Self-help via the Internet

A new approach to psychological treatment

BY

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Dissertation presented at Uppsala University to be publicly examined in H1, psykologen, Uppsala, Friday, October 24, 2003 at 13:00 for the degree of Doctor of Philosophy. The examination will be conducted in English.

Abstract
Ström, L. 2003. Self-help via the Internet. A new approach to psychological treatment. Acta Universitatis Upsaliensis. *Comprehensive Summaries of Uppsala Dissertations from the Faculty of Social Sciences* 132. 53 pp. Uppsala. ISBN 91-554-5745-2

During the last 30 years, studies have shown self-help to be effective in a number of areas, and to produce equal or close to equal results compared to face-to-face therapy. The Internet can reach a large number of people at a low cost and add the possibility of two-way communication to self-help, thereby offering cost-effective psychological treatments.

This thesis is based on four studies and aiming to investigate if self-help treatment conducted through Internet can reduce problems with insomnia, stress and headache and reach effect sizes comparable to previous minimal contact treatment studies. Other aims were to investigate cost-effectiveness, and to examine if adding regular telephone contact would reduce drop-out rates. Treatments involved psychological techniques previously proved to be effective for each problem.

The first study showed a significant decrease in headache severity, and 50% of the participants in the treatment condition showed a clinically significant improvement. In Study II an Internet-based stress management program resulted in significant reductions of perceived stress, anxiety and depression. Improvements were found in both groups, with stronger effects in the self-help treatment group. Study III, a sleep management program, resulted in statistically significant improvements in the treatment group on all main variables, including total sleep time, total wake time in bed, and sleep efficiency. Some improvements were also found in the control group. Follow-up data indicated that improvements were sustained. Study IV did not confirm the hypothesis that the drop-out rates during headache treatment should decrease significantly if adding short and regular telephone contacts.

Results from this thesis suggest that Internet is a medium well suited for therapy, with effect sizes comparable to face-to-face therapy, that using Internet as a medium for treatment can reduce costs while still maintaining similar results, and that adding a small amount of telephone contact does not decrease attrition.
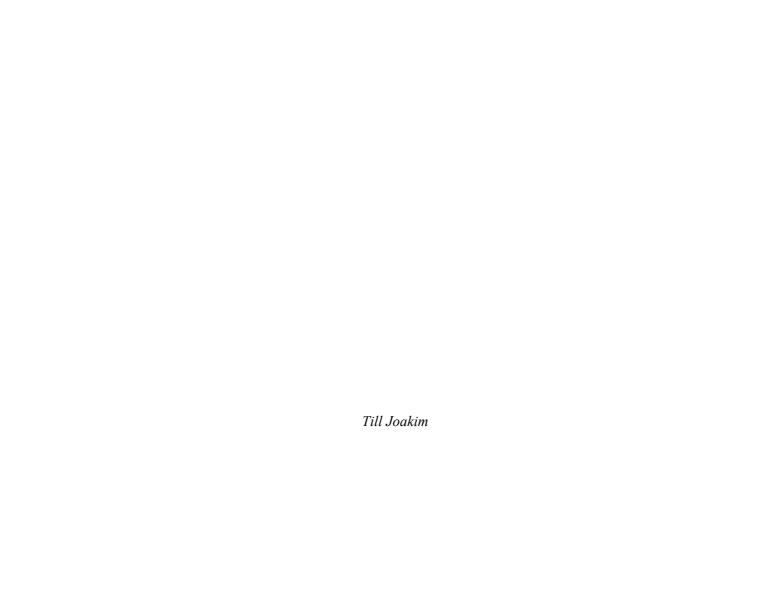
Keywords: Internet, treatment, sleep disorder, insomnia, stress management, stress, headache, drop-out, self-help, minimal therapist contact

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Till Joakim

INCLUDED PAPERS

I. Ström, L., Pettersson, R., & Andersson, G. (2000). A controlled trial of self-help treatment of recurrent headache conducted via the Internet. *Journal of Consulting and Clinical Psychology, 68,* 722-727.

II. Zetterqvist, K., Maanmies, J., Ström, L., & Andersson, G. (2003). Randomized controlled trial of Internet-based stress management. *Cognitive Behaviour Therapy*, 32, 151-160.

III. Ström, L., Pettersson, R., & Andersson, G. (In press). Internet-based treatment for insomnia: A controlled evaluation. *Journal of Consulting and Clinical Psychology*.

VI. Andersson, G., Lundström, P., & Ström, L. (2003). Internet-based treatment of headache. Does telephone contact add anything? *Headache, 43*, 353-361.

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ABBREVIATIONS USED IN THE TEXT

ANCOVA	Analysis of covariance
ANOVA	Analysis of variance
APA	The American Psychological Association
BDI	Beck Depression Index
CBT	Cognitive Behavioural Therapy
CNS	Central Nervous System
CSQ	Coping Strategies Questionnaire
DBAS	Dysfunctional Beliefs and Attitudes about Sleep Scale
ES	Effect size
HA-index	Headache index
HADS	Hospital Anxiety and Depression Scale
HADS-A	Hospital Anxiety and Depression Scale – Anxiety
HADS-D	Hospital Anxiety and Depression Scale - Depression
HDI	Headache Disability Inventory
MLPC	Multidimensional Locus of Pain Control
OSA	Obstructive Sleep Apnoea
PS	Perceived Social Support Scale
PSS	Perceived Stress Scale
SCB	Statistiska Centralbyrån
SD	Standard Deviation
SH	Selfhelp only group
SH+T	Selfhelp + telephone contact group
WWW	World Wide Web

INTRODUCTION

The general purpose of this thesis is to investigate the possible use of the Internet as a medium to deliver self-help treatment for health problems, and to investigate whether a treatment conducted via the Internet can reduce problems with insomnia, stress and headache.

Self-help treatment of health problems

The potential of self-help was expressed already 1969 by George Miller (1969) as a way to bring psychology and psychological knowledge to the general public. Miller considered that the most important social responsibility for psychology was to teach people how to help themselves (Miller, 1969). According to APA:s (The American Psychological Association) article "Task Force on Self-Help Therapies" published 1978 self-help program could be one of the most efficient methods to promote human welfare. Clinical psychologists were considered especially suited to deliver self-help, as they had knowledge of methods to implement and evaluate these in a systematic way (Rosen, 1978).

Effectiveness of self-help treatment

During the last 30 years, studies have shown self-help to be effective in a number of areas, and to produce equal or close to equal results compared to face-to-face therapy. Two meta analyses (Gould & Clum, 1993; Marrs, 1995) summarized the outcome of a large number of trials, showing substantial effect sizes for treatment of depression, headache, anxiety, insomnia, and sexual dysfunctions ($d = 0.74 - 1.86$). More modest effects were found for smoking cessation, alcohol addiction, and weight loss ($d = 0.15 - 0.46$). Here, the effect size is a simple measure of treatment successes with 0.80 indicating a high rate, 0.40 a moderate and 0.20 a poor success rate.

Benefits and drawbacks

Even though one of the driving forces behind self-help – to increase welfare by making psychological knowledge available and useful to a broad public – is appealing, science has given relatively few directions on how to deliver the treatment in the best way, and how to optimize the effects and minimize the drawbacks.

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Rosen (1987) highlighted a few problems that need to be solved with self-help. One explicit problem is knowledge about patient status in terms of diagnosis (both medical and psychological state). A person using self-help without being properly assessed, or perhaps even with a wrong diagnosis, and therefore not following an appropriate program, could be at risk of delaying the possibility of correct treatment and might even deteriorate. For example, a person might mistakenly diagnose himself as insomniac, when the true diagnosis should be obstructive sleep apnoea (OSA), which is not eligible for self-help. In this case the behavioural treatment for insomnia (stimulus control or sleep restriction) is contraindicative for OSA. Another example could be headache originating from brain tumour, where a lack of diagnosis could result in severe consequences.

Other potential problems could be misunderstanding of instructions, non-compliance with treatment, and reduced possibilities for follow- up. Another possible drawback with self-help is the need for a stronger engagement and motivation, which could reduce its value for some people.

Advantages mentioned in the literature are cost-effectiveness, greater accessibility, and better possibilities to generalize treatment to natural environments, higher patient engagement, and reduced resistance to treatment (Rowan & Andrasik, 1996).

Compliance and dropout

One important aspect of self-help, central to the usefulness, but also to the possibility of obtaining valid research results, is the patient's willingness to comply with the treatment procedure and to carry out the treatment. According to Gould and Clum (1993), there is a positive association between compliance with treatment and symptom reduction for treatment in general. They argued that it might be even more so in the case of self-help.

In early research on self-help for headache an observation was made that treatment without any interaction with therapist leads to a high drop-out rate (Kohlenberg & Cahn, 1981). However, later studies are not conclusive regarding this matter. For example, subsequent self-help studies on headache showed that adding a minimal therapist contact reduced the drop-out rate to the level of traditional face-to-face therapy. In addition, treatment effects were found to be strikingly similar (Haddock et al., 1997). In a study on insomnia only a small difference in effect between unguided self-help versus the addition of weekly telephone calls was observed, and with no difference in drop-out rate (Mimeault & Morin, 1999).

Cost-effectiveness

Cost-effectiveness is one of the most salient advantages with self-help. A number of studies have shown that self-help programs have a great potential to reduce health care costs – both to the individual patient and to public medical service (Marrs, 1995).

Rowan and Andrasik (1996) showed in a review on headache treatment that self-help programs produce 2-6 times more reduction in headache per therapy hour, as compared to a treatment conducted by a therapist. This is also found in a meta analysis on chronic headache, where the authors showed that the cost-effectiveness was more than five times higher for treatment with reduced therapist contact, compared to clinical based treatment (Haddock et al., 1997). Because of this, and because of the exceeding health care costs today, minimal therapist contact or self-help interventions have been proposed as a feasible future alternative in the management of headache (Lichstein & Riedel, 1994).

To sum up, self-help programs, at least with the addition of minimal therapist contact, are likely to attain similar results as standard psychological treatment does for a range of psychologically related health problems – and to a substantially reduced cost. The challenge is to develop self-help treatment methods that will equate treatment as usual as much as possible, by minimizing drawbacks such as drop out, non-compliance and diagnostic issues, as well as optimizing the advantages.

Headache

Prevalence and psychological characteristics

Headache is the most frequent type of pain (Martin, 1993). There are several different types of headache, the most common being tension headache, migraine and a mix of the two. Approximately 50% of the population in western countries are troubled by temporary headache (Mohr Catalano & Hardin, 1996) and migraine is commonly seen as a national disease in Sweden – with 12% prevalence for women and 4% for men (Apoteket, 1996). Thubs and Belissimo, (1991) estimated that 13% of the population have some kind of headache as often as 10-30% of the days of the year (Thubs & Belissimo, 1991).

Chronic headache is highly interfering with the patient's life, not only during the headache episodes, but also during the periods in between, and the problem affects relations to family, friends and colleagues. Chronic

headache sufferers have a tendency to give up, and to meet life with frustration and lack of self- control (Cavallini, Micieli, Bussone, Rossi & Nappi, 1995).

Aetiology
The scientific explanations of migraine has for a long time been considered to be extra cranial blood vessel constrictions, followed by rapid dilation, which cause a throbbing pain (Sheridan & Radmacher, 1992). Tension in the neck and back of the head has in similar ways been considered to be a cause of tension headache. The tensed muscles tend to decrease the blood flow, which has been suggested to increase pain further (Martin & Theunissen, 1993).

These theories have recently been questioned, and the causal relations are currently believed to be considerably more complex. Most scientists today agree that it is a question of a complex interplay between genetic, physiologic, psychological and environmental factors, where individual differences in physiologic responses to an increased stress level are important parts (Mohr Catalano & Hardin, 1996). Many distinguished hypotheses today locate the source of both tension headache and migraine to CNS and underlying vascular mechanisms (Sheridan et al., 1992; Thubs et al., 1991; Rapoport, 1992), where disturbances in the metabolism of serotonin or abnormalities in the receptors of serotonin or opiate signal substances have been proposed as potential causes.

Triggers
Factors that trigger headache have, to a high degree, been shown to be the similar for tension headache and migraine, with stress as the most common factor (Scharff et al, 1995). Second common are hormonal changes connected to menstruation and ovulation (Sheridan & Radmacher, 1992), which are mentioned as a trigger by approximately half of the women with migraine (Robbins, 1994). Also tension in neck and shoulders, whiplash problems and other injuries in the neck and back region can contribute to the development of migraine –, as well as grinding one's teeth and tension in the jaw (Sheridan & Radmacher, 1992).

Treatment
Treatments used for headache are either pharmaceutical or psychological, and often combinations of the two. Many types of pharmacotherapy have shown good effect on migraine and tension headache, and for acute medication the efficiency is 50-80% (i.e. 50-80% of patients are relieved from the pain to a degree defined as at least 50% reduction of pain; Thubs et

al, 1991). Prophylactic medication, which is the medication most comparable to psychological treatment, has a clearly poorer effect. Ramadan, Schultz and Gilkey (1997) showed in a comprehensive survey of treatment studies with prophylactic pharmacy, that none of the most preferred medicines in the USA have consistently been shown to prevent migraine.

Psychological treatment of headache during the 70s and 80s was primarily focused on relaxation training, biofeedback and hypnosis. A number of studies have been carried out to assess the effectiveness of the different techniques, and a common feature in the literature is to suggest that there is no difference between the different treatment forms, irrespective of headache diagnosis (Blanchard et al., 1980; Primavera et al., 1992). One interpretation is that relaxation is the common feature responsible for the effect, regardless of technique (Blanchard et al., 1980). During the last years, behaviour therapy (which includes relaxation training) has been the most widely used non-pharmacological treatment for headache problems. Meta-analyses and reviews have clearly shown that this form of treatments leads to as good as or better results than the most widely used pharmacotherapies (Haddock et al., 1997).

Self-help treatment

Psychological treatment for headache has been evaluated in different formats (Blanchard; 1992) with good results, often comparable to those of medication (Holroyd, Nash, Pingel, Cordingley, & Jerome, 1991). However, as clinical psychologists are sparse, the notion of decreasing therapist time and interaction was explored early by Jurish and others (Jurish et al; 1983). Often referred to as minimal-therapist-contact treatments, this form of psychological treatment has been well studied. Perhaps the most interesting finding in these studies is that they often generate equivalent results as full time therapist conducted treatment (Blanchard et al., 1985; Teders et al., 1984; Rowan & Andrasik, 1996). Moreover, it has been found that effects are stable over time (Blanchard, Andrasik, Guarnieri, Neff, & Rodichok, 1987; Blanchard, Appelbaum, Guarnieri, Neff, Andrasik, & Jaccard, 1988).

Techniques used in self-help treatments for headache are with few exceptions relaxation and biofeedback. Studies on effectiveness have shown that these methods give as good results as equivalent clinical treatments and the most commonly used pharmacotherapies (Gold & Clum, 1993; Rowan & Andrasik, 1996; Haddock et al., 1997). Haddock et al (1997) show that self-help treatments on average reach an ES (Cohen, 1988) of Cohen's d = .51 compared to controls, and Cohen's d = .70 at follow-up.

Stress

Prevalence and psychological characteristics

Stress and its detrimental effects is a growing problem in our society. For a majority of people experiencing stress the work situation is considered to be the major source of stress. According to the Swedish *arbetarskydds-styrelsens* and Statistiska Centralbyråns (SCB) report on work environment (Arbetarskyddsstyrelsen, 1999), more than half of the responders considered their work as mentally arduous.

Stress causes significant problems for large number of individuals and rehabilitation of stress-related symptoms is costly for the community. Stress and the issue of cost-effective treatments have been presented as one of the most important challenges for future research (Van der Hek & Plomp, 1997), rendering self-help an attractive alternative. One way of reducing the cost of treatment is by minimizing therapist contact using self-help treatment.

Stress and illness

Perceived stress is shown to increase levels of glucocorticoides, epinephrine, norepinephrine, and other stress related hormones. High levels of these stress hormones are held to contribute to cardiovascular diseases, such as hypertension, vascular spasms and cardiac infarction. Glucocorticoides are also known to affect the immune system and are suggested to increase the risk of infectious diseases (Cohen, Kessler & Underwood Gordon, 1998). Chronic stress has been associated with a number of diseases and health problems, i.e. ulcer, irritable bowel syndrome, Type II diabetes and depression (i.e. Sapolsky, 1998). One of the most serious effects connected to glucocorticoide load is the finding that intense prolonged stress might cause atrophy in parts of hippocampus (Sapolsky, 1996; Bremner et al., 1995) causing difficulties with episodic memory.

Treatment

Several studies show that individually based stress management programs can reduce the level of perceived stress (Timmerman, Emmelkamp, & Sanderman, 1998; Antoni et al., 2000). Jones and Johnston (2000) recommended that stress management programs should include education about stress and analysis of individual reactions in combination with management techniques such as relaxation, assertiveness training, time management, and cognitive restructuring (Ivanisevich, Matteson, Freedman, & Phillips, 1990). In a recent meta-analysis by van der Klink, Blonk, Schene and van Dijk (2001), an effect size of d=.68 was found for cognitive-behaviour therapy (CBT). Another recent review, Reynolds (2000),

concluded that organizational interventions had insignificant effects on individual well-being and on organizational outcomes, suggesting that individually based interventions are superior.

Even though there are some studies showing that stress interventions have a potential to reduce stress, more research is needed to document which strategies have the best effect, and under which circumstances (Van deer Henck & Plomp, 1997).

Insomnia

Prevalence and psychological characteristics

Insomnia is a common problem, with a prevalence of 10-15% of in the adult population (Ford & Cameron, 1989; Malinger, Balder, & Uhlenhuth, 1985). While individuals with insomnia commonly use pharmacological agents as sleep aids, other prefer nonpharmacological alternatives (Morin et al., 1999). However, psychological treatment methods (e.g., cognitive behaviour therapy [CBT]) are often not available, and can be considered quite expensive by consumers. In fact, it has been estimated that less than 15 % of individuals with insomnia get access to any form of treatment (Mellinger et al., 1985), and the vast majority of those who do, never receive treatment from a mental health professional (Morin et al., 1999). Hence, an increased need for self-management and self-help treatment has developed in recent years (Morin, 1996; Hauri & Linde, 1996).

Treatment

Psychological treatment of insomnia often consists of stimulus-control techniques, sleep restriction, relaxation techniques, sleep hygiene, and CBT programs. The latter often combine approaches, such as stimulus-control and cognitive restructuring (Morin et al., 1999). Two meta-analyses have documented the effects of stimulus-control therapy, sleep restriction, relaxation, and a number of different educational and cognitive strategies (Morin, Culbert & Schwartz, 1994; Murtagh & Greenwood, 1995). Compared to pharmacological treatment protocols, studies have shown that nonpharmacological interventions are perceived not only as more acceptable, but that they produce more lasting improvements (McClusky, Milby, Switzer, Williams, & Wooten, 1991; Morin, Gaulier, Barry, & Kowatch, 1992; Morin et al., 1999). The efficacy of multi-component approaches has been slightly superior to single-component treatments (Lichstein & Riedel, 1994).

Effectiveness of treatment

To the best of my knowledge only five studies exist on the use of non-pharmacological self-help for insomnia (Alperson & Biglan, 1979; Morawetz, 1989; Gustavsson, 1992; Riedel, Lichtenstein, & Dwyer, 1995; Mimeault & Morin, 1999). In the meta-analysis by Morin et al. (1994), self-help treatments were found to be slightly inferior to individual and group treatments on number of awakenings, but in the a recent study by Mimeault and Morin (1999) the effect of self-administered treatment was enhanced by adding phone consultations. This benefit did however disappear at 3-month follow-up. However, the main finding from that study was that the patients who received the self-help treatment with telephone consultations improved to an extent comparable to patients who get therapist administered treatment.

Introduction to the internet

Expansion of the Internet

Internet use is constantly growing, and in April 1997 more than half of the population in Sweden had access to Internet, and 1,9 million persons used Internet at least once a month (Infratest Burke, 1998). In April 2003 this number had risen, and 66,5% had access to the Internet (6,0 million users). More than 36,7% used Internet every day and approximately 5,2 million persons used Internet at least once a month. In fact, the high number of users made Sweden number one on the list of Web-using nations in April 2003 (Greenspan, 2003).

Health information on the Internet

Internet has become one of the most widely used tools for gathering information in the Western societies. This is also shown by the extent Internet is used to obtain health information and support. Medical information is considered to be one of the most frequently inquired topics on the Internet (Eysenbach et al., 1999), and this has led to the production of numerous web pages dealing with health areas, such as sleep disorders, headache and stress. A search on *headache* on the search engine www.altavista.com gives for example 858 000 hits. The word *stress* produce 5 521 000 hits, *insomnia* 233000 and *health* 3 385 600 (www.altavista.com), retrieved 21 May 2003. Even though these figures do not reflect the specific number of sites (there might be many hits on the same site) it gives a hint of the huge amount of information available. It must be noted, though, that this expansion of information is very varying in quality, and it can be very difficult for a laymen to determine what parts are reliable and trustworthy (Eysenbach & Diepgen, 1998).

Psychological treatment on the Internet

As described earlier, self-help is a way to give care in a cost efficient way, and an area that could be an essential complement, and sometimes an alternative, to medical and psychological health care.

One way to administer self-help is with Internet as a medium. Internet has several advantages to self-help books:

1. Compared to books, treatment can be tailored to the user, for example by giving different answers depending on how an assessment form is filled in.
2. Internet gives possibilities to interaction between user and supervisor, and when necessary a direct contact can be established.
3. Reminders and prompts can be given, also in an automated fashion, promoting adherence.

Besides this, Internet treatment embraces many of the advantages self-help books possesses compared to face-to-face treatment; for example highly reduced costs and the possibility for participants to access the program at their leisure, and at almost any place.

Online therapy and Internet therapy

There are at least two different approaches to use Internet as a medium of treatment – online therapy and Internet therapy.

Online therapy is exchanges of e-mail between patient and therapist. This form of therapy has been discussed in the literature (Griffiths, 2001; Murphy and Mitchell, 1998), and concerns have been raised over ethical issues, licensing considerations, confidentiality and the effects of this form of therapy (Griffiths, 2001).

Internet therapy, on the other hand, refers to Internet-based treatment, administered by structured web pages to present information, and with the potential to interact with the patient. Internet therapy should be regarded as a minimal therapist contact treatment, within the Internet protocol. The application of self-help via the World Wide Web (WWW) is more structured than e-mail therapy, and the information can be more strictly controlled, and adjusted to the patient by automated functions.

Internet therapy bears some resemblance to the computerized treatments developed during the 90s to treat various anxiety disorders (i.e., White, 1998). While this form of treatment has been found to convey positive effects, it is still not widely used (Marks, Shaw, & Parkin, 1998). The

accessibility of the Internet will perhaps make computerized self-help more readily available.

One disadvantage with the Internet is the difficulty to predict who will benefit from an Internet treatment and who will not. This is a problem also in research on traditional face-to-face treatment (Steketee & Chambless, 1992), but might be more difficult when the patient is not seen in person. There are some possible ways to address this problem. For example, implementation of treatment factors (scheduling and monitoring) could be adjusted to strengthen motivation, as well as to other factors that might affect the outcome (Andersson & Kaldo-Sandström, in press). Several types of reminders can be woven into the program, alternative modules might be used dependent on how motivated the person is or how the problem is manifested. Bearing this in mind, there is still a need for assessment instruments and diagnostic procedures developed specifically for research on Internet treatment.

Doing research on the internet

Security and technical problems

There are a few fundamental requirements for participants to take part in Internet-based treatment research (or treatment) via Internet. They need to have access to a computer, connection to Internet and preferably also possibility to print the available information like text material and forms.

Even if the Internet is increasingly improved regarding security, a 100% guarantee for protection against intrusion cannot be given. The most problematic security issue is (which is often forgotten) the protection of the users own computer. This matter should be discussed with the patient, and in particular if he/she shares computer (and specifically e-mail account) with family members or fellow-workers. In research where e-mail and Internet are used, it should also be recommended to inform participants about the possibility and procedure to create an anonymous and encrypted e-mail account on the Internet.

Questionnaires and assessments

One crucial issue when conducting studies over the Internet is psychometric properties of questionnaires and other assessment instruments. Some research has been conducted in this area, and the results are promising. Buchanan (2000) and Andersson et al. (2003) showed that WWW administration of questionnaires gave reliable and valid data, and that

psychometric properties replicate over media (Buchanan & Smith, 1999). It is even proposed that Internet administration conveys some advantages. The most interesting is the finding that participants report lower social anxiety and social desirability when using Internet, compared to when gathering data on paper forms (Joinson, 1999). Still this is an area with only a few studies, and it is recommended that each scale should be evaluated empirically for Internet use.

Whereas standardized questionnaires often easily transfer to web-administration, diagnosing is more difficult. Even though Lenert (2002) recently showed that valid self-reported diagnoses can be obtained via the Internet in the case of headache, it is possible that self-recruited samples can contain potentially unsuitable cases for self-help treatment.

Internet behaviour differs

One interesting finding presented by Joinson (1998) is that there might be a specific "Internet behaviour" - a tendency for Internet users to be "disinhibited". Joinson suggests that Internet mediated communication is less inhibited by social norms and that this can result in misunderstandings. This behaviour could for example be manifested as a tendency to eagerly seek help and advice on the Internet (instead of turning to traditional health care institutions) – but also to drop out easier when the treatment requires a performance in return. One reason suggested for this is that Internet communication lacks many of the emotional cues provided by spoken language, while still being a "rapid" form of communication without the time to reflect upon answers and comments given.

Attrition and compliance

One disadvantage with Internet-based treatments may be high attrition rates. Earlier self-help studies have shown that treatment with very limited or no contact produces a comparably grater drop-out. The trend in self-help research has therefore been to maintain a certain level of contact with participants, e.g. by weekly or monthly telephone calls, to follow up progress in treatment, answer questions an give some prompting (Blanchard, 1992; Jurish et al., 1983). This tendency to drop-out, together with the disinhibition effect on Internet observed by Joinson (1998), could be a problem in Internet treatment – and create a comparably greater attrition than otherwise.

Other advantages and disadvantages

Another advantage with Internet research could be a decrease of experiment leader effects, in other words participants' tendency to adjust to the expectations of the experiment, and other demand characteristics. This is

believed to be a consequence of anonymity and confidentiality (Hewson, Laurent & Vogel, 1996).

A disadvantage mentioned by Hewson et al (1996) was technical limitations of the system as well as level of technical knowledge. The former can restrict which domains research on Internet can be used within, and the latter might impede generalisation by influencing selection of participants.

Studies on Internet-based treatment

After Study I, which was one of the first published studies using Internet-based self-help treatment, a number of studies have been carried out in different health areas: e.g. tinnitus (Andersson, Strömgren, Ström, & Lyttkens, 2002), panic disorder (Carlbring, Westling, Ljungstrand, Ekselius, & Andersson, 2001; Klein & Richards, 2000), post-traumatic stress (Lange et al., 2000), stress management (Study II), weight loss (Tate, Wing, & Winett, 2001), insomnia (Study III), chronic pain (Buhrman, Fältenhag, Ström & Andersson, 2003), depression (Andersson, et al., 2003), and eating disorders (Winzelberg et al., 2000). The results from these studies are promising and indicate that the Internet is a suitable medium for providing services which effects are equivalent, or close to the effects of face-to-face treatment.

THE EMPIRICAL STUDIES

The aims of the studies

The general purpose of the studies embraced by this thesis was:

1. To investigate whether a self-help treatment conducted through Internet would reduce problems with insomnia, stress and headache to the same extent as has been shown in previous minimal contact treatment studies.

Secondary aims with the studies were:

2. To highlight the pros and cons with this new media.
3. To investigate cost-effectiveness (Study I).
4. To examine if adding regular telephone contact would reduce the drop-out rate in a replication of Study I (Study IV).

General method

In all studies an experimental between-group design was used, in which participants were randomly assigned to a treatment or control group. In Study I – III waiting-list controls were used, in Study IV both groups were treated, but the experimental group differed by adding telephone contact.

In Study I, pre- and post treatment periods consisted of four weeks of headache diaries and results were analysed using a mixed model with one between-group factor and time as the within-group factor.

In Study II pre-treatment and post treatment measures were collected at one time and were analysed using a mixed model with one between-group factor and time as the within-group factor.

In Study III participants filled in sleep diaries during two consecutive weeks at pre-treatment and post treatment. Again, data were analysed using a mixed model with one between-group factor and time as the within-group factor.

Study IV also used a mixed model with one between-group factor and time as the within-group factor. Pre-treatment and post treatment measures included two weeks of headache diaries. As part of the treatment protocol in

this study, participants in the experiment group condition received weekly telephone calls as prompts for compliance with treatment instructions.

Participants

Participants in the studies were recruited by means of newspaper articles in regional papers, and on a web page for the projects. All participants needed to have access to a computer, a modem and an Internet connection. For each study, web pages were created, including an outline of the study, and an application form.

Headache I

A total of 122 persons showed an interest in participating in the study of which 102 fulfilled the inclusion criteria: a) minimum age of 18, b) a headache history of at least six months, c) a headache frequency of once per week or more. Participants with answers indicating specific cluster headache, serious physical or psychological disorder or indicating that their headache was of another kind than migraine or tension headache were excluded, and encouraged to contact their physician for further investigation. 69% of the participants were women, and 31% men. Mean age was 40.2 years (range 19-62 years).

Stress

A total of 164 persons expressed an interest in participating in the study. The first 100 persons who replied that there was nothing preventing them from completing the study (including medical, social, and psychological reasons) were included in the study and randomly assigned to one of the two conditions. However, three participants in the control group and 12 in the self-help group declared that they were no longer interested and withdrew before the study proper had started. The actual number of participants was therefore 85, who by then already had been randomized to each condition. Sixty-two percent of the participants were women, 38 % men, and the mean age was 39.2 years (range 20-57 years).

Sleep

A total of 268 persons applied to participate in the study, and 109 fulfilled the inclusion criteria of; (a) a minimum of 18 years of age, (b) the inability to fall asleep within 30 minutes or being awake during night for 30 minutes at least three nights per week, (c) a problem endurance of minimum three months, and (d) being troubled by at least one daytime problem caused by insomnia (e.g., tiredness or problem with concentration). Exclusion criteria were sleep apnoea or related problems, restless legs syndrome, pronounced

depression or anxiety, sleep difficulties explained by physical symptoms (e.g., whiplash, pain, tinnitus, night shift work or regular daytime sleep, previous or ongoing CBT for insomnia or insomnia a minor problem.

No person was excluded because of high consumption of alcohol or medication. Persons using benzodiazepines or other sleep aids under medical supervision, but who were still experiencing insomnia were included. Of all participants 65% were women and 35% men. Mean age was 44.1 years (range 20-66 years), and they had suffered from sleep problems for a mean duration of 10.6 years (SD=8.0). Sleep aids were used by 29.4% three times a week or more.

Headache with telephone contact

A total of 106 people submitted an interest questionnaire. A total of 44 fulfilled the inclusion criteria: a) minimum age of 18, b) a headache history of at least six months, c) a headache frequency of once per week or more. Participants with cluster headache, whiplash, head trauma, fibromyalgia, major depression, tinnitus or other medically unclear neurological symptoms were excluded and were encouraged to seek other help elsewhere (with recommendations given). In all, 82 % of the participants were women and 18 % men. Mean age was 40.3 years (range 15-59 years).

Psychological assessments and outcome measures

Cost-effectiveness

Cost-effectiveness was calculated in Study I by dividing percent improvement (headache frequency) by clinician contact time. This is a measure commonly used to estimate cost-effectiveness in headache research (Haddock et al., 1997, Rowan & Andrasik, 1996; Gutkin, Holborn, Walker & Anderson, 1994).

Perceived Stress Scale

Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983) a Swedish translation by Eskin and Parr (1996) is a 14-item instrument designed to measure the degree to which situations in one's life are appraised as stressful. The internal consistency reliability of the Swedish version of the PSS (Cronbach's alpha) is 0.82. This scale was used in Study II and Study IV.

Hospital Anxiety and Depression Scale

The Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983) in a Swedish translation (Lisspers, Nygren, & Söderman, 1997) was used in Study II, III and IV. In Study II and IV it was used as dependent measure, and in Study III as a mean for exclusion. The HADS is a 14-item self-report rating scale designed to measure both anxiety (HADS-A) and depression (HADS-D). It consists of two subscales, each containing seven items. The Swedish version of the HADS total score has internal consistency reliability (Cronbach's alpha) of 0.90. The two anxiety and depression subscales have internal consistencies of 0.82 and 0.90. Andersson, Kaldo-Sandström, Ström, and Strömgren (2003) evaluated the use of the HADS administered via the Internet and found equivalent psychometric characteristics as traditional paper-and- pencil administration.

Perceived Social Support Scale

The Perceived Social Support Scale (PS; Procidano & Heller, 1983) consists of two subscales (PS-friends and PS-family) each containing 20 items. The PS has been translated and validated for Swedish conditions (Eskin, 1993). In the Swedish validation, PS-friends had a test-retest reliability of r= .84 and Cronbach's alpha of 0.91. The corresponding figures for PS-family were r=.85 and Cronbach's alpha 0.89 (Eskin, 1993). This measure was used in Study II. The measure was not used as an outcome measure

Social Readjustment Rating Scale

Social Readjustment Rating Scale assesses potential stressors (Holmes & Rahe, 1967). The 15 most common life events were listed based on a translation by Eskin and Parr (1996), with slight modifications. In Study II, the participants were asked to note whether the event had occurred during the last six months. The measure was not used as an outcome measure.

Sleep diary

Sleep diary is used as an outcome measure in most research on sleep (Lacks & Morin, 1992, Lichstein & Riedel, 1994) and was also used in Study III. A sleep diary is considered to be a reliable and valid measure of sleep problems, and even though the parameters obtained do not fully reflect the absolute values obtained by polysomnography (Sateia, Doghramji, Hauri, & Morin, 2000), it has greater real world applicability in most clinical settings. In the diary participants recorded time of going to bed, time of turning out the lights, time of going to sleep, number of awakenings, length of nightly awakenings, time of morning awakening, time of getting up, sleep quality, alertness at rising, daytime nap and use of sleep aids (medical aid and alcohol). These data were used to calculate *total wake time* (sleep latency +

length of nightly awakenings + time of morning awakening), *sleep time* (time between turning out the light and getting up – total wake time), *percent sleep efficiency* (total wake time/total sleep time x 100), *sleep latency*, *wake time during night*, *early morning awakening* (time from awakening to rising) and *sleep quality* (alertness at rising [on a five point scale] + sleep quality [on a five point scale] / 2).

Medication index

To measure medication use, participants specified the number of doses taken each day for up to three different types of pharmaceutical agents (Study I) or number of nights when pharmaceutical agents were used as sleep aids (Study III).

Dysfunctional Beliefs and Attitudes about Sleep Scale

The Beliefs and Attitudes about Sleep Scale (DBAS; Morin, 1993) is a 28-item scale measuring sleep-related cognitions, which was completed before and after the treatment in Study III. Even though five factors have been identified (Morin, Stone, Trinkle, Mercer & Remsberg, 1993), these were not consistently identified in a factor analysis, showing low internal consistencies for some of the factors (Espie, Inglis, Harvey, & Tessier, 2000). Hence, in Study III the DBAS total score was used, for which adequate psychometric properties have been reported. Morin et al. (1993) reported a moderate internal consistency for the total score of the DBAS in both poor (α=0.81) and good (α=0.80) sleepers. Espie et al. (2000) reported an internal consistency of α=0.72 for the total score. Originally the questionnaire uses a visual analogue scale, but due to the Internet format this was transformed into a 6- point Likert-type scale. For each statement participants rated their level of agreement or disagreement from 0 (strongly disagree) to 5 (strongly agree). A higher total score is associated with a greater level of dysfunctional cognitions. The scale has been found to discriminate well between individuals with insomnia and good sleepers (Morin et al., 1993).

Treatment credibility

To obtain a measure of treatment credibility participants in Study III were given a 5-item, 10-point scale adapted from Borkovec and Nau (1972). Psychometric properties for the scale (plus one item) have been reported to be α=0.86 (Devilly & Borkovec, 2000). The credibility questionnaire was completed at the end of the first self-help module, after the participants had received a full description of the treatment.

Headache diary

Participants rated maximum daily headache intensity between 0 and 5, where 0 corresponded to "No pain at all" and 5 to "Unbearable pain". This was done four times each day (with recommended times 8:00, 12:00, 16:00 and 20:00) for the whole duration of the study. In addition, participants rated average headache intensity for the whole day, and duration of headache in hours for the whole day. A headache-index (HA-index) was calculated (means of intensity for each day summed, divided by the total number of registration days). Also extracted were separate measures for number of headache days, duration (sum of duration divided by number of headache days), and mean peak intensity (the maximum intensity for each day divided with total number of headache days). The headache diary was used in Study I an IV, with some slight differences. In Study I the measure of headache was measured only once a day with a scale ranging from 1 to 100, in Study IV participants filled in a 6-point Likert scale (0-5) four times a day.

The Headache Disability Inventory

The Headache Disability Inventory (HDI) (Jacobson, Ramadan, Aggarwal & Newman, 1994) was used in Study I and IV to measure handicap associated with headache. The scale consists of 20 items and has adequate psychometric properties, with a test-retest reliability of $r = 0.83$ Cronbach's alpha for the present Internet-based version in Study IV was $\alpha=0.94$.

The Coping Strategies Questionnaire

For the measurement of coping with headache in Study IV, the The Coping Strategies Questionnaire (CSQ) (Rosenstiel & Keefe, 1983) was used. CSQ consists of 50 items divided in 8 subscales (Diverting attention, Reinterpreting pain sensations, Coping self-statements, Ignore pain sensations, Praying and hoping, Catastrophizing, Increased behavioural activities and Increasing pain behaviours,) and two single item questions (Control over pain and Ability to decrease pain). The two single item questions and the Increasing pain behaviours were excluded in this study because of low reliability. Apart from those scales psychometric properties of the subscales are satisfactory ($\alpha=0.70-0.80$) (Jensen & Linton, 1993).

Evaluation form

All studies included an evaluation form at the end of the program, to highlight the pros and cons with the media in a more qualitative open-ended manner. Participants answered questions such as how they considered Internet to be as a medium for treatment regarding their experience of anonymity, readability, and contact with psychologists etc.

Treatment

Headache (Study I and IV)

Study I included two main treatment strategies, applied relaxation and problem solving. Study IV included relaxation and a cognitive restructuring module, containing cognitive-behavioural techniques for handling negative thoughts and core beliefs.

The relaxation program was largely derived from the method of *applied relaxation*, developed by Öst (1987), and forms of autogenic training (Mohr Catalano & Hardin, 1996) with instructions adjusted to suit the self-help format. The program extended over six weeks, with the participants working with a new section every week.

In the problem solving part, the participants were presented with different methods aimed to be useful in the identification of problems, coping with problems in general and headache-related problems in particular.

Participants in the treatment group had the opportunity to contact the therapists via e-mail and were encouraged to do so. Confirmations of submitted report cards were sent, and occasionally reminders if report cards were not submitted after one week.

Table 1. Summary of treatment modules for the headache program in Study I and IV.

| | **Relaxation** | **Additional excercises** | |
		Study I	Study IV
Week 1	Progressive relaxation	Information	Information
Week 2	Progressive, short relaxation	Problem solving	Cognitive restructuring Negative thoughts
Week 3	Conditioned relaxation	Problem solving time management	Cognitive restructuring Negative thoughts
Week 4	Differential relaxation	Problem solving time management	Cognitive restructuring Core beliefs
Week 5	Cue-controlled relaxation	Problem solving time management	Cognitive restructuring Core beliefs Risk factors
Week 6	Applied relaxation	Maintenance	Time management Concentration, focusing

As a part of the treatment protocol in the Study IV, participants in the self-help + telephone (SH+T) condition received weekly telephone calls for the whole treatment duration (e.g., six calls). Each call lasted 5 - 20 minutes (X=10) and was devoted to fostering adherence to the treatment. While aspects of treatment were covered and each call was structured with an agenda, they were not therapeutic in the strict sense, and did only deal with headache and technical program issues.

Stress (Study II)

The stress management program consisted of six treatment modules, with the recommendation to undertake one module per week. Every treatment module included three parts: relaxation training, additional exercises, and information (see Table 2). The relaxation and the additional exercises contained homework assignments that were recommended to be completed before getting access to the next module, while the information section was optional. As it was possible for participants to take part of certain sections of the program only, they differed in terms of the 'dose' of stress management they received.

The relaxation training program was the same as in the other studies, developed from Öst (1987) and the participants could either download written instructions or use an on-line version. Participants registered the frequency and duration of practicing relaxation in a diary and results were reported once each week. The rationale for this registration was mainly to keep a regular contact with the participants, thereby promoting compliance.

Table 2. Summary of treatment modules in the stress management program in Study II.

	Relaxation	**Additional exercises**	**Information**
Module 1	Progressive relaxation	Problem solving	Sleep management
Module 2	Conditioned relaxation	Problem solving	Eating habits
Module 3	Differential relaxation	Time management	Exercise
Module 4	Cue-controlled relaxation	Time management	Stress at work
Module 5	Applied relaxation	Cognitive and behavioural responses to stress	Positive activities
Module 6	Applied relaxation, Maintenance	Cognitive and behavioural responses to stress	To set limits

The problem-solving module (D´Zurilla & Nezu, 1999) presented step-by-step instructions with illustrating examples of stress topics. The time management exercise (Cartwright & Cooper, 1997; Lakein, 1973) included strategies for short term scheduling as well as planning of long term goals. The cognitive and behavioural restructuring exercise (Greenberger & Padesky, 1995) presented an overview of the role of cognition and behaviour and their link to emotions. Techniques for analyzing and changing negative automatic thoughts and stress enhancing behaviours were also presented.

The information section consisted of the presentation of a stress-related topic and suggestions of techniques to reduce the impact of the stress. The information topics were sleeping problems, nutrition and eating habits, exercise, work stress, social life, and assertiveness.

Insomnia – (Study III)

The sleep management program was derived from published self-help programs and treatment manuals (e.g., Morin, 1993; 1996; Hauri & Linde, 1996), and included sleep restriction, stimulus control, information about sleep hygiene, cognitive restructuring and information on a medication withdrawal program (Morin, 1993; Morin, Colecchi, Ling, & Sood, 1995).

Table 3.Main components of the Internet sleep management program in Study III.

	Main exercise	**Additional exercises**	**Information**
Module 1	Intro sleep restriction	Controlled breathing	Insomnia and sleep
Module 2	Sleep restriction Stimulus control strategies	Progressive relaxation Phasing out sleep aid	Sleep medication
Module 3	Sleep restriction Stimulus control strategies Cognitive restructuring	Cue controlled relaxation Phasing out sleep aid Concentration	Negative automatic thoughts
Module 4	Sleep restriction Stimulus control strategies Cognitive restructuring	Differential relaxation Phasing out sleep aid Concentration	Stress at work
Module 5	Sleep restriction Stimulus control strategies Cognitive restructuring	Applied relaxation Phasing out sleep aid	Sleep hygiene Relapse prevention

The program extended over five weeks, and participants were prompted to send in their sleep diaries weekly. The rationale for this registration was mainly to keep a regular contact, and thereby promote compliance. The weekly components of the program are summarized in Table 3. The medication withdrawal program was presented as an optional part, which only should be undertaken under the supervision of a local physician, in particular when benzodiazepines were used.

Participants were also offered a program of applied relaxation (Öst, 1987) used in the other studies. All instructions were adjusted to suit the self-help format and included the possibility to follow a slideshow or download sound files as an aid to use applied relaxation.

Statistical analyses

In Study I (headache) pre-treatment group differences were noted, and the results were analysed with ANCOVA, using pre-treatment values as covariates. Effects on the separate headache parameters (headache days and peak intensity) were also investigated with ANCOVA, using pre-treatment scores as covariates. Clinical significant improvement was specified as a reduction of headache activity of 50% or more, without corresponding medication increase (Blanchard & Schwarz, 1988). A percentage improvement score was calculated for each participant using the following formula:

$$\frac{(\text{Pre-treatment headache index} - \text{Post treatment headache index}) \ x \ 100}{\text{Pre-treatment headache index}}$$

In Study II (stress) mean scores on the PSS and HADS at pre- and post treatment for the self-help and control groups were analysed by means of a two way repeated measures ANOVA. Group differences at pre- and post treatment were tested with independent samples t-test.

In Study III (sleep) results were analysed with mixed design ANOVAs with one between-group factor (treatment vs. waiting list), and one within-group factor (pre-treatment vs. post treatment).

In Study IV (headache) a mixed design analysis of variance was used to evaluate treatment effects with one between group factor (SH+ T or SH) and one within-group factor (time). Post-hoc tests were conducted with

Bonferroni corrected t-tests. χ^2 was used to evaluate differences in reaching the criteria of clinical significance.

RESULTS

Study I – headache

The first study showed a significant decrease in headache severity, as measured with the Headache index, for the treatment group (see Table 4). The average reduction was 31.1% for the treatment group, and 3.3% in the control group. ANCOVA (with pretreatment as covariate) revealed a statistically significant difference between the treatment and waiting-list group at post treatment [$F(1,42)=5.19$, $p= .028$]. When analysing pre- and post differences for the groups separately, a statistically significant improvement was found for the treatment group [$t(19)=2.69$, $p= .019$], but not for the waiting-list group. Effects on the separate headache parameters (headache days and peak intensity) were also investigated by comparing the post treatment scores with ANCOVA (pretreatment as covariate). Significant effects were found for frequency of headache days [$F(1,42)=10.04$, $p= .003$] and peak intensity [$F(1,42)=7.42$, $p= .009$].

Clinical significant improvement is specified as a reduction of headache activity with 50% or more, without any corresponding increase in medication (Haddock et al, 1997). Among the participants in the treatment condition 50% showed a clinically significant improvement.

The sum of therapist-time (sending of information, training program and confirmations of diaries from participants) was estimated to be approximately 40 minutes per participant. This resulted in a cost-effectiveness score of $X = 0.78$ (mean improvement in headache index divided by therapist time). Compared to other studies (Haddock et al, 1997) this suggests that self-help-treatment via the Internet can be as cost-effective as minimal therapist contact treatment, and up to 12 times as large as traditional clinical treatment.

Table 4. Mean (SD) and pooled within effect size (Cohen's d; ES) for the dependent measures at pre- and post-treatment for treatment group and waiting-list respectively in Study I. Pre- and post treatment effects analysed with paired t-tests.

Measure	Group	Pre-treatment M (SD)	Post treatment M (SD)	ES
Index	Treatment	33.28 (20.65)	22.93 (23.30)**	0.47
	Control	26.82 (18.65)	26.02 (19.41)	0.04
Headache days	Treatment	4.76 (2.09)	3.27 (2.33)***	0.67
	Control	3.94 (1.89)	3.75 (2.09)	0.10
Intensity	Treatment	47.87 (16.51)	46.91 (22.27)	0.05
	Control	45.34 (14.83)	45.97 (15.10)	0.03
Duration	Treatment	7.44 (5.14)	6.20 (5.10)	0.24
	Control	7.87 (5.20)	7.40 (5.44)	0.09
Peak	Treatment	68.03 (18.09)	49.78 (26.38) **	0.76
	Control	60.13 (19.55)	56.26 (19.54)	0.20
HDI	Treatment	47.47 (12.75)	40.55 (15.57)	0.49
	Control	45.42 (21.32)	36.40 (22.07)	0.42
BDI	Treatment	9.90 (8.21)	6.93 (7.41)	0.38
	Control	8.92 (5.71)	7.86 (4.85)	0.20

*p<0.05; ** p<0.01; *** p<0.001
Note. BDI (Becks Depression Inventory); HDI (Headache Disability Inventory).

Study II - stress

In Study II an Internet-based stress management program resulted in significant reductions of perceived stress, anxiety and depression were found. Less marked improvements were found in the waiting-list control group. Mean results are presented in Table 5.

Table 5. Mean (SD) and pooled within effect size (Cohen's d; ES) for the dependent measures at pre- and post-treatment for treatment group and waiting-list respectively in Study II. Pre- and post treatment effects analysed with paired t-tests.

Measure	Group	Pre-treatment M (SD)	Post treatment M (SD)	ES
PSS	Treatment	33.08 (3.87)	25.25 (6.20) ***	1.55
	Control	33.17 (3.76)	28.88 (7.02) ***	0.79
HADS	Treatment	23.50 (6.67)	13.08 (5.38) ***	1.73
	Control	23.23 (5.85)	18.70 (7.64) ***	0.66
LE	Treatment	1.25 (1.48)	1.28 (1.48)	0.02
	Control	1.55 (1.22)	1.60 (1.28)	0.04
PS – family	Treatment	9.08 (3.32)	9.75 (3.22)	0.21
	Control	9.80 (3.45)	9.62 (3.62)	0.05
PS – friends	Treatment	10.42 (4.25)	10.67 (3.20)	0.07
	Control	9.40 (3.26)	9.82 (3.99)	0.12

*p<0.05; ** p<0.01; *** p<0.001
Note: PSS = Perceived Stress Scale; HADS = Hospital Anxiety and Depression Scale; LE = Life Events; PS-family = Social Support - Family; PS-friends = Social Support - friends

In total, 63 participants completed the post treatment measures. For the PSS measure both the treatment group [t(22)=8.04, p=0.0001] and the control group [t(39)=4.20, p=0.0001] improved significantly between pre- and post measurement. Analysis, though, showed a significant group x time interaction [F(1,61)=6.94, p=0.011], and at post treatment there was a significant difference between the two groups [t(61)=2.38, p=0.02, d=0.62]. The average reduction in PSS score for the treatment group was 8.43 points (CI 95%=6.26-10.61).

Analysis of the HADS measure showed a significant reduction of the total HADS score for both the self-help group [t(22)=8.74, p=0.0001] and the control group [t(39)=4.64, p=.0001]. A group x time interaction [F(1.61)=10.52, p=0.002] was found, though, with a significant difference between the two groups [t(61)=2.34, p=0.02, d=0.60] at post treatment. The average reduction in HADS score for the treatment group was 9.48 points (CI 95%=7.23-11.73).

Results on the other measures did not change significantly.

Study III - insomnia

In this study improvements were noted in the treatment group (see Table 6). However, the control group who only received information about the study and completed sleep diary ratings and questionnaire measures also improved on several sleep diary measures. A significant group/treatment by time interaction was found on the Dysfunctional Beliefs and Attitudes about Sleep Scale, with a strong between-group effect size (d=0.81). In contrast, sleep diary measures showed weak and insignificant between-group differences at post-treatment, and between group effect sizes at post-treatment were low, ranging from Cohen's d= -0.03 to d=0.35. Follow-up data were available from 13 participants in the treatment group 9 months after treatment termination, and for 25 participants in the control group 6 months after they had completed the treatment. Results indicated that improvements were sustained (see footnote in study IV).

As the medication data were skewed the non-parametric Wilcoxon signed rank test was used for each group separately. This revealed a marginally significant decreased intake in the treatment group (Z=-1.9, p=0.057), with no change in the control group. The number of participants using the withdrawal schedule was not monitored, but according to the data on medication use, about 30% of the treatment group used this option.

Table 6. Mean (SD) and pooled within effect size (Cohen's d; ES) for the dependent measures at pre- and post-treatment for treatment group and waiting-list respectively in Study III.

Measure	Group	Pre-treatment M (SD)	Post treatment M (SD)	ES
Sleep-onset latency (min)	Treatment	38.3 (27.14)	27.3 (22.06)***	0.45
	Control	40.08 (31.16)	35.9 (27.04)*	0.17
Number of nightly awakenings	Treatment	1.99 (1.25)	1.23 (0.67)**	0.79
	Control	1.82 (1.18)	1.44 (0.98)**	0.35
Wake after sleep onset (min)	Treatment	56.90 (42.34)	34.79 (42.34)***	0.52
	Control	45.36 (32.14)	33.64 (25.37)***	0.41
Early morning awakening (min)	Treatment	54.1 (32.80)	34.8 (36.69)**	0.56
	Control	48.6 (39.22)	39.2 (31.49)*	0.27
Total wake time (min)	Treatment	149.3 (65.06)	94.4 (74.45)***	0.72
	Control	134.8 (61.86)	119.4 (49.15)*	0.28
Total sleep time (hrs)	Treatment	5.63 (1.12)	6.20 (1.36)**	0.46
	Control	6.08 (0.97)	6.19 (0.89)	0.10
Time in bed (hrs)	Treatment	8.12 (0.64)	7.76 (0.65)***	0.56
	Control	8.33 (0.83)	8.01 (0.82)***	0.39
Sleep efficiency (%)	Treatment	69.44 (13.25)	79.88 (16.03)**	0.71
	Control	73.35 (11.35)	77.46 9.63)	0.39
Sleep quality	Treatment	2.74 (0.55	3.14 (0.56)***	0.73
	Control	2.79 (0.51)	3.03 (0.73)***	0.39
Nights with sleep aid	Treatment	3.5 (5.1)	2.5 (4.46)	0.21
	Control	2.7 (4.6)	3.1 (5.5)	0.08
DBAS	Treatment	68.7 (12.55)	56.0 (14.50)***	0.94
	Control [1]	70.7 (21.10)	70.4 (21.18)	0.01

*p<0.05; ** p<0.01; *** p<0.001
[1] 15 participants in the control group did not complete the DBAS
Note: DBAS = Dysfunctional Beliefs and Attitudes about Sleep scale

Study IV- headache with telephone contact

The main hypothesis that the drop-out rate should decrease significantly if adding short and regular telephone contact could not be confirmed. In the experiment group (self-help with telephone) the drop out from treatment was 29% and in the control group (self-help only) the drop out was 35%. The difference was not statistically significant.

Unexpectedly, improvement was far less than expected on the headache index in this study. By comparison, in the first study 50% reached clinical significant improvement (defined as reduction of headache activity with 50% or more, without any corresponding increase in medication (Haddock et al, 1997)). The proportion of participants reaching the criteria for clinical significant improvement in the telephone group was 29%. In the self-help only group 23% reached this criterion. Given the unexpected finding of a lower rate of improvement in this study an additional small sample was recruited, in which the results were more similar to the previous trial (e.g., 50% showed a clinical significant improvement on headache index).

In marked contrast to the diary ratings, several significant improvements were found in the questionnaire data. Handicap associated with headache, as measured by the HDI, decreased significantly for both groups with a main effect of time [$F(1,22)=26.49$ $p=0.0001$]. Jacobson et al. (1994) argued for a cut-off of 29 as indicating clinically relevant improvement. In the telephone group 53% reached this criteria, and in the self-help only group 33%. This difference was however not significant.

Results on the PSS, measuring perceived stress, showed a main effect of time [$F(1,22)=7.1$ $p=0.014$], with both groups experiencing reduced stress following treatment. A significant main effect was also found on the HADS-D [$F(1,22)=4.53$ $p=0.045$], indicating that depression decreased for both groups. Means for the main outcome measures are presented in Table 7.

Prediction of outcome

To explore if any of the pre-treatment or demographic factors (i.e. age, sex etc) were related to outcome in the four studies, a series of Pearson correlations were calculated. Results showed that high pre-treatment HADS-depression scores in Study IV were significantly associated with good

Table 7. Mean (SD) and pooled within effect size (Cohen's d; ES) for the dependent measures at pre- and post-treatment for the two treatment groups respectively in Study IV. Pre- and post treatment effects analysed with paired t-tests.

Measure	Group	Pre-treatment M (SD)	Post treatment M (SD)	ES
Index	SH+T	4.2 (3.7)	4.0 (4.9)	0.05
	SH	3.2 (2.6)	3.1 (2.4)	0.04
Headache days	SH+T	8.4 (4.4)	8.5 (4.1)	0.02
	SH	7.2 (2.8)	6.4 (3.8)	0.24
Intensity	SH+T	2.1 (0.7)	2.0 (1.1)	0.11
	SH	2.0 (0.8)	2.3 (0.8)	0.37
Duration	SH+T	9.8 (6.3)	7.0 (6.7)	0.43
	SH	7.1 (4.1)	9.5 (5.4)	0.50
Peak	SH+T	2.4 (0.6)	2.3 (1.1)	0.11
	SH	2.4 (0.8)	2.7 (0.7)	0.40
HDI	SH+T	46.6 (18.4)	33.6 (16.4)***	0.75
	SH	48.4 (13.3)	34.4 (14.8)***	1.00
HADS – D	SH+T	5.7 (4.3)	4.5 (3.9)	0.29
	SH	6.8 (2.5)	4.9 (3.3)	0.66
HADS-A	SH+T	8.7 (4.8)	7.9 (5.1)	0.16
	SH	7.7 (4.5)	7.0 (4.8)	0.14
PSS	SH+T	31.3 (7.8)	25.7 (2.0)*	1.14
	SH	28.3 (3.9)	24.7 (7.3)	0.64

*p<0.05; ** p<0.01; *** p<0.001
Note. SH+T = treatment with added telephone calls, SH = self-help only. HADS-D (Hospital and Anxiety Depression Scale, depression subscale); HADS-A (Hospital and Anxiety Depression Scale, anxiety subscale); HDI (Headache Disability Inventory); PSS (Perceived Stress Scale).

outcome (r=.36, p=0.05). Except for this association none of the pre-treatment measures or demographic factors in the four studies was related to improvement on the outcome measures.

Attrition analysis

Attrition was very high in several of the studies, in particular in the treatment groups. It was therefore examined if there were any correlations between demographic variables, pre-treatment measures and attrition. In addition, Study IV was designed to specifically test whether drop-out could be reduced by short weekly prompts on telephone.

In Study I 56% dropped out. It was examined if dropout rates could be explained by age, sex, diagnosis, headache parameters, medical consumption, headache duration in years, depression [BDI], degree of handicap [HDI] and attribution style [MLPC]. The dropouts tended to be younger, and to have had headache for a shorter duration. Apart from these differences there was no statistically significant difference among the conditions explaining attrition rate.

Of the participants in Study II, 26 % dropped out at various stages without providing follow-up data. No differences were found between dropouts and completers in demographic factors or pre-treatment outcome measures.

In Study III 24% dropped out, and did not provide post treatment data. All available demographic variables and pre-treatment measures were analyzed by comparing dropouts and completers. It was found that drop-outs differed from completers on the following pre-treatment variables; sleep efficiency [t $(1,70)= -2.6$, $p<0.05$], total amount of sleep [t $(1,70)= -3.1$, $p<0.01$] and wake time during night [t $(1,70)= 2.4$, $p<0.05$], suggesting that drop-outs had less pronounced sleep-problems. No other differences were found.

In Study IV, finally, 32 % dropped out without providing follow-up data. The drop-out rate in the telephone group was 29% and in the self-help group 35%, a difference not statistically significant. No significant differences were found in demographic or other data that could predict drop-out.

An overview of the drop-out rates in the studies is given in Table 8.

The internet as media for treatment

From the evaluation form of the four studies it was found that a majority of the treated participants experienced Internet communication as convenient. Anonymity was not considered to be an obstacle, but rather the opposite. One pervading characteristic of the comments was the experience of freedom to control the time when communicating with therapists and taking part in the treatment.

Table 8. Overview of number of drop-outs and time of drop-out in the four studies.

	Headache I		Stress		Insomnia		Headache II	
	Exp	Cont	Exp	Cont	Exp	Cont	Exp	Cont
Included	54	48	38[1]	47	54	55	24	20
Drop out during pre-treatment N (%)	12 (22)	8 (16)	0 (0)	0 (0)	7 (13)	0 (0)	0 (0)	0 (0)
Treatment Drop out during treatment, N (%)	17 (31)	0 (0)	15 (39)	7 (15)	15 (28)	4 (7)	7 (29)	7 (35)
Drop out during post treatment, N (%)	5 (9)	15 (31)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Total drop out, N (%)	57 (56)		22 (26)		26 (24)		14 (32)	
	34 (63)	23 (48)	15 (39)	7 (15)	22 (41)	4 (7)	7 (29)	7 (35)
Participants ending treatment, N (%)	20	25	23	40	32	51	17	13

[1]Three participants in the control group and 12 in the self-help group declared that they were no longer interested and withdrew before the study proper had started. Hence, the actual number of participants was 85, who by then already had been randomized to each respective condition.

GENERAL DISCUSSION

In the present thesis a new approach to self-help was developed and tested in four randomised controlled trials. Results were overall positive and hold promise that the notion made by Miller (1969), that the most important social responsibility for psychology is to teach people to help themselves, will be an easier task in the future. The four studies in the present thesis give support to this view, suggesting that:

- Internet *is* a medium that is well suited for therapy, with effect sizes comparable to face-to-face therapy. In this thesis this is shown well for headache and stress, and fairly well for insomnia.
- Using Internet as a medium for treatment can highly reduce costs. For example, Study I suggests that cost-effectiveness might be 12 times higher compared to face-to-face therapy for headache, while still retaining comparable results.
- Participants in Internet treatment program considers Internet to be well suited for treatment, and do not consider anonymity or lack of personal contact to be an obstacle.
- Internet therapy seems to be at risk of generating a high attrition rate. This phenomenon might be specific to the Internet medium or to the Internet population. In Study IV, adding telephone contact was not shown to decrease attrition.

These studies are somewhat pioneering in the area of health promotion, and puts the focus on the discussion of if the accessibility to Internet creates an advantage as compared to clinically based face-to-face treatments. These studies do show that this might be so, and that further developing of the techniques involved can make the Internet an extraordinary well suited medium to promote health and psychological wellbeing. Already at this fairly primitive stage of technique and research these and other studies show effect sizes comparable to face-to-face therapy – with reduced costs.

Cost-effectiveness

One of the main purposes of using Internet as a medium for treatment is cost reduction, while still obtaining results equal to "treatment as usual". This was investigated in the first study on headache, showing a reduction of 12 times compared to normal therapist time for headache treatment (6 sessions) but with comparable result. Although this shows that the Internet has a considerable potential to reduce the costs of medical care, it must be noted

that cost-effectiveness depends on the degree to which participants ask personal questions, or experience problems with computers or training programs. Another aspect of cost is travel expenses, since patients often live far from the treatment centre. Waiting for treatment is also costly, and Internet can help to shorten waiting lists. However, these observations merit further investigations as the measure of cost-effectiveness in study I was crude and did not cover all the aspects of cost that are involved in the implementation of Internet-based treatment.

Timing and pacing

One advantage with Internet-based self-help over self-help books is that the treatment can be timed and paced, and that advice can be automated. For example participants can fill in a sleep diary for a week, from witch a recommendation of adjusting bedtime are calculated and presented automatically. This represents a future venue for Internet-based treatment as more interactive programs are under development. How well such developments are received remains to be investigated.

Methodological concerns

The studies in this thesis were all conducted from a quantitative point of view, involving the use of multiple dependent measures. All studies were randomised with one treatment group and one control group with data collected before and after treatment. Most of the self-report measures had an adequate reliability in terms of Cronbach's alpha, which is considered to be of crucial importance in empirical studies. Nevertheless, there are some methodological issues that need to be addressed.

Measures

In the first headache study (Study I) a somewhat different way to calculate a headache index was used as compared to other studies in the literature. The common procedure is that participants register headache-intensity four times a day (Blanchard et al., 1990), Instead, the number of registrations was reduced to one each day, and participants estimated the duration of headache in hours, as well as the intensity. In the second headache study (Study IV) the index was further elaborated, and the index was filled in four times a day using a 5 point Likert scale. These innovations imply that the outcomes of the headache indexes in studies I and IV are not fully compatible with other studies.

Attrition

Unfortunately, and in line with the self-help study by Kohlenberg and Cahn (1981), the attrition rate in all studies was relatively high, which makes it harder to generalise the findings.

One explanation to the high attrition rate could be that the "disinhibition effect", observed by Joinson (1998), did have an impact on drop out. The tendency of Internet users to be "disinhibited" might imply that it is easier to send an e-mail than to respond to an advertisement via telephone or a letter. This may bias the participants to join the studies, and also to drop out quickly when confronted with study demands, especially if the demands are considered harder to comply with than the problem itself. A majority of the drop-outs in the first study occurred before even seeing the actual training program (during the four weeks of pre-treatment diary). In both Study I and Study III there was also a significantly higher attrition rate amongst participants with less severe problems – two observations that support the disinhibition effect argument.

Another explanation for the high drop-out rate in the studies can be derived from the ongoing research about different stages for change, undertaken by Prochaska et al (1992). They suggest that patients may go through several distinct stages-of-change: 1) precontemplation (not considering any change in behavior), 2) contemplation (serious consideration of change sometime in the future), 3) preparation (initial behavioral steps towards change), 4) action (concrete activities that will lead to the desired change), and 5) maintenance (active efforts to sustain the changes made). Depending on which stage the patient is in, compliance with treatment is expected to differ. A tendency to be in the "wrong" state when entering the studies might have increased the attrition rate.

Lack of treatment credibility (Borcovec & Nau, 1972) – i.e. participants consider the treatment not to be trustworthy and effective – could theoretically contribute to the high attrition rate. This was investigated in one study (Study II). The treatment offered was rated as credible, likely to lead to an improvement and no association between credibility rating and attrition or outcome was found.

It must be noted that the main part of attrition in the studies in this thesis was in the experimental groups, which is similar to an earlier study on Internet treatment (Andersson et al., 2002), but opposite to the view that waiting list controls drop out more frequently than participants in the treatment group.

Study IV was specifically tailored to investigate attrition, by testing the hypothesis that adding telephone contact would improve adherence and decrease attrition. Interestingly this hypothesis was not supported. One explanation might be that the difference between the short personal telephone calls and just receiving e-mail feedback was too small to generate meaningful differences. Another factor is that all participants had a first telephone interview. In several previous minimal therapist contact studies, the actual time with the therapist has been rather extensive. In Study IV, though, it was restricted to six 10-minutes phone calls, making comparisons risky. It should be noted that, in one later study on chronic back pain (Buhrman et al; 2002) attrition almost disappeared completely when performing initial short interviews with the participants, during which the termination of the study was carefully planned, and follow-up appointments scheduled. The latter study suggests that a single telephone call in the beginning and in the end in addition to regular calls (Buhrman et al., 2003) might be enough to reduce attrition almost completely – contrary to the finding in Study IV. Taken together these studies suggest three possible factors influencing attrition rate – problem area, scheduling of contact and therapist factors. Even though therapist factors in self-help treatment may not seem important, they can indeed be so, as Martin, Nathan, Milech and Keppel have shown (1989).

Diagnostics and assessment forms

Using the Internet for diagnosing health problems can be questioned, although Lenert et al. (2002) showed that valid self-reported diagnoses can be obtained via the Internet. However, more research is needed to be performed on the correspondence in diagnostic capabilities between Internet-based and face-to-face interviews (Carlbring et al., 2002; Swoboda, Mühlberger, Weitkunat, & Schneeweiss, 1997).

Another issue when conducting studies over the Internet is the psychometric properties of assessment instruments. As mentioned, research in this area (Buchanan, 2000; Andersson et al., 2003) is emerging and has showed that WWW administration of questionnaires gives reliable and valid data, and that psychometric properties replicate over media (Buchanan & Smith, 1999). The finding that there is a tendency to report lower social anxiety and social desirability when using Internet, compared to paper-and-pencil data (Joinson (1999), support the notion that measures via Internet might even be superior in some settings. However, since this is an area with only a few studies, it must be recommended that each new scale should be evaluated empirically for Internet use (Buchanan, 2003).

Improvement of controls

The fact that the control groups showed statistically significant improvements in Study II and III is difficult to explain. However, it may be that the mere registration and assessment of the problem, started a process resulting in higher problem awareness and hence capability for behavioural change. Since information regarding health management for conditions such as stress, headache and to some extent also insomnia, is widely available, it could be that the controls started to alter their habits and behaviour before getting access to the program. According to this interpretation, again the stages-of-change model might be applicable (Prochaska, DiClemente, & Norcross, 1992). Individuals who located the site and the treatment study might all have been at a stage when they were contemplating to take action, and inclusion in the waiting list control group did not preclude that they took steps and measures resulting in behavioural change. However, it must be noted that being put on a waiting list does not usually result in spontaneous improvements, and no data was collected to support the stages-of-change interpretation in any of the studies. Thus, this remains a speculation.

Another possible factor is that all studies were undertaken during springtime. It could be that some general factor, for example more sunlight (in Sweden the increase in daylight is more than six hours from 1st of April to beginning of June), did affect all samples positively, perhaps by a general decrease in stress levels, regardless of health status. While this possibility cannot be excluded, it seems unlikely that individuals improve to such an extent without any intervention or deliberate change in life-style. That would imply a seasonal character in all those problems, which is unlikely.

Another possible explanation is that the pre-treatment measures – especially in the headache and insomnia studies, where it consisted of filling in diaries for several weeks – might induce treatment effects. For example Hauri (1993) found that a single treatment session improved insomnia in many patients. In line with this finding some of the participants in study I noted in their evaluation comments that the baseline diaries had a great impact on their problems, resulting in better knowledge of when and why they got headaches.

Finally one must also consider regression towards the mean as a plausible explanation to the improvements noted, given the common fact that high scores are likely to decrease over time.

There is no data in the present studies to support or refute any of the theories above and future trials should closely monitor treatment-related activities in

control participants' group awaiting the intervention, as well as treatment effects resulting from pure monitoring activities.

Failure to replicate findings in Study IV

One finding that needs to be discussed is the fact that the amount of headache reduction from Study I was not replicated in Study IV. There are some potential factors that may account for this.

First, the treatment may of course have been less successful than in the previous trial. However, disability inventories suggest that participants improved also in Study IV. For example, on the HDI improvements were evident, and as this questionnaire is well validated there is no reason to doubt this finding.

Second, the headache monitoring period used as pre- and post treatment in Study I and IV was different (4 weeks in Study I, 2 weeks in Study I). Two weeks might have been too short to measure changes in a reliable way, especially for participants with migraine and combined headache. Blanchard, Hillhouse, Appelbaum, and Jaccard (1987) assessed the adequacy of different lengths of baseline by correlating scores for baselines of 1, 2 or 3 weeks with scores from a 4-week baseline. Their analyses led them to recommend a 2-week baseline for studies with tension headache sufferers and a 3-week baseline for when migraine is part of the problem.

Third, the difference might be due to a cohort problem. In Study I, more generous inclusion criteria were used, accepting headache associated with whiplash and severe headache (high intensity 24 hrs/day) and participants with a fairly high consumption of pharmaceutical agents. When realising that there was a significant lower rate of improvement in Study IV an additional small sample was recruited (N=8) (participants earlier excluded because of problems such as whiplash and pain). In this group the results were more similar to the previous trial (e.g., 50% showed a significant improvement). If not an effect of regression towards the mean, these findings indicate that the programs might be more effective for more difficult problems.

Ethical concerns

Some ethical concerns must be considered in all self-help treatment, particularly when Internet is used (Hodge, Gostin, & Jacobson, 1999). These relate primarily to diagnostic issues and medication withdrawal.

The difficulty to establish valid diagnoses through self report inventories is a methodological problem, but also an ethical dilemma. It could be of major importance if participation in a self-help program gives the person a false feeling of safety, which can postpone the discovery and treatment of serious problems. For example, to exclude disorders and diseases such as brain tumour or other neurological diseases, it is necessary to visit a neurologist, and in order to role out obstructive sleep apnoea a visit to a sleep laboratory might be mandatory.

Participants in self-help programs must therefore be carefully informed about the necessity to undergo a thorough medical examination by a physician, whenever there might be a risk that their problem is of a constitutional/somatic origin. This has been a problem in the headache studies (to rule out tumours) and in the insomnia study (to rule out obstructive sleep apnoea). The approach to meet this dilemma has been to inform that the inclusion form is not a substitute for a medical diagnosis. Any doubts about the suitability for taking part in the study, motivated by medical or psychological problems detected in the inclusion procedure were dealt with by recommending the participant to search for an alternative treatment or consultation.

Medication withdrawal is a topic that needs special attention. When dealing with insomnia for example, withdrawal of medication is an issue that needs careful consideration, especially when benzodiazepines are used, and preferably all withdrawal should be supervised by a physician. In Study III this was highly recommended to the participants who wanted to reduce their medication intake. This was also the recommendation given to participants in Study I and IV, using painkillers containing codeine.

Future directions

The results of the studies in this thesis demonstrate that the Internet has the potential to serve as a medium for psychological treatment. Self-help/minimal therapist contact through Internet has been reported as efficient for headache, stress, insomnia (Study I - IV) depression, panic anxiety, chronic pain, tinnitus (Andersson et al., 2003; Carlbring et al., 2001; Klein & Richards, 2000; Buhrman et al, 2003; Andersson et al., 2002), post-traumatic stress (Lange et al., 2000), and eating disorders (Winzelberg et al., 2000). All these studies need replication, and more specific investigations about the relative merits of Internet in relation to other established treatment forms should be undertaken.

Interestingly, only very few participants in the Internet self-help studies showed dissatisfaction with the lack of personal contact; in fact the privacy and anonymity involved was mentioned as an advantage with the method. The computer knowledge needed and the software required to participate in the study was kept at a minimum. While these studies introduced on-line exercises, such as relaxation and cognitive restructuring, it is likely that future technological advancements and the spreading of present technology (such as Web-cameras) will widen the scope and extent of Internet-based self-help.

Although it is shown that the Internet as a medium for self-help results in treatment effects similar to other procedures, the relatively high attrition rate impedes generalization. This raises several research questions touching the development and investigation of program modules to increase compliance. For example one could adapt the treatment of specific problems by combining face-to-face and Internet interventions, and to study if there are individual differences that could predict attrition or low compliance. It would be interesting to see if programs based on the "model of stages of change" (Prochaska et al., 1992) could affect attrition, compliance and treatment effect.

In future studies it will be crucial to investigate if statistically and clinically significant improvements presented in the controlled studies can be replicated in clinical settings. In the psychotherapy literature this is referred to as an effectiveness study (Seligman, 1995) in which the outcome of the therapy is tested in routine practice. Preliminary data suggests that Internet-based treatment works in clinical practice, at least for tinnitus patients (Kaldo-Sandström, Larsen, & Andersson, 2003). Future studies and clinical practice will reveal if Internet-based treatment is here to stay.

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ACKNOWLEDGEMENTS

I would like to express my deepest gratitude to all the staff, teachers, professors, students, doctors and participants who have inspired and helped me during this work.

I especially would like to thank:

My supervisor - *Gerhard Andersson*, who was there whenever I needed, giving support and excellent scientific guidance over the years!

My very good friend and colleague, *Richard Pettersson*, for the cooperation on the work on the first and third study, and for all the years of shared discussions, work, visions and beers.

My co-workers in the field of self-help: *Kristoffer Zetterquist*, *Juha Maanmies* and *Per Lundquist*, for their help with the second and fourth study.

Mats Fredrikson – head of the Department of Psychology - for invaluable comments on the manuscript.

Per Carlbring, *Victor Kaldo-Sandström* and the rest of the doctoral students, for their supportive comments and interesting discussions.

Finally, I particularly want to thank:

My very good friend through my life – *Yngve Hareland*, for making me realise that birdwatching is a kind of self-help heavily contributing to a meaningful life.

My parents – *Ulla och Lennart* – for bringing me here, always supportive.

My family - *Annebelle, Joakim, Kim* and *Samuel* – for sharing everything, with a tremendous patience.

Västerås in August 2003
Lasse Ström

Acta Universitatis Upsaliensis

Eqo rtgj gpukxg'Uwo o ctkgu'qh'Wrrucrc 'Fkuugtvcvkqpu htqo 'vj g'Hcewn{ 'qh'Uqekcn'Uekgpegu

Editor: The Dean of the Faculty of Social Sciences

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