Exploring the Design Space of Web-based Solutions for Mindfulness-Based Cognitive Therapy

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ABSTRACT

More and more people are affected by stress in their work lives, and it is in society’s interest to decrease the levels of stress [15]. There are several approaches that can be used to reduce stress, such as bodily exercises, digital aids, psychological treatment programs, or relaxation exercises. A new psychological program called Mindfulness-Based Cognitive Therapy (MBCT), originally used to prevent relapses in depression, can also help to treat stress. However, not much research has been conducted on the effects of MBCT to treat stress, and even less on how to design for web solutions for this treatment. The aim of this study is to investigate and explore how web solutions for mindfulness-based cognitive therapy used to treat stress can be designed, with the research question Based on an informed understanding of Mindfulness-Based Cognitive Therapy, how might we, from a design perspective, design a novel web application for it? To investigate this, a research through design approach was used, and the method “future workshop” for the evaluation of the design prototype. The results of this study suggest that when designing websites for MBCT treatments, the most important features to include are visual representations of the patient’s progress and regulated home assignments. The visual representations should show the correlation between stressors and mood, and the regulation would provide assurance to the therapist that the patient does the home assignments. However, more research should be done to further explore the design space in web solutions for mindfulness-based cognitive therapy.

Author Keywords
Mindfulness-Based Cognitive Therapy; web-based treatments; stress reduction; design space.

INTRODUCTION

The 2014 report of the Swedish Work Environment Authority states that more and more men and women are affected by stress in their work lives [15]. When we experience some form of disturbance, the body responds with stress, which has previously been vital for our survival [25]. However, when exposed to the stress-response for a longer period, it can be pathogenic. Adrenal steroids called glucocorticoids (GCs) are secreted when people experience stress, which can have many kinds of harmful effects on the brain and its functionality, when they are stressed for a longer period. The hippocampus is the part of the brain that is mainly damaged of stress exposure. One common type of damage, caused by long exposure to stress, is that the GCs kill neurons in hippocampus [25]. To manage one’s stress levels, there are different methods that can be used, such as to do bodily exercises, to use digital aids, to talk to a therapist and undergo a psychological treatment program, or to do mental and relaxation exercises. For instance, there are many applications that provide guided meditation to reduce stress and increase presence, for example “Headspace” (by Headspace, Inc.), “Mindfulness App” (by MindApps), and “Calm - Meditate, Sleep, Relax” (by Calm.com, Inc.), to name a few.

A new psychological treatment program that has evolved over the past 15 years is Mindfulness-Based Cognitive Therapy (MBCT). It was developed as a group-based prevention program for preventing and reducing relapses in depression [13, 19, 23]. It contains methods used in Cognitive Behavioural Therapy (CBT, a common evidence-based treatment used to improve mental health) such as behavioural analysis, planning of activities, daily structure, life review, cognitive restructuring, social competence, and relapse prevention [29]. It also contains mindfulness practice, such as meditation, body scan, yoga, mindful movement and mindful breathing, to accept emotional displeasure and sensations registered by their bodies [16, 21, 23]. Programs in mindfulness-based cognitive therapy traditionally contain an orientation session with a therapist, and weekly two-hour group sessions stretching over eight weeks [5, 13, 16, 19, 22, 27]. The aim of MBCT is for patients to become more conscious about their thoughts, feelings, and the sensations they register with their bodies. MBCT also aims at giving the patients tools for handling their thoughts and feelings, and teaches the patients how to react to them in different ways [23].

Mindfulness-Based cognitive therapy can be modified and used as an acceptable form of treatment for neuroticism (stress vulnerability) [4]. If it is modified to specifically suit individuals who become easily stressed, it is a promising treatment for reducing stress vulnerability. However, since MBCT is a relatively new area in psychological treatments, there is not much research to be found on digital solutions for MBCT used to prevent depression relapses, compared to
research on digital solutions for Mindfulness-Based Stress Reduction (MBSR) or CBT. There is less research to be found on MBCT used for treating stress, than research about MBCT treating depression, and even less on digital solutions for MCBT used for stress, since treating stress is not the main aim of MBCT. Therefore, this paper aims to investigate and explore how web solutions for MBCT treating stress can be designed.

Research Question
The research questions investigated in this paper is Based on an informed understanding of Mindfulness-Based Cognitive Therapy, how might we, from a design perspective, design a novel web application for it?

Limitations
This paper will not investigate how well the method MBCT works for reducing stress, nor is the aim to evaluate or change the treatment itself, or to replace physical therapist time with the proposed design solutions – the design is meant to complement the treatment. The digital solutions proposed and evaluated in this study, consist of web pages and are suitable for use on a computer. Smartphone applications will not be included. The aim of the paper is also not to prove that the proposed design solutions work, but to open the design space within this area, and the target group is the patients, not the therapists.

RELATED RESEARCH AND STATE OF THE ART IN MBCT
Short explanations of all the abbreviations can be found in Appendix 1.

Related Research in MBCT
Mindfulness-based cognitive therapy is a modification of the Mindfulness-Based Stress Reduction program (MBSR), which uses mindfulness meditation to relieve suffering connected to physical, psychosomatic, and psychiatric disorders [13]. The main difference between the two programs is the CBT-methods that only occur in mindfulness-based cognitive therapy, and not in mindfulness-based stress reduction. Another treatment approach is to talk to a therapist specialized in Cognitive Behavioural Therapy (CBT), and there are internet-based solutions in CBT to be found as well. There is a limited amount of research conducted on MBCT, however, there has been some studies on related topics relevant for this study.

Wagner et al. [29] performed a study that compared treatment results of face-to-face treatment with an internet-delivered treatment, based on CBT principles, for depression. The internet treatment was guided, and it consisted of writing assignments together with feedback from the therapist, adapted for the individual. The authors concluded that the internet-delivered treatment for depression was equally useful as the face-to-face treatment. In fact, at the 3-month follow-up, the treatment effects were greater in the online group, than in the group with face-to-face treatment. More individuals in the online group also indicated clinically significant changes, than in the other group. The authors argued that one reason might have been that the online treatment had less personal guidance than the face-to-face treatment, which put more focus on the patient’s own responsibility [ibid.].

The research paper by Andersson and Titov [3] investigated the advantages and limitations of internet-based interventions for common mental disorders. The treatment used was Internet-delivered Cognitive Behavioural Therapy (ICBT), and during the treatment the patients logged in on a secure website to get access to, read and download online material, which was organised in lessons or modules. Andersson and Titov wrote that it is a known fact that many potential patients with mood and anxiety disorders do not contact specialists for help, and even hesitate to talk about their problems when they meet with a therapist. Therefore, by using online treatments, more individuals who need therapeutic help might get it. They concluded that while online questionnaires provide strong results, contact with the patient is needed to determine diagnoses, but there is much evidence suggesting that internet treatments work [ibid.].

Dimidjian et al. [12] used a web-based MBCT solution, called Mindful Mood Balance (MMB), to try to reduce depressive symptoms in patients. MMB used individually adapted treatment, which gave the patients access to the core components of the in-person MBCT program. It taught the patients specific emotion regulation and depression self-management skills, such as how to disconnect from dysfunctional cognitive patterns, over eight sessions. Each session had a learning cycle, which consisted of experiential practice, video-based vicarious learning, and didactic information. MMB was not made to replace face-to-face treatment, but rather to be a tool to complement MBCT treatments. They concluded that web-based MBCT is a promising field, which suggests clinical advantages for patients with depression, compared to those treated with only face-to-face care [ibid.].

The study by Crane et al. [10] explored the effects of home practice in a MBCT treatment for depression. The participants in the study were asked to perform home practice between sessions on six days during a week’s time. They were also instructed to keep a home practice diary. In the diary, they wrote if they had completed the home practice assignment guided by a CD, any scheduled meditations, such as “breathing spaces”, as well as informal mindfulness practice, such as “noticings”. Noticings are daily life moments that the patient is mindfully aware of. They concluded that their findings confirm previous results that home practice is related to treatment outcome in MBCT [ibid.].

Boettcher et al. [6] evaluated the efficacy of an unguided internet-based mindfulness treatment program for anxiety. Their treatment program did not include contact between clinicians, fellow participants, and the patient in question.
The authors stated that the online treatment did not decrease the efficacy of the mindful intervention [ibid.].

Taylor et al. [27] did a randomised control trial of Mindfulness-Based Cognitive Therapy Self-Help (MBCT-SH). The treatment used the MBCT-SH book “Mindfulness: A practical guide to finding peace in a frantic world” by Williams and Penman. It was designed for people who experience stress, low mood, and anxiety. During the treatment, there was no therapeutic support. They concluded that stress levels among the participants were reduced, as well as the levels of depression and anxiety, compared to a wait-list control group that did not receive treatment [ibid.].

Spijkerman et al. [26] investigated the overall effects of online Mindfulness-Based Interventions (MBI) on mental health by performing a randomised control trial on several research papers about the subject. Spijkerman et al. found that in two of the studies, the researchers had used MBCT specifically, and they had used a website and a smartphone application respectively to provide the treatment. The website treatment had not used therapist guidance, while the smartphone application treatment had used it. The authors concluded that online MBIs overall are promising tools in interventions for improving mental health, especially stress, when including therapist guidance [ibid.].

There are web solutions for MBCT, as well as for CBT, treating depression, but the area of MBCT for stress remains relatively unexplored.

State of the Art in MBCT

Based on research that has been done, MBCT is mainly a group based treatment program, with up to 15 participants [23]. This contributes to making MBCT a low-cost treatment and is an advantage. If the treatment program is internet-supported as well, there might be more advantages. For instance, treatments over the internet save a lot of the therapist’s time [2]; the participants in internet treatments represent the general population better than those who go to specialist clinics [3]; waiting-lists are reduced [11]; travelling time is cut [11]; and people who cannot easily access other forms of treatments can be reached [11].

Apart from group treatment, patients always spend around 45 minutes per week at home doing home assignments [6], and studies have shown that home practice is an important factor in a successful MBCT treatment [10, 22]. Exercises to do at home is therefore important to include in a web solution for complementing MBCT.

Some of the internet-delivered programs found in research have used unguided treatments, not including a therapist, since patients might be more likely to prefer those [3], but there are advantages with guided treatments that should not be discarded. Firstly, a therapist can make a proper diagnosis. Secondly, in guided treatments, the treatment can be more individualized than in unguided treatments. Thirdly, therapist support prevents dropout from the treatment [1, 3]. Studies have shown that the computer does not completely replace human contact, even if it can be reduced [1].

One issue might be that the increase of internet-delivered programs might make the therapists feel threatened and fearing for losing their work [3]. However, if the small number of trained therapists and the large number of people in need of evidence-based psychological treatment are considered, that fear is not well founded. Internet interventions should therefore be thought of as complementing face-to-face treatments, and not as a replacement of them.

One question might be what the effects of internet-delivered MBCT will be on a long-term perspective. Data found in the paper by Carlbring et al. [7] shows that the long-term effects of internet-delivered CBT for social phobia are like the effects found in face-to-face treatments – the patients no longer fulfilled the diagnostic criteria for social phobia after 30 months. This might apply for internet-delivered MBCT as well, since MBCT includes CBT practices.

So far, MBCT for treating depression has mostly been discussed in this study. High vulnerability to stress leads to overly sensitivity and reactivity to emotional stimuli [4]. Since mindfulness focuses on awareness and acceptance, it might take the role of a protective factor against the negative processes in stress vulnerability. Therefore, MBCT could be suitable for treating stress.

Interviewed psychological experts

For this study, two experts in psychological treatments were interviewed to gather more information about the topic of mindfulness-based cognitive therapy and internet treatments.

One expert is a medical doctor [20], specialist in cardiology and internal medicine, and is also educated in psychotherapy. He is not an expert in MBCT, and has not much knowledge about it, but he has been part of the development of applications, and other forms of designs for stress reduction, mostly Acceptance and Commitment Therapy (ACT), which is a stress reduction treatment similar to MBCT. ACT uses acceptance and mindfulness strategies, together with commitment and behaviour-change methods [14]. According to him, a behaviour analysis would be good to include in a web solution for MBCT, where the patient can see what stresses him/her, what happens before the stress peaks happen, and what kind of thoughts and emotions appear before those peaks. Another part to include would be to have a behaviour analysis of why the patient does not recover after the stress peaks, and strategies for recovering provided by the therapist, which is more specific for stress and not for depression, according to the expert. This could show what pressures the patient negatively, and what resources the patient has that are positive. The interviewed expert also said that it would be interesting to create visual representations of the internal
processes, such as thoughts and emotions. This has previously been used for people with hallucinations [9]. The patients got to create avatars, which represented the voices they heard in their heads (see Figure A1 in Appendix 2). To apply this on stress patients, they could then use this visual representation to possibly create more effective behavioural changes.

The other expert interviewed was a psychologist [17], and has worked with internet-delivered CBT for different conditions. He has mainly worked with children and adolescents suffering from irritable bowel syndrome (IBS). According to him, internet-delivered treatments have many advantages, especially in CBT. For instance, it can be challenging for people to get help from a psychologist and therefore it is easier to do it online instead. Another advantage is that there are too few psychologists trained in using CBT and a web solution could then be helpful. It might also be difficult for people to go to a hospital or a reception and meet a psychologist during work hours, if the patient has a job and perhaps a family as well. Then an internet-delivered treatment would be helpful. A disadvantage with internet-delivered CBT is the difficulty to adapt to the individual – if the patient does not fit into the template, it could be difficult to meet all the patient’s needs. However, that inflexibility could also be an advantage, according to the expert, since it is then very clear what the aim of the treatment is, which makes both therapist and patient more focused on working with the specific problem the patient needs help with. The expert said it is not very relevant to talk about life in general, if the patient needs help with irritable bowel syndrome. Another aspect to consider in internet-delivered treatments is to make the interfaces user-friendly, according to the expert. Nowadays, many patients have difficulties understanding how they should interact with the system, a problem that was not there when the expert and his team started working on this ten years ago. The tolerance towards non-user-friendly interfaces has decreased, since there is now an expectancy of how a website should function. The expert also thinks an application with a joint tool to plan a treatment for both therapist and patient would be good. There, the patient could also see what goals he/she has achieved.

**Existing websites related to MBCT**

In this sub-section, existing, commercial websites related to MBCT treatments are analysed. The websites are described as what they look like to clarify what design solutions already exist. Images of the websites can be found in Appendix 2.

As mentioned earlier in the paper, the website Mindful Mood Balance was used by Dimidjian et al. to reduce depressive symptoms [12]. It offers an online course only, which means the patients do not have any face-to-face contact with each other or the therapist [18]. At the top right corner of the website, there are some tabs which stay visible even when scrolling, which makes it easier for the user to see what pages the website has. The texts on the page are short and descriptive, and the user has the possibility to click on buttons to get more information if wanted. The page explaining the course has a short video explaining what MBCT is, a text describing both the method and the course content, and a list of what technical components are used in the course. The website uses streaming video, interactive modules, and audio recordings. The course also offers the possibility to ask questions to experts via text, and a community where one can chat with other course participants. These functionalities can only be accessed when logged in as a paying customer.

Another online course in MBCT is offered by the Center for Mindfulness in Medicine, Health Care, and Society, which is part of the University of Massachusetts (UMass) Medical School [28]. This website has a red banner at the top with several tabs, both above and below the banner, which contains a lot of information and can cause confusion among the users. The tabs are not visible when scrolling, which forces the user to scroll when other pages are sought. The information about MBCT on the web page is short, but there is the possibility to learn more if one clicks on a button. There is also information about the course, whose content can only be reached if one is enrolled in the course. The course is completely online, and the participants and the therapist meet via an online meeting room, where they can interact with one another both during class, and home assignments. There is no information about how the home assignments are provided.

The website Centre for Mindfulness Studies also offers an online course in MBCT [8]. This page also has tabs in the top right part, which stay visible when scrolling, making it easy for the user to see them. Right below the tabs is an image showing how participants see each other during the video sessions. There is a list on the right part of the page showing upcoming courses, and the page also contains information about what MBCT is, who the course is for (what kind of problems it should solve), and a video about MBCT. The patient participates in the program via computer or mobile device (smartphone or tablet), with interactive audio, video and chat. The course content cannot be accessed unless the patient is registered on the course, and there is no information about how the home assignments are provided.

Papilly is a website that offers online courses in the stress management method Acceptance and Commitment Therapy (ACT) [21]. The website offers interactive web exercises that can be performed either on a computer or a smartphone. This page also has tabs on the top right part, but they are not visible when scrolling, once again forcing the user to scroll when other pages are sought. There are arrows on the website that show that the user should scroll down to get more information – the arrows are also clickable and scroll the page when clicked. This creates “segments” on the page. There is not much text on the
website, but one can click on links and buttons to get more information. There is a login button in the top right corner, which means that the patient must be a course participant to get access to the course materials – there is no information about how the home assignments will be provided. As a course participant, the client gets feedback online on his/her progress.

The last website analysed is also a website about ACT, called Psychwire [24]. It offers online courses, and offers also other treatment programs than ACT, such as CBT and Dialectical Behaviour Therapy (DBT, used to treat borderline personality disorder). The website has a login button in the top right corner, which once again means that the course materials cannot be accessed if the patient is not a paying customer. However, there are PDFs and audio files that can be downloaded for free from the website, but they alone are not enough – one must still take the course to get the full treatment. There is a panel with tabs located in the middle of the page when first entering the page, and it does not stay visible when scrolling, forcing the user to scroll if other pages are wanted. There is text explaining ACT and the course, with very few images. There is also a video explaining ACT and the course. If one wants to read more, one can click on buttons and links. This website offers four different ACT courses, and it has some courses that are offered to everyone. However, almost all courses on the website (ACT, CBT and DBT) are offered to mental health professionals, therapists, and not patients. To access the courses, one must use a computer. It will not work on a smartphone or a tablet.

**METHOD**

In this section, the methods used to answer this study’s research question are described.

**Research Through Design**

This study used research through design to create the design suggestion, which is a design method for making the right thing as a designer, rather than a commercially successful thing [30]. Doing the right thing means a product that changes the world from its current state to a preferred state. Using this research approach, interaction design researchers incorporate the true knowledge (models and theories from behavioural science) with the how knowledge (technical possibilities from engineering) [30]. Apart from making the right thing, research through design also allows the Human-Computer Interaction research community to commit to problems that cannot be solved only through science and engineering.

**Future Workshop**

The design prototype, which was a clickable prototype created in the online interface design tool Figma, was evaluated by using a future workshop. Future workshop is a design method recommended to use in the participative design approach to design interactive systems, and it has a long tradition in Scandinavia especially, going back to the late 1970’s [5].

A future workshop consists of three stages; critique, fantasy, and implementation [5]. The critique stage is a group brainstorming session that explores different approaches to the problems addressed by the proposed system. The outcome of this stage is a set of themes, which will be used in the fantasy stage. The fantasy stage has an emphasis on creative solutions, which may be very unrealistic. The outcome of the fantasy stage is also a set of themes, which are used in the final stage – implementation. In the implementation stage, the group discusses what would be necessary to do to create a real solution based on some of the fantasy themes generated. The outcome of this stage is a mock-up of the new design solution or a storyboard.

For the evaluation of the prototype of this paper’s exploration, eight people were invited to participate – one expert in stress, three experts in interaction design, and four Media Technology students at KTH Royal Institute of Technology. They were invited since they had knowledge about either psychological treatments, or interaction design, which was valuable for the evaluation. The real end-users were not invited to participate due to ethical reasons. In the end, two students, two experts in interaction design, and one person with knowledge of psychological treatments participated.

The workshop was scheduled for two hours, and started with an introduction of what this paper is exploring. Then the participants were given access to the developed prototype, and the critique stage started. During the workshop, notes were simultaneously taken by the author. Preferably, the session would have been recorded and transcribed later, but due to time constraints, the workshop was documented via text directly.

**RESULTS**

**First Prototype**

The first prototype was based on information gathered by reading literature, interviewing experts, and analysing already existing MBCT and ACT treatment websites. One important aspect is that the treatment MBCT is group based, according to the literature, and therefore it might be desirable for the patients to be able to interact with each other via the website. Therefore, a chat function should be included, which easily allows the patients to interact, when desirable. A normal chat function (with the possibilities to use text, video chat, voice chat, and group conversations) could be a good solution, since it is important to make the interfaces user-friendly, according to one of the experts. Some people already know what a chat function normally looks like, and therefore, they already have expectations of what it will look like. If the design of the chat function was changed, it could cause unnecessary confusion. Patients might also want to contact the therapist, since they might that is a feature included in several of the existing websites. Therefore, it should be easy to find information about how to contact the therapist. Since both the chat function, and
information about contacting the therapist falls under the same category, they were put under the same page, "contact" (see Figure A2).

According to the literature, in MBCT there are always home assignments the patient should do. The content of the home assignments plays a role in how the assignments should be provided. Information about the assignments were not to be found in the literature or in the existing websites, but since the aim of this study is to explore what is possible to design, it was not a major issue. A solution of three mediums was used; text, video, and audio. They were chosen because they all require use of different skills (reading, watching, listening). That way, the patient could choose which medium suits him/her the best for absorbing information, if they all contain the same instructions. People might absorb information differently and to offer options could perhaps have a positive effect on the patients' learning. The assignments were put in chronological order, with the most recent on the top of the page, to make it easy to find the current assignment (see Figure A3).

Another detail to consider was that the amount of text on each page should be as little as possible, as too much text could be experienced as confusing and stressful, according to the literature. It would be better to present only small amounts of text, and then provide the possibility to click and get more information, if wanted, as done in the existing websites. For the first iteration of the prototype, there was no possibility to click and get more information, but consisted only of short texts, thought to be descriptive enough (see Figure A3, A4, and A5).

The patients should be required to log in to the website to get access to the treatment, the assignments, and their own data about how their progress is coming along, preventing others from accessing sensitive data. This is a feature already used in the existing websites. Therefore, a log in page was created, where the patient also could get help if a patient forgets his/her password.

The existing websites all use banners with tabs, most of them in the top right part of the pages, to show what other pages the user can access. To explore new design solutions and not to imitate existing websites, tabs were not used in the first prototype. Instead, the home page has three buttons, the three pages the user can access apart from the home page (see Figure A4). The three pages each has a back-button to go back to the home page. There was also intentionally no indication of where the user is on the website, since that feature is provided in modern websites, and the author wanted to explore if that feature is needed in an MBCT website.

Most of the existing websites also have their texts on white backgrounds, and the pages have either nature images, or calm, nature-like colours, such as green, orange, and blue. The decision to have a nature image in the prototype was based on the intention of keeping a design aspect that the users might expect from a psychological treatment website. It covers the whole page to hopefully give the users the feeling of being closer to nature, compared to if the image had been smaller, or in only a certain part of the page. The background on top of the image was made light grey, not white, to differentiate from the other existing websites, and put on top of the image to make reading easier. The background is a bit transparent to keep the nature image visible and the feeling of being closer to nature.

Based on the first expert interview, a behavioural analysis should be part of the treatment [20]. Important parts of the analysis, according to the expert, are stressors (events that triggers stress reaction, causing stress peaks), what is important in life to the patient (what resources the patient has got), and what emotions the patient has before the stress peaks. Based on the second expert interview [17], the ability for the therapist and the patient to have a joint platform where they could plan the treatment and see what progress has been made is important. In the first prototype, the behaviour analysis is the foundation of the planning of the treatment. Radial charts were used to represent how the analysis could be visualized (see Figure 1 or Figure A5). They were the first the author thought of as a visual representation of behaviour, based on personal experience, and the author thought it would be interesting to see if they could be used in this design space. In the charts, months are displayed, but the idea was to have different words on the charts – the months chart was chosen only as a representation. For instance, words such as “family”, “time alone”, and “friends” could be on the chart “important to me”. Then, over time, new colours or lines appear on the chart, showing how the patient has progressed.

Feedback from Future Workshop
The five participants discussed in group what they thought about the prototype, and they are referred to as “the group”, or “group members”.

Log in page
One aspect that the group pointed out was that there is no introduction to the website, the user directly comes to the log in page. Therefore, it was a bit unclear what the website was about, and the group said it would be nice to have an introduction page, before the log in page.

Home page
The group wanted to include positive feedback on the home page, to make use of the space on the page. It could for instance be “this is how you feel today”, “this week’s assignment is”, “you’re doing great”, or similar. Alternatively, ask the patient how he/she is doing when the patient logs in, and to have a short emotional assessment then (see Figure A6 and A7).

According to the group, it would also be good to see where the user is on the website and to include explanations of different words. The group stated that they liked how the website only had short descriptions. However, they
proposed that it would be good to use pop-up windows for first-time users, to explain the website and words, or to add clickable question marks beside words, to provide additional information when requested by the patient.

**Behaviour analysis page**

The group said that the charts were the main issue with the prototype. It was unclear how they worked, and what the words “stressors”, and “important to me” meant. However, according to the group, the presentation of data over time made sense to have in the charts, since that connects the charts, and the patient can see what has happened. It was also suggested that more physiological aspects could be added, such as tracking sleep and food, and to perhaps add a fourth chart for that. However, it was unclear whether that analysis would be placed in “behaviour analysis”, or someplace else on the website.

The solution to have only one chart was discussed, which would show the correlation between the three aspects, since it is more important to see that the patient moves forward, rather than seeing exactly what happened, according to the group (see Figure A8). The group discussed if a time slider should be put under the charts, to see the patient’s progress, but concluded it might be difficult to get it done well. Another suggestion was to have the charts change colours, or shape, to indicate change over time and to make the change clearer visually.

The group said that the part “important to me” is more general, and does not change much over time like the other parts do. Therefore, it might not be relevant to include “important to me” in a chart, since it is on a different scale than the other aspects and it could be difficult to relate “important to me” to them. The group also pointed out that the word “mood” might be better to use than “emotions”, or “feelings”.

Another aspect discussed was having a questionnaire on the website, which results then would be shown in the charts. That could save some time from the sessions with the therapist. The questionnaires could be shorter for more frequent use, and a bit longer when less used. One suggestion was to start with a questionnaire every day, and make them less frequent as the treatment progresses (see Figure A9).

The charts should not change too often, according to the group, since it is not desirable to have the patients feel they need to check the charts every day. They suggested the charts change once a week, and a push notification could then be used to tell the patient they have been updated. The questionnaire should then also be accessed once a week.

**Home assignments page**

The group wanted to add a reminder to remind the patient to do the assignments. The group further discussed how it could be made sure that the patient did the assignments, and they suggested to add a checkbox, which the patient could use when completing the assignments for each week. The group also wanted to add a quick assessment after completing the assignments, regarding what the patient thought of the assignment (see Figure A10).

One suggestion from the group was to put all the assignments of each week in a “blog post”, to keep them collected in one place. Another suggestion was to put the current assignment in the home page, and the past assignments under it. They also suggested to embed the assignments in the system like a slide show or a video, where the patient cannot continue the assignment material until he/she has done certain exercises or assessments.

One of the group members suggested to add more online content about the different week themes, such as links to books, or videos, in case the patient want to know more about the theme.

**Contact page**

The group pointed out in the contact section it is unclear which type of contact is preferred at what time during the day. They suggested to add information about that, and to add a number to the reception, in case the therapist cannot answer his/her private phone, or to replace the private number with the reception number. Contact information for emergencies should also be added, according to the group (see Figure A9).

They also commented on the function to chat with the other patients, participating in the treatment at the same time. They said the function felt separate from the rest of the website, and that perhaps it would not be as functional in the online environment as in the physical environment. The patients could arrange contact with each other outside the scheduled meetings by themselves, according to the group.

Another aspect discussed by the group was the possibility to participate remotely in emergencies, or to record the sessions and put them on the website, in case the patient misses a session. The group said it would be good to have that option.
Other opinions stated by group members

One of the group members wanted to have a second prototype with the therapists as target group, to see how they would upload information on the website.

Another group member wanted to make the website location based, to make it easier to assess in which environments or places the patient felt stressed, relaxed, etc. for the emotional assessment.

The possibility to personalize the website was also discussed, as well as if the therapist should have the possibility to intervene when necessary and tailor the website to the participant. However, the group did not agree on a solution.

Finally, the group wanted to add a new section for “schedule”, where it would show when the next session with the patient group or the therapist is. The schedule should also include a section which would show when the home assignments are due.

New Prototype

The second iteration of the prototype was based on the feedback from the future workshop. The second prototype can be found on the following link:


Feedback considered

Most of the group’s feedback was considered when redesigning the prototype. A welcome page, before the log in page, was added, since the group said it was a good feature to include (see Figure A11).

The feedback on the home page concerning positive feedback for the patient, as well as the ability to log the amount of sleep every night was considered, and put on the home page (see Figure A12). Since the group suggested it would be good to use clickable question marks next to words, to get more information about the segment, that feature was added as well. An example of how the pop ups would look like can be seen in Figure A13.

The feature to be able to see where the user is on the website was added, since the group had proposed it. A “progress bar” was added to the pages “behaviour analysis”, “home assignments”, “contact”, and the new page “schedule”. The page “schedule” was added to the prototype and it includes both scheduled group sessions with the other patients, as well as deadlines for the home assignments (see Figure A14).

The group suggested to add checkboxes next to the assignments, to make sure the patient did the assignments. Therefore, this feature was added (see Figure A15). The idea is that the video consists of some chapters, and after each chapter, some exercises, or instructions for exercises, will appear on the screen. The patient cannot continue the video chapters until the exercises are finished. What the exercises will consist of is up to the therapist to decide.

When all the exercises have been done, and all the video chapters have been played, the checkbox will turn green automatically. After the exercises have been done, a short assessment will appear to get feedback from the patient what he/she thought of the assignment. Such an assessment will look like the one for the behaviour analysis (see Figure A16), but with questions regarding the exercises.

The main issue was the “behaviour analysis” page, since the radial charts were difficult to interpret and understand – they proved to be a bad solution to use. To change that, new charts replaced the old ones – one to show the correlation between how stressed the patient feels and how the patient’s mood is, and one to show how many hours the patient has slept every night. At the bottom of the page, lists were added, showing what helps the patient recover (resources the patient has), and what stressors (triggers that make the patient stressed) he/she has identified in consultation with the therapist (see Figure A17). The list showing what helps the patient recover used to be called “important to me” in the first prototype and used to be a chart, but since the wording and the chart itself was out of place, according to the group, it was changed to a list.

The patient will have the possibility to enter the number of hours of sleep daily, on the home page, and the chart showing sleep will thus update every day. The chart showing mood and stressors will update once a week, based on the assessment for behaviour analysis, which will also be available for the patient to fill out once a week. A suggestion for this assessment can be seen in Figure A16, but the therapist will decide what it will consist of.

The feedback about the contact page was considered, and information about which type of contact to use when was added. The personal phone number to the therapist was replaced by a reception number (see Figure A18). The feature to chat online with both the therapist and the other patients was removed, since the therapist might not have the time to chat, and the patients can arrange contact with each other by themselves.

Feedback not considered

Some of the group’s feedback was not considered when redesigning the prototype, because the group did not agree on those ideas. The feedback not considered is presented below.

Feedback that was not considered in the new prototype was adding more online content about the assignments’ themes, because it was only one group member who wanted to include that. The rest of the group did not say they agreed, and were uncertain of if it was a good idea.

Another feature the group suggested to add, but which was not included, was for the patients to be able to participate remotely. If the patients could participate remotely, the treatment would become too much like an online-only treatment, which is not the focus of this paper.
One group member wanted to have a prototype for the therapists, but since the target group of this prototype is the patients, and not the therapists, this feature was not included.

The feature to have parts of the website location based created divided opinions in the group, and was therefore not included. Its advantage was not confirmed by the group.

The possibility to personalize the website was also discussed, but the group did not agree if it was a good suggestion, and was therefore not included.

**DISCUSSION**

The purpose of this study was to investigate and explore how web solutions for mindfulness-based cognitive therapy used to treat stress can be designed, with the research question *Based on an informed understanding of Mindfulness-Based Cognitive Therapy, how might we, from a design perspective, design a novel web application for it?*

The results of the study showed that when designing websites for the user during an MBCT treatment, made to complement the treatment, it is important to include

- clear instructions,
- the option to get more information,
- positive feedback,
- visual representation of the patient’s progress over time, such as charts showing correlation between stressors and how the patient feels,
- assurance for the therapist that the patient does the home assignments,
- regular information gathering about the patient, as well as their feedback on home assignments, using assessments.

The aspect of the therapist knowing that the patient has done the assignments was taken into consideration in the new version of the prototype, and was added by using checkboxes turning green when an assignment was completed. However, the importance of this feature can be discussed. The paper by Wagner et al. shows that less personal guidance can lead to greater treatment effects, since more focus is then put on the patient’s own responsibility [29]. The treatment in the paper was used to treat depression, and not stress, but this can be applied to treating stress as well. Therefore, the need for the therapist to know whether the patient has completed home assignments or not, might not be as important as first thought.

An aspect that was pointed out during the workshop was the feature to be able to participate remotely in the therapy sessions. This was not included in the new version of the prototype, since that would make the treatment too much like online treatments. Andersson and Titov write that internet interventions should be thought of as complementing face-to-face treatments, and not replacing them, as a completely online treatment would do [3].

However, there is disagreement in the research literature. If the feature to participate remotely was to be included, there could for instance be a limit to how many sessions the patient can miss, preferably decided by the therapist, to avoid this feature turning the treatment completely online. After a certain amount of remote participations, that feature would no longer be available, and the patient could receive notifications about how many remote participations he/she has left.

The future workshop participants discussed the possibility to track the patient’s location for certain features of the website, but this was not included in the prototype due to different opinions in the group. This feature is not something that has been brought up in previous research about web-based MBCT, but could be a possibility if therapists think it brings value to the treatment, such as making it easier to analyse the change of mood of the patient. One part of the group reasoned that if the patient does a mood assessment while being on different locations each time, it could be more difficult to draw conclusions about the patient’s behaviour. Certain locations can also work as stressors for the patient, which then could be identified and processed.

The feature to personalize the website was not included in the new prototype. It was discussed in the group, but the group did not agree if it was a good feature or not, which was one of the reasons for its exclusion. Another reason for not including the possibility to personalize, or individualize the treatment, is that one of the interviewed experts said the inflexibility is an advantage. By not adapting to the individual, the aim of the treatment becomes clearer, and thus making the therapist and patient focus more on working with the specific issue the patient needs help with.

This study focused on web-solutions as a complement to the treatment – the patients still must visit the therapist and other patients for the group sessions. Travelling time is therefore not cut or reduced, and has no positive impact on the environmental sustainability. However, novel design solutions for complementing the treatment might hopefully help increase the efficiency of the treatment, and therefore reduce the likelihood of patients experiencing more stress after the treatment is finished. If fewer people sign off due to stress-related issues, it will be a smaller cost for society, and therefore it might have a positive impact on the economical sustainability.

The exploration of this design space was done with no specific gender in mind. However, it would be interesting to investigate if the design solution in this study has any effect on the efficiency of the treatment for different genders, since they might react to the presentation of information and interpret it differently.

The ethical implications of this study are that sensitive data of the patient is handled and therefore a log in page should be included in a design solution. A clarification of the
management of the data could also be included (the data is only accessible to the patient and perhaps the therapist, as a suggestion), as well as information about what happens to the data after the patient has finished the treatment.

Since the existing websites’ treatment content were not available unless you could log in to them as a paying customer, it is difficult to say how this study’s design solution differs from the existing ones.

Methodology Criticism
Alongside the gathering of information about this topic via literature, experts were interviewed. However, only two persons were interviewed. More interviewees were desirable, and more than two were contacted, but only two agreed to participate in the study. More relevant information could have been gathered, if more experts had been interviewed. Preferably more experts in MBCT would have been interviewed, since the experts who were interviewed had other expert areas. It would also have been a good contribution to interview people working with the commercial websites offering online MBCT, as this could have produced more relevant information about the state of the art in internet-delivered MBCT treatments. However, due to time constraints, they were not contacted.

Time constraints were also the reason for choosing future workshop as evaluation method. The original idea was to have the same experts interviewed to gather information, to evaluate the prototype using heuristic evaluation. They would have evaluated the hi-fi prototype more than once, and other people, such as university students, would have evaluated the lo-fi prototype, making the procedure more iterative. However, it was concluded that since so few experts were interviewed in the first place, it would be very difficult to get their feedback on the prototype, especially more than once, and since time was an issue, it was decided to use a future workshop instead, which allowed a smaller number of people, and a more heterogeneous group of people.

The number of people participating in the workshop was also not ideal. Only two people replied that they could participate on the suggested date, but in the end, three more people showed up. The workshop would ideally have had six participants, and five people participated, which is close enough to six. Since the workshop was held quite late in the process, there was no time to evaluate the new version of the prototype, which would have been beneficial. That way, more aspects could have been identified as necessary, and the design space could have been explored even more.

Future Research
There are features that were not included at all in either version of the prototype, and which require more research to design. One interviewed expert talked about visually presenting for the patient what happens before the stress peaks happen, and what kind of thoughts and emotions appear before those peaks. The chart in the prototype showing the correlation between stressors and mood touches lightly on that subject, but it does not show clearly what exactly happens before the peaks – only that they do happen. It would be a contribution to create this visual representation, and it is an area worth exploring in future research. Another contribution would be to test the design solutions on patients undergoing a stress reduction program, since it was not done in this study.

Another area worth exploring is how to design visual representations of the internal processes of the patient, such as thoughts and emotions. This approach to face one’s inner voices could be used for treating stress, and such a solution would also be a contribution. An avatar could be one solution, but it could also be something else, which is why this area should be further explored. However, if that method is suitable for the MBCT treatment is for therapists to explore, as it is outside the author’s area of knowledge.

Finally, investigations about the mobile space for internet solutions in mindfulness-based cognitive therapy should be made, since it was not included in this study.

CONCLUSION
The aim of this study was to investigate and explore how web solutions for mindfulness-based cognitive therapy used to treat stress can be designed. Based on existing websites related to MBCT and the feedback received from the evaluation of the first prototype, web applications in MBCT should be designed to contain visual representations of the patient’s progress, especially the correlation between stressors and mood, as well as home assignments that are regulated to make sure the patient does them. These features were identified as the most important ones to include in an MBCT web solution.

This study has helped to open the design space for web-based MBCT, and has contributed with more research in a relatively unexplored area. The author believes other designers can be inspired by these results and explore the design space even more.

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REFERENCES


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APPENDIX 1 – ABBREVIATIONS

ACT – Acceptance and Commitment Therapy. A stress reduction treatment that uses acceptance and mindfulness strategies, together with commitment and behaviour-change methods.

CBT – Cognitive Behavioural Therapy. The most commonly used evidence-based method to improve mental health. It focuses on developing coping strategies to change unwanted cognitions, behaviours and emotional regulation.

DBT – Dialectical Behaviour Therapy. A psychotherapy method used to help people suffering from borderline personality disorder.

ICBT – Internet-delivered Cognitive Behavioural Therapy. When internet is used to provide the patient with CBT strategies.

MBCT – Mindfulness-Based Cognitive Therapy. A psychotherapy method originally developed to prevent relapses in depression. Contains both CBT strategies and mindfulness strategies.

MBCT-SH – Mindfulness-Based Cognitive Therapy Self-Help. The same as MBCT, but with no therapist contact. Does not necessarily mean that internet is involved, books can be used to provide the patient with the required instructions.

MBI – Mindfulness-Based Interventions. Umbrella term for therapeutic approaches that are grounded in mindfulness.

MBSR – Mindfulness-Based Stress Reduction. A program that uses mindfulness meditation, body awareness, and yoga to help people with stress related issues.
APPENDIX 2 – EXISTING WEBSITES AND FIGURES

Mindful Mood Balance

Support your clients with depression and anxiety disorders by using the core competencies of Mindfulness Based Cognitive Therapy.

Our cutting-edge online courseware will change your approach to treating depression and other clinical problems.

3-MINUTE Breathing Space
An interactive course that teaches skills to incorporate Mindfulness Based Cognitive Therapy into daily life.

MMB Pro
An online program that delivers the core content and practices of mindfulness meditation.
We could tell you about Mindfulness-Based Cognitive Therapy, or you could just dive in.

Learn by doing in the MMBPro online course.

This 8-week online course will teach you how to:

1. Describe the core principles, practices, and structure of the 8-week MBCT approach
2. Differentiate automatic and mindful modes of mind as they relate to everyday experience and emotional challenges
3. Distinguish the experience of difficult emotions when connected to the body in contrast to when engaged in habitual rumination patterns
4. Identify personalized skillful actions likely to support well-being and prevention of problems with mood
5. Inquire and self-reflect about your own experiences with daily mindfulness and cognitive behavioral practices
6. Develop effective responses to common challenges in learning core elements of MBCT
A Mindful Way Through Depression
MBCT Online | CT-201-WEB

Break the cycle of recurrent depression

What is MBCT?

Mindfulness-Based Cognitive Therapy (MBCT) is an 8-week program for people with depression. MBCT combines the practice and clinical application of mindfulness meditation with the tools of cognitive therapy to break the cycle of recurrent depression. For more information on MBCT and to determine if it is right for you, click here.

This program is most beneficial:

- For those who have suffered from recurrent depression
- For those who have been advised to remain on antidepressant medications for the rest of their life to prevent a recurrence, as MBCT may be a welcome alternative
- For those interested in an opportunity to learn a new way of relating to unwanted thoughts and feelings and powerful skills for responding to them in an intentional and skillful manner

What is the MBCT 8-Week Live Online program?

This program addresses the needs of those interested in taking the MBCT 8-week program with others, but are unable to physically attend the in-person program. The entire course is delivered live through video conferencing. Rather than meeting in person, participants engage with the teacher and interact with one another through their computer during class time, and for home assignments and practice.

A computer and high-speed internet connection are required. Mobile devices such as phones and tablets are not recommended.

What is the course structure and commitment?

The Live Online MBCT program consists of
Mindfulness-Based Cognitive Therapy ONLINE

Learn to manage anxiety & prevent the relapse of depression

Mindfulness-Based Cognitive Therapy (MBCT) is an evidence-based group therapy providing tools and strategies for preventing depressive relapse, as well as reducing acute depression, anxiety and stress.

Relapse, as well as reducing acute depression, anxiety and stress.

We recognize that our in-person MBCT program is not accessible for all, and so we now offer MBCT Online, allowing you to participate from the comfort of your home or office, wherever you may be.

Mindfulness is a non-judgmental way of paying attention to the present moment. Cognitive Behaviour Therapy is designed to bring awareness to the habitual negative thinking that leads to depressive and anxious spirals. Combined, MBCT interrupts how we habitually react to situations, so we can choose to respond in more skillful ways.

Research has demonstrated MBCT is as effective as antidepressants in the prevention of depressive relapse or recurrence. (Kykpen, 2015)

Who Should Attend

Individuals experiencing moderate anxiety or depression and people with a history of depression who are unable to attend an MBCT in person.

Participants must be able to meet the following technical requirements

Timing

8 weekly online sessions of 2.5 hours each plus Orientation of 1.25 hours

Your third-party insurance plan may cover the cost of this program.

Learn more, click here.
Your third-party insurance plan may cover the cost of this program. Learn more, click here.

Participants Will Learn

Skills and practices to manage depression, anxiety and prevent relapse. By learning to identify the triggers and symptoms of anxiety and depression, participants can effectively address these issues as they arise in everyday life.

A commitment to attendance, participation, and home practice activities is required.

"I am not the same person as when I started. I will continue to meditate as a daily habit... this has been so powerful and profound..." - MBCT Participant

Learn about our Personal Health Information Privacy Policy
Låt inte stressen flytta in

Nu har du möjlighet att var du vill och när det passar dig, jobba med din stress, livsutmaningar och hinder som ligger i vägen för din självutveckling. För att hitta balansen i din verklighet, behöver du få insikt i den livssituation och bestämma dig för att göra något åt den.

För första gången finns en svensk forskningsbaserad metod som gör det förebyggande arbetet enkelt och praktiskt möjligt på bred front.

Det här är stressprogrammet

Digitalterapi för 295:-/månaden

- Svegsus leder dig genom interaktiva övningar för att stärka din förmåga att hantera stress
- Insatser och tekniker som får dig ihop balansen - här och nu
- Programmet är vetenskapligt framtaget av forskare från Karolinska Institutet och bygger på ACT, det senaste inom KBT
- Programmet är berättigat till friskvårdsbidrag och vi lämnar 100% kortat kund garanti.
Psychwire

ACT for Beginners

I'm Learning ACT

ACT for Beginners

ACT for Beginners (May 29)

$545

Heather Power
Registered Psychologist

I am finding this course to be extremely helpful in focusing my work with my clients. I have used the Choice Point worksheet with many of my clients and have only had good responses to it.

Starts May 29
30hrs | 9 weeks + 20 hours bonus content
For Mental Health Professionals
Figures

Figure A1. Avatar used in auditory verbal hallucinations treatment.

Figure A2. The contact page of the first prototype.
Figure A3. The home assignments page of the first prototype.
Figure A4. The home page of the first prototype.
Figure A5. The behaviour analysis page of the first prototype.

Figure A6. Suggested new home page.
Figure A7. Suggested new home page.

Figure A8. Suggested new behaviour analysis graph.
Figure A9. Suggested questionnaire, and contact page.

Figure A10. Suggested new home assignment page.
Welcome to XXX!

This site functions as an aid for you who takes part in the Mindfulness-based Cognitive Therapy treatment, held at XXX.

Here, you can for instance access the weekly home assignments, and see your progress.

Log in  Sign up

Figure A11. New welcome page.
Figure A12. New home page.
Figure A13. New home page, with pop up window.
Figure A14. Schedule page.
Figure A15. New home assignment page.
Figure A16. New behaviour analysis page, with assessment.
Figure A17. New behaviour analysis page.
Figure A18. New contact page.