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Mindfulness and Self-Compassion in Clinical Psychiatric Rehabilitation: a Clinical Trial

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Abstract

Objectives Previous research has suggested Mindful Self-Compassion (MSC) as being beneficial for people dealing with a variety of mental health issues in outpatient area.

Method A clinical trial was conducted with 200 psychiatric inpatients testing the efficacy of a specially designed 6-week MSC program compared with a control intervention of progressive muscle relaxation (PMR). Each session lasted 75 min and took place once a week for each of the study groups. The primary end-point was the change in the self-compassion scale (SCS) total score from pre- to post treatment. Secondary end-points included changes in the Medical Outcomes Study 36-item short-form health survey (SF-36), the Global Severity Index (GSI) of the Brief Symptom Inventory-18 (BSI-18), and subjective feeling of happiness (single item).

Results Of the 200 randomly assigned participants, the MSC group (M = 2.90, SD = 0.5) showed a significant improvement in SCS ($F(1,198) = 25.57$, $p < .01$, $\eta^2 = 0.11$) after 6 weeks in comparison with the PMR group (M = 2.57, SD = 0.6, $p > .05$). Correspondingly, the MSC group stated a greater amount of happiness in comparison to the PMR group ($p < .05$). Furthermore, the GSI and SF-36 parameters improved in both study groups to the same extent during the 6-week treatment ($p < .01$).

Conclusions These preliminary data suggest the clinical applicability of MSC in psychiatric patient groups, which merits further large-scale studies.

Keywords Self-compassion · Mindfulness · Progressive muscle relaxation · Psychological well-being

In recent years, there has been convincing evidence for the positive effects of mindfulness-based interventions in regard to subjective well-being and physical health, which is underlined by the fact that complementary and alternative methods, such as mindfulness-based meditation, are becoming more and more important in medicine (Baer et al. 2012; Barnett and Shale 2012; Burstein et al. 1999; Gaiswinkler and Unterrainer 2016; Hollis-Walker and Colosimo 2011; Kabat-Zinn 2003; MacBeth and Gumley 2012; Neff et al. 2007; Unterrainer et al. 2014). Therapeutic interventions such as acceptance and commitment therapy (Hayes et al. 1999), dialectical behavioral therapy (Linehan 1993) or compassion-focused therapy (Gilbert 2010) "give greater prominence to positive affect in the therapeutic process" (MacBeth and Gumley 2012, p. 2).

Drawing on this background, the Mindful Self-Compassion (MSC) program has been developed as a specific kind of mindfulness meditation-based training to enhance self-compassion (Neff and Germer 2013). Referring to Neff (2003, p.87), self-compassion "involves being touched by and open to one's own suffering, not avoiding or disconnecting from it, generating the desire to alleviate one's suffering and to heal one's pain with kindness. Self-compassion also involves offering nonjudgmental understanding to one's pain, inadequacies and failures, so that

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one's experience is seen as part of the larger human experience". The MSC program is derived from the well-established Mindfulness-Based Stress Reduction (Kabat-Zinn 1982, 1990) and Mindfulness-Based Cognitive Training (Segal et al. 2002), it comprises meditation, interpersonal exercises, informal practical exercises, and home assignments, in order to enable the individual to engage in an attentive and loving contact with his or her self (Neff 2003; Neff et al. 2007).

Self-compassion, as defined by Neff and Germer (2013), contains three important elements: mindfulness, self-kindness, and a feeling of common humanity. In the MSC program, it is taught to be kind and understanding to oneself when we suffer, instead of exaggerating the painful feelings or drowning in self-pity. The training also involves learning a sense of common humanity. To develop a feeling of common humanity means to recognize that we are not the only ones suffering and that pain, sorrow, and personal inadequacies are all a part of the human condition which we all share. "Finally, self-compassion entails balanced awareness of one's emotions—the ability to face (rather than avoid) painful thoughts and feelings, but without exaggeration, drama or self-pity" (Neff et al. 2007, p. 909).

As supported by evidence, self-compassion is positively related to emotional intelligence, happiness, optimism, and personal initiative (Heffernan et al. 2010). Meanwhile, negative associations were observed between self-compassion and depression, anxiety, self-criticism, the suppression of negative emotions, and a negative body image (Neff et al. 2007). In correspondence to this, participants who are very harsh and critical of themselves benefited less from therapeutic interventions in previous investigations (Blatt 1995). Furthermore, self-criticism turned out to be a major predictor for anxiety and depression and was associated with a broad range of psychopathology in a study by Van Dam et al. (2011).

Existing literature concerning the reason why self-compassion may lead to less depression and anxiety reveals, that by exercising loving kindness, which is part of the training of MSC, worry and rumination, known as to be dominant in participants dealing with depression and anxiety, decrease (Graser and Stangier 2018; Raes 2010). Since the enhancement of self-compassion has been shown to be especially effective for people dealing with feelings of anxiety and depression, MSC training might substantially contribute to the positive outcome of clinical interventions and therefore should be examined in clinical surroundings (Gilbert 2010; MacBeth and Gumley 2012; Raes 2010; Segal et al. 2002; Van Dam et al. 2011).

Based on these highly promising findings in healthy populations, demonstrating a clear positive link between self-compassion and various parameters of psychological well-being and mental health, we conceptualized a study to examine the effects of MSC training in naturalistic clinical psychiatric surroundings (Neff et al. 2007). In this clinical trial, the efficacy of a specially designed 6-week MSC intervention, derived from the original MSC training invented by Neff and Germer (2013),

is tested against the efficacy of the well-established Progressive Muscle Relaxation (PMR) program invented by Jacobsen (1929). We hypothesize that the implementation of the MSC program leads to a better outcome at the end of the 6-week clinical treatment period. Furthermore, we expect that participants in the MSC group exhibit a greater improvement in self-compassion, physical, and mental functioning and a greater reduction of psychiatric symptom burden, than the PMR group.

Method

Participants

Eligible participants were at least 18 years of age while undergoing a 6-week inpatient treatment at the Sonnenpark clinic. The occurrence of an acute psychotic episode was an exclusion criterion, as this is also an exclusion criterion for attending rehabilitation at the Sonnenpark clinic. Furthermore, participants with acute suicidal tendencies as well as participants with acute addiction disorders are not eligible for rehabilitation and are transferred to specific psychiatric hospitals. Screening was done through the treating psychiatrist of the Sonnenpark clinic. All participants displayed a full command of the German language and confirmed written informed consent with a signature on an information letter which was provided by the review board of the Medical University of Graz and which included sufficient information. The main investigator made clear that the participants fully understood all the information given on the information letter, including the purpose of the treatment, as well as possible benefits and risks and that withdrawing from consent is possible at any time. It was ensured that there will be no disadvantages if a patient declined to participate. All participants participated voluntarily in this study.

Baseline measurement was done on the first day of the patient's rehabilitation stay and 6-week measurement was done on the last day of rehabilitation at the Sonnenpark clinic. Both measurements, baseline as well as 6-weeks measurement, were applied at Wednesday in the early afternoon. Through G-power analysis software and derived from cautious estimations due to previous studies on this topic, we hypothesized that a minimum of 85 participants per group would be needed to detect a mean difference between groups in total SCS score of half of a total standard deviation (Cohen's $d = 0.5$) with a predicted power of .90 (Faul et al. 2007). Guided by these results, and conscious of possible dropouts, we assigned 139 participants to the MSC group and 110 participants to the control group.

Procedure

Based on the day of their arrival at the rehabilitation clinic, the patient groups were alternately assigned either to the MSC or

to PMR by an employee who was independent of the study. Due to the character of the interventions and because the name of the study "mindfulness and self-compassion in clinical psychiatric rehabilitation" had to be specified in the consent form (as a requirement from the review board of the Medical University of Graz), blinding was not an option for the participants and the trainers. Those who did the assessments were blinded. There was no sponsorship and the study was conducted in accordance with the trial protocol. Parameters were assessed on the day of arrival (baseline) and again after the 6-week rehabilitation stay. Interventions took place in a group setting comprised of a minimum of 8 and a maximum of 12 participants.

For this study, the original MSC training protocol, developed by Neff and Germer (2013) was adapted in order to fit into the 6-week treatment schedule of the Sonnenpark clinic. The elements of the MSC intervention were selected carefully in accordance with the increased psychiatric symptom burden of the participants. Therefore, participants were asked to communicate only their feelings and perceptions during the interpersonal exchange exercises and not to bring in their personal history, as these topics were specifically addressed during psychotherapy sessions and could have been too overwhelming for them. For this reason, interpersonal exercises were minimized. The classes were taught by a certified MSC trainer with more than 10 years of teaching experience in the field of mindfulness. In the first session, the theory behind self-compassion and its principles were explained to the trainees. In subsequent sessions, participants practiced informal exercises such as dealing with difficult emotions (moments of suffering, sorrow, and joy) and core meditations (MSC breathing, Metta meditation, one for me-one for you and MSC body scan) which represent the central elements from the original MSC training.

In the first unit participants were provided with instructional words regarding the upcoming intervention. The purpose of mindfulness and self-compassion were explained and the definition of mindfulness was reported as perceiving what is happening in the current moment without judging it. Subsequently, the participants were informed that the MSC training they would undertake in the next few weeks would be an abridged version of the original MSC training. In the following sessions, the actual training took place, including the core meditations (loving breathing, Metta meditation, to give and to receive compassion), the body scan with compassion and informal exercises (self-compassion break, gentle touch, enjoying with all senses, self-compassion in everyday life and mindfulness in everyday life). While the first session served to introduce the concept of MSC training, the second session comprised the core meditations "loving breathing" and the "Metta" mediation. In the third session, "giving and receiving compassion" was trained and the "body scan with compassion" was accomplished. The fourth session comprised the "self-compassion

break" and the "gentle touch." Subsequently in the fifth session, "self-compassion in everyday life" as well as "mindfulness in everyday life" was exercised. In the sixth and final session, to "enjoy with all senses" was trained, further advice for practicing at home was given and further reading was recommended. For detailed information about the MSC training, please see Neff and Germer (2013).

The PMR program, initially developed by Jacobsen (1929), is a highly established relaxation technique where participants learn to recognize the differences between muscle tension and relaxation by tensing and subsequently relaxing all distinct muscle groups. At each session a clinical psychologist, who is highly experienced in PMR, instructed the participants in the stretching and tensing of every muscle group in the body, holding the tension no longer than 7 s and subsequently relaxing for up to 30 s. Participants were encouraged to pay attention to the feelings that were associated with contraction and relaxation and to enjoy the more pleasant state of relaxation.

Both interventions took place once a week for 6 weeks and each session lasted about 75 min. The interventions were held every Tuesday at the same place successively. All participants were provided with an audio CD and a handout for practicing on their own. Throughout the intervention period participants were encouraged to practice MSC/PMR in addition to the intervention time.

Measures

The frequency and duration of the additional practice were tracked, as well as the mode (formal: same time/same place vs. informal: any time when needed), favor for the practice (single item rating from 1 = does not like MSC/PMR at all to 10 = likes the intervention very much) and trust in the MSC/PMR trainer (single item rating from 1 = no trust at all to 10 = full trust) to get insight into the amount of additional practice of the participants concerning MSC/PMR.

The primary outcome measure was the change in the Self Compassion Scale (SCS) total score, where the German version was used (Hupfeld and Ruffieux 2011; Neff 2003). The SCS is a well-validated, multidimensional measurement instrument that captures self-compassion by means of 26 items on a five-point Likert scale. Mean scores range from 1 to 5 with higher scores indicating greater self-compassion. Categories include self-kindness, self-judgment, common humanity, isolation, mindfulness, and over-identification which are summarized to a SCS total score. The internal consistency (Cronbach's α) of the total score was reported as .92. In correspondence to López et al. (2015), two subscales, namely self-compassion and self-criticism, were created.

Secondary outcomes included the summary scores of the mental and physical component scales from the Medical Outcomes Study 36 Item Short-Form Health Survey in

German language (SF-36) (Bullinger 1995; McHorney et al. 1993; Ware et al. 1994). The Medical Outcomes Study 36 Item Short-Form Health Survey covers eight sub-dimensions: physical function, physical role, bodily pain, general health, vitality, social functioning, emotional role, and mental health with different response formats. The subscales are summarized into a physical and a mental component. The scores range from 0 to 100, with higher scores indicating better health status; Cronbach's α was reported as > .90.

Furthermore we applied the Brief Symptom Inventory (BSI 18) in German version (Derogatis 2001; Franke 2000; Spitzer et al. 2011). Secondary outcomes included the Global Severity Index (GSI) of psychiatric symptoms. The GSI of the BSI-18 captures psychiatric symptoms in three dimensions (somatization, depression, and anxiety) for the preceding 7 days which is assessed by means of 18 items. The BSI 18 is a short version of the highly established Symptom Checklist SCL-90-R (Derogatis 1994). GSI: The BSI 18 includes a five-point rating form ranging from 0 (absolutely not) to 4 (very strong). Mean scores range from 0 to 24 with higher scores indicating greater symptom burden. Cronbach's α was observed to be > .80 for GSI.

Lastly, the subjective amount of happiness was captured by means of a single item, ranging from 1 to 10, with higher scores indicating a greater feeling of happiness; in addition, nicotine use (frequency in participants and the daily amount of tobacco consumed) and the body mass index (BMI) were assessed. All measurements were based on self-report.

Data Analysis

Data analysis was done with SPSS Vol. 25. We conducted the analysis including only participants that actually completed the 6 weeks evaluation (200 participants in total). Between-group and within-group changes in outcomes at 6 weeks were analyzed using ANOVA for repeated measures. Post-hoc testing was done via pair wise comparisons. A Bonferroni correction for multiple testing was applied. Due to the explorative character of the study the α-level was set to .05.

Results

A total of 271 incoming inpatients were screened by an independent psychiatrist at the Promente Rehabilitation Centre Sonnenpark based on the given inclusion criteria. However, 22 participants declined to participate in the study and we lost 49 participants because they broke off rehabilitation before the 6-week evaluation. Finally, 200 inpatients in total, of whom 114 were assigned to the intervention group and 86 were assigned to the control group, were included in the per-protocol analysis (Fig. 1). Unfortunately, no information about the reasons why a patient broke off rehabilitation can be given as participants were not committed to specify their reasons.

Nevertheless, there was no patient that continued rehabilitation but decided to drop out of the study.

Baseline Characteristics of the Participants

All captured variables of the 200 participants after randomization are displayed in Table 1. All baseline characteristics, except two diagnoses, were well balanced between the groups. The most common diagnosis of the participants was primarily mood disorders, although a broad range of other diagnoses were maintained within the study population (Table 1). The participants were diagnosed according to the International Classification of Diseases (ICD-10, WHO 1992, Chapter F) and the medication was given at the rehabilitation center after psychiatric screening. The most commonly diagnosed group of ailments, recorded in 116 (58%) participants, were affective disorders (ICD-10: F30-F39), followed by neurotic, stress-related and somatoform disorders (ICD-10: F40-F48) which was observed in 35 (17.5%) participants. A total of 157 (78.5%) participants exhibited a comorbid (two or more) disorder. Participants who had been diagnosed for disordered substance use had to sign an abstinence contract and were tested regularly on alcohol and drug use. The BMI of the participants (M = 23.43, SD = 5.23) deviates slightly from the normal population (Nie et al. 2017) ($p < .01$).
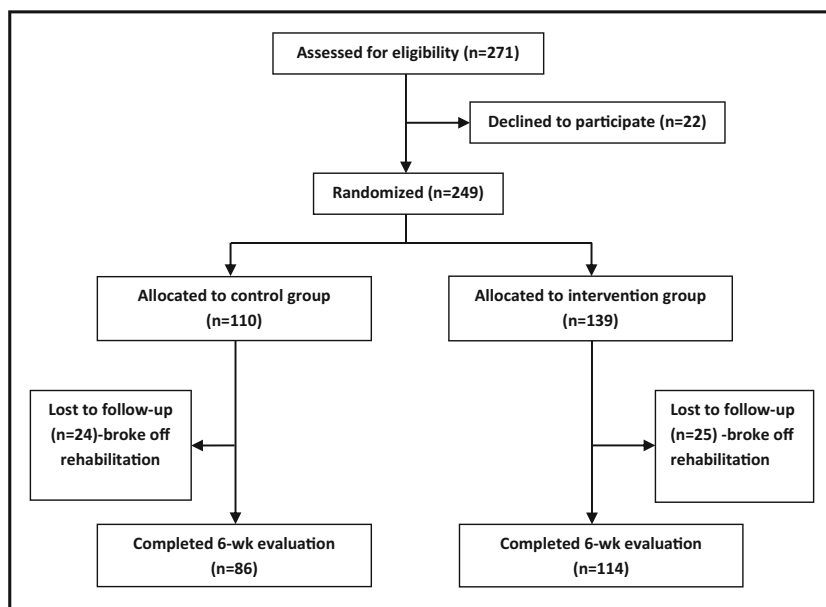
Changes in Outcome Variables

Changes in Primary Outcomes At week 6, there was a significant difference concerning the MSC and the PMR group in SCS total score. ($F_{(1,198)} = 25.57$, $p < .01$, $\eta^2 = 0.11$)). The MSC group showed a significant improvement in SCS total score (M = 2.90, SD = 0.5, $p < .01$) in comparison to the PMR group (M = 2.57, SD = 0.6, $p > .05$). Regarding the generated subscales "self-compassion" and "self-criticism," there were also significant differences detected as shown in Table 1.

Changes in Secondary Outcomes There was a significant difference detected concerning subjective feeling of happiness at week 6 ($F_{(1,198)} = 6.28$, $p < .05$, $\eta^2 = 0.03$)). The MSC group showed greater improvement in subjective feeling of happiness (M = 5.51, SD = 2.2, $p < .01$) than the PMR group (M = 4.95, SD = 2.3, $p < .01$), although both groups rose in their subjective feeling of happiness over time ($p < .01$). There was no significant between-group difference at week 6 concerning mental and physical components, GSI, or nicotine use (Table 1).

Changes in Further Outcome Measures Analysis of within group-differences showed a significant improvement in all primary and secondary outcomes for both study groups over time (Fig. 2). We observed several relevant differences in the frequency and the duration of the additional practice. Overall

Fig. 1 Screening, randomization and completion of 6-week evaluation

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                    │ Assessed for eligibility (n=271) │
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        │ Allocated to control  │   │ Allocated to intervention │
        │    group (n=110)      │   │     group (n=139)         │
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  │ Lost to follow-up │◀─────       ─────▶│ Lost to follow-up │
  │ (n=24)-broke off  │              │ (n=25) -broke off │
  │  rehabilitation   │              │  rehabilitation   │
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  ┌──────────────────────┐        ┌──────────────────────┐
  │ Completed 6-wk eval.  │        │ Completed 6-wk eval.  │
  │       (n=86)          │        │       (n=114)         │
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study groups, a total of 149 (74.5%) participants stated to practice in addition to the intervention time. 92 (80.7%) participants in the MSC group reported additional practice, whereas only 57 (66.3%) participants from the PMR group admitted to practice in addition to the usual intervention time ($\chi^2 = 5.37$; $p < .05$).

Regarding the frequency of practice, there were significant differences between the groups detected ($\chi^2 = 13.63$; $p < .01$). Whereas 21.1% of the participants from the MSC group (M = 2.25; SD = 1.39) stated to practice daily, only 5.8% from the PMR group (M = 1.56; SD = 1.33) reported to do so. Concerning the duration of the additional practice, the differences between the MSC group (M = 1.34; SD = 0.91) and the PMR group (M = 1.41; SD = 1.19) were significant ($\chi^2 = 18.42$, $p < .01$). Concerning the mode of practice, there was no difference between the groups detected ($\chi^2 = 5.51$; $p > .05$). A total of 120 (60.0%) participants practiced in an informal way (any time when needed) and 29 (14.5%) participants practiced in a formal (same time/place) way. Within the study groups, 75 (65.8%) participants in the MSC group and 45 (52.3%) participants in the PMR group stated to practice in an informal way, while 17 (14.9%) participants in the MSC group and 12 (14.0%) participants in the PMR group practiced in a ritualized way.

Regarding the trust in the teacher, there were no differences between the groups detected ($t(198) = 0.81$; $p > .05$). The overall mean for both study groups was M = 7.14 (SD = 3.15). Within the groups, there was a mean of M = 6.98 (SD = 2.97) for the MSC group and M = 7.35 (SD = 3.39) for the PMR group with regard to the trust in the respective trainer. Concerning the favor for the practice, there were significant differences between the groups detected ($t(198) = -3.18$; $p < .01$). There was an overall mean of M = 6.69 (SD = 3.14) detected for the study groups. In the MSC group, the mean for favor for the practice was M = 7.18

(SD = 2.77) and for the PMR group, there was a mean of M = 5.79 (SD = 3.42) detected.

Discussion

In this study, our intention was to test the effectiveness of an abridged version of the original MSC training developed by Neff and Germer (2013) in comparison with PMR in a psychiatric rehabilitation center. This study represents an attempt to employ MSC in the context of a naturalistic setting of in-patient rehabilitation treatment. In correspondence to this, in previous research MSC training was shown to be especially effective in bringing relief to healthy people who suffer from steady ruminations and acting harsh towards themselves (Longe et al. 2010; Raes 2010). Not surprisingly, the short-ened MSC training led to an enhanced amount of self-compassion in the MSC group in comparison to the PMR group after 6 weeks of training but not compared with the general population after usually 8 weeks of MSC training (Neff and Germer 2013). With respect to this, the MSC group stated increased feelings of happiness at week 6. Nevertheless, both groups exhibited more self-compassion and more subjective felt happiness after 6 weeks rehabilitation stay.

In contrast to our assumptions, we detected no significant differences between the study groups in regard to the change in GSI as well as in the mental and physical components of the SF-36, or in nicotine use. Therefore, both groups improved significantly to the same extent from pre- to post-treatment after 6 weeks, as they exhibited less psychiatric symptom burden and improved scores in mental as well as physical components and a reduced number of cigarettes per day. When further compared with the general population, GSI

Table 1 Characteristics of the Study Participants

Variable	MSC $n = 114$	PMR $n = 86$	Norm-population	F/t/χ^2	p
Sociodemographic Data					
Age M(SD)	47.9 (8.3)	49.0 (8.9)		0.87	>.05
Female sex f(%)	71 (62.3%)	58 (67.4%)		0.57	>.05
Standing in profession/working f(%)	59 (51.8%)	36 (41.9%)		1.92	>.05
High school or higher education f(%)	57 (50.0%)	42 (48.9%)		0.03	>.05
In relationship/married f(%)	69 (60.5%)	51 (60.5%)		0.00	>.05
Children f(%)	75 (65.8%)	64 (74.4%)		1.72	>.05
Religious affiliation f(%)	81 (70.3%)	59 (68.7%)		0.14	>.05
Previous experiences					>.05
Previous experience with mindfulness techniques f(%)	54 (47.4%)	43 (50.0%)		0.14	>.05
Previous experience with relaxation techniques f(%)	48 (42.1%)	27 (31.4%)		1.33	>.05
Frequency of already known practice M(SD) $1 \leq$ once/month, $2 =$ twice/month, $3 =$ weekly, $4 =$ multiple times/week, $5 =$ daily*	1.56 (1.92)	1.56 (1.80)		4.20	>.05
Duration of already known practice M(SD) $1 \leq 3$ months, $2 \geq 3$ months, $3 = 6$ months, $4 = 1$ year, $5 = 2$ years, $6 = 3$ years, $7 = 5$ years, $8 \geq 5$ years**	2.83 (2.98)	2.86 (3.14)		2.98	>.05
Health-related variables					
BMI M(SD) compared with normal population	23.46 (5.1)	23.40 (5.4)	25.71	−6.13	<.01
No. of participants smoking f(%)/amount of cigarettes per day M(SD)	49 (43.0%) / 6.8 (9.1)	38 (44.2%) / 7.9 (10.9)		0.03	>.05
Alcohol f(%)	29 (25.4%)	27 (31.4%)		0.86	>.05
Drugs f(%)	2 (1.8%)	1 (1.2%)		0.12	>.05
(ICD-10) Diagnosis f(%) #					
F00-F09 organic, including symptomatic, mental disorders	0	3 (3.5%)		4.04	<.05
F10-F19 mental and behavioral disorders due to psychoactive substances	28 (24.6%)	34 (39.5%)		5.14	<.05
F20-F29 Schizophrenia, schizotypal, and delusional disorders	2 (1.8%)	4 (4.7%)		1.41	>.05
F30-F39 Affective disorders	86 (75.4%)	66 (76.7%)		0.05	>.05
F40-F48 Neurotic, stress-related, and somatoform disorders	62 (54.4%)	51 (59.3%)		0.48	>.05
F50-F59 behavioral syndromes associated with physiological disturbances and physical factors	2 (1.8%)	4 (4.7%)		1.41	>.05
F60-F69 personality and behavioral disorders	12 (10.5%)	16 (18.6%)		2.66	>.05
Z73.0 Burn out	29 (25.4%)	13 (15.1%)		3.15	>.05
Medication f(%)					
Anticonvulsants	10 (8.8%)	13 (15.1%)		1.94	>.05
Antidepressants	100 (87.7%)	74 (86.0%)		0.12	>.05
Muscle relaxants	5 (4.4%)	1 (1.2%)		1.75	>.05
Benzodiazepines	18 (15.8%)	11 (12.8%)		0.36	>.05
Antipsychotics	36 (31.6%)	27 (31.4%)		0.00	>.05
Anxiolytics	21 (18.4%)	16 (18.6%)		0.00	>.05
Hypnotics	19 (16.7%)	12 (14.0%)		0.28	>.05
Antiepileptics	4 (3.5%)	5 (5.8%)		0.61	>.05
Analgesics	26 (22.8%)	22 (25.6%)		0.21	>.05
Homeopathics	10 (8.8%)	5 (5.8%)		0.62	>.05
Baseline characteristics of outcome variables					
SCS total M(SD)	2.55 (0.6)	2.57 (0.5)		0.30	>.05
Self-compassion/	2.61 (0.7)	2.56 (0.6)		0.29	>.05
Self-criticism/	3.50 (0.7)	3.40 (0.7)		1.19	>.05
SF-36 Physical component scale M(SD)	43.91 (9.7)	44.22 (9.5)		0.23	>.05
SF-36 Mental component scale M(SD)	31.04 (10.9)	31.09 (10.6)		0.03	>.05

Table 1 (continued)

Variable	MSC $n = 114$	PMR $n = 86$	Norm-population	F/t/χ^2	p
GSI M(SD)	4.96 (2.6)	5.21 (2.4)		0.70	> .05
Subjective feeling of happiness M(SD)	3.70 (2.1)	3.91 (2.0)		0.67	> .05
Characteristics of outcome variables after 6 weeks					
SCS total M(SD)	2.90 (0.5)	2.57 (0.6)	3.47 (0.79)	25.57	< .01
Self-compassion/	3.03 (0.6)	2.86 (0.7)		14.46	< .01
Self-criticism/	3.02 (0.6)	3.30 (0.8)		22.04	< .01
SF-36 Physical component scale M(SD)	46.21 (9.2)	46.41 (9.2)	45.2 (10.9)	0.00	> .05
SF-36 Mental component scale M(SD)	37.72 (11.5)	37.80 (12.7)	49.7 (11.2)	0.00	> .05
GSI M(SD)	3.80 (2.6)	4.05 (2.9)	3.87 (4.64)	0.00	> .05
Subjective feeling of happiness M(SD)	5.51 (2.2)	4.95 (2.3)		6.28	< .05

M, mean; SD, standard deviation, *f*, frequency, *Participants were asked how often they practice a possibly already known mindfulness or relaxation technique, **Participants were asked for how long they already practice a possibly already known mindfulness or relaxation technique, # ICD-10 diagnosis were assessed through the treating psychiatrist of the Sonnenpark clinic, / Calculation done in correspondence to López et al. 2015

values did not differ significantly after 6 weeks of treatment (Derogatis 2001, $p > .05$, ns.). In addition, the physical component of the SF-36 was increased ($p < .05$) in both groups at week 6 compared with the general population ($p > .05$.). However, the mental component score of the SF-36 was still decreased ($p < .05$) compared with the normal population at week 6 (Ware et al. 1994).

It could be argued, that given the very huge amount of treatment as usual that was identical for participants from both groups (75 min per week vs. probably more than 30 h of other treatment) an assumption to find differences in GSI as well as in SF-36 seems probably rather ambitious. Therefore, differential effects in the groups, if they exist at all, can be expected to be very small and rather impossible to find with the current sample size and the shortened MSC program. In contrast to the literature this study did not find an effect of the improved self-compassion on psychopathology. One explanation that should be taken into account is that this study does not report a long-term follow-up and that effects might have developed later on.

Limitations and Future Research

Overall the generalizability of our findings contains some important limitations due to reasons of clinical practicality. An important limitation of the current study is that randomization was not possible. Due to the fact that the Sonnenpark clinic has a strict treatment schedule which is planned precisely, group allocation had to be done for whole incoming groups instead of for every single patient. Reasons of practicality in a clinical context led to the necessary adaptations of the study design; otherwise, an investigation would have not been possible. This fact might limit the reliability of the current findings.

We observed an increased amount of additional practice in the MSC in comparison with the PMR group. This circumstance might have had a tremendous impact on our findings, as previous research on this topic has already suggested a positive association between the duration and the number of repetitions of a regular meditation basis and various parameters of psychological well-being (Baer et al. 2012).

Moreover, a social component could be more pronounced in the MSC group than in the PMR group, as the MSC program provides plenty of interpersonal exercises. In line with the literature, these positive experiences of social bonding as being a member of a peer group can foster psychological well-being in a significant way (Cohen 2004; Lee and Robbins 1998). Notably, positive associations between self-compassion and happiness have already been reported in Buddhist religious practices (Rāhula 1974; Salzberg and Kabat-Zinn 2004).

Due to various reasons, the intervention had to be applied in an abridged form in clinical practice. In its original version, the MSC program is designed for 8 weeks' duration with 150 min training per session. The inpatient stay at the Sonnenpark clinic, however, lasts only 6 weeks and due to limits of practicality for the participants, the duration of each session was shortened to 75 min. This fact limits the generalizability of our findings substantially, as we cannot say anything about whether the original MSC program (containing a higher dose of MSC treatment) might have led to more convincing results or not.

Another limitation of this study is that we neglected to record adverse events in the participants' life. The use of a standard adverse-event case report, comparable to similar studies, might have given us more detailed information about the developmental process of each patient (Keller et al. 2000; Wang et al. 2010). Furthermore, we were unfortunately unable to assess the reasons for breaking off rehabilitation, as well as the reason why participants declined to participate in the study.
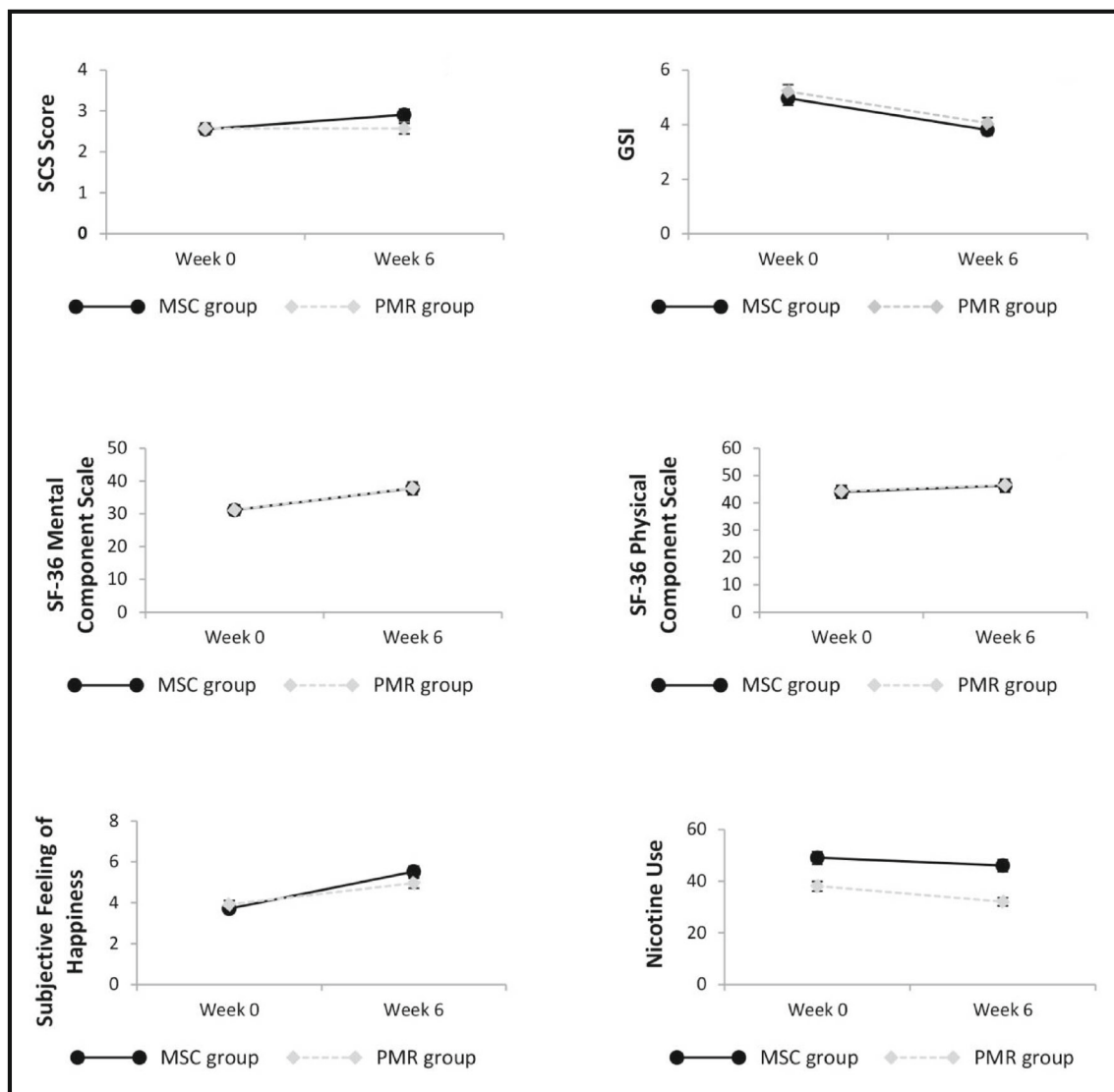
Fig. 2 Within-group changes in primary and secondary outcomes. Results of ANOVA for repeated measures. Notes. SCS: $F(1,198) = 19.65$, $p < .01$, $\eta^2 = .17$, GSI: $F(1,198) = 28.49$, $p < .01$, $\eta^2 = .22$; SF-36 Mental Component Scale: $F(1,198) = 33.04$, $p < .01$, $\eta^2 = .25$; SF-36 Physical Component Scale: $F(1,198) = 10.49$, p < .01, $\eta^2 = .10$; Subjective Feeling of Happiness: $F(1,198) = 44.22$, $p < .01$, $\eta^2 = .31$.; nicotine use (number of participants): $F(1,198) = 12.75$, $p < .01$, $\eta^2 = .11$. The values shown are unadjusted means; I bars indicate 95% confidence intervals

There was a significant between-group difference with regard to the diagnosis of organic, including symptomatic, mental disorders (ICD-10: F00-F09), since there were only three participants in total carrying this feature allocated to the PMR group and none to the MSC group. Another between-group difference was the distribution of the diagnosis of mental and behavioral disorders due to psychoactive substances (ICD-10: F10-F19) as there were more participants with this diagnosis in the PMR group than in the MSC group. Because the allocation to the study groups was done in a randomized way, unfortunate coincidences were likely to occur. This circumstance might limit the generalizability of the current findings slightly but as ability to consent was given for all participating participants, this fact seems to be negligible.

For further research, actual alcohol/drug consumption and self-injury might also be interesting variables which could give more information about the patient's attitude towards health and self-care in general. Furthermore, it could be helpful to keep a record of changes in medication from previous pharmacological treatment to treatment proposed and given at the rehabilitation clinic. A change in medication might have had a tremendous impact on our psychological measures. Furthermore, all psychometric assessment in our study was based on self-report measures and comparisons to the general population were made due to the corresponding American samples. The results of the general population relate to the American original and an American population. Comparisons of the Austrian population using German language should therefore be made with extreme caution.

In further research, the additional use of semi-structured interviews might facilitate enhanced knowledge concerning the clinical applicability of a shortened MSC program. At this point, what we know from personal statements of some members of the MSC group is that they were mostly enthusiastic about the shortened MSC intervention. This appreciation seems to be only partly reflected in the scores of the quantitative measures. It was already mentioned in previous studies that when a control intervention is used, it is important that the investigator makes certain that the social interactions between the group and teachers, amount of home exercise, physical exercise and psycho-education should be comparable (Tang et al. 2015). Those issues were mostly covered by the study design, although the MSC group possibly concentrated more on their mind while the PMR group concentrated more on their body. Nevertheless, both groups had social interaction with the trainer, were encouraged to practice outside the intervention time, and received psycho-education.

Furthermore, both interventions took place in the same room and at the same time and both groups were provided with handouts and audio-CDs with relaxation music and exercises spoken by the respective trainer. However, previous studies already used relaxation training as an active control condition in comparison to meditation training (Jain et al. 2007; Tang et al. 2007; Tang et al. 2009). Therefore, the choice to use PMR as a control intervention seemed acceptable, although it is notable that there is a certain difference concerning the MSC intervention and the PMR control intervention which lies in the nature of the respective practices. Whereas MSC sessions are based on each other, revealing more complex strategies to gain self-compassion over time, PMR sessions are always the same, leading to a natural trainings effect.

In a previous study where the efficacy of integrative body mind training was tested against muscle relaxation, the authors claimed that while integrative body mind training addresses more facets of mindfulness meditation like relaxation, breathing adjustment, mental imagery and mindfulness training in general, the training of PMR has its focus solely on relaxation (Tang et al. 2007). Therefore, it can be assumed that the training of MSC contains more components than the training of PMR which might be a fact that should be kept in mind for future studies. It might lead to more convincing results if the control intervention is some sort of fake meditation (e.g., placebo meditation) intervention like in previous research where the control group received meditation training without proper meditation instructions (Zeidan et al. 2010). With regard to this, an extraction of the effects only attributable to the meditation training would therefore be best.

In conclusion, our preliminary findings generally suggest a further examination of the clinical applicability of a shortened MSC program for psychiatric inpatients, as we did not detect any differences either in physical or mental components or in psychiatric symptoms between the MSC and the PMR group. Additionally, there is some small evidence that participants who were in the MSC group cared for themselves more compassionately and were feeling happier after their rehabilitation stay. This appraisal gets further confirmation by the vast amount of literature demonstrating the important role mindfulness-based techniques play in patient treatment (Barnett and Shale 2012; Burstein et al. 1999; Van Dam et al. 2011). Future research might focus on the further validation of these initial, quite promising findings, in particular by employing bigger samples.

Compliance with Ethical Standards

Informed Consent Informed consent was obtained from all individual participants included in the study. The study protocol was approved by the institutional review board of the Medical University Graz in compliance with the current revision of the Declaration of Helsinki, ICG guideline for Good Clinical Practice and current regulations (EK-number: 28-019 ex 15/16) and is registered at clinicaltrials.gov (Identifiers: NCT02578433, Unique Protocol ID: ECS 1392/2015, brief title: Mindful Self Compassion in Rehabilitation Inpatients). Furthermore, the study was approved by the review board of the "Land Burgenland."

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