E-mental health interventions for harmful alcohol use: research methods and outcomes
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Citation for published version (APA):

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Chapter 1

General Introduction
Background

Alcohol

Ethanol, commonly called alcohol, is the main psychoactive ingredient in alcoholic beverages (beers, wines, and spirits). It is a depressant of the central nervous system. Initially at lower doses, alcohol generally produces feelings of relaxation and cheerfulness; consumption of higher doses can lead to blurred vision and coordination problems (Pohorecky & Brick, 1988). Alcohol is consumed and produced in most countries of the world, and its consumption often reflects both cultural and religious peculiarities and geographical and sociological conditions (Hanson, 1995).

The discovery that beer jugs existed in late Stone Age confirms that fermented beverages existed at least as early as 10,000 B.C. (Patrick, 1952). It has been suggested that beer may have preceded bread as a staple in people’s diet (Braidwood, Sauer, Helbaek, et al., 1953; Katz & Voigt, 1987). Wine appeared as a manufactured product in Egyptian pictographs around 4,000 B.C. (Lucia, 1963). Surviving records of ancient Greek and Roman culture reveal the copious use of wine by the gods, as well as by people of all social classes. The worship of Dionysus, or Bacchus, the wine god, and his festival, the Bacchanalia, was most popular. The Greco-Roman classics often provide descriptions of drinking and drunkenness. On the other hand, the literature of the Greeks is replete with warnings against the possible negative effects of excessive drinking (Encyclopaedia Britannica, 2011). With the collapse of the Roman Empire and decline of urban life, religious institutions became the repositories of brewing and winemaking that had been earlier developed (Babor, 1986). The Black Death and subsequent plagues, which began in the mid-fourteenth century, changed people’s perception of autonomy over their lives. Some dramatically increased their consumption of alcohol in the belief that this might protect them from illnesses, whereas others thought that they would stay healthy through moderate consumption (Hanson, 1995). All in all, alcohol consumption has been part of European culture and other civilizations since ancient times.

Until the beginning of the nineteenth century, attitudes towards drinking were characterized by a continued recognition of the positive effects of moderate consumption, without much public concern about the negative effects. The nineteenth century, however, brought a change in attitudes as a result of industrialization and the need for a reliable and punctual workforce (Porter, 1990). Problems commonly associated with industrialization and rapid urbanization were now also attributed to alcohol. Abolitionist groups arose and
pressed for the total prohibition of the production and distribution of beverage alcohol (Hanson, 1995). About the same time, the disease theory of chronic drunkenness was coined by the Scottish physician Thomas Trotter (1760–1832) (Trotter & Porter, 1988). In 1819, the German-Russian physician C. von Brühl-Cramer published an important book on the history of alcoholism. Brühl-Cramer classified chronic drunkenness as continuous, remittent, intermittent, periodic, or mixed form, and in his book he discussed its aetiology, pathogenesis, sequelae, and treatment options (Kielhorn, 2006). A 1960 study by E. Morton Jellinek is considered the foundation of the modern disease theory of alcoholism (Jellinek, 1960).

**Epidemiology**

In 2005, average annual worldwide consumption was 6.1 litres of pure alcohol (recorded and unrecorded) for each person aged 15 years or older (World Health Organization, 2011), but there are wide variations in the amount consumed. The highest average consumption is found in Europe; in fact, the WHO European region consumes an average of 12.2 litres of alcohol per person aged 15 years or older each year. Within the European region, consumption is highest in Eastern Europe in the vicinity of Russia. The Americas are the second highest consuming region (WHO Americas region consumes an average of 8.7 litres per adult each year.) The WHO eastern Mediterranean region is lowest worldwide, with 0.7 litres consumed per adult each year. In the Netherlands, the annual per capita consumption of people aged 15 years or older is 10.1 litres (World Health Organization, 2011). Until the $7,000 threshold is reached, there is a strong inverse relationship between gross domestic product per inhabitant and abstention from alcohol, i.e. the higher the production, the lower the proportion of alcohol abstainers. In all WHO regions, men’s consumption of alcohol is higher than women’s. The gender difference is greatest among low-income countries. In 2009, it was found that 55% of the world’s adult population (45% men, 66% women) had not consumed alcohol during the previous year (Rehm, Mathers, Popova, et al., 2009). Lifetime abstainers worldwide include 35% of all men and 55% of all women (World Health Organization, 2011).

**Negative Effects**

Besides its immediate positive effects, including feelings of relaxation and cheerfulness, excessive use of alcohol has both direct and indirect harmful effects on people’s health. Alcohol is a potent teratogen with a range of negative effects
on the human foetus, including low birth weight, cognitive deficiencies, and foetal-alcohol disorders (National Institute on Alcohol and Alcoholism, 2001). Alcohol is also a neurotoxin that negatively affects brain development (Taki, Kinomura, Sato, et al., 2006). It is, moreover, an immunosuppressant, which increases people’s risk of contracting communicable diseases (Parry, Rehm, Poznyak, & Room, 2009), and it is classified as carcinogenic by the International Agency for Research on Cancer (International Agency on Research on Cancer, 2007). On the other hand, in low and regular doses (i.e. 10 g ethanol, which is equal to one EU standard drink, every other day), alcohol is cardioprotective (Corrao, Rubbiati, Bagnardi, Zambon, & Poikolainen, 2000), but when consumed at higher doses and in irregular patterns, it is cardiotoxic (Bagardi, Zatonski, Scott, La Vecchia, & Corrao, 2008).

Uncontrolled use of alcohol leading to negative consequences is considered to be a mental disorder. Alcohol’s dependence-producing potential is estimated to be among the top six of all regularly consumed substances; however, in terms of prevalence of its use, alcohol outranks the five substances with a higher dependence potential (barbiturates, cocaine, heroin, street methadone, tobacco) (Nutt, King, Saulsbury, & Blakemore, 2007). Alcohol abuse is also a causal factor in intentional and unintentional injuries and harm to people other than the drinker, and it leads to a variety of other negative consequences, such as reduced job productivity and absenteeism from work, family deprivation, interpersonal violence, suicide, homicide, crime, and fatalities caused by driving under the influence, and it is a contributory factor in risky sexual behaviour and sexually transmittable diseases (Anderson, Chisholm, & Fuhr, 2009). In 2004, 2.5 million deaths (World Health Organization, 2011), and 4.6% of the global burden of disease and injury in disability-adjusted life-years (DALYs) were attributable to the harmful use of alcohol (Rehm, Mathers, Popova, et al., 2009).

Harmful alcohol use not only causes health-related burdens, but also extends to economic costs as a consequence of losses in workplace productivity, absenteeism, criminal damage, and harm to others. Estimates of economic costs show that more than 1% of the gross domestic product is spent on costs attributable to harmful use of alcohol (Casswell & Thamarangsi, 2009). Costs per capita in high-income countries range from $358 in Scotland to $837 in the United States (calculated in international dollars). The greatest contributor to total alcohol-attributable costs is the cost of losses in productivity, which on average accounts for 72.1% of all costs. Healthcare expenditures (12.8%) and law-enforcement costs (3.5%) are the second and third largest contributors,
respectively (Rehm, Mathers, Popova, et al., 2009). Thus, it would advantageous from both a public-health and an economic perspective to reduce alcohol-related harm in society.

**DSM/ICD Diagnostic Classification Systems**

Harmful use of alcohol is included as a disorder in the two most widely used disease classification systems in mental health. Both the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; American Psychiatric Association, 2000) and the International Classification of Diseases (ICD-10; World Health Organization, 2005a) list various criteria for diagnosing the over-consumption of alcohol and the negative consequences resulting from it as a disorder. DSM, published by the American Psychiatric Association, is now in its fourth, text revised edition. DSM-IV-TR delineates two alcohol-use disorders: alcohol abuse and alcohol dependence. The DSM-IV-TR criteria for alcohol dependence include both physiological symptoms, such as tolerance and withdrawal, and behavioural symptoms, such as impaired control over drinking. Alcohol abuse is a category for diagnosing drinkers who have never met the criteria for alcohol dependence, but who regularly use alcohol in situations in which it is dangerous to do so, such as while driving, or who drink alcohol despite recurrent social, interpersonal, and legal problems resulting from it (American Psychiatric Association, 2000).

Researchers and clinicians both in the United States and worldwide use the DSM criteria to diagnose alcohol-use disorders. There is, however, a second major diagnostic classification system that is also widely used—that of the World Health Organization. The World Health Organization originally developed its diagnostic criteria for the purpose of compiling statistics on the worldwide causes of illness and death, including those related to alcohol abuse and dependence (National Institute on Alcohol Abuse and Alcoholism, 1995). The WHO classification system is the ICD, which is currently in its tenth edition. Alcohol dependence is defined in a similar way in the ICD and DSM classification systems. However, unlike DSM, the ICD-10 includes a category of harmful alcohol use instead of alcohol abuse. Harmful use of alcohol leads to physical or mental harm without the person being dependent on alcohol (Babor, 1992). Currently, both the DSM and the ICD classification systems are being updated, and, at least in the case of the DSM, will result in fundamental changes in the definition of alcohol use and other substance-use disorders (O’Brien, 2011).
Reducing Harm

Considering the harm that it causes, alcohol use is not very high on the global-health agenda, although effective regulatory controls and healthcare interventions are now available. There are several reasons why global action against alcohol-related harm is insufficient. An important reason is the fact that alcohol use is viewed as a normal part of everyday life, and it has become integrated into western societies. This is true not only for alcohol consumption, but also for the production, exportation, and taxation of alcoholic beverages. All of the latter would decrease if the consumption of alcohol were to decrease. Thus, alcohol producers, governments, and the wider public all have a vested interest in alcohol consumption. Additionally, alcohol producers effectively lobby for industry-friendly policies, including trade agreements that challenge effective alcohol-control policies (e.g. Zeigler, 2009). In the alcohol policy arena, there is because of limited resources less NGO engagement in anti-alcohol policy than in anti-tobacco lobby (Casswell & Thamarangsi, 2009). A coherent international policy for global control of alcohol-related harm is lacking (Room, 2006), although progress has been made in preparing a global strategy to reduce harmful use of alcohol (World Health Organization, 2010). Currently, more than 100 countries have laws that regulate the production, sale, and consumption of alcohol. These laws specify such things as the minimum age at which a person can legally buy or drink alcoholic beverages, or what types of alcohol can be sold by different types of vendors (World Health Organization, 2010).

Another way to reduce alcohol-related harm in society is to deliver effective treatments to those who need them. In fact, there is much to be gained from these endeavours. Nevertheless, the availability of effective alcohol interventions is currently insufficient. In order to address this insufficiency, innovative ways of delivering treatments have emerged, such as through brief interventions. Since the 1980s, numerous randomized controlled trials of brief interventions have been conducted in a variety of healthcare settings in multiple countries. Evidence for the effectiveness of brief interventions has been summarized in several review articles (e.g. Bien, Miller & Tonigan, 1993; Kahan, Wilson & Becker, 1995; Moyer, Finney, Swearingen & Vergun, 2002; Wilk, Jensen & Havighurst, 1997).

Brief interventions have become increasingly valuable in the management of individuals with alcohol-related problems. Because these interventions, especially those based on cognitive behavioural therapy (CBT), are both effective and cost-effective across the spectrum of alcohol problems, healthcare workers
and policymakers have increasingly focused on them as a way to address harmful alcohol use (Babor & Higgins-Biddle, 2001).

**Treatment Gap**

Despite their effectiveness, the availability and use of brief interventions by harmful alcohol users is limited. The majority of harmful drinkers do not receive any form of treatment. This difference between the prevalence of a disorder and the proportion of individuals affected by the disorder who are being treated is referred to as the treatment gap (World Health Organization, 2005b). Stated differently, the treatment gap is the percentage of individuals who need treatment, but who are not receiving it (Kohn, Saxena, Levav, & Saraceno, 2004). With an estimated 78.1% of untreated individuals worldwide, alcohol abuse and dependence remain largely unaddressed, although effective treatments exist. Compared to alcohol-use disorders, the treatment gap for other mental disorders is smaller: schizophrenia and other kinds of non-affective psychosis (32.2%), depression (56.3%), dysthymia (56.0%), bipolar disorder (50.2%), panic disorder (55.9%), generalized anxiety disorder (57.5%), and obsessive compulsive disorder (57.3%) (Kohn, Saxena, Levav, & Saraceno, 2004).

The treatment gap is especially wide for early stage harmful drinkers. In a large representative sample of the Dutch population, 85.9% of those with diagnosed alcohol abuse and 52.1% of those with alcohol dependence had not received any professional help in the last 12 months (de Graaf, ten Have, & van Dorsselaer, 2010). These statistics might, however, overestimate the proportion of harmful drinkers in search of treatment. The Dutch NEMESIS-2 study, for example, reports that only 6% of participants who were diagnosed with a DSM-IV-TR Axis I disorder indicated that they had had an unmet need for treatment in the last 12 months. Axis I disorders include both alcohol-use disorders and the other clinical disorders named above, such as schizophrenia and depression. Kohn et al.’s study (2004) suggests that the percentage for alcohol-use disorders is larger than the average of 6% would suggest, but it indicates that the treatment gap is 78.1% worldwide in comparison to a lower gap in the Netherlands.

All in all, the evidence suggest that there is most probably a substantial treatment gap with respect to alcohol-use disorders, i.e. people who need treatment are not receiving it. There are numerous factors related to the treatment gap for harmful alcohol use, including stigmatization about having an alcohol-related problem (Room, 2005), limited availability of services, healthcare costs, lack of motivation to undergo treatment, and denial about having an alcohol
problem. The treatment gap, regardless of how narrow or broad it is, might be reduced through accessible, effective, and inexpensive treatment programmes. Using Internet-based interventions, if they are shown to be effective, would be one promising approach for developing such treatment options.

E-Health and Internet-Based Interventions

The advantages of using Internet technologies for improving healthcare delivery are their flexibility and cost-effectiveness. Recent publications in leading medical journals (British Medical Journal: Cross, 2008; New England Journal of Medicine: Mandl & Kohane, 2008) describe how Internet technology, or e-health, is changing general healthcare. Mental healthcare is one aspect of healthcare that embraces the possibilities of e-health applications through the design, testing, and implementation of Internet-based interventions. The use of e-health in mental healthcare is referred to as e-mental health.

Many evidence-based therapies and prevention programmes can be delivered through e-mental-health interventions. In addition to their use in therapy programmes, e-mental health offers the opportunity for self-help. E-mental health is likely to attract individuals with a mental-health disorder who have limited access to treatment services and do not seek help from face-to-face practitioners. People in need of mental healthcare who wish to avoid stigma or who prefer to take responsibility for their healthcare themselves are likely to be attracted to e-mental health. Mental-health interventions delivered through the Internet have the potential to substantially reduce individual distress and the burden of disease (Christensen, 2010). In recent years, e-mental-health programmes have been developed for disorders such as depression, anxiety, post-traumatic stress disorder, substance-use disorders, and obsessive-compulsive disorders. In this dissertation, however, the focus is mainly on Internet-based interventions for harmful alcohol use.

From a wide spectrum of Internet-based interventions that address harmful alcohol use, three emerge that can be ordered in terms of increasing level of intensity as follows: (a) Self-assessment with automated personalized feedback (e.g. Sinadinovic, Berman, Hasson, & Wennberg, 2010), (b) multi-session Internet-based self-help for behaviour change (e.g. Cunningham, Wild, Cordingley, van Mierlo, & Humphreys, 2009; Riper, Kramer, Smit, et al., 2008), and (c) individual therapy with interaction between therapist and client over the Internet. This
list is generally in line with what Drost and Schippers (2004) suggested. They, however, included providing information as a fourth type of intervention, and they placed it before self-assessment at the low-intensity end of the spectrum.

**Internet-Based Self-Assessment**

Self-assessment is the least intensive kind of Internet-based intervention. The aim of self-assessment is to give drinkers insight into their drinking behaviour by providing them with automated personalized feedback and by comparing their own drinking with drinking norms. Self-assessment usually consists of a single session and is considered to be a minimal intervention. Using Internet-based self-assessments for harmful alcohol use has generally resulted in reduced alcohol consumption (Bewick, Trusler, Barkham, et al., 2008; Riper et al., 2008; Williams, Herman-Stahl, Calvin, Pemberton, & Bradshaw, 2009), although effect sizes have been small, with Cohen's $d < 0.25$ (Sinadinovic et al., 2010).

**Internet-Based Self-Help**

Internet-based self-help for problematic alcohol users is more intensive than Internet-based self-assessment, and it usually comprises multiple treatment sessions. Self-help interventions for harmful alcohol use are often modular in design and are based on cognitive-behavioural therapy (CBT) and/or motivational interviewing (MI) techniques (e.g., Cunningham et al., 2009; Hester & Delaney, 1997; Linke, Brown, & Wallace, 2004; Riper et al., 2008). This combination of components is also often seen in face-to-face treatments for alcohol-use problems. Evidence for the effectiveness of Internet-based self-help for harmful alcohol users is accumulating, but effect sizes are small to moderate (e.g., Cohen's $d=0.28$, Cunningham et al., 2009; Cohen's $d=0.40$, Riper et al., 2008). In a recent meta-analysis by Rooke et al. (2010), effect sizes from alcohol and tobacco RCTs of computer-delivered interventions were analysed. The average Cohen's $d$ for alcohol interventions was 0.22, somewhat lower than the effect sizes reported by Cunningham et al. (2009) and Riper et al. (2008). A shortcoming of current Internet-based self-help programmes is that they are not tailored to meet participants' individual needs. This could also explain the low adherence rates; frequently, fewer than 50% of the initial participants complete a multi-session self-help intervention (Christensen & Mackinnon, 2006; Eysenbach, 2005).
Internet-Based Therapy

Internet-based therapy aims to overcome the limitations of Internet-based self-help just described, and it is the most intensive treatment of the three modalities discussed here. It comprises non-automated, personally tailored feedback and interaction with a therapist. In general, Internet-based therapy is expected to better meet participants' expectations than the other modalities; it encourages greater disclosure by including interaction with the therapist; and it provides therapist guidance and advice. Interaction between therapist and client can be synchronous or asynchronous. In asynchronous interactions, the client and therapist do not interact simultaneously, but they correspond through, for example, e-mail messages. In synchronous interaction, on the other hand, contact is in real-time and direct, for example, through text-based chat. Interactions via the Internet, telephone, or videoconferencing are also synchronous. Evidence for the effectiveness of Internet-based therapy for problematic alcohol use, based on synchronous text interaction, has until now been lacking. Rooke et al.'s (2010) study is, however, noteworthy in that lower effect sizes were obtained for computerized interventions for alcohol or tobacco use with chat or discussion compared to interventions without these features (d=0.12 versus d=0.22), although both effect sizes were small and the difference between them was not significant (p=0.17). On the other hand, Spek, Cuijpers, Nyklícek, et al.'s (2007) meta-analysis that focused on Internet-based interventions for anxiety and depression reported larger effects for Internet-based therapy compared to Internet-based self-help. Spek et al. (2007) reported large effect sizes (d 95% CI: 0.75-1.24) for interventions with therapist support and small-to-medium effect sizes (d 95% CI: 0.08-0.44) for self-help interventions without therapist support. In this dissertation, effect sizes for therapy and self-help evaluated in the randomized trial were measured and compared directly.

Research on Internet-Based Interventions

Use of the Internet in healthcare delivery has implications for the development of new interventions, and also for mental-healthcare research. It is, however, necessary to test the effectiveness of newly developed interventions in a methodologically thorough way. The gold standard for performing efficacy or effectiveness research on new interventions is considered to be the randomized controlled trial (RCT) (Pocock, 1984). Because new communication media are being used for both the delivery of and intervention and for effectiveness research
on it, methodological challenges might arise. Three of these challenges are addressed in this dissertation: (a) engagement of participants, (b) participants’ adherence to an intervention, and (c) validity of the data collected from the intervention. These three challenges are discussed in greater detail below.

Engaging Participants

Internet-based interventions might be a treatment option for harmful drinkers who are not reached by conventional, face-to-face treatment options. However, not everyone introduced to an Internet-based intervention will participate in it. A review of engagement rates among study participants who were offered computer-based interventions indicated that only 38% of those who were introduced to the programme started using it (Waller & Gilbody, 2009). In order for a participant to engage, the intervention should be attractive and tailored to his or her needs and expectations (Martinez & Williams, 2010). The scope of the intervention should be formulated as explicitly as possible, and it must be clear to participants beforehand what they can expect from the intervention and how it can benefit them. The availability of a therapist is believed to be an especially important factor in leveraging engagement. For example, Murray, Pombo-Carril, Bara-Carril, et al. (2003) found that potential participants who did not engage in an Internet-based intervention for bulimia had concerns about the lack of therapist involvement and the lack of an individualized approach to their treatment programme, and how these perceived deficits would affect the outcome of the intervention (Cavanagh, 2010). The question of whether the addition of therapist input to Internet-based interventions is associated with better outcomes is one of the key topics addressed in this dissertation.

Participant Adherence

After participants have engaged in an intervention, it is important to promote their adherence. For Internet interventions, the following are critically important: focussing on discreteness, ease of following an intervention’s pathway, clear communication about homework assignments, explicitly stating potential benefits of continuing with the programme, and sending adherence reminders. Password protected, therapist-supported treatment programmes report higher rates of adherence, lower attrition, and larger effect sizes than unsupported, open-access interventions (Cavanagh, 2010). For example, the average exposure time for an open-access website for depression is only 9.5 minutes; the average user visits only once; and fewer than 5% of the participants
complete an intervention that is unsupported (Christensen, Griffiths, & Korten, 2002). Thus, accessibility without therapist involvement results in many contacts at limited costs, especially for prevention activities or treatment for subclinical populations, but adherence rates are low. Problems with adherence might also occur during the data-collection phase. Some guidelines are, however, available for increasing adherence in a longitudinal study (Andrews, Nonnecke, & Preece, 2003; Kaplowitz, Hadlock, & Levine, 2004). For example, it is best to make questionnaires as short as possible, especially those that are to be completed after the intervention has ended. Giving feedback about the length of the assessment and motivating participants to complete the questionnaires by financially rewarding them are also considered helpful. Following these guidelines makes it feasible to successfully conduct Internet-based longitudinal research. How the studies reported in this dissertation were designed so as to maximize adherence to the interventions is discussed in future chapters.

**Measurement Validity**

In order to draw conclusions from the evaluation of an intervention, the outcome measurements must be valid. In several studies, the validity of paper-and-pencil instruments used in Internet-based research has been assessed. These studies in general seem to suggest that the reliability and validity of data obtained over the Internet are comparable to those obtained using traditional methods, including paper-and-pencil testing (see Eysenbach & Wyatt, 2002, pp. 4-5, 17-19). A study by Ritter, Lorig, Laurent, and Matthews (2004) underscores this conclusion. They determined similarities and differences between Internet and the paper-and-pencil versions of 16 self-report instruments that have been useful for evaluating interventions. Instruments administered via the Internet appeared to be reliable, and to have been answered similarly to how they were when administered via traditional paper-and-pencil questionnaires distributed in the post. Brodey, Rosen, Brodey, Sheetz, Steinfeld, and Gastfriend (2004) reached the same conclusion for instruments to measure substance use. Comparing experiments conducted over the Internet with those in the laboratory indicates that if Internet studies are properly designed, laboratory results obtained in many areas of psychology can be replicated. Although significant differences between results from laboratory studies with undergraduates and studies in which participants were recruited via the Internet have been reported, they might be due to differences between the participants tested rather than the methodology used (Birnbaum, 2004). Based on these conclusions, the validity of
the Internet-based instruments used in this study can be assured. Accordingly, in this dissertation, the psychometric properties of the instruments used are not presented, but when possible the psychometric work of other authors is referenced.

**Aims of the Dissertation**

As can be inferred from the previous sections, there is currently a lacuna in our knowledge with regard to (a) the effectiveness of therapist-led Internet interventions for harmful alcohol use, and (b) methodological aspects of e-mental-health research. Both the clinical and the methodological aspects of Internet-based interventions and the accompanying research are, therefore, addressed in this dissertation.

**Table 1.1 Overview of the Research Questions**

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Questions are addressed regarding both the interventions (e.g., Are they feasible, effective, cost-effective?) and the research methodology (e.g., How should an Internet intervention be designed and the data analysed?) (see Table 1.1). The overarching aims of the dissertation are, therefore, to address (a) the effectiveness and cost-effectiveness of Internet-based self-help and Internet-based therapy for harmful alcohol use, and (b) the methodological challenges and possible solutions in the design, execution, and analysis of Internet-based
randomized clinical trials.

In the remainder of this dissertation, harmful alcohol use will be defined according to the definition given in the 58th World Health Assembly Resolution WHA58.26. In the context of this dissertation, harmful has a broader meaning than how it is used in the ICD-10 definition of harmful use. Here, harmful alcohol use refers to the negative public-health effects of the consumption of alcoholic beverages, regardless of religious beliefs and cultural norms. This is in accordance with the WHO definition in WHA58.26 (World Health Organization, 2005c). The research questions presented in Table 1.1 are addressed in Chapters 2 through 7, and the results presented in these six chapters are discussed in Chapter 8. The dissertation comprises three consecutive studies. The results of these studies are discussed in Chapters 2 to 7. Table 1.2 summarizes the basic features of the studies that were conducted.

<table>
<thead>
<tr>
<th>Study</th>
<th>Research design</th>
<th>Year</th>
<th>Sample size</th>
<th>Chapter</th>
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<tr>
<td>Program evaluation</td>
<td>Retrospective cross-sectional</td>
<td>2005</td>
<td>3,386</td>
<td>2</td>
</tr>
<tr>
<td>Pilot study to prepare for RCT</td>
<td>Prospective cohort</td>
<td>2008</td>
<td>435</td>
<td>4</td>
</tr>
<tr>
<td>RCT with 3 arms</td>
<td>Prospective cohort + control</td>
<td>2009</td>
<td>205</td>
<td>5; 6; 7</td>
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Chapter 2 presents the analyses of the data from the self-help intervention, together with results from a retrospective, cross-sectional study and a detailed description of the Internet-based self-help intervention. Thus, this chapter addresses Research Question I. Based on the outcome of this evaluation, the self-help intervention was further refined, and the Internet-based therapy programme was developed. Based on lessons learned while the study that is discussed in Chapter 2 was being conducted, a protocol for a RCT was designed, and it is presented in Chapter 3, which addresses Research Question II.

Chapter 4 focuses on the statistical and methodological aspects of longitudinal data analysis. There is an array of methods for analysing longitudinal datasets with missing observations, all of which have inherent strengths and weaknesses. From data collected in the pilot study prior to the RCT presented in Chapter 3, the reliability and validity of different methods were assessed and discussed. In this forth chapter, Research Question III is addressed.

Chapter 5 is the first of three chapters in which data analyses from the RCT are presented. From this study, it was possible to draw conclusions about the effectiveness of Internet-based self-help and Internet-based therapy, and about
the effectiveness of adding therapist contact to the Internet-based self-help intervention; thus, Research Question IV is addressed in Chapter 5. From the RCT dataset, a cost-effectiveness and cost-utility analysis were performed, and the results are presented from a societal perspective in Chapter 6. Based on the analyses that were performed, conclusions about the cost-effectiveness of adding therapist contact to an Internet-based CBT/MI alcohol intervention could be drawn (Research Question V). Finally in Chapter 7, a statistical technique called recursive partitioning was applied to the RCT dataset. Analyses were performed that allowed individual differences in outcome from Internet self-help and Internet therapy to be predicted. From the predictors of treatment outcome, a screening instrument for classifying participants according to their chances of success was suggested and its utility evaluated. In this chapter, Research Question VI is addressed.

In the general discussion in Chapter 8, the implications of the answers to the research questions are presented and discussed. After the main findings are presented, conclusions that can be drawn from this dissertation are presented. Limitations of the RCT are presented next, and are divided into two categories—methodological and clinical. Under future perspectives, a forecast of where the current studies should lead is presented.

References


