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Mindfulness: Life with attention and awareness

- Test-retest reliability of the FFMQ for Dutch fibromyalgia patients

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Abstract

Mindfulness is a way of living that is increasingly practiced in Western cultures. It is a form of attentiveness characterized by curiosity, openness and acceptance. Therapeutic interventions based on developing and using mindfulness skills, for example the Mindfulness Based Stress Reduction program, are now used in medical and mental health settings and can help patients to cope with their chronic pain more effectively. Fibromyalgia is one disease that is successfully treated with mindfulness-based interventions. To evaluate whether a mindfulness-training can improve mindfulness of fibromyalgia patients or not it is important to have an appropriate questionnaire that measures mindfulness. The FFMQ is such a questionnaire. This study is conducted to assess the test-retest reliability of the Dutch version of the FFMQ in a clinical population in a period of two weeks. After conducting a pilot study and modifying the questionnaire fibromyalgia patients filled in an online version of the FFMQ. Thirty patients completed the test and retest. Intraclass Correlation Coefficients are used as values for the test-retest reliability of the total FFMQ and the five facets. They are adequate to good ranging from 0.657 to 0.863. The FFMQ is thus a reliable instrument to measure mindfulness in a clinical population.

Mindfulness is een manier van leven die steeds meer zijn intrede doet in westerse culturen. Het is een vorm van attentie gekarakteriseerd door nieuwsgierigheid, openheid en acceptatie. Therapeutische interventies die gebaseerd zijn op het ontwikkelen en toepassen van mindfulness vaardigheden, bijvoorbeeld het Mindfulness Based Stress Reduction programma, worden in medische en geestelijke instellingen gebruikt en kunnen patiënten helpen om effectiever met hun pijn om te gaan. Fibromyalgie is een ziekte die succesvol kan worden behandeld met op mindfulness gebaseerde interventies. Om te kunnen evalueren of een mindfulness-training mindfulness van fibromyalgie patiënten kan verbeteren of niet is het belangrijk om over een geschikte vragenlijst te beschikken die mindfulness meet. De FFMQ is een dergelijke vragenlijst. Deze studie is doorgevoerd om de test-hertest betrouwbaarheid te berekenen van de Nederlandse versie van de FFMQ voor een klinische populatie in een periode van twee weken. Na het uitvoeren van een pilotstudie en het aanpassen van de vragenlijst hebben fibromyalgie patiënten een online versie van de FFMQ ingevuld. Dertig patiënten vulden de test en de hertest in. Intraclass Correlation Coefficients zijn gebruikt als waarde voor de test-hertest betrouwbaarheid van de complete FFMQ en de vijf facetten. Ze zijn adequaat tot goed van 0.657 tot 0.863. De FFMQ is dus een betrouwbaar instrument om mindfulness bij een klinische populatie te meten.

Introduction

Mindfulness

Mindfulness is a way of living that has its roots in Eastern spiritual traditions, particularly Buddhism but that is increasingly practiced in Western cultures (Kabat-Zinn, 2000). Kabat-Zinn (1994, p.2) defined mindfulness as "paying attention in a particular way: on purpose, in the present moment, and non-judgmentally". It is a state of attentiveness towards experiences that is characterized by curiosity, openness and acceptance. Arising thoughts, sensations, and feelings are always subject to observation; they are noticed and accepted without any evaluation or judgment (Bishop *et al.*, 2004). Mindfulness can be contrasted with mindlessness, which is characterized by the lack of awareness about the current moment and one's current actions and a preoccupation with thoughts and feelings about the past or future (Brown & Ryan, 2003). Examples of mindlessness are, according to Brown and Ryan (2003), breaking or spilling things out of carelessness or snacking without being aware of eating.

Mindfulness is often associated with meditation but one must emphasize that mindfulness is more than meditation practice. Rather, meditation practice is just one of a variety of techniques or methods used to learn and develop mindfulness (Hayes & Shenk, 2004). One can define meditation as "the intentional selfregulation of attention from moment to moment" (Kabat-Zinn, 1982). Formal meditation exercises in which participants sit while directing their attention to a specific object, for example their own breathing, or other exercises in which participants mindfully engage in routine activities such as walking can help to develop mindfulness skills (Baer, Smith & Allen, 2004).

Interventions based on mindfulness

Interventions based on mindfulness have been developed after the pioneering work of Jon Kabat-Zinn. He developed the Mindfulness Based Stress Reduction (MBSR) program to help patients with chronic pain to cope better and more effectively with their lives (Kabat-Zinn, 1982, 1990; Kabat-Zinn, Lipworth & Burney, 1985). The MBSR program is an 8-week intervention during which patients meet weekly for 2,5 hours per session. The participants are systematically introduced to the practice of mindfulness with body scan, sitting meditation and mindful yoga being the three techniques that build the foundation of the program. By

means of this program participants learn to be more responsive and less reactive in the face of challenging stressful situations (Bishop, 2002; Kabat-Zinn, 1990).

After the success of the MBSR for patients with chronic pain it has been successfully implemented to other groups. A meta-analysis of Grossman et al. (2004) reveals that participation in the MBSR program is associated with an enhanced ability of coping with distress and improvements in quality of life and anxiety. These effects were observed in a wide spectrum of clinical populations such as patients suffering from pain, cancer or depression and in nonclinical populations. A more recent study of the MBSR of Carmody and Baer (2008) found that psychological well-being increased and medical and psychological symptoms and perceived stress levels decreased among participants of the program. Participants were adults with a variety of problems including illness-related stress, chronic pain and employment-related stress. Practicing mindfulness increased the levels of being mindful in daily life which is related to reductions in stress and improvements in psychological functioning (Carmody & Baer, 2008).

Based on these successes mindfulness skills have been integrated into several therapeutic interventions that are now used in medical and mental health settings, including Mindfulness-Based Cognitive Therapy (MBCT; Segal, Williams, & Teasdale, 2002), Dialectical Behavior Therapy (DBT; Linehan, 1993a, 1993b), and Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 1999).

Moreover, psychological problems that have been examined using interventions or treatments based on mindfulness are for example depression, anxiety, panic or symptoms of borderline personality disorder. A decrease in all of these issues can be reported after developing mindfulness skills (Linehan, 1993a, 1993b; Roemer & Orsillo, 2002; Segal *et al.*, 2002).

Another disease that has been examined and successfully treated with mindfulness-based interventions is fibromyalgia (for example Sephton *et al.*, 2007; Goldenberg *et al*. 1994).

Fibromyalgia/Rheumatic diseases

Fibromyalgia is a form of rheumatism. According to the World Health Organization (WHO), rheumatism is an umbrella term for diseases that appear at the musculoskeletal system and are almost always associated with pain and often with limitation of movement. It can be subdivided into three main groups. The first group of rheumatic diseases are inflammatory rheumatic diseases which are characterized by inflammation of joints. The most common

form of this disease is rheumatoid arthritis. Degenerative joint and spine diseases, also known as osteoarthritis, are the second group and are characterized by the damage or loss of the joint cartilage. The third group are soft tissue rheumatic disorders that show neither a sign of inflammations nor of damage of cartilage. Fibromyalgia belongs to this last group (Brückle, 2004).

The diagnosis of fibromyalgia is made on the basis of the criteria of the American College of Rheumatology (ACR; Wolfe *et al.,* 1990). The main symptom of the fibromyalgia syndrome is chronic pain in multiple areas of the body, also known as „chronic widespread pain". This is often associated with other symptoms such as feelings of stiffness and swelling of hands, feet and face; fatigue; sleep disturbances and also mental disorders like anxiety or depression (Eich *et al.,* 2008). Pursuant to the ACR, pain must be present longer than three months in all of the following body parts before the classification of fibromyalgia can be made: axial skeletal pain, pain of the left part of the body, pain of the right part of the body, pain above the waist and pain below the waist. Furthermore, the patients must feel pain on digital palpation on at least 11 of 18 so-called tenderpoints (Wolfe *et al.,* 1990).

Based on recent estimates there are about 2.3 million Dutch people that suffer from one or more types of rheumatic disorders. 500.000 of these people have soft tissue rheumatic disorders, most of them fibromyalgia (Reumafonds, not dated). A study of Bazelmans et al. (1997) that was conducted by general practitioners in the Netherlands revealed that there are more women (87%) than men (13%) suffering from fibromyalgia.

Mindfulness and fibromyalgia

Treatment of fibromyalgia is often disappointing. Central nervous system medications, cardiovascular fitness training, biofeedback or hypnotherapy show often only little if any improvements. Psychological interventions, however, seem to be more promising (Kaplan *et al.*, 1993). Kaplan et al. (1993) found that patients that took part in the MBSR program showed clinically significant improvements in each of the measures such as pain, well-being or coping strategies. This suggests that this approach in the treatment of fibromyalgia is beneficial. One drawback of the study is that it is old and uncontrolled but more recent and controlled studies offer similar results. Sephton et al. (2007) tested the effect of the MBSR program on depressive symptoms in fibromyalgia patients. In this trial patients were randomly assigned to the treatment group that received the MBSR intervention and a waiting

list control group. It was found that depressive symptoms improved significantly after receiving the treatment compared to the control group. Grossman et al. (2007) used a quasi-randomized trial and long-term observational follow-up to test the effect of the MBSR program on patients with fibromyalgia. They found that female fibromyalgia patients can benefit in the long-term from mindfulness interventions with respect to pain perception, coping with pain, depression or anxiety. Another controlled study that determined the effect of a meditation based program on patients with fibromyalgia is that of Goldenberg et al. (1994). The patients were randomly assigned to the treatment or a waiting list control group. Symptoms of fibromyalgia such as global well-being, pain or fatigue improved significantly after the treatment with the program compared to the control group as did functional and psychological status. Based on these studies one can conclude that programs based on mindfulness and meditation are useful instruments in the treatment of patients with fibromyalgia.

Five Facet Mindfulness Questionnaire (FFMQ)

To evaluate whether a mindfulness-training can improve mindfulness of fibromyalgia patients or not it is important to have an appropriate questionnaire that measures mindfulness. The questionnaire that is used in this study is the Five Facet Mindfulness Questionnaire (FFMQ; Baer *et al.*, 2006). This questionnaire has been developed to examine the facet structure of the mindfulness construct because several independently developed self-report questionnaires have operationalized it in different ways. There was no consensus if mindfulness has a multifaceted structure and, if so, how the facets should be defined. Baer et al. (2006) conducted a study to answer these questions. They developed the FFMQ in a project that consisted of five parts. They first examined the psychometric characteristics of five available mindfulness questionnaires which are the Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003), the Freiburg Mindfulness Inventory (FMI; Buchheld, Grossman, & Walach, 2001), the Kentucky Inventory of Mindfulness Skills (KIMS; Baer, Smith, & Allen, 2004), the Cognitive and Affective Mindfulness Scale (CAMS; Feldman, Hayes, Kumar, & Greeson, 2004; Hayes & Feldman, 2004) and the Mindfulness Questionnaire (MQ; Chadwick, Hember, Mead, Lilley, & Dagnan, 2005). The internal consistency of all five mindfulness questionnaires was good and they correlated with each other, with meditation experience and with several other variables as it was expected. The second part of the project was to create an

item pool of all items of the five questionnaires. Then exploratory factor analysis was used to examine the facet structure of this item pool. The result was a five-facet structure. In the third part, confirmatory factor analysis was used to examine the validity of this facet structure in an independent sample. After that construct validity was examined and it was shown that the mindfulness facets were differentially related to other constructs like emotional intelligence or openness to experience. In a final step regression analysis was used to confirm the incremental validity of the mindfulness facets in the prediction of psychological symptoms (Baer *et al.*, 2006). The result of this project is thus a questionnaire that assesses the following five facets of mindfulness: observing, describing, acting with awareness, nonjudging of inner experience and nonreactivity to inner experience. Observing means noticing or attending to a range of stimuli. Describing involves labeling experiences such as sensations or cognitions with words. Acting with awareness refers to focusing attention on one's current activities. Nonjudging of inner experience involves refraining from an evaluation of thoughts and feelings and nonreactivity to inner experience refers to noticing thoughts and feelings without showing a reaction towards them. Items of the scales of these five factors were combined into a 39 item questionnaire, the FFMQ. The five subscales are adequately to well internally consistent, with alpha coefficients ranging from .75 to .91 (Baer *et al*., 2008). Up to now there is no study conducted that has evaluated the test-retest reliability of the FFMQ (Carmody *et al.*, 2009).

For the assessment of mindfulness in the Netherlands Muskens and Kamphuis translated the English version of the FFMQ into Dutch. The article about this topic is still in progress but by means of information from the authors it is known that this Dutch version is valid for students and for people with meditation experiences. In these studies results were obtained that are similar to the results of Baer et al. (2008). The Dutch FFMQ is thus not validated for a clinical population.

Research question

This leads to the purpose of this study, the reliability testing of the Dutch version of the FFMQ in a clinical population so that it can be used to evaluate the effects of the planned mindfulness-training. One method of computing reliability involves the temporal stability of a measure which is assessed by measuring the test-retest reliability. This will be the aim of this study. The question that is going to be answered here is: What is the test-retest reliability of

the FFMQ for Dutch fibromyalgia patients measured in a period of two weeks? This measure will be done for the whole group of patients and further for subgroups based on level of education and experiences with meditation. Additionally, Cronbach's Alpha is going to be computed to assess the internal consistency of the FFMQ and its five facets for a clinical population.

Hypotheses

There are two mindfulness questionnaires in which the test-retest reliability has been assessed for nonclinical populations. Baer, Smith, & Allen (2004) examined the test-retest reliability of the KIMS. Forty-nine students completed the 39-item version of the KIMS 14 to 17 days after the first administration of the questionnaire. This study offered test-retest correlations for the Observe, Describe, Act With Awareness, and Accept Without Judgment coefficients that were .65, .81, .86, and .83, respectively. These correlations indicated adequate to good test-retest reliability. The MAAS is the second mindfulness questionnaire of which the test-retest reliability is known (Brown & Ryan, 2003). Sixty Psychology students were tested over a time period of four weeks. The study offered an intraclass correlation of .81 which is in indication of high temporal stability. Regarding these studies mindfulness seems to be a relatively stable construct, assumed that no training in mindfulness takes place during the time between the two measures. This leads to a suggestion that this is also the case in a clinical population.

Based on these findings and based on the assumption that the scales of the FFMQ and the other two questionnaires are well related, it is hypothesized that the test-retest reliability of the Dutch version of the FFMQ for a clinical population of patients with fibromyalgia will be good, with correlations above .80. Only the correlations for the observe scale are expected to be adequate, thus above .60. This expectation is made because the coefficient for the observe facet of the KIMS was lower than that of the other facets.

Hypothesis 1: The test-retest reliability for the facets describing, acting with awareness, nonjudging of inner experience and nonreactivity to inner experience are good (≥ .80).

Hypothesis 2: The test-retest reliability for the observe facet is adequate (≥ .60).

Method

Participants

Patients were eligible for this study if they met the following inclusion criteria: age of 18 or older and diagnosed with fibromyalgia. All patients that answered the question in the online questionnaire if a doctor had diagnosed them with fibromyalgia positively were thus included. It was in advance not clear if there are enough patients with fibromyalgia that take part in the study. Thus patients with other forms of rheumatism were at first recruited to obtain a sample that is big enough to make significant conclusions. However, because of the insufficient response rate (5 %) of these patients they were eventually excluded from the analysis.

Selection

Participants were selected in two ways. Firstly, fibromyalgia patients were recruited via the website of the Dutch fibromyalgia patients association (www.fibromyalgiepatientenvereniging.nl). In agreement with the owner of the site an appeal was placed under the section medical research (medische onderzoeken). Patients were briefly informed about the content and goal of the study and were invited to participate. They could get access to the online questionnaire via a link in the appeal. Secondly, patients with a form of rheumatism, including fibromyalgia, were recruited via the rheumatology clinic of the Medisch Spectrum Twente (MST) in Enschede, the Netherlands. During consultation hours in the clinic patients in the waiting room were asked by trained students if they wanted to take part in this study.

Measures

Mindfulness was assessed using the Dutch version of the FFMQ. This is a 39-item instrument that measures the five facets observe, describing, acting with awareness, non-judging of inner experience and nonreactivity to inner experience. The patients rate the items on a 5-point Likert scale ranging from 1 (never or very rarely true) to 5 (very often or always true). Scores of every item are added to obtain one total score which ranges from 39 to 195. The higher the total score the more mindful the patients are. Separate scores for the five facets can also be computed. The observe facet consists of eight questions (items 1, 6, 11, 15, 20, 26, 31, 36). An

example of a question for this facet is 'I pay attention to sensations, such as the wind in my hair or sun on my face' ('Ik let op lichamelijke ervaringen, zoals de wind in mijn haar of de zon op mijn gezicht'). Scores range from 8 to 40. The describing facet consists of the following eight items: 2, 7, 12, 16, 22, 27, 32 and 37. An example is 'I can easily put my beliefs, opinions, and expectations into words' ('Ik kan makkelijk mijn overtuigingen, meningen en verwachtingen onder woorden brengen'). Scores for this facet range from 8 to 40. The acting with awareness facet consists of eight questions (items 5, 8, 13, 18, 23, 28, 34, 38). An example question for this facet is 'I rush through activities without being really attentive to them' ('Ik doe activiteiten gehaast zonder dat ik er echt aandacht voor heb'). Scores range from 8 to 40. The non-judging of inner experience facet consists of the following eight items: 3, 10, 14, 17, 25, 30, 35 and 39. An example is 'I make judgments about whether my thoughts are good or bad' ('Ik oordeel of mijn gedachten goed of fout zijn'). Scores for this facet range from 8 to 40. The nonreactivity to inner experience facet consists of seven questions (items 4, 9, 19, 21, 24, 29, 33). An example is 'I perceive my feelings and emotions without having to react to them' ('Ik neem mijn gevoelens en emoties waar zonder dat ik er iets mee hoef te doen'). Scores for this facet range from 7 to 35.

Before collecting the data a discussion had arisen about the translation of the FFMQ. It was not sure if the questionnaire was applicable for a clinical population. Because of this uncertainty it was decided to conduct a pilot study. Ten patients with a form of rheumatism were recruited via the MST in Enschede. After the completion of the questionnaire the patients were interviewed individually and were asked to tell which items are too difficult to understand and what kind of suggestions for improvement they have. These interviews revealed that patients had problems with items 4, 5, 9, 11, 14, 15, 18, 19, 20, 22, 35 and 39. There was thus in each of the facets at least one problematic item. The wording of these items was modified so that the clinical population could answer the questions more easily. The modified FFMQ which is added in the appendix was then used for data collection.

Sociodemographic characteristics were assessed only the first time the questionnaire was completed. The patients reported date of birth, gender, family status, work situation and level of education. Family status had five categories: unmarried and living alone, unmarried and living together with someone, married, widowed and divorced. Work situation was subdivided in paid work, housekeeping, school or study, unemployed, unemployable and retired. Level of education had eight categories ranging from no education and lower vocational education

(basisonderwijs) to higher vocational education (hoger beroepsonderwijs; wetenschappelijk onderwijs). Patients were further asked if they had fibromyalgia, if the diagnosis was made by a doctor and how long they were suffering from fibromyalgia. Next, patients had to indicate how much pain as a consequence of their disease they had during the last week. They had to rate this pain score on a scale that ranged from 0 (no pain at all) to 10 (unbearable pain). Finally, they had to report if they had experiences with meditation or not.

Procedure

Fibromyalgia patients that participated via the website of the Dutch fibromyalgia patients association were not individually recruited. They voluntarily visited the website and could read the introduction to this study. If they wanted to take part they could follow the link to the questionnaire that was placed below the information. First, patients had to answer questions about sociodemographic data and their disease followed by the 39 items of the FFMQ. At the end of the questionnaire these patients were asked if they were willing to fill in the FFMQ again after two weeks. If so they had to quote their email-addresses. It was mentioned that this will be treated confidentially. To raise the attractiveness of taking part in the retest patients were told that they have the chance to win a gift coupon amounting to 25€ if they stated their email-addresses and completed the FFMQ again. The date of fill-out was automatically recorded by the computer system. Data of the first test was collected over a period of three weeks.

Patients that were willing to fill in the online version of the FFMQ again received a mail exactly two weeks after completion of the first test. In that mail it was mentioned again that they can win one of the coupons if they fill in the FFMQ for a second time. They got access to the questionnaire via a link that was placed in the mail. Patients did not have to state their sociodemographic data but their email-addresses again so that it was possible to couple the data from the retest with the data from the first test.

Additionally, patients with a form of rheumatism were recruited in the waiting room of the rheumatology clinic. After receiving a short introduction to this study they were asked by trained students if they wanted to participate. If they agreed they received a paper-and-pencil version of the FFMQ including an addressed and postpaid envelope to simplify the return of the questionnaire to the University of Twente. Number of pages and content and order of the items were the same as in the online version. At the end of the questionnaire patients were

asked if they were interested and willing to fill in the FFMQ again after two weeks. If so they had to state their names and home addresses. It was mentioned that confidentiality was warranted and that these data were abolished after sending the questionnaire for the retest. These patients did not get the offer of winning a gift coupon. The FFMQ for the retest was sent to the home addresses of the patients in a way that they received it exactly two weeks after the date of fill-out that they had stated in the first test. The letter included again an addressed and postpaid envelope for the return. As mentioned, response rate of these patients was unsatisfying so that they were not included in the analysis.

Data analysis

At first, a reliability analysis was made to compute Cronbach's Alpha for the total FFMQ and each facet as measure of internal consistency.

A Chi-square test was used to test if there are significant differences in gender, family status, work situation, type of education and experience with meditation between the patients that took part in the retest and the patients that did not take part in the retest.

To test if there was a difference between the patients that filled in the retest and those who did not regarding age, disease duration and pain score a Mann-Whitney test was done.

The test-retest reliability was assessed through making a reliability analysis. Intraclass Correlation Coefficients (ICCs) were computed using a two-way random effects model where both people effects and measures effects are random and an absolute agreement definition. Scores of the total FFMQ and scores of each scale of the first test were correlated with the scores of the retest. Separate Intraclass Correlation Coefficients of the total FFMQ and of each subscale were computed for patients with and patients without experiences with meditation and further for patients with lower and higher level of education.

Data was analyzed using SPSS for Windows 16.0.

Results

Response rate

Fifty-six patients with fibromyalgia participated via the website. Of these 56 people 46 were willing to complete the FFMQ again and stated their email-addresses. Thus 46 mails for the retest were sent. 30 of these 46 people actually filled in the questionnaire again. This is a

response rate of 53,6 % which is considered to be adequate.

In the clinic 100 patients were recruited to fill in the first questionnaire. Of these 100 patients only 10 were willing to complete the FFMQ again and of these 10 only 5 actually sent back the questionnaire. This is a response rate of 5 % which is unsatisfying. Additionally, none of these five people suffered from fibromyalgia but from other forms of rheumatic diseases. This gives no additional value for the analysis but would probably interfere with the results of the fibromyalgia patients. The response rate for the patients that took part via the website however was more satisfying. For these reasons it was decided to leave out the five responses of the patients of the clinic for the analysis and focus only on the fibromyalgia patients that completed the online version.

Sociodemographic data and data about the disease

The 30 patients that completed the online version of the test and retest of the FFMQ were between 19 and 63 years old with a mean of 43 years. Of these 30 patients 29 were female and one was male. The majority was married and had a paid job. In terms of the level of education the patients were nearly even distributed. All of the 30 patients reported to have fibromyalgia and all said that this diagnosis was made by a doctor. Patients were suffering on average 9,43 years (σ = 7.60) from fibromyalgia. Further, patients reported a pain score during the last week of M = 6.97 (σ = 1.45). At last, 13 of the 30 patients had experiences with meditation and 14 did not. Table 1 gives a summary of the results.

Table 1

Sociodemographic data and data about the disease of the 30 fibromyalgia patients that completed the test and retest of the FFMQ

Variable		N	%
Gender	Male	1	3.3
	Female	29	96.7
Family status	Unmarried & living alone	4	13.3
	Unmarried & living together	4	13.3
	Married	17	56.7
	Divorced	5	16.7
Work situation	Paid work	16	53.3

	Housekeeping	6	20.0
	School/study	1	3.3
	Unemployed	1	3.3
	Unemployable	6	20.0
Level of education	Lager beroepsonderwijs	6	20.0
	MAVO, (M)ULO, VMBO	6	20.0
	Middelbaar beroepsonderwijs	7	23.3
	HAVO, MMS, gymnasium	4	13.3
	Hoger beroepsonderwijs	7	23.3
Experiences with meditation	Yes	13	43.3
	No	14	46.7
	Skipped	3	10.0

Age, Mean years (SD)	43.00	(11.92)
Disease duration, Mean years (SD)	9.43	(7.60)
Pain score, Mean (SD)	6.97	(1.45)

Analysis

For the analysis of the FFMQ some items have to be recoded so that a higher score on each item implies that patients are more mindful. Thus items 12, 16 and 22 of the describe scale and all items of the acting with awareness scale as well as the non-judging of inner experience scale are recoded.

Cronbach's Alpha is computed for the total FFMQ and each facet of the first test. The values range from $\alpha = 0.67$ for the observe facet to $\alpha = 0.91$ for the acting with awareness facet which means that the internal consistency of the facets is adequate to good. The internal consistency of the total FFMQ is also good with $\alpha = 0.92$.

The Chi-square test tests the null hypothesis that the groups do not differ significantly with $\alpha = 0.05$. Table 2 gives a summary of the Pearson Chi-square values and significance. As can be seen in the table all significances exceed the significance level of 0.05 considerably which means that the null hypothesis cannot be rejected. The difference between the patients that filled in the retest and patients that did not is not significant regarding the tested variables.

Table 2

Pearson Chi-square values and significance to test the independence of several variables from the variable filled in/not filled in the retest

Variable	Pearson Chi-square	Asymp. Sig (2-sided)
Gender	0.011	0.918
Family status	0.786	0.853
Work situation	2.362	0.669
Type of education	4.604	0.595
Experience with meditation	0.001	0.982

For the Mann-Whitney test a significance level of $\alpha = 0.05$ is used. When comparing the pain scores of the patients that filled in the retest and those who did not the results reveal that $z = -0.737$ with $p = 0.461$. This means that both groups do not significantly differ in pain scores. The groups do further not significantly differ regarding age and disease duration with $p = 0.516$ ($z = -0.650$) and $p = 0.515$ ($z = -0.651$), respectively.

An independent samples t-test is done to test if the patients that filled in the retest differ significantly from those who did not regarding their mindfulness score, thus the sumscore of the total FFMQ of the first test. Results imply that the two groups do not differ significantly on this variable ($t = -0.937$; $p = 0.353$).

Next, means and standard deviations of the total FFMQ as well as of each subscale for the first test and retest are computed which is summarized in table 3. Patients score highest on the observe facet and lowest on the acting with awareness facet on both the first test and the retest. The score for the nonreactivity to inner experiences facet is lower because it consists of only seven items instead of eight.

Table 3

Means and standard deviations of the FFMQ and each subscale for the first test and retest

	First test			Retest		
Scale	Mean	SD	N	Mean	SD	N
FFMQ	122.07	19.62	27	123.42	17.24	26
Observe	28.55	4.20	29	27.97	4.69	29
Describe	24.59	6.02	29	24.96	5.39	27
Acting with awareness	22.77	6.34	30	24.00	6.33	29
Non-judging of inner experience	24.47	6.78	30	24.54	6.26	28
Nonreactivity to inner experience	21.21	4.81	29	21.23	4.34	30

To check the scores on the five facets for ceiling effects or floor effects boxplots for each facet for the first test and the retest are made. The top of the box represents the 75th percentile, the bottom of the box represents the 25th percentile, and the line in the middle represents the 50th percentile. The whiskers (the lines that extend out the top and bottom of the box) represent the highest and lowest values that are not outlier. Outliers (values that are between 1.5 and 3 times the interquartile range) are represented by circles beyond the whiskers. The boxplots for the first test (see figure 1) [1] illustrate that there are some outliers upwards (for example patient number 16). There are fewer outliers in the retest (see figure 2). Except for these outliers patients do not score extremely high on the facets which means that there is no ceiling effect. Patients score low on the acting with awareness and the non-judging of inner experience facet but not extreme enough to call it a floor effect.

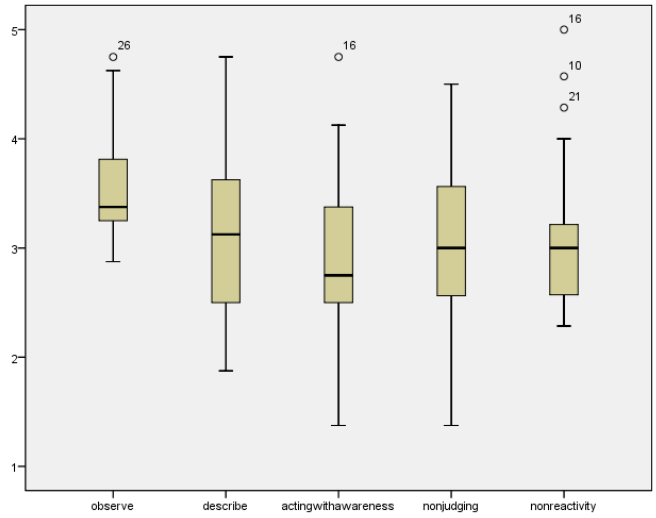

Figure 1: Boxplots of each facet for the first test

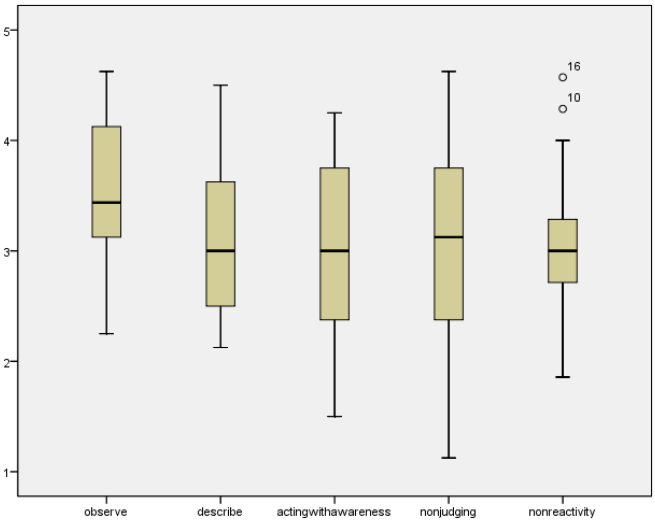

Figure 2: Boxplots of each facet for the retest

The Intraclass Correlation Coefficients and the degrees of freedom (df) for each measure are summarized in table 4. Coefficients range from 0.657 for the acting with awareness scale to 0.863 for the observe scale. The ICC for the total FFMQ is 0.798. These are adequate to good results.

Table 4

Intraclass Correlation Coefficients and the degrees of freedom (df) for the total FFMQ and each subscale

Scale	ICC	df
FFMQ	0.798	22
Observe	0.863	27
Describe	0.820	25
Acting with awareness	0.657	28
Non-judging of inner experiences	0.757	27
Nonreactivity to inner experiences	0.776	28

Separate Intraclass Correlation Coefficients of the total FFMQ and the five facets are computed for patients with and patients without experiences with meditation and for patients that are lower educated and for those who are higher educated. The results are summarized in table 5. All ICCs of the total FFMQ are higher than 0.70 which is an indicator of good reliability. There are no big differences between the groups. The ICCs of the observe and the describe facet are also good. There are some lower ICCs of the other facets but they are all above 0.5 which is acceptable. The most noticeable value is the ICC of the acting with awareness scale for patients with experiences with meditation which is 0.416. This is much lower than the value for patients without experiences with meditation and actually not an adequate value. Comparing the means of the first test and the retest for the patients with and without experiences with meditation it can be seen that patients with experiences score on average higher in the retest than in the first test on this facet (M = 26.17 compared to M = 23.17). The differences between the scores of the patients without experiences with meditation are smaller.

Table 5

Intraclass Correlation Coefficients and degrees of freedom (df) for each facet and the total FFMQ with experiences with meditation and level of education as grouping variables

Scale (ICC (df))	Experiences with meditation		Level of education	
	Yes	No	High	Low
FFMQ	0.767 (10)	0.860 (8)	0.721 (8)	0.919 (13)
Observe	0.842 (11)	0.729 (12)	0.798 (8)	0.905 (18)
Describe	0.822 (11)	0.810 (10)	0.846 (9)	0.804 (15)
Acting with awareness	0.416 (11)	0.889 (13)	0.734 (9)	0.576 (18)
Non-judging of inner experience	0.570 (10)	0.825 (13)	0.683 (9)	0.823 (17)
Nonreactivity to inner experience	0.804 (12)	0.599 (12)	0.671 (10)	0.868 (17)

Discussion

This study was conducted to assess the test-retest reliability of the Dutch version of the FFMQ for a clinical population in a period of two weeks. Thirty patients with fibromyalgia participated and filled in the first test and retest of an online version of a modified FFMQ in a period of two weeks. Analysis of the data reveals that Cronbach's Alpha for the five facets was 0.67 and higher which is an indicator of adequate to good internal consistency. Similar results were obtained in earlier studies (Baer *et al*., 2008). The internal consistency of the facets is thus for a clinical population even good as for a nonclinical population. Patients scored on average highest on the observe scale and lowest on the acting with awareness scale. They have a mean level of mindfulness, thus are not very mindful but also not mindless. 'Sometimes true' was the category of answers that patient on average used most frequently. The test-retest reliability was assessed using a reliability analysis with Intraclass Correlation Coefficients as indicator of the reliability. Coefficients for the five facets ranged from 0.657 to 0.863 with the observe facet having the highest ICC which is an indicator of good test-retest reliability and the acting with awareness facet having the lowest ICC. The ICC for the total FFMQ is 0.798. This means that mindfulness seems to be a stable construct which is in agreement with what was founded in the KIMS study of Baer, Smith & Allen (2004) and the MAAS study of Brown & Ryan (2003). It can further be concluded that the test-retest reliability for the total FFMQ and the observe, describe, non-judging of inner experience and nonreactivity to inner experience facet are good and the test-retest reliability for the acting with awareness facet is adequate. When computing separate ICCs for the total FFMQ and the five facets for patients with high and low education they were still high which means that the FFMQ is good applicable for both groups. The same is true for patients with and without experiences with meditation. Here, the ICCs are also adequate to good. The only exception is

the ICC for the acting with awareness facet for patients that had experiences with meditation. These patients scored higher on average higher on the retest than on the first test.

It was hypothesized that the test-retest reliability for the facets, excepting the observe facet, is higher than 0.80. This hypothesis is supported only for the describe facet. For the acting with awareness, non-judging of inner experience and nonreactivity to inner experience facets the hypothesis is not supported. Especially the test-retest reliability for the acting with awareness facet lies somewhat below the expected value. One explanation for that can be that the act with awareness facet of the KIMS, which was the foundation of the expected value, consists of other questions than the acting with awareness facet of the FFMQ so that a one-to-one comparison is not exactly possible. Another explanation can be the influence of experiences with meditation on this facet. In meditation patients learn to concentrate consciously on a certain thing, for example their breath. It could thus be that those patients have developed skills that help them to be more aware in different situations of daily life. The mere exposure to questions concerning awareness in the first test might be a trigger or reminder that those patients apply these developed skills shortly after quitting the questionnaire. They could think that this might help dealing with their pain. The scores on the retest might be higher because of this reason. Patients without experiences with meditation might not have developed awareness skills so that they could not apply them, even if confronted with this kind of questions. However, the test-retest reliability for this facet is adequate which does not support the hypothesis but is a satisfying result. Moreover, the ICCs of the non-judging of inner experience and nonreactivity to inner experience are only slightly lower than expected which is also satisfying.

The second hypothesis was that the test-retest reliability for the observe facet is above 0.60. This hypothesis is supported because the coefficient is much higher than 0.60. The result is absolutely acceptable. The observe scale of the FFMQ seems thus better than the observe scale of the KIMS. One explanation might be that the observe scale of the KIMS consists amongst others of some questions about emotions and thoughts which might be more susceptible to change than the questions about external cues such as smells or sounds that are predominantly used in the FFMQ.

It can thus be concluded that although the hypotheses are only supported for two facets the result for the total FFMQ and the five facets is satisfying.

One good point of this study is that the group that filled in the retest did not significantly

differ from the group that did not fill in the retest. Both groups are comparable regarding the variables age, gender, family status, work situation, level of education, experience with meditation, disease duration, pain scores and initial mindfulness scores. This diminishes the possibility that patients of a certain sociodemographic group or patients with a certain experience of meditation or certain disease-data are over-represented in this study. The sample represents further the average group of fibromyalgia patients regarding age and gender. Young women are mostly affected by this disease and this group patients is predominantly represented in this study.

Beside these good points there are some shortcomings in this study. The sample represents well the typical fibromyalgia patient but is very small. Because of some missing values the number of patients that could have been used for the analysis of the total FFMQ was 26 instead of the primarily 30 patients. With such a small sample it is difficult to make significant conclusions. Moreover, patients were not individually recruited for this study but were active users of the website. These patients could differ from patients that do not use this website in terms of age or the way they concern themselves with their disease. It might be that younger people that are more interested in their disease use the website more frequently and thus might take part in such studies more often. This group patients might thus be over-represented in this study. One thing that could be studied in future research is the influence of experiences with meditation on the FFMQ, especially the questions concerning awareness. In this study, the correlation between the scores of the first test and the retest of the acting with awareness facet of patients with experiences with meditation were low. This could influence the results of the total questionnaire and must thus be considered when interpreting the results and applying the questionnaire in future studies.

All in all, based on the satisfying results it can be concluded that the Dutch version of the FFMQ has a good test-retest reliability for a clinical population.

References

Baer, R. A., Smith, G. T., & Allen, K. B. (2004). Assessment of mindfulness by self-report: The Kentucky Inventory of Mindfulness Skills. *Assessment*, *11*, 191-206.

Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment, 13*, 27-45.

Baer, R. A., Smith, G. T., Lykins, E. et al. (2008). Construct Validity of the Five Facet Mindfulness Questionnaire in Meditating and Nonmeditating Samples. *Assessment, 15,* 329.

Bazelmans, E., Vercoulen, J. H. M. M., Galama, J. M. D., van Weel, C., van der Meer, J. W. M. & Bleijenberg, G. (1997), Prevalentie van het chronische-vermoeidheidssyndroom en het primaire-fibromyalgiesyndroom in Nederland, *Nederlands Tijdschrift voor Geneeskunde*, *141 (31)*, 1520-1523.

Bishop, S. R. (2002). What do we really know about Mindfulness-Based Stress Reduction? *Psychosomatic Medicine*, 64 (1), pp. 71-83.

Bishop, S. R., Lau, M., Shapiro, S., Carlson, L., Anderson, N. C., Carmody, J., et al. (2004). Mindfulness: A proposed operational definition. *Clinical Psycholology: Science and Practice, 11*, 230-241.

Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology*, *84*, 822-848.

Brückle, W. (2004). *Was ist Rheuma?* Retrieved 03-13-2009, from http://www.rheuma-liga.de/uploads/68/merkblatt_1.1.pdf

Buchheld, N., Grossman, P., & Walach, H. (2001). Measuring mindfulness in insight meditation (Vipassana) and meditation-based psychotherapy: The development of the Freiburg Mindfulness Inventory (FMI). *Journal for Meditation and Meditation Research*, *1*, 11-34.

Carmody, J., & Baer, R. A. (2008). Relationships between mindfulness practice and levels of mindfulness, medical and psychological symptoms and well-being in a mindfulness-based stress reduction program. *Journal of Behavioral Medicine, 31*, 23-33.

Carmody, J., Baer, R. A., Lykins, E. L. B., Olendzki, N. (2009). An empirical study of the mechanisms of mindfulness in a mindfulness-based stress reduction program. *Journal of Clinical Psychology, 65*, 613-626.

Chadwick, P., Hember, M., Mead, S., Lilley, B., & Dagnan, D. (2005). *Responding mindfully to unpleasant thoughts and images: Reliability and validity of the Mindfulness Questionnaire*. Unpublished manuscript.

Eich, W., Häuser, W., Friedel, et al. (2008). Definition, Klassifikation und Diagnose des

Fibromyalgiesyndroms. *Der Schmerz, 22,* 255-266

Feldman, G. C., Hayes, A. M., Kumar, S. M., & Greeson, J. M. (2004). *Development, factor structure, and initial validation of the Cognitive and Affective Mindfulness Scale*. Unpublished manuscript.

Goldenberg, D. L., Kaplan, K. H., Nadeau, M. G., Brodeur, C., Smith, S., Schmid, C.H. (1994). A controlled study of a stress-reduction, cognitive-behavioral treatment program in fibromyalgia. *Journal of Musculoskeletal Pain*, *2 (2)*, 53-66.

Grossman, P., Niemann, L., Schmidt, S., Walach, H. (2004). Mindfulness-based stress reduction and health benefits: A meta-analysis. *Journal of Psychosomatic Research*, *57 (1)*, 35-43.

Grossman, P., Tiefenthaler-Gilmer, U., Raysz, A., Kesper, U. (2007). Mindfulness training as an intervention for fibromyalgia: Evidence of postintervention and 3-year follow-up benefits in well-being. *Psychotherapy and Psychosomatics*, *76 (4)*, 226-233.

Hayes, A. M.,& Feldman, G. (2004). Clarifying the construct of mindfulness in the context of emotion regulation and the process of change in therapy. *Clinical Psychology: Science and Practice, 11,* 255-262.

Hayes, S. C., Shenk, C. (2004). Operationalizing mindfulness without unnecessary attachments. *Clinical Psychology: Science and Practice*, *11 (3),* 249-254.

Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (1999). *Acceptance and commitment therapy: An experiential approach to behaviour change*. New York: Guilford Press.

Kabat-Zinn J. (1982). An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: theoretical considerations and preliminary results. *General Hospital Psychiatry, 4***,** 33-47.

Kabat-Zinn, J. (1990). *Full catastrophe living: Using the wisdom of your body and mind to face stress, pain, and illness.* New York: Delacourt.

Kabat-Zinn, J. (2000). Indra's net atwork: The mainstreaming of Dharma practice in society. In G. Watson & S. Batchelor (Eds.), The psychology of awakening: Buddhism, science, and our day-to-day lives (pp. 225-249). North Beach, ME: Weiser.

Kabat-Zinn, J. (1994). *Wherever You Go, There You Are: Mindfulness Meditation in Everyday Life*. New York: Hyperion.

Kabat-Zinn, J., Lipworth, L., & Burney, R. (1985). The clinical use of mindfulness meditation for the self-regulation of chronic pain. *Journal of Behavioral Medicine, 8,* 162–190.

Kaplan, K. H., Goldenberg, D.L., Galvin-Nadeau, M. (1993). The impact of a meditation-based stress reduction program on fibromyalgia. *General Hospital Psychiatry*, 15 (5), 284-289.

Linehan, M. M. (1993a). Cognitive-behavioral treatment of borderline personality disorder. New York: Guilford.

Linehan, M. M. (1993b). Skills training manual for treating borderline personality disorder. New York: Guilford.

Reumafonds (Not dated). *Reuma in Nederland.* Retrieved 03-13-2009, from https://www.reumafonds.nl/index.php?option=com_content&task=view&id=47&Itemid=95

Roemer, L., Orsillo, S. M. (2002). Expanding our conceptualization of and treatment for generalized anxiety disorder: Integrating mindfulness/acceptance-based approaches with existing cognitive-behavioral models. *Clinical Psychology: Science and Practice*, *9 (1),* 54-68.

Segal, Z. V., Williams, J. M. G., & Teasdale, J. D. (2002). *Mindfulness-based cognitive therapy for depression: A new approach to preventing relapse*. New York: Guilford Press.

Sephton, S. E., Salmon, P., Weissbecker, I., Ulmer, C., Floyd, A., Hoover, A. & Studts, J. L. (2007). Mindfulness meditation alleviates depressive symptoms in women with fibromyalgia: Result of a randomized clinical trial. *Arthritis & Rheumatism, 57*, 77-85.

Wolfe, F., Smythe, H. A., Yunus, M. B., Bennett, R. M., Bombardier, C., Goldenberg, D. L., et al. The American College of Rheumatology 1990 criteria for the classification of fibromyalgia: report of the multicenter criteria committee. *Arthritis & Rheumatism, 33,* 160-72.

Appendix

Five Facet Mindfulness Questionnaire

Hieronder staan verschillende uitspraken. Geef voor elke uitspraak aan hoe vaak deze voor u in het algemeen waar is door het juiste bolletje aan te klikken.

1	2	3	4	5
nooit of bijna nooit waar	zelden waar	soms waar	vaak waar	heel vaak of altijd waar

_____ 1. Als ik loop let ik bewust op hoe de beweging van mijn lichaam voelt.
_____ 2. Ik ben goed in het vinden van woorden om mijn gevoelens te beschrijven.
_____ 3. Ik bekritiseer mezelf voor het hebben van onlogische of ongepaste emoties.
_____ 4. Ik neem mijn gevoelens en emoties waar zonder dat ik er iets mee hoef te doen.
_____ 5. Als ik iets aan het doen ben dwalen mijn gedachten af en ben ik in het algemeen snel afgeleid.
_____ 6. Als ik onder de douche sta of in bad lig blijf ik me bewust van het gevoel van water op mijn lichaam.
_____ 7. Ik kan makkelijk mijn overtuigingen, meningen en verwachtingen onder woorden brengen.
_____ 8. Ik let niet op wat ik doe omdat ik dagdroom, pieker of iets anders doe waardoor ik afgeleid ben.
_____ 9. Ik observeer mijn gevoelens zonder dat ik me er helemaal door laat meeslepen.
_____ 10. Ik zeg tegen mezelf dat ik me niet zo zou moeten voelen als ik me voel.
_____ 11. Het valt me op hoe voedsel en drinken mijn gedachten, lichamelijke gewaarwordingen en emoties beïnvloeden.
_____ 12. Het is moeilijk voor me om de woorden te vinden die mijn gedachten beschrijven.
_____ 13. Ik ben snel afgeleid.
_____ 14. Ik heb soms niet normale of slechte gedachten, die ik niet zo zou moeten denken.
_____ 15. Ik let op lichamelijke ervaringen, zoals de wind in mijn haar of de zon op mijn gezicht.
_____ 16. Ik heb moeite met het bedenken van de juiste woorden om uit te drukken wat ik van dingen vind.
_____ 17. Ik oordeel of mijn gedachten goed of fout zijn.
_____ 18. Ik vind het moeilijk om mijn aandacht te houden bij wat er op dit moment gebeurt.
_____ 19. Als ik verontrustende gedachten heb of beelden zie, dan laat ik me daar niet door meevoeren.
_____ 20. Ik let in het algemeen op geluiden zoals het tikken van een klok, het fluiten van de vogels of het voorbijrijden van een auto.
_____ 21. In moeilijke situaties kan ik me inhouden zonder onmiddellijk te reageren.
_____ 22. Als ik iets in mijn lichaam voel, kost het me moeite om de juiste woorden te vinden om het te beschrijven.
_____ 23. Het lijkt alsof ik op de 'automatische piloot' sta zonder dat ik me erg bewust ben van wat ik doe.
_____24. Als ik verontrustende gedachten heb of beelden zie, voel ik me kort daarna weer

rustig.

_____ 25. Ik zeg tegen mezelf dat ik niet moet denken zoals ik denk.
_____ 26. Ik merk de geur en het aroma van dingen op.
_____ 27. Zelfs als ik heel erg overstuur ben kan ik dit op een of andere manier onder woorden brengen.
_____ 28. Ik doe activiteiten gehaast zonder dat ik er echt aandacht voor heb.
_____ 29. Als ik verontrustende gedachten heb of beelden zie, kan ik ze opmerken zonder iets te doen.
_____ 30. Ik denk dat mijn emoties soms slecht of ongepast zijn en dat ik ze niet zou moeten voelen.
_____ 31. Ik merk de visuele aspecten van kunst of de natuur op, zoals kleur, vorm, structuur of patronen van licht en donker.
_____ 32. Het is mijn natuurlijke neiging om mijn ervaringen in woorden te vatten.
_____ 33. Als ik verontrustende gedachten heb of beelden zie, merk ik ze op en laat ze los.
_____ 34. Ik doe mijn werk of taken automatisch zonder dat ik me bewust ben van wat ik doe.
_____ 35. Als ik verontrustende gedachten heb of beelden zie, veroordeel ik mezelf.
_____ 36. Ik let op hoe mijn emoties mijn gedachten en gedrag beïnvloeden.
_____ 37. Over het algemeen kan ik in detail beschrijven hoe ik me op dat moment voel.
_____ 38. Ik merk dat ik vaak dingen doe zonder er aandacht aan te besteden.
_____ 39. Ik keur mezelf af als ik onlogische gedachtes heb.