change, of course, is very complex and is influenced by multiple individual, social and environmental determinants. To curb problem drinking, all these strategies are required, preferably in an integrated approach that can influence drinking behaviours on a population level.

**Target group**

Problematic alcohol consumption appears in many forms. The focus here was on problem drinkers who had an interest in unguided digital self-help and a desire to moderate their alcohol intake. The results can therefore be generalised to this group only. Moreover, as we kept our study exclusion criteria to a minimum, we did not conduct diagnostic interviews. It is therefore unknown what percentage of the samples would have met the diagnostic criteria for alcohol abuse or dependence. Yet given the high levels of mean weekly alcohol intake and alcohol-related problems reported at baseline, we appear to have reached a high-risk group.
Long-term effectiveness of Drinking Less

At the twelve month follow-up, the difference between the experimental and control conditions was no longer significant, mainly due to improvement in the control group. The twelve-month results for DL-RP will be available in 2009. For the television-based DL intervention, the trial results for posttreatment response could only be obtained at five-week follow-up. Further investigation into the maintenance of clinical improvements over longer time periods is therefore warranted.

Loss to follow-up

Two of our studies (DL-RCT and DL-RP) had high rates of participant loss to follow-up (around 45%) – a well known feature of many alcohol intervention studies. Loss to follow-up appears higher for interventions delivered over the Internet, as easy accessibility may also mean easy dropout. While we dealt with this problem as rigorously as possible in our analyses, it remains a point of concern and it may have somehow biased our study results.

Predictor analysis

The number of putative predictors in our secondary analysis of DL-RCT was kept to a minimum and was appropriate in relation to the sample size. However, false-positive or false-negative predictors as a result of multiple testing cannot be ruled out. The fact that we detected different predictors at six- and twelve-month follow-up could mean that different factors operate at different stages during the post-intervention period.

Drinking Less in routine practice

One out of four users who initially registered for DL in daily practice took part in our online survey. This may reflect a selection bias between those who registered for the DL self-help intervention and those who registered but participated in the study as well. Since the DL-RP study was uncontrolled, the
data can only show whether the use of DL was correlated with improved drinking outcomes, and not whether any association was causal. Our comparison of DL-RP with the randomised controlled trial DL-RCT did, however, suggest evidence for causality.

**Conclusions and beyond (chapter 8)**
The overall findings point to a sizeable population of problem drinkers who are motivated to seek digital self-help without therapeutic guidance and who may do so effectively. Our outcome studies have shown small to medium effects for digital self-help interventions in reducing problem drinking. Such interventions could therefore have an important public health impact, provided that they can be disseminated on a large scale at relatively low cost. Our routine practice study (DL-RP) showed that this is a viable prospect. Digital self-help could be offered as a first step within a stepped care approach to problem drinking. That would allow users to move on to booster sessions or more intensive treatments either online or face-to-face, such as maintenance therapy or relapse prevention, should that be necessary. But while the potential public health impact is encouraging, the results also show that not all problem drinkers benefit from digital self-help. Formidable challenges remain to ensure that additional interventions and recruitment strategies are in place for groups not reached by digital self-help.

There are signs that the Netherlands is now developing this public health approach to problem drinking. Both the control of alcohol misuse and the provision of digital self-help are now recognised by Dutch national policy as promising prevention strategies. Addiction agencies delivering prevention and treatment services are becoming increasingly digitally enabled. Health authorities and insurance companies are exploring what role digital interventions might play in health service delivery and the related insurance coverage. Yet the most salient driver of such developments may be the very group whose health is at stake – problem drinkers in the general population.
Ten recommendations (10 R’s) are presented here to guide research and routine practice involving digital prevention and treatment in the coming years. These guiding premises include designing a road map for evidence-based development, implementation and dissemination strategies for digital interventions to curb problem drinking. This could function as a framework to initiate randomised controlled studies on cost-effectiveness, effectiveness of specific intervention components, dose-response relationships, and improving compliance and lowering dropout rates in interventions and studies. Replication of our studies is needed, to test the robustness of the findings and to strengthen the evidence base for digital interventions aimed at problem drinking. This approach could be further enhanced by digital surveying methods, which can produce data rapidly and efficiently and can unobtrusively monitor treatment. A powerful potential of digital intervention research is the automatic monitoring of treatment responses within a disease management approach. To broaden the reach of digital interventions, these should not only be accessible to a wide range of problem drinkers, but should also be meaningful and acceptable to them. Alternative digital interventions need to be developed and evaluated for groups not yet reached, such as problem drinkers who do not fare well with cognitive-behavioural interventions, individuals with lower educational backgrounds, younger and older problem drinkers or people whose religion or culture condemns alcohol use. This requires more insights into cost-effective recruitment strategies for attracting diverse groups of problem drinkers to digital interventions. Successfully recruiting problem drinkers not yet motivated to change requires the further development of effective referral procedures. These may include referrals from first-step digital interventions to more intensive online or face-to-face treatment services, and need the involvement of primary and secondary care providers. This means more knowledge is needed about the actual costs of developing, evaluating, disseminating and maintaining digital interventions. While the health and social
benefits of large-scale implementation are already clear, further exploration is needed of the potential returns on investment strategies and the potential economic costs and gains at individual, organisational and population levels. Many of the proclaimed benefits of digital prevention and treatment interventions for problem drinking still lack an empirical basis, and potential drawbacks are not yet fully understood. The potential risks of using digital self-help need to be further investigated. These include insufficient client data protection, unexpected consequences of participation in user forums, and possible negative side-effects of early treatment dropout. Many such risks might be overcome by developing a benchmark endorsed by key stakeholders (clients, providers, insurance companies, health authorities), which could assure the quality of digital interventions. More insight is also needed into the workings of natural versus guided remission and relapse prevention and into the role that digital intervention could play in strengthening such processes. Priority should be given to further developing and evaluating user-centred intervention models suitable for use in daily practice. This might include a ranking of interventions by the participants themselves. It might also involve analysing the influence that participants’ choice of treatment might have on treatment response or the influence that posttreatment factors (such as social support) might have on the maintenance of treatment gains. Realism compels an awareness that digital intervention alone cannot reduce the total prevalence and burden of alcohol misuse. Integrating such interventions with public health measures such as environmental strategies is therefore advisable.

We believe that research based on these ten guidelines will help to improve evidence-based public health approaches to problem drinking. A blend of new and old media will make it possible to reach out to the heterogeneous group of adult problem drinkers. If effectively implemented, such an approach should result in both health improvements and economic gains at the population level.