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INFLUENCE OF MINDFULNESS-BASED STRESS REDUCTION

ON

ANXIETY, DEPRESSION, QUALITY OF LIFE AND COPING

IN CFS PATIENTS

Thesis for obtaining the degree licentiate in the Psychology,

Option Clinical Psychology

by

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Abstract

CFS is a chronic disease from which complete recovery is rare . Mindfulness-Based Stress Reduction (MBSR) is a clinical training whose worldwide program in recent years has been for all kinds of problems. However, only one study has been conducted on its effectiveness on individuals with CFS. This pre-effect study investigates the effect of this training on self-reported anxiety, depression, coping, rumination and quality of life in this population and whether the effects are the result of developing mindfulness. Self-reported questionnaires were used for this purpose. We found a decrease for depression, rumination and anxiety. There is also an improvement in quality of life and coping but not to the same extent. The changes in depression, anxiety, rumination and quality of life depend on the degree of mindfulness. This also applies to the improvements in active coping strategies, seeking social support, reassuring thoughts, passive response pattern, and expression of emotions. We also found that the degree of mindfulness had no influence on the results of whether or not the person was depressed in the beginning of the training. We've noticed that the depressed group achieved better results than the non-depressed group. Results and implications for further research are discussed further.

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Introduction

Chronic fatigue syndrome, a new disease?

We often feel tired after a busy or stressful period. Fatigue is a well-known phenomenon for all of us, but after a period of rest and relaxation we can pick the thread up with full energy. Some people feel tired all the time, even after a rest period. If the complaint of fatigue has existed for at least six months, it is referred to as chronic fatigue. If no physical cause for the complaint is found and the daily , occupational and social functioning is impaired, we can speak of chronic fatigue syndrome (CFS). In CFS fatigue is the main complaint but this is often accompanied by other complaints such as pain: muscle pain (71%), headache (46%) and joint pain (17%). Also concentration and memory problems, gastrointestinal complaints, dizziness, sleeping complaints and muscle weakness (Blijenberg, Bazelmans, & Prins, 2001, p. 8).

Doctors and psychologists are increasingly confronted with patients with chronic fatigue complaints, but CFS is not a recent disease. According to Wesseley (1999), CVS is 'Old wine in new bottles'. As early as 1750, the clinical picture of fatigue was associated with various combinations of pain complaints. Due to the extensiveness of the combinations of symptoms and the then not yet existing common definition of CFS, the disease has been given various names in history, including neurasthenia and myalgic encephalomyelitis (ME) (Wesseley, 1990).

In 1994 the consensus definition of the US Center for Disease Control emerged (Fukuda et al., 1994). Since then, this definition has been used to diagnose CFS. The definition of CFS is formulated as follows: CFS is a clinically evaluated, unexplained, persistent or recurrent chronic fatigue, with new and apparent onset, which is not the result of continued exertion, does not improve significantly with rest, and which is guided by has significantly reduced previous levels of occupational, social, or personal functioning. And during 6 months at least four or more of the following symptoms have been present

- a) self-reported impairment in short-term memory or concentrating;
- b) sore throat;
- c) sensitive neck or axillary glands;
- d) muscle or joint pain without swelling or redness;
- e) headaches;
- f) sleeping complaints;
- g) post-exercise malaise lasting longer than 24 hours .

These complaints should not be present before the onset of fatigue symptoms. The picture of complaints can best be described as a 'flu-like illness' (Blijenberg et al., 2001, p. 8-9).

Despite many studies, no somatic explanation has yet been found for CFS (Wesseley, Hotopf, & Sharpe, 1998). According to Cleare (2004), the cause of CFS is multifactorial. The development of the disorder is in the current literature explained by a combination of causal factors on three levels: 1) *facilitating factors*: a premorbid psychosocial problem, an overactive lifestyle and a perfectionist personality; 2) *initiating factors*: somatic factors, psychosocial problems and stressful life events; 3) *Perpetuating factors*: failure to recognize CFS, negative self-efficacy, physical attributions, avoidance of physical exertion, lack of social support, fear of fatigue, and focus on physical sensations (Blijenberg et al., 2001, p. 20).

The difficulties prior to 1994 in defining the disease unambiguously leave a great deal of uncertainty about the prevalence of CFS today. It is estimated that the prevalence is between 0.2% - 0.7% in the general population (Maquet, Demoulin, & Crielaard, 2006). According to Blijenberg et al. (2001), there may also be an underestimation of the prevalence due to physicians' ignorance of the syndrome. This would have increased in recent years. According to Cairns and Hotopf (2005), the demographic data in most studies shows that 75% or more of the patients are women. In an experiment by De Jong et al. (1997), the diagnosis was also made in young people from the age of 10. The disease lasts on average 3 to 9 years. Full recovery without relapse is rare.

Cognitive Behavioral view of CFS

In his cognitive model, Beck (1995) argues that our feelings and behaviors are influenced by our perception of events. The way we *interpret a situation or event*, determines what we feel and our physiological and behavioral responses. So it is not the situation or the event itself that has an influence. He assumes that dysfunctional thoughts lead to unnecessary emotional and/or behavioral problems. People with psychopathological disorders make characteristic logical and/or empirical errors in their reasoning. These fallacies perpetuate the disorder are defined by dysfunctional *schematics* that filter, transform, and interpret all incoming information. A schedule is a representation of a collection of knowledge about a particular subject. A schedule contains both quick, evaluative *automatic thoughts* and deeper *core thoughts*. These core ideas are global, rigid and generalized. They lead to the emergence of *intermediate ideas* consisting of attitudes, rules and assumptions. The goal of cognitive therapy is to change dysfunctional beliefs and develop more realistic and functional ideas (Beck, 1995).

Surawy, Hackmann, Hawton and Sharpe (1995) have developed a cognitive model of CFS . The first part of the model explains how certain initiating factors can lead to CFS in individuals with congenital frailty and how cognitive, behavioural, physiological and social factors influence and maintain the disease. The first part is shown in Figure 1.

Intermediate Thoughts

To be accepted by myself and others I must:

- (a) meet high standards of performance and responsibilities
- (b) be in control of my emotions and not express weakness



Premorbid behavior

High pursuing standards

Not complaining or admitting weakness

Ignoring own needs



Initiating factors

High demands (at work) or reduced resilience to meet high demands

Emotional consequences of stressful life events or viral illness lead to inability to meet the demands of the intermediate ideas



<i>Behavior</i>	<i>Emotion</i>	<i>Symptoms</i>	<i>Thoughts</i>
more effort	frustrations	fatigue	Why can't I ?
not complaining	sadness	arousal	I must be sick!

Figure 1. Cognitive model of the origin of CFS.

In a second part , Surawy et al. (1995) show how frustrating efforts, ineffective rest and dysfunctional thoughts, including attributing physical symptoms to a disease, lead to a vicious circle and lead to the conservation of the chronic disease in. This vicious circle is shown in Figure 2.

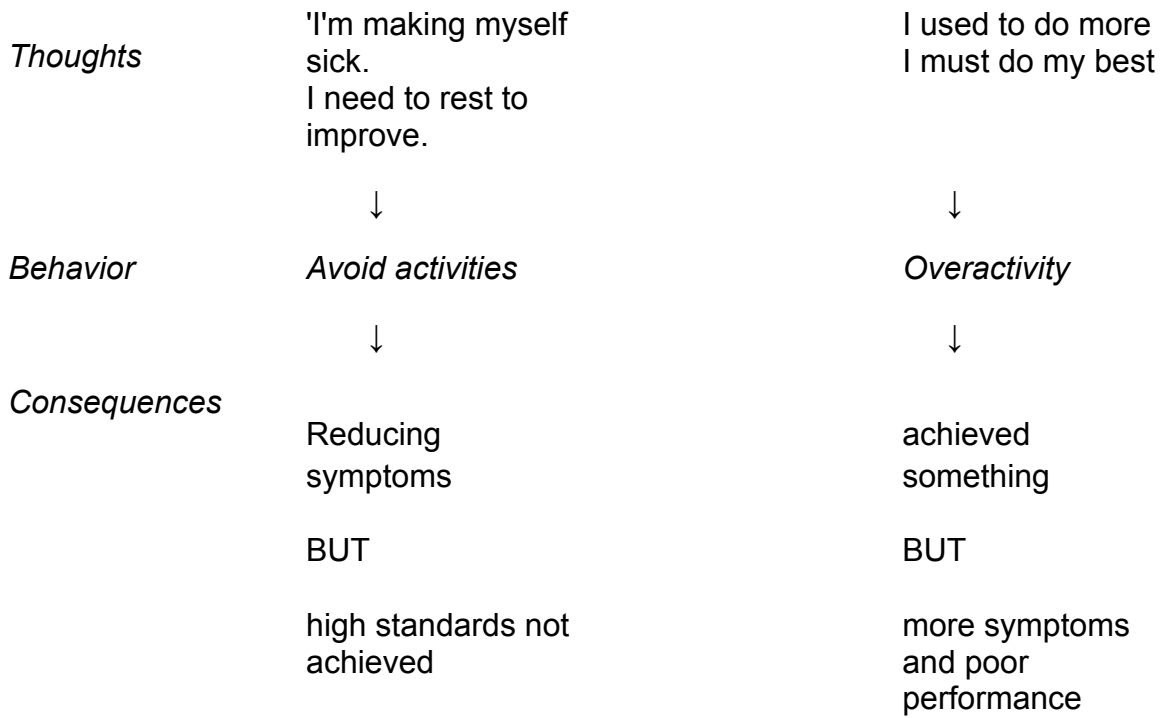


Figure 2. Persisting factors of CFS

CFS and Coping Styles

Everyone has to deal with stressful-life- events, problems and adaptation-requiring events in life. The interpretation of and response to these difficult events are described by Lazarus (1966) as separate processes: appraisal and coping. Appraisal is the cognitive process by which a situation is interpreted and evaluated. A particular situation may seem unimportant, but it may be interpreted as stressful to someone else. The situation is then assessed as dangerous and threatening (Schreurs, Van de Willige, Brosschot, Tellegen, & Graus, 1993). Surawy 's model et al. shows that patients with CFS' physical symptoms attribute to a disease. These dysfunctional interpretations thus perpetuate the chronic disease .

Coping is the way in which a person reacts behaviorally, cognitively and emotionally to stressful events. Schreurs et al. (1993) assume that people are behaviorally and cognitively consistent across various problematic situations.

For this response they use the term coping style. These coping styles are the result of, among other things, past learning experiences, parenting patterns and personality traits. However, they are changeable. Schreurs et al. make a distinction between seven different coping styles:

1. *Active approach* : people look at the situation from all sides, things are put in order and they work purposefully and with confidence;
2. *Palliative response*: one seeks distraction and one is busy with other things in order not to think about the problem: one tries to feel better by smoking , drinking or relaxing;
3. *Avoid, wait and see* : let things take their course, avoid the situation to see what will happen;
4. *social support Seeking* : seeking comfort and understanding from others;someone who tells their concerns or asks for help;
5. *Passive reaction pattern* : completely absorbed by the problems and the situation, looking gloomy, withdrawn in self worrying, unable to do anything about the situation ;

6. *Expression of emotions*: showing annoyance or anger; release tensions;

7. *Reassuring thoughts* : reassuring oneself with the thoughts that after rain comes sunshine, that others may also have difficulties or that worse things could happen: encourage yourself.

Vercoulen et al. (1998) have also developed a model about the perpetuating factors of the fatigue symptoms from CFS. In this model, negative self-efficacy plays an important role and has a direct influence on fatigue. By self-efficacy we mean identifying the disease, having a pessimistic view of the course of the disorder and a limited belief in the possibilities of recovery. Negative self-efficacy is associated with an increase in avoidant coping strategies, a decrease in the expression of emotions, a decrease in seeking social support, and a decrease in problem-focused coping. Problem-oriented coping means that the coping styles are aimed at solving the problem .

The findings of the models above can be found in various studies. Petrie, Moss-Morris and Weinman (1995) found a positive association between catastrophic thoughts on one hand and fatigue in CFS patients on the other. A negative association was also found between the catastrophic thoughts and occupational and social functioning. Heijmans (1998) came to the important conclusion that the attitudes of CFS patients about their condition are stronger predictors of physical and social functioning than the way of coping. The thoughts themselves thus appear to have a major influence on the specific coping style. Patients who believe that they have some control over their complaints, were more likely to have more positive coping behaviors such as active management and planning.

These models above demonstrate that dysfunctional cognitions can be determinative in the development of CFS and negative coping behavior. Avoidance, attributing physical symptoms to a disease, a decrease in support seeking, and a passive response pattern are negative coping strategies that perpetuate the disease in the longer term.

CFS, difficult to treat?

In recent years, several studies have been conducted into the effectiveness of different therapies in the treatment of CFS. Cognitive behavioral therapy (CBT) and graded exercise therapy give the best results. CBT yielded an improvement of about 70%, graded exercise therapy about 55%. CBT is currently the most efficient (Rimes & Chalder, 2005). However, the study by Sharpe et al. (1996) found that the CFS patients participating in cognitive behavioral therapy improved, but only a few patients resolved all symptoms and not all showed progress. The Nijmegen research group has developed a treatment protocol based on cognitive behavioral therapy for CFS patients. The effect of this has been tested in a randomized clinical trial of 270 CFS patients (Prins et al., 2001). However, the treatment protocol was not effective for everyone. Relatively active CFS patients benefited from this treatment protocol but patients with a passive activity pattern hardly benefited from it. Given the continuing increase in diagnoses of CFS, the need for adequate treatment of CFS patients remains high.

Mindfulness-Based Stress Reduction (MBSR) is applicable. This training was originally developed for people with difficult-to-treat diseases.

Mindfulness-Based Stress Reduction (MBSR)

In 1979, Jon Kabat-Zinn developed the Mindfulness-Based Stress Reduction (MBSR) training at the University of Massachusetts Medical Center, Worcester, YS. Mindfulness-Based Stress Reduction can be translated into Dutch as Stress Reduction with Attention Training. This training uses mindfulness meditation, a form of meditation originating from the Buddhist tradition in Asia, the satipatthana vipassana or insight meditation from the Theravada tradition and Mahayana tradition in Soto-Zen. There is no unambiguous translation of the word mindfulness in Dutch. There are different translations used: awareness, mindfulness, wakefulness, alertness, presence, direct experience and attentive presence. Kabat-Zinn (1996, p. 24) translates mindfulness as "(...) being consciously present in the here and now, without judgment. This kind of mindfulness leads to greater awareness, clarity and acceptance of reality at the moment (...)". Saki Santorelli (1992) states the objectives of MBSR as follows:

Mindfulness meditation is used (...) as a self-regulatory coping strategy intended to help people:

1. more effective and adequate ways to cope with chronic conditions
2. to learn make positive changes in the lifestyle (mental patterns and behavior) that either contribute to current medical conditions or contribute to a greater risk of future diseases;
3. of beliefs, assumptions and perceptions about oneself, others and the world that limit one's capacity for greater self-regulation, to learn to let go.

During the training, various meditation techniques are taught, such as the body scan, yoga, sitting meditation and walking meditation. During these exercises, the focus is always on a different object, but they all aim to develop attention training. The controlled attention can be applied to any bodily sensation, cognition and emotion. Through the regular practice of mindfulness, one develops an ability to see thoughts and feelings as conditioned patterns and not as aspects of the person himself or as representations of reality. As a result, one develops a non-judgmental attitude and can take a step back from thoughts and feelings during stressful events. One no longer gets carried away by the thoughts about the situation or by emotions and this allows one to answer the situation instead of reacting to it. Attention training teaches people to respect their limits and to develop acceptance for themselves and others (Nhat Hanh, 1998). A study by Brown and Ryan (2003) shows that mindfulness can play an important role in the well-being of people with a wide variety of health problems.

The MBSR training proceeds according to a fixed protocol. First, the participant has a personal introductory meeting of approximately 45-60 minutes with the trainer. In this conversation, the trainer becomes acquainted with the living conditions and the personality of the participant, the trainer explains the course and purpose of the training and asks for motivation. To be able to do the homeworks and because these assignments are important for the positive evolution of the participant, it is important that the participant is motivated at the start. At the end of this meeting, it is decided whether the participant is fit for the training. The training runs over 8 weeks. Every week there is a fixed day with a session of 2.5 hours. Each session consists of a practical and a theoretical part. In the practical part, various formal meditation exercises are taught: the body scan, sitting meditation, yoga and walking meditation.

After these exercises, the participants always exchange experiences. In the theoretical part, the psychophysiological functioning of stress and emotions is discussed and the participants learn different ways to approach specific situations mindfully. The participants are instructed to practice 6 days a week 45 minutes formally and 5 to 10 minutes informally. The formal part consists of daily practice of the various meditation techniques. For this they can use 3 CD's with guided meditations and an extensive workbook. The informal part consists of applying mindfulness in personal situations: awareness of pleasant and unpleasant events, interpersonal communication, repeated cognitions and emotions in relation to the body and habits. The experiences during these homework assignments are always discussed in groups and, if necessary, individually in the next session. In week 6 there is a practice day of approximately 7.5 hours. Practice is mainly done in silence. Known and new exercises are discussed. Participants will have the opportunity to deepen their experience. Finally, the 8-week session ends with a personal discussion of approximately 1 hour. In this conversation the experiences of the participant is discussed and it is discussed how the participants can take the exercises into their daily life and which exercises they are motivated to keep practicing with. (Kabat-Zinn & Santorelli, 2003)

Mindfulness and areas of application

Kabat-Zinn, professor of medicine, experienced meditation and yoga teacher, originally developed this training to help difficult-to-treat patients with chronic pain to manage with their illness (Kabat-Zinn, 1982). He was convinced that meditation and yoga practice and especially the quality of attention can play an important role in the healing process of sick people. In developing the training, he drew on his biomedical knowledge and various disciplines of consciousness. He has done several studies on the effect of his training. The first results turned out to be hopeful. The patients with chronic pain who followed the MBSR training reported at the end of the training less pain and pain-related behavior compared to the control group (Kabat-Zinn, 1982). Subsequently, attention training was also applied and scientifically investigated in people with anxiety disorders (Kabat-Zinn et al., 1992), fibromyalgia (Kaplan, Goldenberg, & Galvin-Nadeau, 1993), psoriasis (Kabat-Zinn et al., 1998) and eating disorders (Kristeller & Hallet, 1999). These studies also showed promising results, but they should be handled with care. Despite the already widespread availability of mindfulness training, there is still little empirical evidence about its true effectiveness. (Baer, 2003; Bishop, 2002). Baer (2003) concludes in her meta-analysis based on 19 studies, conducted before 2002, that MBSR is "probably efficient". The lack of control groups in most studies leads to this cautious statement. Bishop (2002) also made the same conclusion earlier and recommends further research.

In recent years, a variant has been developed, Mindfulness-Based Cognitive Therapy for depression (MBCT), a combination of mindfulness and cognitive therapy. This is applied to prevent relapse in people who have experienced one or more depressive episodes (Segal, Williams, & Teasdale, 2002). In two studies (Teasdale et al., 2000; Williams, Teasdale, Segal, & Soulsby, 2000) it was found that for patients with a history of three or more major depressive episodes, following the MBCT training reduced the recurrence rate of 66% in the control group, was nearly halved to 37% over a one-year follow-up. In patients with only one or two episodes, there was no difference. These results were replicated after 2002 (MA & Teasdale, 2004). Positive results of mindfulness-based approaches are published too. Linehan's Dialectical Behavior Therapy (DBT) (Linehan, 1993 a,b) has become the preferred treatment for borderline personality disorders. Hayes' Acceptance and Commitment Therapy (ACT) (Hayes, Masuda, Bissett, Luoma, & Guerrero, 2004) is said to help with common psychological difficulties.

The impact of MBSR on CFS

Given the assumption that dysfunctional cognitions might play an important role in developing and in maintaining CFS and negative coping behavior, we wonder whether MBSR can intervene. As a central theme of this research, we therefore want to investigate whether following a Mindfulness -Based Stress Reduction for a period of 8 weeks leads to a reduction in rumination and an improvement in coping strategies, both leading to a higher well-being and fewer complaints.

Despite the worldwide application of MBSR for people with all kinds of problems, there is still limited empirical evidence about its effectiveness on people with chronic fatigue syndrome. The only published study is by Surawy, Roberts and Silver (2005). They examined the effect of mindfulness training on mood, fatigue, activity level and quality of life in patients with CFS who were on the waiting list for cognitive therapy. The results showed that the quality of life of the patients who followed mindfulness was improved compared to the waiting list. The participants showed a significant reduction in anxiety, depression, fatigue and an increase in physical activity. The effects could still be found after a period of 3 months. So the study showed that MBSR has something valuable to offer for treating people with CFS.

Following from this study, we want to investigate the effect of MBSR training on patients with CFS. We would like to replicate the research results on anxiety , depression and quality of life of Surawy et al. (2005). In addition, we want to check the effect of the training specifically on the causes assumed by the cognitive therapy, in particular rumination and coping.

Conclusion

Cognitive behavioral therapy is to this date the most efficient method of treating CFS , but full recovery is rare and ineffective in certain individuals (Prins et al., 2001). Unlike cognitive behavioral therapy, MBSR does not focus on changing cognitions but on accepting them (Segal et al., 2002, p. 61-62).

Within a pre-post study we want to find out whether MBSR training promotes coping with CFS. We want to investigate whether an 8-week MBSR training indeed leads to a significant change in self-reported anxiety, depression and quality of life. We then also want to investigate whether there is a change in coping behavior and whether there is a reduction in rumination. Consistent with the cognitive models of CFS we expect that active coping strategies and seeking social support will increase and avoidant coping and passive response patterns will decrease. Since in MBSR one learns a skill to become aware of emotions without reacting to them, we also expect that the coping strategy decreases expression of emotions. In addition, we expect that the proposed effects are the result of developing mindfulness, which skill we also check with a specific questionnaire.

Method

Research group

The total population studied consists of 30 people over the age of 29, of which 28 are women and 2 men. The inclusion and exclusion criteria were assessed based on the MBCT demographic questionnaire (see below).

The group consists of participants who have voluntarily registered from 2004 until March 2007 to an MBSR training under the supervision of Edel Maex in the Middelheim hospital in Antwerp. They were invited to complete a bundle of questionnaires at the beginning and end of the eight-week training. From this group, 31 individuals were selected who reported in the MBCT demographic questionnaire to be diagnosed with CFS. Of these, 17 with CFS, 3 with CFS and depression, 1 with CFS and back problems and muscle paralysis, 6 with CFS and fibromyalgia, 1 with CFS and fibromyalgia and Hoshimoto's disease, 1 with CFS and fibromyalgia and obesity and depression, 1 with CFS and fibromyalgia and depression, 1 with CFS and fibromyalgia and whiplash. 1 Person did not meet the exclusion criterion: having extensive Zen or Vipassana meditation. 10% followed the training in 2004, 33% in 2005, 50% in 2006 and 7% in 2007. 60% Are unfit for work, 17% are working, 10% are housewives, 10% are retired and 3% are looking for a job. 10% Reported a history of four or more major depressive episodes, 3% a history of four major depressive episodes, 7% a history of three major depressive episodes, 3% a history of two major depressive episodes, 36% a history of one major depressive episode, 41% reported not having had a major depressive episode. 90% Take medicines at the start of the training. The mean age is 44 years ($SD = 8.98$) with an age range of 30 - 60 years. The entire group is of Belgian descent.

Equipment and Material

Depressed mood. Beek Depression Inventory second edition (BDI-II, Beek, Steer, & Brown, 1996), translated into Dutch by Van der Does (BDI-II-NL, 2002), is a self-assessment questionnaire made up of 21 items. Each item consists of 4 answer options, with a score ranging from 0 to 3. This questionnaire is suitable for measuring the severity of depression from the age of 13. The test questions depressive symptoms over the past 2 weeks, including emotions such as hopelessness and irritability; cognitions such as guilt or feelings of punishment; physical symptoms such as fatigue, weight loss and lack of interest. The total score consists of the sum of the raw scores. This score can range from 0 to 63. The higher the score, the higher the severity of the depression. The Dutch questionnaire appears to have sufficient validity and reliability, largely in line with that of the original (Van der Does, 2002).

Anxiety complaints. The Self-Assessment Questionnaire (ZBV, Van der Ploeg, 2000) is a Dutch version of the Spielberger State-Trait Anxiety Inventory (STAI-form Y, Spielberger, 1983). This instrument is made up of the scales fear of state and fear of pulling. In our study, only the trait version (ZBV DY-2) was administered. This version measures the anxiety disposition through self-reporting. It measures how the person feels in general. The fear disposition scale is made up of 20 items in which the person indicates, according to his own assessment, that he or she does not show a certain behavior at all or very much, and this on a four-point scale (almost never, sometimes, often, almost always). The total score can range from 20 to 60. The higher the score, the more fearful. According to van der Ploeg (2000), the fear disposition scale has a relatively high reliability and validity.

Ruminative response style. The Ruminative Response Scale (RRS, Nolen-Hoeksema & Morrow, 1991), translated into Dutch by Raes, Hermans and Eelen (RRS-NL, 2001), is a self-evaluation scale that assesses the presence of a ruminating thinking style. This questionnaire consists of 22 items that ask how often people think or do certain things when they feel sad, dejected or depressed. The items are scored on a four-point scale (almost never = 1 to almost always = 4). The higher the total score, the more ruminating thinking style is present. Reliability and validity are good and correspond to the original questionnaire (Raes, Hermans, & Eelen, 2003).

Mindfulness. The Mindfulness Attention Awareness Scale (MAAS, Brown & Ryan, 2003), translated into Dutch by Godfrin, Goeleven and Schoof (2004), is a 15-item self-assessment questionnaire that assesses the presence or absence of attention and awareness in everyday life. The items are scored on a six-point scale (1=almost always; 6=almost never). The higher the total score, the better the well-being, the mood, the more openness to new experiences and satisfaction with life. The Everyday Experiences Questionnaire has high reliability and good validity according to Brown and Ryan (2003).

Coping behavior. The Utrecht Coping List (Schreurs & Van de Willige, 1988) is an instrument that measures characteristic coping behavior when dealing with problems or adaptive events. With self-report they measure how someone copes with stressful events. The UCL contains 7 scales and 47 items. The items are scored on a four-point scale (rarely or not, sometimes, often, very often). The adult is asked to tick only one answer that applies to him/her in a stressful event. The scores are calculated by adding the items per scale. For this research, we will specifically examine whether there is a difference on the scales of active tackling, seeking social support, avoidance, passive reaction pattern and expression of emotions before and after an 8-week MBSR training. The UCL is considered a reliable and valid instrument for measuring coping behavior (Sanderman & Ormel, 1992).

quality of life. The SF-36 Health Status Questionnaire is the Dutch translation of the SF-36 Health Survey (Ware & Sherbourne, 1992). Through self-reporting, this questionnaire measures 8 different aspects related to quality of life. For this study, we want to specifically investigate whether there is a change on the scales of physical functioning and vitality. The SF-36 contains 36 items divided over the 8 scales. A higher score indicates a better state of health. The SF-36 Health Status Questionnaire is a reliable and valid tool according to Ware and Sherbourne (1992).

Procedure

This study is part of a larger study that also included the following questionnaires: BHS, POMS and the CEQ.

In the first session, the goal, the importance of scientific research, was briefly explained orally by the trainer. The participants were also informed that participation was voluntary and could be stopped at any time and that complete anonymity was assured. Immediately afterwards, the volunteers received a bundle of questionnaires for the pre-measurements: an informed consent and 10 questionnaires. Each volunteer was first asked to confirm their participation by writing (informed consent). Then there was written instruction on how to fill in the questionnaires. It stated that there were 10 questionnaires and that they were allowed to take the time to complete it, that all questionnaires were better completed on the same day, that it was important to carefully read the instruction at the beginning of the questionnaire because each questionnaire has a different instruction.

The first questionnaire was the MBCT demographic questionnaire. Extensive questions were asked about the general living conditions, the physical and psychological conditions in the present and past, meditation experiences and medication use. Then followed BDI-H-NL, BHS, POMS, RRS-NL, MAAS, UCL, ZBV, CEQ and the SF-36 health status questionnaire. The bundle was completed at home and brought back to the second session. At the end of session seven, the persons who completed and submitted the pre-measurements were asked to complete the bundle of questionnaires from the post-measurements. This was again on a voluntary basis. This bundle contained 8 questionnaires. Again, there was a written instruction that there were 8 questionnaires, that it was better to complete the questionnaires the same day, that there were no correct or incorrect answers, that it is best to read the instruction carefully before filling in the list, that they should not skip any questions and that the information would be treated confidentially. Then followed the BDI-H-NL, BHS, POMS, RRS-NL, MAAS, UCL, ZBV, an evaluation of the training and a short questionnaire about the personal opinion of the volunteer about this set of questions. This bundle was also completed individually at home and brought to the last session.

Results

First, the correlations were checked in the pre-measurement. Pearson's correlations are shown in Table 1. A positive r-value means that the scores on both scales increase linearly, a negative value means that the scores on one scale are increasing while those on the other scale are decreasing.

To determine the effect of MBSR, a paired sample f-test was first performed for all questionnaires on the total scores of the pre- and post-measurement. Due to missing data, the results for the SF-36 were calculated on a group of 25 subjects and for the UCL on a group of 29 subjects. There is a significant effect for the BDI ($z(29) = 4.12, p < 0.05$), for the RRS ($t(29) = 2.18, p < 0.05$), for the MAAS ($X(29) = -2.67, p < 0.05$) and for the ZBV, $t(29) = 2.55, p < 0.05$. There is no significant effect for the UCL, $t(28) = -.952, p = 0.35$. Based on the observed pre- and post-measurement cell, presented in Table 1, there is a decrease for the BDI, the RRS and the ZBV and an increase for the MAAS, the SF-36 and the UCL.

We also performed a paired samples f-test for the pre- and post-stage scores for each subscale of the SF-36 and the UCL. With regard to the SF-36 there is a significant effect for the social functioning subscale ($z(26) = -3.31, p < 0.05$), for the role limitations due to emotional problems subscale there is an almost significant effect ($\chi(29) = -2, p = 0.6$), for the subscales role limitations due to physical problems ($\chi(29) = -1.85, p = 0.07$) and general health perception ($\chi(26) = -1.76, p = 0.09$) there is a marginally significant effect. Physical functioning, mental health, vitality and pain were not found to change significantly, all $t < 1$ and $p > .1$. Based on the observed cell, shown in Table 2, we notice an increase from pre to post for all these subscales.

Table 1

The observed means, standard deviations and Pearson's correlations

	Pre-measurement M (SD)	Post-measurement M (SD)	2	3	4	5	6
1.BDI (n=30)	21.47 (10.76)	13.17 (9.87)	.432*	.748**	-.427*	-.642*	-.356
2.RRS (n=30)	44.43 (12.70)	40.20 (10.00)	-	.583**	-.399*	-.426*	.007
3.ZBV (n=30)	52.07 (10.51)	46.77 (10.67)	-	-	-.501**	-.609**	-.496**
4.MAAS (n=30)	49.40 (12.40)	55.10 (13.31)	-	-	-	.266	.471**
5. SF-36 (n=25)	40.40 (14.91)	48.60 (19.06)	-	-	-	-	.137
6.UCL (n=29)	106.03 (12.05)	107.48 (11)	-	-	-	-	-

*P < 0.05.

**p < 0.01.

No significant effects were found for the UCL subscales, except for a marginally significant effect for the avoidance subscale, $t(29) = -1.89$, $p = 0.07$. Based on the observed cell means reported in Table 2, an increase in avoidance appears after exercise. Because of this unexpected effect, the different items of this subscale were analyzed. We mainly notice a significant increase for item 45 'Don't worry: everything usually works out', $t(29) = -2.28$, $p < 0.05$. No significant effect was found for the other items.

To determine whether the differences between the two time points are dependent on an increase in mindfulness, an ANOVA repeated measures were performed for each scale and subscale using time as the within-subject factor and the difference score on the MAAS between post- and pre-stage as covariate. Regarding the scores on the questionnaires, a significant interaction effect of time and mindfulness was found for the BDI ($F(1,28) = 21.78$, $p < 0.05$), the RRS ($F(1,28) = 22.24$, $p < 0.05$), the ZBV ($F(7,1.28) = 40.01$, $p < 0.05$) and the SF-36, ($F(7,1.23) = 4.74$, $p < 0.05$). There is marginal significance for the UCL, ($F(7,1.27) = 3.60$, $p = 0.69$). Further analyzes of the directions based on the parameter values show that the effects are in line with expectations: on one hand, the higher the improvement score on the MAAS, the lower the final score on the BDI, the RRS and the ZBV. On the other hand, the higher the improvement score on the MAAS, the higher the final score on the SF-36 and the UCL.

Regarding the subscales of the SF-36, there is a significant interaction effect for mental health ($F(1,28) = 5.07, p < 0.05$) and a marginal effect for physical functioning, $F(1,28) = 3.32, p = 0.08$. There is no significant effect for the subscales social functioning, role limitations due to physical problem, role limitations due to emotional problem, vitality, pain and general health. For the subscales of the UCL, a significant effect was found for active approach ($F(1,27) = 10.25, p < 0.05$), seeking social support ($F(1,28) = 6.05, p < 0.05$), passive response pattern ($F(1,27) = 24.45, p < 0.05$) and comforting thoughts, $F(1,27) = 5.15, p < 0.05$. For the subscale expression of emotions there is a marginally significant effect ($F(1,27) = 3.74, p = 0.06$) and for the subscales palliative response and avoidance there is no significant effect. Further analyzes of the directions of the interaction effects show that the effects are also in line with the expectations: the higher the improvement score on the MAAS, the higher the final score on mental health, physical functioning, active approach, seeking social support and reassuring thoughts.

Table 2

The Observed Means and Standard Deviations of the Total Scores on the SF-36 and UCL Subscales in Pre- and Post-Phase

	Pre-measurement M (SD)	Postmeting M(SD)
UCL (n = 29)		
Avoidance	15.41 (3.51)	16.03 (2.87)
Expression of emotions	6.69 (2.25)	6.62 (1.86)
Passive response pattern	13.76 (2.98)	13.14 (3.24)
Seeking social support	13.93 (3.86)	14.83 (3.78)
Palliative response	18.00 (3.56)	18.14(2.95)
Take an active approach	17.86 (4.20)	18.38 (4.01)
Reassuring thoughts	13.62 (3.04)	13.75 (3.45)
SF-36 (n=25)		
Social functioning	37.64 (27.73)	53.68 (27.35)
Role limitations due to emotional problems	58.60 (41.21)	74.68 (36.40)
General health experience	31.24(16.16)	38.40 (19.38)
Role limitations due to physical problem	7.00 (16.96)	24.00 (32.66)
Physical functioning	53.20 (20.71)	55.40 (25.86)
Mental health	56.48 (18.45)	61.12(21.21)
Vitality	30.00 (20.05)	38.00 (21.55)
Pain	39.52 (18.66)	39.92 (29.57)

On the other hand, the higher the improvement score on the MAAS, the lower the final score on the passive response pattern and the expression of emotions.

Looking at the total pre-measurement results on the BDI, we notice that 19 out of 30 subjects are above the cutt-off score of 19. A depressive episode at the time of participation in the training has already been shown in previous research (Teasdale et al., 2000) to be a contraindication for the effectiveness of the training. To be able to determine whether the effect of the training is stronger or weaker according to whether the participant is depressed at the beginning of the training, the test group was divided into two groups. On the one hand, the subjects with a total score for the BDI lower than 19 (group 1) and on the other hand the subjects with a total score for the BDI of 19 or more (group 2). Due to missing values, there are 9 subjects in group 1 and 18 in group 2 for the SF-36. Each repeated measures were also performed with group as the between-subjects factor. There is a significant effect for time and groups for the BDI ($F(1,27) = 13.78, p < 0.05$) and for the ZBV, $F(1,27) = 7.66, p < 0.05$. For the total score of the SF-36, there is a marginally significant effect for time and groups, $F(1,22) = 3.53, p = 0.07$. For the RRS and the total score of the UCL, there is no significant effect for time and groups. There are no significant effects for the subscales of the UCL. For the subscales of the SF-36, there is a marginal significance for the general health subscale, $F(1,24) = 4.25, p = 0.05$. There is no significant effect for the other scales. The mean difference scores from pre to post for the different questionnaires are shown in Table 3.

Table 3

The mean difference scores from pre to post for the BDI, the ZBV, the SF-36 and the general health subscale for group 1 and group 2

	Premeting	Postmeting
	M (SD)	M (SD)
BDI		
Group 1 (n = 11)	10.68 (1.93)	8.59 (2.52)
Group 2 (n = 19)	27.71 (1.47)	15.82 (1.92)
ZBV		
Group 1 (n = 11)	43.87 (2.45)	43.06 (2.67)
Group 2 (n = 19)	56.81 (1.86)	48.91 (2.03)
SF-36		
Group 1 (n = 8)	50.02 (4.87)	47.64 (6.51)
Group 2 (n = 17)	35.87 (3.34)	49.05 (4.46)
General health perception		
Group 1 (n = 9)	39.89 (4.83)	25.94 (3.42)
Group 2 (n = 18)	35.78 (6.37)	38.78 (4.51)

Discussion and Conclusion

CFS is proving to be a difficult disease to treat. Several studies have been conducted in recent years, showing that cognitive behavioral therapy is the most efficient to date, delivering 70% progress (Rimes & Chalder, 2005). However, full recovery is rare and given the rising prevalence, the need for new interventions is high. Within this study, we focused on the effect of Mindfulness-Based Stress Reduction on anxiety, depression, quality of life, rumination and coping in CFS patients. The protocol of this training was developed by Jon Kabat-Zinn for patients with difficult-to-treat diseases. So far, promising results have been achieved (Kabat-Zinn, 1982, Kabat-Zinn et al., 1985, Kabat-Zinn et al., 1992; Kaplin et al., 1993). However, only one published study on the effect of MBSR on CFS patients has been conducted by Surawy et al.. It found that the quality of life and physical activity of the CFS patients who followed mindfulness increased significantly. There was also a decrease in depression, anxiety and fatigue. Within this study, we examined whether these results could be replicated as well as the effect of training on two specific vulnerability factors to CFS, namely rumination and dysfunctional coping.

In the cognitive models of CFS discussed (Surawy et al., 1995; Vercoulen et al., 1998) it was clear that dysfunctional cognitions can be decisive in the development of CFS and negative coping behavior. In the MBSR training one learns that thoughts and feelings are conditioned patterns with which one identifies. By practicing mindfulness, one learns to look at this from a distance without being drawn into the thoughts or emotions associated with stressful situations. In this way one becomes aware of one's own cognitions and behavioral patterns and one develops the skill to let go of those cognitions and behavioral patterns. This creates possibilities for more response options. There is thus space and freedom to consciously stop rumination and to use more functional coping behaviour.

By means of the Utrecht Coping List (Schreurs et al., 1993) we investigated five coping strategies, namely active tackling, seeking social support, avoidance, passive reaction pattern and the expression of emotions. In addition, we expect that the proposed effects are the result of the development of the mindfulness skill, which can be measured by means of the Dutch translation of the Mindful Attention Awareness Scale questionnaire that we use (Brown & Ryan, 2003, 2004).

Our results are congruent with those of Surawy et al. for depression and anxiety, i.e. both decreased significantly. However, the SF-36 shows a marginally significant increase. Given the missing data, which reduced the test group to 25 subjects, we also expect a significant increase for a larger test group. There is also a significant decrease in rumination and a significant increase in mindfulness. These results already show that MBSR can make a valuable contribution.

On further analysis of the subscales of the SF-36 and the UCL, we note that the effect over time is dependent on the subscale. Only the subscale social functioning has improved significantly, the subscale role limitations due to emotional problems has improved almost significantly and the subscales role limitations due to physical problems and general health perception have marginally improved. However, when looking at the means for each subscale, we see an improvement for each subscale of the SF-36. This should be further investigated. We suspect that a larger sample size would lead to more significance. For the subscales of the UCF, against our expectations, no significant effects were found. With reservations we can assume that MBSR has no direct influence on coping strategies or that changing coping behavior takes more time. Coping strategies need thus not be a prerequisite before symptoms improve. This needs to be further investigated. Contrary to expectations, there is a marginally significant increase for the avoidance subscale. Based on the cognitive models of CFS, we hypothesized that the avoidance subscale would decrease. On further research, however, we noticed that the item 'Don't worry, usually everything will work out' as the only item on this subscale increases significantly. In our opinion, this item is open to interpretation and fits within the rationale of MBSR. We hypothesize that by practicing mindfulness, one becomes aware of one's own cognitions and behavioral patterns and can thereby let go of them. This creates room for choices in behavioral patterns. As a result, one responds to the situation instead of reacting to it. So the increase in this item can be understood from the assumption that the subjects do not react reactively to the situation but rather adopt a wait-and-see attitude. This certainly needs to be further investigated.

We also asked ourselves whether the improvements depend on the development of mindfulness as a skill. Significant relationships have been found for depression, rumination, anxiety and quality of life and there is a marginally significant improvement for coping. This means that the more mindfulness is developed, the stronger the improvement in depression, anxiety, rumination, quality of life and coping. This therefore confirms our hypothesis. Regarding the subscales of the SF-36, we notice that there is only a significant improvement in mental health and a marginally significant improvement in physical function. To our surprise, not for the other subscales. From this can we hypothesize that the previously found improvements in the subscales social functioning, role limitations due to emotional problems, role limitations due to physical problems, and general health perception do

not depend on whether or not they are more mindful. Other factors may play a role in this, but this also needs further investigation. This confirms that the exploration of the underlying mechanisms of the training require much more research. For the UCL subscales, significant increases were found for active tackling, seeking social support and comforting thoughts. So the more mindful, the more one takes an active approach to the situation, seeks social support and has reassuring thoughts. There is also a significant decrease in palliative responses and a marginally significant decrease in the subscale expression of emotions. This means that the more mindful the less one reacts passively and the less the expression of emotions. This is within the expectations of our hypothesis. No significant time effects were found for these subscales per se, but the changes in these subscales do depend on whether or not you are more mindful. There is no significance for the avoidance and palliative response subscales. From this we can assume that mindfulness does influence certain coping strategies and that the increase in the avoidance subscale is not the result of an increase in mindfulness. Other factors may also play a role here. Further research is also necessary here.

In the overall test group, we noted that 19 out of 30 subjects had a cutt-off score of 19 or more for the BDI. We investigated whether or not being depressed at the beginning of the training had an effect on the results. In the study by Teasdale et al. (2000) this turned out to be a contraindication for the effect of MBCT training. In our study, the time effect appeared to depend on which group one belongs to, but the persons belonging to group 2, persons with a cutt-off score of 19 or more, achieved better results than the persons from group 1. In addition, we note that the degree of mindfulness did not improve significantly differently per group. To our surprise, we have the opposite effect here. So we hypothesize that both groups develop mindfulness equally as a skill, but group 2 benefits more from it. This certainly needs to be further investigated. However, there are no (yet happened) studies that confirm and demonstrate that for people with depression, participating in an MBSR training, in contrast to an MBCT training, is not recommended. This certainly needs to be further investigated. We can also question our screening. We did the screening for depression with the BDI. We suspect that if we used a semi-structured interview like Hamilton we could make a better diagnosis of depression. There may be a bias in the diagnoses because the BDI is more likely to indicate that someone is depressed based on less information.

Thus, this study demonstrates that mindfulness can help CFS patients cope with their illness in a more constructive way. But this study also has some limitations. Due to practical circumstances, this study ran over 6 of the 8 sessions of the MBSR training. This means that, if the research were to run over the entire training, there would probably be even more and better effects from the research. The study also involved a limited test group of 25 to 30 subjects, depending on whether or not values were missing. Here too, we expect that a larger sample size could lead to more efficient research. Our study was also not tested against a control group and there was no follow-up. The number of subjects, a control group and a follow-up are important and necessary for a good evaluation of the training.

Nevertheless, we can conclude that following a Mindfulness-Based Stress Reduction training course for a period of 8 weeks certainly has something valuable to offer CFS patients. Our research shows that MBSR training for CFS patients can lead to a reduction in depression, anxiety, and rumination, as well as an increase in quality of life.

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