

**Teaching Interpersonal Communication Skills Using an Internet Based
Intervention: a Randomised Controlled Trial**

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Foreword

The impetus to the present research has been an interest in conflict resolution theory and practice. Being a practicing lawyer for almost 10 years, I have experienced first hand the importance of interpersonal communication skills in negotiation and conflict resolution in the legal context. The last few years I have been engaged in research and teaching in conflict resolution in legal conflicts. A growing interest in the psychology of negotiation and conflict resolution led to the study of some psychological subjects, which – after some time – added up to a bachelor's degree. In recognition of the many exciting research problems awaiting study in my field of interest, I wanted to learn more about experimental research and statistical analysis. Therefore I perceived it as a great opportunity when it became possible to participate in the present research as part of my master's degree in psychology at the University of Oslo.

My supervisors have been Professor Pål Kraft and ph.d. student Filip Drozd. The intervention (*New Me Kommunisere Bedre*) studied in this research was developed by the for profit company Changetech AS. The present author has no affiliations to or interests in Changetech AS.

Kraft and Drozd were responsible for design of the experiment. The measures were assembled and translated by Drozd, aided by Kraft and the present author. Statistical analyses were performed by the author.

I would like to thank to my supervisors, who have read and commented upon several drafts of this thesis, and provided excellent support throughout the project. The responsibility for any remaining errors is naturally mine alone. Finally, I would like to thank my family, for encouragement and support.

Abstract

Skilled interpersonal communication improves individual and group outcomes in life and work. This makes it important to find effective and efficient training methods to teach interpersonal communication skills. Internet based interventions may provide training to a wide audience at low cost and have been shown to be effective for a range of health related behaviours, but so far not for communication skills training. The present study evaluates the efficacy of an internet-based intervention to teach interpersonal communication skills relative to a control group. Participants were randomly assigned to one of the two conditions. In the treatment condition, participants got access to a four week internet based communication skills training program. The control group was put on a waiting list. Interpersonal communication skills were measured at baseline and at 1 month, 2 months and 6 months follow ups, using a selection of subscales from the Conflict Resolution Questionnaire and the Perspective Taking scale. Analyses did not find any statistically significant effects of the intervention relative to the control group. Several possible reasons for this null finding are discussed, and directions for future research are proposed.

Introduction

Interpersonal communication skills affect individual experience and improve individual and group outcomes in life and work. On a fundamental level, interpersonal communication plays an important role in fulfilling several basic human needs, like the need to belong, the need for competence and the need for autonomy (Baumeister & Leary, 1995; Ryan & Deci, 2000, 2008). In order to satisfy these basic human needs the individual must be able to communicate in an effective and appropriate way.

Lack of interpersonal communication skills may have negative consequences. There is a large body of research that shows that lack of adequate interpersonal communication skills is related to psychological suffering. Deficits in interpersonal skills have been shown to be related to depression (Segrin, 2000b), loneliness (DiTommaso, Brannen-McNulty, Ross, & Burgess, 2003) and social anxiety (Wenzel, Graff-Dolezal, Macho, & Brendle, 2005). Even severe psychological disorders, like schizophrenia, have been shown to be related to dysfunctional interpersonal skills (Patterson, Moscona, McKibbin, Davidson, & Jeste, 2001).

But the converse is also true. Interpersonal skills have been shown to be consistently and positively associated with a broad set of indicators of psychological well-being, including life satisfaction, self-efficacy, happiness and quality of life (Segrin & Taylor, 2007). The directions of the relationship between communication skills and psychological health and well-being are not in every case entirely clear. But at least some of the causal arrows points from communication behaviour toward psychological outcomes, suggesting the possibility of improving psychological health by imparting interpersonal communication skills (Segrin & Taylor, 2007).

One way that interpersonal communication skills may impact on the subjective well-being of the individual, is through the role communication plays in securing positive relationships with others. In a study of social skills, psychological well-being and positive relationships, Chris Segrin and Melissa Taylor (2007), found that positive relationships mediated the association between social skills and psychological well-being. Segrin and Taylor had 703 adults complete a questionnaire with measures of social skills, psychological well-being and positive relationships. Results from the study showed that social skills were associated with measures of psychological well-being, including greater life satisfaction, environmental mastery, self-efficacy in social situations, hope, happiness, and quality of life.

Results also showed that social skills were associated with psychological well-being because of positive relationships with others. Interpersonal success led to subjective experience of well-being.

Given the relationship to basic human needs and the impact on individual happiness and relations with others, interpersonal communication skills should have a broad range of applications, and this proves to be the case. Beginning in childhood and adolescence, children who develop good interpersonal communication skills perform better academically (Graziano, Reavis, Keane, & Calkins, 2007). Married couples exhibiting effective interpersonal communication report happier relationships than less skilful couples (Ridley, Wilhelm, & Surra, 2001). Generally, people with higher levels of interpersonal communication skills cope more readily with stress, and they adapt and adjust more easily to major life transitions than those whose level of competence in these skills is lower (Segrin, 2000a).

Interpersonal communication skills are important also in professional contexts. In the business sector it has been shown that skilled interpersonal communication is associated with effective management (Bambacas & Patrickson, 2008). Employers often include interpersonal communication skills in the criteria for recruiting, and employees tend to view superiors with effective interpersonal communication skills more favourably. Interpersonal communication skills are a crucial part of any effective negotiator's tool kit (Fisher, Ury, & Patton, 1991; Mnookin, Peppet, & Tulumello, 2000). Negotiation may be seen as a structured and goal-directed process of communication. People negotiate all the time, in all kinds of situations, be it husband and wife, two business partners or nations. The ability to defuse negative emotions, in self and other, is an important negotiator skill. Likewise it is important to build a working relationship based on trust. These are basic communication skills, and effective communication thus forms a part of effective negotiation. In mediation and other forms of conflict resolution communication skills are also important, and mediator education is often for a large part training in specific communication skills, e.g. transformative mediation specifically aimed to deal with interactional crises (Bush & Folger, 2005). Indeed, it has been shown that one of the most important mediator characteristics is the ability to connect with the parties through the use of listening skills, empathy and other communication skills (Goldberg, 2005).

In health care the importance of effective communications skills has long been recognized. It has been shown that effective interpersonal communication made a significant

contribution to patient well-being and treatment outcomes (Blasi, Harkness, Ernst, Georgiou, & Kleijnen, 2001; Street, 2003). Doctors who formed a warm, friendly relationship with their patients and provided reassurance – thus exhibiting good interpersonal communication skills – were more effective at securing positive treatment outcomes and subjective patient well-being.

Effective and appropriate interpersonal communication thus is important to meet the basic needs of the individual, to secure a happy and fulfilling life, and in a number of applied contexts, ranging from childrearing to health care and business. The question how to improve interpersonal communication skills is therefore of great practical importance.

Interpersonal communication skills defined

In designing interventions to promote interpersonal communication skills, it is important to be clear about what we are studying and trying to improve. Communication is a broad subject and the concept of interpersonal communication is notoriously hard to define (Hargie, 2011). Some initial remarks about the concept of interest, therefore seems to be needed. Interpersonal communication is studied in a number of fields, from communication studies to anthropology and linguistics, but here the focus of attention will be on the social psychological literature. We will begin with the core concept of communication.

The word communication derives from Latin *communicare*, which means 1) to share; to do or to have in common with another, and 2) to inform, to tell someone about something (Johanssen, Nygaard, Schreiner, Kraggerud, & Tosterud, 1998). The Latin word thus had a double meaning, referring both to sending of messages and doing something in common. The Latin word thus reflected the interpersonal or relational aspect of communication. It is interesting to note, moreover, that the word *communicare* etymologically is closely related to the word *communitas*, meaning community or society. The observation that human society is predicated upon communication is thus reflected in language at an early stage.

More recently, several definitions and models of communication have been proposed in the social psychological literature. The emerging consensus is that interpersonal communication most fruitfully may be seen as a process, which is transactional in nature (Adler, Proctor, & Rosenfeld, 2011; Hargie, 2011). The emphasis on the transactional aspect underlines that interpersonal communication is a dynamic process that the participants create through their interaction with one another, not a one-way street with a “sender” and “receiver”. In the transactional view of communication, sending and receiving is conceived as usually

occurring simultaneously, meanings as relational, and both content and process as affected by the environment, including noise and channel (Adler, et al., 2011). According to the transactional view, communication is therefore a highly complex social phenomenon with a host of variables potentially affecting the outcome.

The interpersonal element of communication has been defined in both quantitative and qualitative ways (Adler, et al., 2011). Quantitative approaches see interpersonal communication as defined by the number of participants. Interpersonal communication occurs, according to this view, in a dyad (two persons interacting). This seems to be an overly restrictive definition of interpersonal communication, and would exclude much of what goes on in small groups, teamwork, meetings, interaction in the family, etc. It will not be adopted here. Interpersonal communication has also been defined in qualitative ways. Qualitative approaches try to formulate criteria that distinguish interpersonal communication from *impersonal* communication (Adler, et al., 2011). Several such criteria have been proposed, i.e. uniqueness, irreplaceability, interdependence, disclosure of personal information, intrinsic rewards (Adler, et al., 2011). Some of these criteria seem to impose too restrictive a view on interpersonal communication, and accordingly will not be adopted.

A simple definition, sufficient for our purposes, will instead be taken as our point of departure. Interpersonal communication will be seen as “the process by which information, meanings and feelings are shared by persons through the exchange of verbal and nonverbal messages” (Brooks & Heath, 1993, cited in Hargie, 2011, p. 15). Interpersonal communication, according to this definition, includes communication in dyads and small groups, as it occurs non-mediated (or face-to-face), and excluding transactions of a wholly impersonal nature (e.g. buying a ticket on the bus).

Skilled interpersonal communication

One way to look at interpersonal communication is to see it as a set of skills (Hargie, 2011). According to Hargie, communication is a form of skilled performance. Communication is, according to this view, goal-directed, and requires considerable coordination with others.

The goals that motivate communication behaviour need not be consciously formulated, and the behaviour may often be executed automatically. Indeed, a feature of skilled performance is that behaviour is executed automatically (Moors & De Houwer, 2007). But

automaticity in communication behaviour is often a result of learning. When learning new skills, as when acquiring communication skills, individuals move through several steps from unconscious incompetence, through conscious incompetence, conscious competence to unconscious competence (Hargie, 2011, p. 7). Thus, the seemingly automatic patterns of interpersonal communication are acquired by processes of learning.

Effective communication behaviour may indeed to a great degree be seen as a set of skills that anyone can learn (Fortney, Johnson, & Long, 2001). This is not to say that skilled interpersonal communication does not involve natural ability. Obviously it does. Differences in interpersonal communication styles and behaviour are partly predicated upon personality differences inhering in part from our genes. However, natural ability may be developed, and the skills underlying effective interpersonal communication may in fact be learned.

The exact range of skills required for interpersonal communication to be effective is not agreed upon. But it is widely held that in addition to skills in sending and receiving messages, several other important interpersonal or social skills are involved as well (Adler, et al., 2011; Trenholm & Jensen, 2011). Skilled interpersonal communication is not only about verbal communication. It is trite to point out that non-verbal messages are often more salient for the receiver, than verbal messages. Non-verbal communication is obviously important, and especially so in securing the relational needs of the individual – autonomy and relatedness. Communication is a way of interacting, and this not only has instrumental purposes, but meaning for the individual in and of itself. The non-verbal dimension thus has to be included, if the goals of interpersonal communication are to be fulfilled.

Interpersonal communication skills thus are closely related to the concept of interpersonal or social skills. Conceptually, social skills are often equated with non-verbal communication skills (e.g. Riggio, 1986). The skills identified under this conception may include some of the following: social expressivity (taking the initiative towards others), emotional expressivity (expressing inner states and feelings), social sensitivity (concern about impression on others), emotional sensitivity (ability to empathize with others) and emotional control (ability to self-regulate emotions) (Riggio, 1986).

A list of skills that pertain to interpersonal communication would probably include some of the following: listening skills, questioning skills, skills in showing understanding for others, skills of explaining, skills of persuasion, skills of self-disclosure, and skills of assertiveness (for an even more comprehensive list, see Hargie, 2011).

There seems to be some features common to all these skills. Perhaps the most important common feature is that skilled interpersonal communication must satisfy two basic conditions: it must be both effective and appropriate (Segrin & Taylor, 2007; Spitzberg, 2000a, 2000b). Interpersonal communication is effective when the individual's needs are met. This is obviously an important goal. But the needs of the individual may be met in basically two ways: with or without regard for the needs and interests of the other (or others). This is where the dimension of appropriateness comes in. Interpersonal communication is appropriate to the degree that need-fulfilment of the individual happens in a way that does not damage the relationship.

The two dimensions of skilled interpersonal communication may be represented graphically as two orthogonal dimensions: 1) degree of effectiveness, and 2) degree of appropriateness (Figure 1).

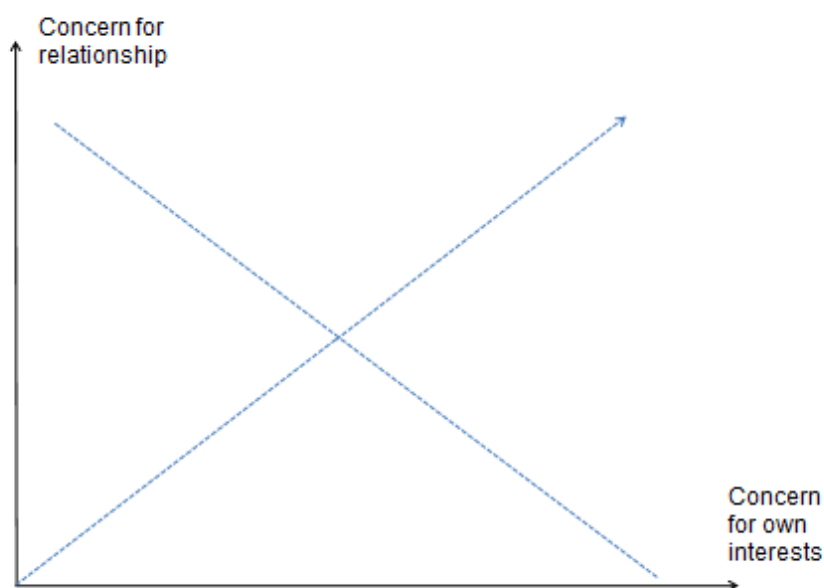


Figure 1: Two Basic Dimensions of Skilled Interpersonal Communication

The dimensions of effectiveness and appropriateness may be explained in several different, but related ways. One important factor impacting on the individual's communication behaviour is the degree of concern for own and others interests, as highlighted in figure 1. In this respect, this model closely resembles the widely used dual-interest model

of conflict strategies (Pruitt & Kim, 2004). Conflict strategies obviously are closely related to communication behaviour, though communication of course applies also to situations without conflict.

As noted above, it is the combination of effectiveness and appropriateness that is the hallmark of skilled communication. This is represented in the upper right corner of the model. This is the case when the individual want something (be it expressing her views, fulfilling some need, or something else), and communicates this in a manner that takes the other persons interests into account, is appropriately respectful and/or friendly, and thus is met with sympathy and a wish to fulfil the need from the other person. (Actual success in a particular case is not a valid criterion of skilled communication, though. There may be barriers to effective communication operating that have nothing to do with the skills exhibited by the individual in that particular situation. The other person may not understand the language, may be so preoccupied with other matters that the communication is not attended to, etc. It's the tendency to generate sympathy and need-fulfilment that matters).

If the concern for the others interests and/or the relationship dominates, the individual may communicate in ways that are appropriate without being effective. Motivated perhaps by fear of damaging the relationship, the individual does not dare to voice own concerns. This type of communication pattern is common for example early in romantic relationships, where none of the partners candidly express their own preferences, when they for example discuss where to go for dinner. Being highly motivated to please the other, but afraid to state their preference, they may easily end up somewhere none of them wanted to go.

If, on the other hand, the concern for own interests dominates, the individual may communicate in a way that is effective in securing these interest, but with little regard for the others interest, and perhaps at the cost of damaging the relationship. The late passenger elbowing his way through the crowds at the airport, or the aggressive salesman approaching the unsuspecting tourist in the bazaar, may be seen as examples of this pattern of communication. Sometimes, this kind of communication behaviour in fact is appropriate (in another sense of the term). The situations just mentioned may be seen as examples. Other examples may be when the other are expressing needs that are illegitimate (e.g. wanting to steal your bike), has limited capacity to understand and act in the situation (e.g. the two-year old in the supermarket), or there is and will not be any relationship that matters with the other person, and it is important for you to have your interest met here and now (e.g. the late

passenger). But our understanding of the situation may be flawed (especially in the last example), and you never know when or where you will meet your fellow passenger again. So, the combination of effectiveness and appropriateness is very often the goal to aim for.

Skills targeted in the present intervention

Based on theoretical considerations like those outlined above, a set of skills may be targeted in a particular intervention. Different sets of skills are targeted in different interventions, and there is no agreement as to the choice of skills that should be included. Interventions aimed at particular audiences (e.g. physicians) will differ from interventions directed to the general public, like the intervention evaluated in this research. As an example of a general intervention, Marshall Rosenberg's (2003) popular and well regarded Non-Violent Communication (NVC) has targeted the following skills: 1) receiving empathically, 2) observing without evaluating, 3) identifying, expressing and taking responsibility for our feelings, and 4) requesting that which would enrich life. For the intervention evaluated in the research presented here, three main sets of skills were singled out:

1. Listening skills and skills in showing empathy
2. Skills in identifying, acknowledging and managing feelings
3. Skills in observing without evaluating and in communicating clearly based on your needs

The implementation of the training in these skills in the intervention, including the performance objectives set for each skill, is described in more detail in the Method section (below). Here, a brief account of each skill is offered.

Listening skills and skills in showing empathy

The ability to listen actively and show empathy is obviously important in skilled interpersonal communication (Hargie, 2011). Empathy may be conceived as other-focused emotional response that makes it possible to experience emotional contact with another (Galinsky, Maddux, Gilin, & White, 2008). Showing empathy communicates understanding and acceptance of the other as a person.

Listening skills and skills in showing empathy both make it easier to obtain information and to maintain positive relationships with others. In fact, listening is often what

we do most when communicating (Emanuel et al., 2008). It is also a highly valued skill, both in private and professional contexts (Wolvin, 1984). Thus it is obviously a skill to include in interpersonal communication training.

Skills in identifying, acknowledging and managing feelings

Our emotions may be seen as communication to ourselves. Emotions arise when an individual attends to a situation and understands it as being relevant to his or her current goals (Lazarus, 1991). Negative emotions alert us to the possibility that our needs or interests are being threatened or harmed; positive emotions signal expansion and harmony and contribute to broaden and build our resources for future interactions (Fredrickson, 2001). Skills in identifying, acknowledging and managing feelings thus already for this reason obviously are important as prerequisites for effective communication. Without sufficient attention to in what ways what happens affects our goals and needs, it is impossible to exert influence on the on-going action by way of communication.

But emotions are important for interpersonal communication also when we take the interaction into account. Much of what goes on in communication is emotional. When we are joyful, we communicate our joy to others; when sad, sadness. As has been said, emotions are ever present, impossible to suppress and hard to handle (Fisher & Shapiro, 2005). Effective emotion management in both self and others is thus important to interpersonal communication.

Skills in observing without evaluating and in communicating clearly based on your needs

This third set of skills is composed of two different, but related skills: skills in observing without evaluating, and skills in communicating based on needs. These skills are related because evaluations are often masked expressions of our needs (Rosenberg, 2003).

Evaluation is often harmful in interpersonal communication because it generates defensiveness (Gibb, 1961). When people hear evaluation, they often perceive criticism. This perception leads to defensiveness – self absorption and feelings of threat and weakness. And important approach to mediation, transformative mediation, is designed to deal with this form of interactional crisis (Bush & Folger, 2005). Evaluations may be communicated using both

verbal and non-verbal cues. Non-verbal cues may include facial expression, tone of voice, manner of speaking, etc.

Observing without evaluating is linked to communicating based on needs, because when the observation is exposed without the evaluative mask, it is easier to connect with your needs (Rosenberg, 2003). In what way is what the other person is saying or doing having an impact on your needs? This question is clearly much easier to answer, if you are in fact focusing attention on the behaviour, and not attaching labels and other forms of evaluations to the person. Thoughts and statements like “They are stupid”, “They are incompetent”, “They are thoughtless”, etc., often originate in perceptions of needs or interests being threatened or harmed. But the statements and thoughts direct attention somewhere else: namely towards the personality and disposition of the other person or persons. We easily lose sight of our own needs in our eagerness to condemn and criticise the others. How can we then have them met? Thus, the skill of observing without evaluating is crucial for our ability to communicate our needs.

Teaching communication skills

The importance of skilled interpersonal communication for happiness and fulfilment in work and life, and the negative consequences resulting from ineffective and inappropriate communication, makes it important to learn better ways to communicate. Happily, it is possible to improve. Although somewhat determined by natural ability, it is beyond dispute that communication skills to a large degree can be taught.

Possibly in realization of the potential for learning and our failure to meet the highest standards in the matter, there exist quite a few communication skills training programs. Some of these are addressed to the general audience. Some apply to particular settings. Most of them are relatively innocent of theory, and just a very few have been scientifically evaluated. A thorough review of existing communication skills training programs will not be attempted here. A brief mention will be given to some of particular interest to this study.

Evaluation studies of communication skills training

Although there are a host of training programmes in communication skills, few seem to be evaluated in any rigorous fashion. Take the widely known theory of non-violent communication (Rosenberg, 2003). The Center for Non-Violent Communication

(www.cnvc.org) has its own website, with materials and resources. There are many training programmes around the world dedicated to teaching the skills (and attitudes) consistent with the NVC approach. Testimonials to the effect of practicing NVC in individual's lives are available on the CNVC website. However, there does not seem to be any rigorous empirical studies of the effectiveness of NVC training. Extensive literature searches and reviews conducted by the present author did not provide any evidence of there being any rigorous scientific and empirical studies on the effectiveness of NVC training.

The exception to the lack of evaluation studies of communication skills training programmes seems to be the medical sector. The teaching of communication skills has also been a part of the curriculum in medical schools since the nineteen seventies. Also, in continuing medical education there is some training in communication skills, (Hulsman, Ros, Winnubst, & Bensing, 1999). The communication skills training programmes in medical settings vary according to training objectives, duration and location of the training. There have been a number of studies in which the effects of training programmes in communication skills in medical settings have been evaluated (e.g. Edwards et al., 2006; Finset, Ekeberg, Eide, & Aspegren, 2003; Mjaaland, 2009; Moore, Wilkinson, & Rivera Mercado, 2004; Murray, Burns, See, Lai, & Nazareth, 2005).

Some authors have pointed out problems with the research designs used in some of these types of evaluation studies. In a review by Hulsman and colleagues (1999), most of the studies examined used inadequate research designs, positive training effects were found on half or less of observed behaviours, and that studies with the most adequate designs reported the fewest positive training effects (Hulsman, et al., 1999). Hulsman and colleagues (1999) found that only three of the fourteen studies examined used an adequate design, which was specified as the pre-test-post-test randomized control group design.

In the aftermath of Hulsman and colleagues' review there have been conducted more randomized controlled trials (e.g. Fallowfield et al., 2002). Fallowfield and her colleagues assessed an intensive 3-day training course on communication skills in a randomized controlled trial with a two-by-two factorial design. The participants were 160 physicians from 34 UK cancer centres and they were allocated to four groups: written feedback followed by course; course alone; written feedback alone; and control. Participants in the treatment group received written feedback based on six to ten videotaped consultations with patients about four weeks prior to attending the training course. The course was learner-centred,

incorporating cognitive, experiential, and behavioural components. The researchers found that course attendance significantly improved key outcomes such as form of questions (open, closed, leading), appropriate responses to patients cues and emphatic responses.

Despite the evidence being mostly related to the health care setting, and there being some methodological problems, there are reasons to believe that training in communication skills may be an effective way to improve people's communication behaviours. But it is an important question what is the right way to do it, and in what kind of setting.

Internet based interventions

The usual way to run a training programme in communication skills is through real-time, face-to-face, class-room teaching. This type of training has some disadvantages; it can be costly and time consuming, and the reach is limited. Thus, in recent research and practice, there has been a move towards finding alternative means of dissemination.

One potentially powerful means of dissemination is to use internet based technology. Internet based technology has a number of potential benefits in providing interventions designed to produce behavioural change: the reach is much less limited; the cost once the training programme has been designed and developed is much lower; participants may take the training when they have the time; etc.

With the increased access to and use of the internet, and with regard to potential benefits compared to traditional interventions, there has in recent years been a surge in internet based interventions in health care and behavioural change. This trend in providing health care and behavioural change interventions by the internet has caught the interest of researchers. Quite a few studies have evaluated different types of internet based and other computer-delivered interventions for health promotion and behavioural risk reduction. Recently some large meta-analyses have been performed on selections of these interventions (Barak, Hen, Boniel-Nissim, & Shapira, 2008; Cugelman, Thelwall, & Dawes, 2011; Portnoy, Scott-Sheldon, Johnson, & Carey, 2008; Webb, Joseph, Yardley, & Michie, 2010).

Cugelman and colleagues (2011) conducted a meta-analysis of 31 online interventions for health behaviour change to assess effectiveness and examine design features. They found that the overall impact of online interventions across all studies was small but statistically significant. The results regarding design features were inconclusive, but the general

conclusion was that online interventions may be an effective way at a reasonable cost to help individuals achieve personal goals that may help them improve the quality of their lives.

Webb and colleagues (2010) conducted a meta-analysis of 85 studies of internet based interventions designed to promote health behaviour change. In the same vein as Cugelman and colleagues, Webb and colleagues found that on average, the internet based interventions had a statistically small but significant effect on health-related behaviour. However, this general conclusion masked the large differences in effectiveness between interventions. Some interventions were quite effective, whereas others had negligible or even negative effects on behaviour. This variability of effectiveness prompted a search for the characteristics of effective interventions. Webb and colleagues found some intervention design features that had differential impact on the effectiveness of the interventions. More extensive use of theory was associated with increases in effect size, interventions based on the theory of planned behaviour tended to be quite effective, interventions incorporating more behaviour change techniques tended to have larger effects compared to interventions that incorporated fewer behaviour change techniques, and the effectiveness was enhanced by the use of additional methods of communication (e.g. sms).

Internet based interventions have been used in psychotherapy for a long time. A comprehensive review and meta-analysis of the effectiveness of internet based psychotherapeutic interventions showed promising results (Barak, et al., 2008). Barak and colleagues collected all the empirical articles on internet-based psychotherapeutic interventions published up to March 2006 and performed a meta-analysis on the 92 studies reported in them. They found an overall mean weighted effect size of 0.53 (medium effect). The effect size was quite similar to the average effect size of traditional face-to-face psychotherapy.

The finding that the effect of internet-based therapy was quite similar to traditional face-to-face therapy is quite remarkable, considering that the effectiveness of psychotherapy consistently has been found to be strongly related to the quality of the relationship between the therapist and the client (Duncan, Miller, Wampold, & Hubble, 2010; Wampold, 2010). It would not be unreasonable to believe that the quality of the therapeutic relationship (the alliance) in large measure was dependent upon face-to-face contact, non-verbal communication, etc. But the research evaluated in Barak and colleagues' large meta-analysis

indicates that for some reason, internet-based interventions may be quite as effective as face-to-face therapy.

The review of the literature on internet based interventions show that internet based interventions may be effective in changing a variety of health related behaviour. An important question is whether and to what degree internet based interventions may also be effective in teaching interpersonal communication skills.

The intervention

The intervention studied in the present research was an internet-based program for teaching interpersonal communication skills called *NewMe Kommunisere Bedre*. The program was developed and marketed by Changetech AS, and is aimed at the consumer market. It was tested in the present research in version 1.0.

The material for the program was assembled from different sources in the scientific literature and psychological research (inter alia Fussell & Kreuz, 1998; Harris & Nelson, 2008; Knapp & Daly, 2010; Lyubomirsky, 2008; Reed, 1985; Rosenberg, 2003; Wilmot & Hocker, 2007).

NewMe Kommunisere Bedre employs a tunnelled design (Fogg, 2003). A tunnelled design guides the user through the program content page by page. As opposed to traditional websites which employ a hierarchical or matrix information architecture design, a tunnelled design provides content in an organized, logical, and reasoned chronological order. Any potential distractors (e.g. ads or links) are removed to help the user focus on the message. Participants received an e-mail every Monday, Wednesday, and Friday for one month. The program consisted of a total of 12 sessions or program days. An e-mail was sent to users for every program day containing a hyperlink. Clicking on the hyperlink leads the user to the unique contents for that specific session. Each session had unique content and divided into two parts. The first part consisted of psycho-educational information about that session's specific topic and the second part consisted of tasks and exercises related to the topic for the session. Each session took about five to ten minutes to complete.

When developing interventions for health behaviour and related behaviours, it has been proposed to adopt intervention mapping as a guiding framework to aid intervention development and implementation planning (Bartholomew, Parcel, Kok, Gottlieb, & Fernandez, 2011). The intervention mapping approach was not used in developing *NewMe*

Kommunisere Bedre. However, the intervention mapping protocol was used as a descriptive tool after actual intervention development in order to document the *NewMe Kommunisere Bedre* intervention, its potentially active ingredients, and providing other researchers with the possibility of replicating the study or designing similarly effective communications interventions. Thus, the description of the intervention may deviate in several respects from the original intervention mapping protocol. For example, the decision regarding mode of delivery was already determined from the outset.

The performance objectives of *NewMe Kommunisere Bedre* are outlined in Table 1.

Table 1. Performance objectives for *NewMe Kommunisere Bedre*

-
1. Actively listen and take others perspectives into account, including non-verbal cues.
 2. Identify, acknowledge, and manage emotional subjects, including personal emotion-regulation.
 3. Clearly express and communicate personal needs without creating conflict.
-

As will be seen, the three performance objectives refer to the three sets of skills identified and described in the Introduction. The objective of the skills of listening and showing empathy (to be learned through the intervention) is to make participants able to actively listen and take others perspectives into account, including non-verbal cues (performance objective no. 1), etc.

The performance objectives are implemented in the intervention in the day by day program composition, as will be seen in Table 2.

Table 2. Program overview for *NewMe Kommunisere Bedre* day by day

Day No.	Description	Psychoeducational Content	Tasks and Exercises	Home Assignments
1	Program introduction	Providing program structure and establishing credibility.	Test of communication skills assessing (a) expression of thoughts, feelings, and needs, (b) awareness of non-verbal cues, and (c) engaging in emotional conversations.	
2	Active listening	Why active listening is so important. Active listening consists of (a) perceiving, (b) processing, (c) evaluating, and (d) responding to information.	Cheat-sheet for active listening.	(a) Give someone an unsolicited compliment and observe the effects on the receiver and yourself. (b) Practice active listening.
3	The dynamics of conflicts	Why and how conflicts arise. Explaining the nine steps in conflict escalation.	Identifying steps in previous personal conflicts (written exercise).	(a) Observe disagreements or conflicts and identify the steps in conflicts. (b) Apply active listening to avoid conflict escalation.
4	Observation	How and why evaluations lead to conflicts (e.g. cause biased impressions of others, lead to misunderstandings or generalizations).	"Observation or evaluation?"-quiz.	Practice observing without evaluating.
5	Identifying emotions	(a) Distinguishing between emotions and e.g. expectations or evaluations. (b) Learning the six basic emotions.	"Emotion or...?"-quiz.	(a) Continue practicing observation without evaluation. (b) Practice identifying and expressing personal emotions.
6	Taking responsibility for personal needs	(a) What are basic needs? (b) Identifying and expressing basic needs.	"Clear expression of need or... ?"-quiz.	(a) Continue practicing observation without evaluation (b) Continue identifying and expressing personal emotions (c) Practice identifying personal needs.

7	Expressing personal needs	Distinguish between expressing needs and demanding.	"Expression of need or demand?"-quiz.	Practice clearly expressing personal needs.
8	Empathy and perspective-taking	What empathy is and is not?	"Empathy or...?"-quiz.	Practice expressing empathy and taking the perspective of others
9	Anger management	Debunking anger management myths (i.e. ventilation)	(a) Timeout (b) Implementation intention	(a) Continue practicing NVC (b) Apply timeout or implementation intentions when needed
10	Active-constructive responding	(a) Being enthusiastic when responding (b) Constructive criticism	"Criticism or complaint?"-quiz.	(a) Practice being enthusiastic (b) Practice complaining
11	Forgiveness	(a) Normal reactions to feeling hurt or betrayed (b) vengefulness (c) what forgiveness is and is not (e.g. apology or forgetting)	(a) Instructions on how to write a letter of forgiveness (b) Read an example letter	(a) Write a letter of forgiveness <i>to</i> someone who hurt you (b) Write a letter of forgiveness <i>from</i> someone who hurt you
12	Apologizing	How to apologize? Accept what you have done. Do not attempt to explain. Do not argue back. Listen actively. Take perspective		Be open, show interest in other people and take their perspective. Give compliments (ros)
13	Repetition and summary	Test of communication skills assessing (a) expression of thoughts, feelings, and needs, (b) awareness of non-verbal cues, and (c) engaging in emotional conversations.	Cheat-sheet for communication and conflict prevention.	

The participants accessed the application through a link provided in emails generated by the programme and sent to the email address provided by the participants. They did not have to pay, neither were they paid, to participate. To visit the program, follow the test-link: <http://program.changetech.no/ChangeTechF.html?Mode=Trial&P=2X6080&UserType=TESTER>

Purpose of the present research

Interpersonal communication skills training differ from psychotherapy, health promotion and behavioural risk reduction. But there are also some similarities suggesting that internet-based interventions might be a fruitful way to do this kind of intervention. To my knowledge no study has yet evaluated an internet-based intervention for the teaching of communication skills.

In the study presented here, participants were exposed to the internet based intervention for teaching of interpersonal communication skills described above. The purpose of the present study was to examine the impact of this intervention on self-reported communication behaviour.

The main objective was to test whether participants in the treatment group would show increased levels of skilled communication as measured by selected subscales from the Conflict Resolution Questionnaire at 1, 2 and 6 months post intervention, compared to the control group. Further, it was an objective to test whether the main effect of the intervention would be mediated by increased levels of perspective taking, as measured by the Perspective Taking Scale. Finally, it was tested if the potential effect of the intervention varied across a number of background variables, i.e. if there were interaction effects between the intervention and gender, age and level of education, upon the dependent variables.

Method

Design

In the present study, the impact of a four-week internet based intervention for teaching communication skills was compared to a control group. The design of the study was a randomized controlled trial with two treatment arms. One group of participants was assigned to receive *NewMe Kommunisere Bedre*. The other group of participants was assigned to a waitlist condition.

Random assignment creates two or more groups that are on average probabilistically similar to each other. Any effect on the outcome variables is therefore likely to result from the treatment, not from any differences between the groups. Random assignment is thus a very potent method to control extraneous sources of variation. For this reason some have referred to randomized controlled experiments as “the gold standard” for treatment outcome research (Shadish, Cook, & Campbell, 2002, p. 13).

Participants and recruitment

Participants in this study were 138 professionals and students. Participants were recruited in March 2011 using targeted advertisement in the e-mail bulletin of the Norwegian Communication Association (Kommunikasjonsforeningen) and by advertisements on Facebook and emails to selected email addresses. The recruitment material invited the recipients to participate in a study where they could learn to communicate more effectively. The recipients were told that they might try a new self help program in communication where all teaching was internet based.

By clicking on the link provided in the advertisements described above, prospective participants were routed to an external website with study information. Those who wished to participate had to confirm that they had read the information, before they could proceed to the baseline questionnaire. To be eligible for participation, participants had to be above 18 years of age and provide a valid e-mail address.

Recruiting was purely web-based; there were no face-to-face components. Although the recruiting procedure, being conducted online only, would theoretically allow multiple

entries/identities, there were no indications of this, based on the e-mail addresses provided during registration.

Randomization

Unrestricted randomization procedure was carried out by a separate researcher that did not participate in recruitment (co-supervisor FD). A random sequence generator on www.random.org was used to allocate participants to either the experimental- or the control group. None of the participants knew whether or not they would end up in the control- or the experimental group before the randomization was conducted.

Data collection

The design featured a pre-test of all participants to establish a baseline level in communication competence. The two groups were then tested at 1, 2 and 6 months after the intervention (post-tests).

Measures

Extensive literature reviews and searches for adequate, reliable and valid measures of interpersonal communication skills did not yield any appropriate general measures for the interpersonal communication skills that *NewMe Kommunisere Bedre* was designed to affect. The instruments found typically measure only certain aspects of interpersonal communication, like empathy and perspective taking, or related constructs, like interpersonal functioning. Therefore, it was decided to use a selection of items from the Conflict Resolution Questionnaire (Henning, 2003, 2004).

The Conflict Resolution Questionnaire ("CRQ"; Henning, 2003, 2004) is a 41 item instrument with 10 subscales. The 10 subscales refer to 10 presumed factors. The 41st item is not part of the 10-factor configuration. Henning (2004) found that the CRQ did not possess either split-half reliability or internal consistency within factors. Some of the subscales only had modest reliability scores, below the recommended cut-off of .70 suggested in the psychometric literature. However, as pointed out by Henning, the CRQ has several advantages, including availability and ease of scoring. On basis of the scarcity of relevant measures, and the considerations regarding the CRQ cited above, it was decided to use a selection of items from five of the subscales of this instrument for the present research.

The subscales selected were: 1) Extra considerations, 2) Options, 3) Future/Clarification of perceptions, 4) Power and 5) Mutual-benefit agreements. In addition, item 41 was included. Three items were selected from each subscale based on face validity and conceptual validity (cf. the problem of finding appropriate self-report measures of communication skills discussed above). All items were translated and back-translated to Norwegian. The selection, reduction in number and translation was done to facilitate responding and thus to retain as many participants as possible throughout the study, thus preventing attrition caused by the research process (Shadish, et al., 2002, p. 325). In all, the questionnaire used in the study had a total of 23 items, with three additional demographic questions asked at baseline (sex, age, education), and 10 items relating to perceived usefulness, perceived ease of use and global assessment of the intervention asked the intervention group at 1 month follow-up.

Reliability for the subscales was assessed at each measurement time, for each subscale, computing Cronbach's alpha coefficients. Some of the subscales (Extra considerations, Future/Clarification of perceptions and Power) showed very poor internal consistency (alphas below .50) and consequently were discarded from further analyses. The final analyses thus were conducted on the subscales Options and Mutual-benefit agreements, as well as on a new total score computed for the items from these subscales, together with item 41 from the original CRQ. This scale was called Revised Total CRQ. Further description of the CRQ is limited to these subscales.

The subscale Options contains statements that assess elements of communication during conflict resolution such as listening behaviour ("I listen with an open mind to alternative options"). Responses were recorded using a five-point Likert scale (1 = "almost never" and 5 = "almost always"). Cronbach's alphas for this subscale in this study were .63, .59, .49 and .55, at baseline, 1 month, 2 months and 6 months respectively. The reliability scores are below the recommended cut-off of .70 suggested in the psychometrics literature (Furr & Bacharach, 2008). However, the subscale consists of only three items, making it difficult to obtain the recommended alpha. Mean inter-item correlations were .37, .33, .25, and .30 at baseline, 1 month, 2 months and 6 months respectively. The modest mean inter-item correlations suggest that the items did not tap the same construct (i.e. the sub-scale was not uni-dimensional) and that the items may not successfully discriminate

between those who perform well and those who perform not so well or poorly on the Options sub-scale.

The subscale Mutual-Benefit Agreements contains statements that assess elements of communication during conflict resolution such as questioning skills (“When in conflict with someone, I ask them to explain their position”). Responses were recorded using a five-point Likert scale (1 = “almost never” and 5 = “almost always”). Cronbach’s alphas for this subscale in this study were .68, .84, .69, .79, at baseline, 1 month, 2 months and 6 months respectively. The reliability scores are at or above, or close to the recommended cut-off of .70 suggested in the psychometrics literature (Furr & Bacharach, 2008).

Item 41 of the CRQ is a question that assesses perceived ability to resolve conflict without harming the relationship: “How often do you feel you are effective at resolving conflicts in a way that builds your long-term relationship with the other parties”. This item is somewhat different from the sub-scales of the CRQ, being a global measure of conflict resolution skills, whereas the sub-scales reflect more specific skills. The item was included in the revised total score of the CRQ.

Participants also completed the Perspective-Taking (PT) scale (M. H. Davis, 1983). The PT scale contains statements that assess the tendency to adopt the point of view of other people and see things from their point of view (e.g. “I sometimes try to understand my friends better by imagining how things look from their perspective”). Responses were recorded using a five point Likert scale (1 = “describes me very poorly” and 5 = “describes me very good”). The Cronbach alpha coefficients for this subscale in this study were .68, .85, .69, .79, at baseline, 1 month, 2 months and 6 months respectively. The reliability scores were at or above the recommended cut-off of .70.

Perceived usefulness (F. D. Davis, Bagozzi, & Warshaw, 1989) was assessed at 1 month using a version of the perceived usefulness scale with five items specifically adapted for this study. This scale contains statements that assess participants’ perceptions of the usefulness of the intervention (e.g. “Jeg synes *NewMe Kommunisere Bedre* har bidratt til å gi meg en bedre hverdag.”). Responses were recorded using a seven point Likert scale (1 = “completely disagree” and 7 = “completely agree”). The Cronbach alpha coefficient for this scale was .91.

Ethical considerations

Participants were asked to give informed consent to participate. The participants were informed that they were free to withdraw at any time, and were assured full anonymity. The study was reported to the Norwegian Social Science Data Services on account of handling of personal information (project number 26815).

Statistical analysis plan

Alpha level was set to $< .05$ for all statistical tests, and all tests were two-tailed. To check for differences between experimental conditions at baseline, t-tests were used for scales, and chi-square tests were used for categorical data. To assess differences in attrition between groups, chi-square tests were performed. For chi-square tests based on 2 x 2 contingency tables, the Yates continuity correction was applied.

Descriptive analysis of missing values was performed to assess the extent of missing values for background variables at baseline and for the selected outcome variables at each measurement occasion. All statistical tests were performed using pairwise deletion unless otherwise stated.

The analyses of main effects were performed using a mixed between-within subjects analysis of variance with repeated measures on the selected outcome variables, from baseline through 6 months. Effect sizes were reported as partial η^2 . Only participants who had completed the questionnaire at all measurement times were included in the analyses. To determine whether to use parametric or non-parametric statistics, distributions of scores and equality of variances across groups were assessed. Distributions of scores were examined using histograms obtained from SPSS. The assumption of homogeneity of variances across groups was checked using Levene's test for equality of variances.

The analysis of mediation was performed on the Mutual Benefit Agreements subscale at 2 months, using hierarchical multiple regression, to assess to what degree the intervention would still predict a significant amount of the variance in the outcome variable, when controlling for the possible effect of perspective taking, as measured by the Perspective Taking scale. The Mutual-Benefit Agreements sub-scale was chosen for the analyses of mediation and moderation, because it had the best psychometric properties of the selected sub-scales.

The analyses of possible interactions of gender, age, or educational level with the intervention on the Mutual-Benefit Agreements subscale were performed using hierarchical multiple regression. It was assessed whether the interaction between the intervention and the demographic variables predicted a significant amount of variance in the dependent variable, when controlling for the separate effects of the intervention and the demographic variable. All interaction effects were assessed at 1 month follow-up. The age variable was centred (grand mean) before entered into the regression analysis.

Post-hoc statistical power analyses were performed to examine to what degree the performed statistical tests of main effects had sufficient power to detect possible main effects.

Descriptive statistics and statistical analyses of main effects and interaction were performed using the IBM SPSS software (version 19.3). Analyses of statistical power were performed using the G*Power software (version 3.1).

Results

Participant characteristics

The flow of participants is depicted in figure 2. A total of 157 persons were recruited to the study and directed to the website to fill in the questionnaire at baseline. Participants above 18 years and providing a valid e-mail address were eligible to participate in the study. Nineteen persons did not provide a valid e-mail address, and thus were excluded from the study. The remaining 138 were included in the study.

The 138 participants included in the study had a mean age 38.6 years. One hundred and six (78.5 %) were women, 29 (21.5 %) were men. Thirty-one (22.5 %) had up to three years higher education, 53 (38.4 %) had 4-5 years of higher education, and 54 (39.1 %) had more than five years higher education.

Sample participant characteristics for each group at baseline are shown in table 3. All tests to compare groups on the variables shown in table 3 yielded non-significant results, suggesting that randomization was successfully implemented.

Table 3. Sample participant characteristics at baseline

Characteristic	KB (n = 77)	Control (n = 61)
Sex, female, No. (%)	57 (76.0)	49 (81.7)
Age (years)	39.1 +/- 7.9	38,0 +/- 9.0
Up to 3 years higher education, No. (%)	17 (22.1)	14 (23.0)
4-5 years higher education, No. (%)	30 (39.0)	23 (37.7)
More than 5 years higher education, No. (%)	30 (39.0)	24 (39.3)
Options	10.6 +/- 1.9	10.7 +/- 2.2
MBA	9.6 +/- 1.4	9.6 +/- 1.5
PT	18.2 +/- 4.5	18.2 +/- 4.3

Note. Numbers are mean +/- SD except where noted

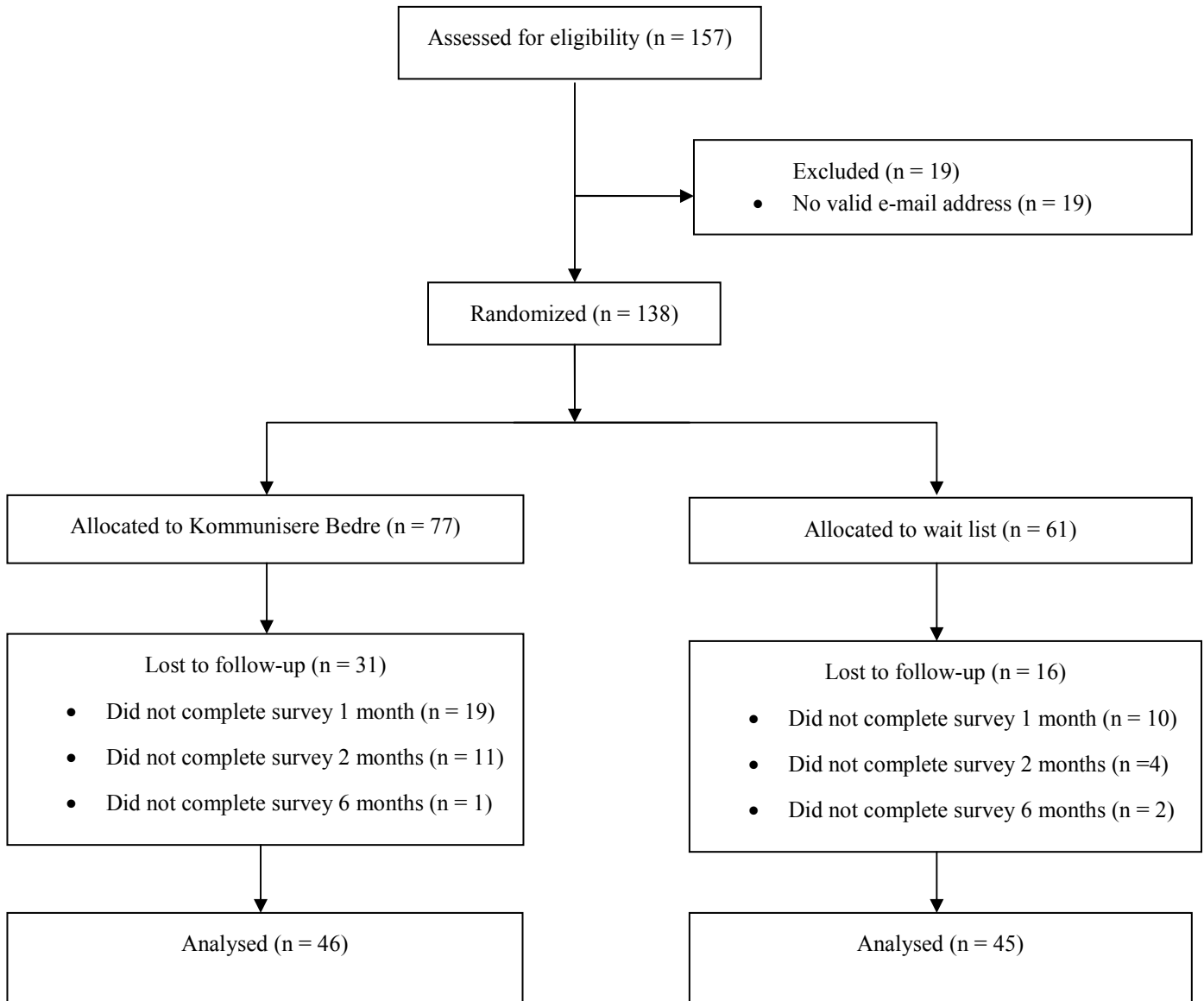


Fig. 2 Flow Diagram of Participants

Missing values for demographics and selected subscales at four measurement times are shown in table 4. All missing values at baseline were at or below the recommended or conventional cut-off of 5 % (Graham, 2009). At 1 month, 2 months and 6 months follow-ups, missing values should be compared to levels of attrition (complete lack of data at a measurement occasion), which is addressed in the next section.

Table 4. Missing Values Between Groups at Four Measurement Times

	KB				Control			
	BL	1M	2M	6M	BL	1M	2M	6M
Gender	2 (2.6)				1 (1.6)			
Age	4 (5.2)				1 (1.6)			
Education	0				0			
Options	1 (1.3)	19 (24.7)	30 (39.0)	31 (40.3)	0	11 (18.0)	15 (24.6)	16 (26.2)
MBA	2 (2.6)	20 (26.0)	30 (39.0)	31 (40.3)	0	11 (18.0)	14 (23.0)	16 (26.2)
CRQ	2 (2.6)	20 (26.0)	30 (39.0)	31 (40.3)	0	12 (19.7)	15 (24.6)	16 (26.2)
PT	1 (1.3)	23 (29.9)	30 (39.0)	31 (40.3)	1 (1.6)	11 (18.0)	14 (23.0)	17 (27.9)

Note. Numbers are total (percent)

Attrition, program use and perceived usefulness

Response rates observed in this study are shown in table 5. Of a total of 138 participants, 91 (66 %) completed all surveys across four time periods (baseline, 1 month, 2 months and 6 months follow-ups). Chi-square tests for independence performed to compare frequencies of attrition between treatment group and control group at 1 month, 2 months, and 6 months, yielded non-significant results, suggesting no significant differences in attrition rates between groups across time.

Table 5. Response rates for the Intervention Group and Control Group Across Four Time Periods

Time	KB	Control	Total
Pre-intervention	77 (100 %)	61 (100 %)	138 (100 %)
1 month follow-up	58 (75 %)	51 (84 %)	109 (79 %)
2 months follow-up	47 (61 %)	47 (77 %)	94 (68 %)
6 months follow-up	46 (60 %)	45 (74 %)	91 (66 %)

Note. Numbers are total (percent)

Out of 77 participants allocated to the intervention, a total of 43 participants (58.1 %) completed all 12 program days (3 system-missing values).

The perceived usefulness reported by participants in the treatment condition measured at 1 month is shown in figure 3. Out of 55 participants in the treatment group completing the Perceived Usefulness scale at 1 month, a total of 25 participants (45.5 %) agreed that the intervention had been useful to them.

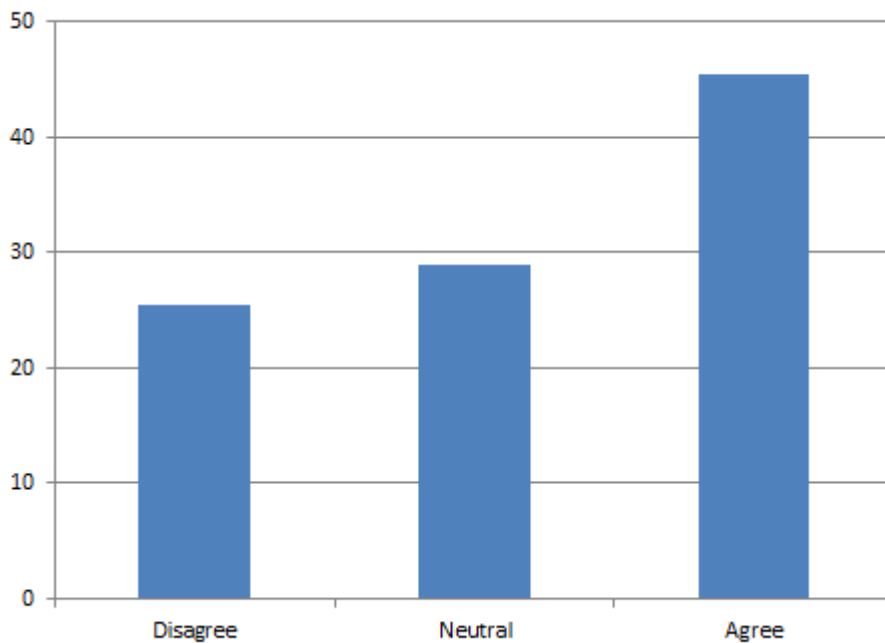


Figure 3. Perceived Usefulness in Percent as reported at 1 month. Response alternatives have been collapsed to three categories (Disagree = completely disagree, disagree, slightly disagree; Neutral = neither disagree nor agree; Agree = slightly agree, agree, completely agree).

Analyses of main effects

In the first analysis of main effects, a mixed between-within subjects analysis of variance was conducted to assess the impact of the intervention compared to the control group, on participants' scores on the Options subscale, across four time periods (pre-intervention, 1 month, 2 months and 6 months follow-ups). Levene's Test of Equality of Error Variances yielded non-significant values at baseline ($p = .06$) and 2 months ($p = .33$), but significant values at 1 month ($p = .01$) and 6 months ($p = .00$), suggesting that the assumption of

homogeneity (equality of variances across time periods) was not satisfied at these measurement times. As equality of variances thus could not be assumed, the Greenhouse-Geisser correction was applied.

There was no significant interaction between groups and time, Greenhouse-Geisser = 3.32, $F(2.69, 77) = .77$, $p = .50$, partial $\eta^2 = .01$. There was a significant main effect for time, Greenhouse-Geisser = 19.29, $F(2.69, 77) = 4.77$, $p = .01$, partial $\eta^2 = .05$, with both groups showing an increase in Options test scores across four time periods (table 6). As to the between-groups effect – the main focus of this analysis – the main effect comparing the intervention and the control group was not significant, $F(1, 79) = .88$, $p = .35$, partial $\eta^2 = .01$, suggesting no difference in the level of communication skills between the treatment and control groups.

Table 6: Options Test Scores for Treatment Group and Control Group Across Four Time Periods

Time	KB (n = 42)		Control (n = 39)	
	M	SD	M	SD
Pre-intervention	10,88	1,63	10,49	2,24
1 month follow-up	11,31	1,63	11,13	2,42
2 months follow-up	11,33	1,57	11,23	1,86
6 months follow-up	11,55	1,35	10,92	2,16

In the second analysis of main effects, a mixed between-within subjects analysis of variance was conducted to assess the impact of the intervention compared to the control group, on participants' scores on the Mutual-Benefit Agreements subscale, across four time periods (pre-intervention, 1 month, 2 months and 6 months follow-ups).

There was no significant interaction between groups (treatment and control) and time, Wilk's Lamda = 1.00 $F(3, 77) = .06$, $p = .98$, partial $\eta^2 = .00$. There was no significant main effect for time, Wilk's Lamda = .97, $F(3, 77) = .83$, $p = .48$, partial $\eta^2 = .03$, with neither group showing any statistically significant increase in Mutual-Benefit Agreements test scores across the four time periods (table 7). Neither were there any significant main effect comparing the intervention with the control group, $F(1, 79) = .02$, $p = .88$, partial $\eta^2 = .00$, suggesting no difference in the level of communication skills between the treatment and control groups.

Table 7: Mutual-Benefit Agreements Test Scores for Treatment Group and Control Group Across Four Time Periods

Time	KB (n = 41)		Control (n = 40)	
	M	SD	M	SD
Pre-intervention	9,78	1,22	9,75	1,50
1 month follow-up	9,85	1,01	9,95	1,13
2 months follow-up	9,85	1,01	9,88	1,22
6 months follow-up	9,68	1,15	9,70	1,22

In the third analysis of main effects, a mixed between-within subjects analysis of variance was conducted to assess the impact of the intervention compared to the control group, on participants' scores on the Revised CRQ Total scale, across four time periods (pre-intervention, 1 month, 2 months and 6 months follow-ups).

There was no significant interaction between groups (treatment and control) and time, Wilk's Lamda = .95, $F(3, 76) = 1.38$, $p = .25$, partial eta squared = .05. There was a significant within-groups main effect for time, Wilk's Lamda = .80 $F(3, 76) = 6.55$, $p = .00$, partial $\eta^2 = .21$, with both groups showing an increase in revised CRQ total scale test scores across four time periods (table 8). There was no significant main effect comparing the intervention with the control group, $F(1, 78) = .53$, $p = .47$, partial $\eta^2 = .01$, suggesting no difference in the level of communication skills between the treatment and control groups.

Table 8: Revised CRQ Total Test Scores for Treatment Group and Control Group Across Four Time Periods

Time	KB (n = 41)		Control (n = 39)	
	M	SD	M	SD
Pre-intervention	25,54	3,65	24,82	4,78
1 month follow-up	26,44	3,69	26,51	5,23
2 months follow-up	26,93	3,46	26,59	3,74
6 months follow-up	27,24	3,90	25,87	4,29

Analysis of mediation

A hierarchical multiple regression analysis was performed to explore whether perspective taking, as measured by the Perspective Taking scale at 1 month, mediated the effect of the intervention on levels of interpersonal communication skills, as measured by the

Mutual-Benefit Agreements subscale, at 2 months. Treatment was entered at Step 1, perspective taking at Step 2. Treatment explained 0.4 % of the variance in interpersonal communication skills at 2 months. This finding was not significant, $F(1, 85) = .3, p = .56$. Due to this null finding, no further analysis of mediation was conducted.

Analyses of moderation

In spite of the lack of findings of main effects of the intervention, there remained the possibility that one or more demographic variables could moderate the effect of the intervention on the outcome variables, i.e. that the intervention could have effect for some groups of participants, but not others. Several analyses were conducted to explore this possibility.

First, a hierarchical multiple regression analysis was performed to explore the impact of gender and the intervention on levels of interpersonal communication skills, as measured by the Mutual-Benefit Agreements subscale at 1 month. Treatment was entered at Step 1, explaining 2 % of the variance in interpersonal communication skills (though this impact was not significant, $F(1, 102) = 1.79, p = .19$). Entry of gender at Step 2 did not yield a statistically significant change, R square change = .00, $F(1, 101) = .01, p = .92$. Neither was there a significant effect of the interaction of treatment and sex on interpersonal communication skills, R square change = .01, $F(1,100) = 1.25, p = .27$.

Second, a hierarchical multiple regression analysis was performed to explore the impact of age and the intervention on levels of interpersonal communication skills, as measured by the Mutual-Benefit Agreements subscale at 1 month. Treatment was entered at Step 1, explaining 2 % of the variance in interpersonal communication skills (though this result was not significant, $F(1,101) = 1.78, p = .19$). Entry of age at Step 2 did not yield a statistically significant change, $F(1, 100) = .00, p = .99$. There was no significant change following the entry of the interaction between treatment and age at Step 3, R square change = .04, $F(1, 99) = 3.85, p = .05$.

Third, a hierarchical multiple regression analysis was conducted to explore the interaction of educational level and the intervention on levels of interpersonal communication skills, as measured by the Mutual-Benefit Agreements subscale at 1 month. Treatment was entered at Step 1, explaining 2 % of the variance in interpersonal communication skills (though this result was not significant, $F(1,105) = 1.84, p = .19$). Entry of educational level at

Step 2 did not yield a significant change, $F(1,104) = 1.01, p = .32$. There was no significant change following the entry of the interaction between treatment and educational level at Step 3, R square change = .00, $F(1,103) = .08, p = .77$.

Analysis of statistical power

A post hoc power analysis for F-tests was conducted to examine the statistical power for the analyses of main effects, using the G*Power software (Faul, Erdfelder, Buchner, & Lang, 2009; Faul, Erdfelder, Lang, & Buchner, 2007).

A test of statistical power for analysis of variance with repeated measures, between factors, was chosen. The test was performed on the revised CRQ total. The effect size was computed with input of means in each group at measurement time 6 months, as well as number of participants in each group at this measurement time. The means were: treatment group at 6 months = 27.24 (SD = 3.65), number of participants = 41; control group at 6 months = 25.87 (SD = 4.78), number of participants = 39. Alpha level was set to .05. Computed effect size using the conventions in Cohen (1988) was, $f(V) = .14$.

With these inputs, the power of the test was computed to be: critical F value = 3.96, non-centrality parameter = 4.51, Power (1 – error probability) = 0.35; which amounts to 35 % chance of detecting a statistically significant effect of the intervention using this measure at 6 months.

Discussion

The main aim of the present research was to assess whether an internet based intervention could be an effective way to teach interpersonal communication skills. In particular, we tested whether participants who got access to the intervention described in the Introduction (*NewMe Kommunisere Bedre*) would experience gains in self-reported interpersonal communication skills relative to a control group. It will be recalled that interpersonal communication skills were measured for the two groups at baseline and at three follow-up occasions (1, 2, and 6 months). The measures used were two sub-scales from the Conflict Resolution Questionnaire, as well as a revised total scale from this measure. Statistical analyses were conducted to check for main effects, mediation and moderation.

However, no statistically significant effects were found. A statistically significant main effect of the intervention was not found on any of the selected measures over all measurement times. Effect sizes were all very small, and, as the statistical tests indicated, could just as well be due to chance. Moreover, there was no significant effect of the intervention on at 2 months follow-up, the measurement occasion targeted for the analysis of mediation. For this reason the planned analysis of mediation through perspective taking was not carried through. Finally, no statistically significant interaction effects of sex, age or level of education with the intervention on the level of interpersonal communication skills at 1 month, were found. Thus, the hypothesis that an internet based intervention could be an effective way to teach interpersonal communication skills was not supported.

There are several possible explanations for the lack of significant findings in this study. The possible explanations fall in two main categories: considerations concerning the intervention, and methodological considerations. The methodological considerations also point towards important limitations of the present study.

Explanations for the null findings: Considerations concerning the intervention

First, it may be that the intervention (*NewMe Kommunisere Bedre*) was in fact ineffective. Access to the intervention did not lead to measureable gains in interpersonal communication skills. This null-finding holds across gender, educational level and age; all being equally unlikely to profit from access to this intervention.

If this is the case, the lack of effectiveness may be due to several different possible features of the intervention. It might be a problem with changing this type of behaviour (interpersonal communication) using internet based interventions. It may also be that design features of the program prevented the program from being effective.

As mentioned in the Introduction, internet based interventions have been shown to be effective for a broad range of health related behaviours. However, to my knowledge no study has so far investigated the use of internet based interventions to teach interpersonal communication skills. Thus, it is an open question whether internet based interventions may be an effective way to teach those skills. More to the point, it is a question whether internet based interventions actually may change communication behaviour. Perhaps the social nature of communication calls for a different context of learning. However, the broad range of application for internet based interventions suggests that interpersonal communication skills may be within reach for these kinds of interventions. There may, however, be features of the particular intervention that caused the null findings.

It will be recalled that there has been some research on the influence of design features on the effectiveness of internet based interventions. Webb et al. (2010) found some design features that had differential impact on the effectiveness of interventions. Use of theory, behaviour change techniques, and additional methods of communication, were among the features that affected effectiveness. The intervention under investigation was presented in the Introduction. It will be recalled that *NewMe Kommuniserer Bedre* made extensive use of theory, and that each program day consisted of both psycho-educational content and tasks and exercises related to the topic. On the face of it, it is not easy to pin down any serious flaws among these design features. Anyway, the features most conducive to effective teaching of interpersonal communication skills may not be determined by the present study.

It is also important to note that 45.5 % of participants who completed the questionnaire at 1 month perceived the intervention to be useful. This finding of subjectively experienced usefulness to some degree contradicts the null finding of main effect. Though the level of perceived usefulness is not very high, it may indicate that the lack of findings could just as well be explained by methodological features of the present study.

Methodological considerations and limitations of the present study

There are several methodological features of the present study that may limit the generalizability of the null findings.

First, the characteristics of the participant sample in this study may differ from other populations for which the intervention may be effective. It will be recalled that participants were mainly recruited from an association of professional communication consultants (*Kommunikasjonsforeningen*). This population may have a higher level of communication skills than other populations, and may thus to a lesser degree profit from an intervention designed to teach interpersonal communication skills. Moreover, the pool of participants consisted of nearly 80 % women. Women are often believed to be better communicators than men, especially when it comes to non-verbal communication, and these beliefs are mostly accurate when compared to observations of sex differences in communication (Briton & Hall, 1995; Hall, 1984). Thus, participants were perhaps naturally endowed with above average communication skills, due to their biological sex, and thus less likely to profit from the intervention.

Second, there is the problem of compliance. As shown in the Results section, the level of exposure to the intervention was somewhat limited. About 58 % of participants in the treatment group completed all 12 program days. Lack of compliance may have caused problems with detecting a main effect for several reasons. There may have been participants who followed the intervention under sub-optimal conditions (e.g. lying far behind schedule), or participants who followed some parts of the intervention, but not enough to experience the expected effect. Participants who discontinue or does not comply with treatment, but complete questionnaires, will necessarily confound the results on the treatment outcome variables. However, data on compliance was not investigated in this study, and compliance was not taken into account in the statistical analyses. Compliance rates could be taken into account in future studies on the same data, cf. below under Directions for future research.

Third, there is the problem of non-response and missing values. This problem takes at least two forms in this study. Partly, it comes in the form of wave non-response, a version of measurement attrition (Hawkes & Plewis, 2006). Measurement attrition, defined as loss of respondents after randomization (Shadish, et al., 2002, p. 323), is a common problem in treatment outcome research. Attrition lowers statistical power, and may even threaten the

assumptions of random assignment. Because attrition rarely may be assumed to be random, when attrition rates are substantial, groups that could be presumed to be equal after randomization may not be equal at later measurement times. Attrition may thus threaten the conclusions about treatment effectiveness.

It will be recalled that a total of 91 out of 138 participants completed all questionnaires. Analyses of attrition showed that there were no significant differences in attrition rates between treatment group and control group. However, even if attrition rates were comparable between groups, that does not imply that the causes of and mechanisms behind attrition necessarily were the same. Thus, from the analyses conducted in this study, it is not possible to conclude that values were missing completely at random, and may be safe to ignore (Blankers, Koeter, & Schippers, 2010). Patterns of missingness could be taken into account in future studies on the same data, cf. below under Directions for future research.

Missing values may also pose other problems for the conclusions to be drawn from this study. Not only does missing values lower statistical power, and lead to biases between groups, but statistical techniques to remedy missing values may bias results. As was mentioned in the Statistical Analysis Plan, all analyses in this study were conducted using pairwise deletion, where that option was available (e.g. in analyses using hierarchical multiple regression). However, pairwise deletion may increase the probability of committing Type II errors, and may lead to serious over- or underestimation of effect sizes, correlations and beta-values (Acock, 2005). More advanced techniques for working with missing values (e.g. forms of imputation) could be taken into account in future studies on the same data, cf. below under Directions for future research.

Forth, there is the problem of lack of sufficient statistical power. Statistical power may be defined as the probability of rejecting the null hypothesis when it is in fact false (Mayr, Erdfelder, Buchner, & Faul, 2007). When the analysis of main effects fails to find any significant main effects, statistical power analyses are especially important. Without control of statistical power it is very difficult to interpret non-significant results. When results are non-significant – as in this study – it is thus important to consider whether this finding may be due to lack of statistical power.

As shown in the Results section, the post hoc analysis of statistical power showed statistical power of the analysis of main effect on the revised CRQ total test scores at 6 months to be .35, which roughly equals a 35 % chance of detecting a significant main effect

with the sample size used in this study. Thus, only one in three studies with this sample size would have been able to detect an effect of the intervention. Perhaps this study was not one of those.

A larger sample size would have increased statistical power. Recruiting procedures were conducted with the aim of getting a larger sample. However, it proved to be quite hard to reach this goal. Due to time constraints, the study was conducted on the sample recruited. If we had waited longer before launching the study, some of the participants already recruited might have been lost.

Fifth, there might also be problems with the measures being used in this study. It will be recalled that there were problems finding appropriate measures for the interpersonal communication skills that *NewMe Kommunisere Bedre* was designed to affect. Selected subscales from the Conflict Resolution Questionnaire were used in the online questionnaire assembled for this study. Several of the CRQ subscales did not show adequate reliability in this study and had to be discarded. Moreover, the subscales selected only contained three items each. With only three items per construct there may be problems with insufficient domain sampling (insufficient variance to detect any between-groups differences). Furthermore, inter-item correlations were rather modest for the Options sub-scale (about .30) suggesting lack of uni-dimensionality. This may make it difficult to distinguish between participants who perform well and participants who do not perform well using this measure. Thus, for several related reasons, the measures employed may have lacked sufficient sensitivity to detect any changes in interpersonal communication skills actually experienced by participants in this study.

Directions for future research

The limitations of the present study discussed in the preceding section also point to directions for future research. An important task will be to develop an appropriate scale to measure interpersonal communication skills as targeted in this intervention and related interventions. Though there are a lot of scales and measures that are relevant to interpersonal communication, no existing measure seems to capture the skills targeted in this intervention.

Research on internet based interventions for teaching interpersonal communication skills should also be conducted using a larger sample and thus increasing the statistical power of the tests employed.

Moreover, the dataset used in this study should be investigated further, inter alia on the patterns of missing values and with different statistical techniques to work with these missing values. From the study presented here, it was not possible to determine whether patterns of missing data masked the effect of the intervention, thus leading to the null results. This should be further investigated, before drawing any final conclusions. As noted above, compliance could also be taken into account, to see whether participants who followed the program faithfully experienced the expected effect. Keep in mind that around 45 % of participants in the treatment condition experienced the intervention as useful (cf. Results section). Though perceived usefulness does not necessarily equal effectiveness, this is an interesting discrepancy in the results.

Finally, if it were determined that internet based interventions may indeed be effective ways to teach interpersonal communication skills, the next logical step would be to search for the active ingredients in such interventions and to map design features and other aspects that might improve treatment effectiveness.

Conclusion

The main conclusion drawn from this study was that the hypothesis that an internet based intervention could be an effective way to teach interpersonal communication skills was not supported. More precisely, it could not be shown that the internet based intervention *NewMe Kommunisere Bedre* was effective. This could be due to the intervention itself, or to methodological features of the present study.

Interpersonal communication skills are important for every individual human being and may improve individual and group outcomes in life and work. From the cradle to the grave humans communicate all the time. Individual health and psychological well-being, relationships and conflict resolution, are all influenced by the interpersonal communication skills of individuals. Thus, the importance of teaching interpersonal communication skills can hardly be overstated.

Internet based technology show great promise for health and behaviour change interventions. Internet based interventions may be widely disseminated, thus making them cost-effective, and they may be very flexible for users. Internet based interventions have been found to be effective for a broad range of health related behaviour change, and clearly belong to the future.

The linking of interpersonal communication skills training and internet based technology did not get support in this study. However, future researchers and developers should not be overly deterred by this lack of findings. The existence of several possible reasons for the null findings in this study makes it premature to make any final conclusions as to the effectiveness of the *NewMe Kommunisere Bedre* intervention. Moreover, this lack of findings regarding that intervention does not imply that internet based interventions for teaching interpersonal communication skills may not be effective in other cases. Based on the theoretical and practical considerations discussed in the Introduction, it seems worthwhile to pursue effective and efficient methods to teach interpersonal communication skills. Internet based interventions show too much promise in other areas to be discarded lightly. The pursuit for effective methods of teaching interpersonal communication using internet based interventions should continue.

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