

# Effects of a Mindful Self-Compassion Intervention on Emotion Regulation in Psychiatric Rehabilitation: A Randomized Controlled Trial

Andrea Andorfer<sup>a,b</sup> Michaela Hiebler<sup>b</sup> Hugo Senra<sup>c,d</sup> Johannes Peter<sup>e</sup>  
Sabina Kraler<sup>f</sup> Paul Kaufmann<sup>g</sup> Ewald Pollheimer<sup>g</sup> Christoph Spah<sup>g</sup>  
Adelheid Kresse<sup>h</sup> Hans-Peter Kapfhammer<sup>a</sup>  
Human-Friedrich Unterrainer<sup>a, b, e, i</sup>

<sup>a</sup>Department of Psychiatry and Psychotherapeutic Medicine, Medical University of Graz, Graz, Austria;

<sup>b</sup>Addiction Research Hub (ARH), Grüner Kreis Ltd., Vienna, Austria; <sup>c</sup>Institute of Electronics and Informatics Engineering of Aveiro (IEETA), University of Aveiro, Aveiro, Portugal; <sup>d</sup>School of Health and Social Care, University of Essex, Colchester, UK; <sup>e</sup>Faculty of Psychotherapy Science, Sigmund Freud University, Vienna, Austria; <sup>f</sup>Research Institute for Developmental Medicine, Johannes Kepler University, Linz, Austria; <sup>g</sup>Pro Mente Reha, Sonnenpark Neusiedlersee, Rust, Austria; <sup>h</sup>Institute for Pathophysiology and Immunology, Medical University of Graz, Graz, Austria; <sup>i</sup>Department of Religious Studies, University of Vienna, Vienna, Austria

## Keywords

Mindful self-compassion · Emotion regulation · Psychiatric rehabilitation · Randomized controlled trial

## Abstract

**Introduction:** Emotion regulation (ER) is essential for psychological functioning and daily life. Deficits in ER are associated with various psychiatric disorders and are important targets for therapeutic interventions. Self-compassion, the practice of responding to one's own suffering with kindness, has been proposed to support adaptive ER. This study examined changes during a 6-week psychiatric inpatient rehabilitation program to evaluate the effects of a mindfulness- and self-compassion-based intervention on ER. **Methods:** In a randomized controlled trial, 168 psychiatric inpatients were allocated to either a Mindful Self-Compassion (MSC) intervention group ( $n = 95$ )

or an active control group receiving Progressive Muscle Relaxation (PMR;  $n = 73$ ). Participants completed assessments at baseline and post-treatment, including the Self-Compassion Scale (SCS), the Emotion Regulation Questionnaire (ERQ), and the Positive and Negative Affect Schedule (PANAS). At post-treatment, the Reappraisal Inventiveness Test (RIT) was additionally administered. Data were analyzed using mixed-design ANOVAs and independent  $t$  tests. **Results:** Both MSC and PMR groups showed significant increases in self-compassion, positive affect, and self-reported cognitive reappraisal. No significant changes were observed in expressive suppression, and no between-group differences were found for reappraisal inventiveness as measured by the RIT. **Conclusions:** Participation in either intervention was associated with enhanced use of cognitive reappraisal, suggesting that both MSC and PMR may foster adaptive ER in psychiatric rehabilitation. Further research is warranted

to clarify the specific mechanisms and potential long-term benefits of mindful self-compassion interventions in clinical populations.

© 2025 The Author(s).  
Published by S. Karger AG, Basel

## Introduction

Emotion regulation (ER) refers to the capacity to modulate emotional experiences in terms of intensity, duration, and expression. It has become a central focus in psychotherapy as emotional dysregulation is implicated in a range of psychiatric disorders [1]. Gross's process model of ER [2] delineates five strategies, categorized into antecedent-focused and response-focused mechanisms. Antecedent-focused strategies, situation selection, situation modification, attention deployment, and cognitive change are employed before emotional responses are fully generated. Response-focused strategies, such as response modulation, occur after emotional responses have been initiated [2, 3].

To operationalize these concepts, Gross and John [4] concentrated on cognitive reappraisal and expressive suppression – two strategies frequently used in daily life, experimentally accessible, and representative of the two broader categories. Reappraisal, a cognitive change strategy, involves altering the interpretation of an emotion-eliciting situation to attenuate its emotional impact. Its use is associated with increased experience and expression of positive emotions and reduced negative affect. In contrast, expressive suppression, a form of response modulation, entails inhibiting outward emotional expressions. Suppression is linked to decreased positive emotional experience and expression, as well as heightened negative emotional experience. However, it does not significantly impact the outward expression of negative emotions, suggesting that suppression may be externally effective while internally costly [4].

Self-compassion, being kind toward oneself in times of suffering [5], showed promising effects on ER as highlighted in previous research. For instance, self-compassionate individuals tend to employ adaptive ER strategies, such as acceptance [6, 7]. Furthermore, a study employing self-compassion mood induction demonstrated that higher self-compassion levels correlate with increased positive affect and reduced negative affect [5, 8, 9]. Similarly, Finlay-Jones [10] points out a positive connection between self-compassion and the capacity to deal with challenging situations in a more compassionate way, increasing positive affect and decreasing negative affect. Hence, self-compassion may foster psychological

well-being by promoting ER strategies like self-soothing, reappraisal, and acceptance [10, 11]. Furthermore, increased self-compassion is associated with less avoidance of negative emotions [12] and less avoidance of emotions in general [7, 13], as well as reduced negative thinking [14].

In this paper, we seek to expand the knowledge about the effect of a mindfulness- and self-compassionate-based training, namely, Mindful Self-Compassion (MSC) program on ER in clinical populations. The original MSC program is an 8-week program by Neff and Germer [13], which aims to foster self-compassion in healthy individuals. Besides being kind toward oneself when suffering, self-compassion also encourages to recognize suffering and failing as part of being human and being aware of the experience in the present moment [15, 16]. Additionally, the MSC program includes managing difficult emotions and relationships [5, 13]. Drawing on this background, we hypothesized that MSC program has a positive effect on adaptive ER parameters and that this effect would be stronger in MSC compared to Progressive Muscle Relaxation (PMR) [17, 18], a well-established relaxation technique.

## Methods

### *Procedure and Participants*

The present study was conducted at a rehabilitation clinic specializing in the treatment of anxiety, depression, and burnout. Given the 6-week rehabilitation interval, the original 8-week MSC program [13] was modified to fit the 6-week format. Preliminary findings indicate that the adapted 6-week MSC program yields beneficial effects in the inpatient psychiatric rehabilitation facility, leading to improvements in self-compassion, happiness, and quality of life [19]. Furthermore, a previous study, conducted at the same rehabilitation facility, reported that the adapted 6-week MSC program was associated with positive changes in psychophysiological stress responses among psychiatric inpatients [20].

The recruitment phase of the randomized controlled trial took place from September 2020 to August 2021 (same duration as the initial study aiming to a similar sample size [19] and included two study arms: MSC (intervention group) and PMR (active control group). Patients were randomly assigned to one of these groups using a permuted block design on a computer, stratified by sex, age, and primary psychiatric diagnosis. Due to the nature of the MSC and PMR sessions, there was no

blinding of participants or trainers. Throughout the 6-week inpatient psychiatric rehabilitation program at the Sonnenpark Neusiedlersee clinic in Austria, patients remained in their assigned group. Apart from the group-specific sessions (MSC vs. PMR), all participants received the same standard multidisciplinary treatment program, which included medical care, occupational therapy, physiotherapy, as well as individual and group psychotherapy by the staff of the rehabilitation clinic.

Eligibility criteria required patients to: (a) be over 18 years of age, (b) have a psychiatric diagnosis according to ICD-10, (c) be fluent in German, and (d) provide informed consent. Exclusion criteria, as defined by the rehabilitation clinic, included: (a) acute psychosis, (b) active substance use disorder, or (c) acute suicidal tendencies. Additionally, patients were excluded if they discontinued the rehabilitation stay before completing the 6-week treatment cycle. Self-reported measures were collected at baseline (start of treatment) and again at the end of the 6-week treatment (end of treatment). The CONSORT checklist can be found in the online supplementary material (for all online suppl. material, see <https://doi.org/10.1159/000548902>).

### Intervention

During each 6-week treatment cycle, the MSC and PMR groups were conducted in parallel, with one session per week lasting 75 min. MSC sessions were led by a male MSC-certified teacher. The MSC program, as developed by Neff and Germer [13, 21], is originally structured as a group-based intervention that emphasizes on fostering self-compassion. Delivered over 8 weekly sessions, each lasting approximately 2.5 h, and one half-day meditation retreat, the MSC program integrates teaching didactic topics, formal (e.g., guided meditation) and informal self-compassion practice, as well as inquiry. To accommodate the 6-week inpatient rehabilitation program, the original MSC protocol [13] was adapted by two MSC-certified teachers [22] prior to the initial study [19]. While some parts of the adapted MSC program, such as the inquiry, are drawn directly from the original 8-week MSC program, other elements were adjusted to meet the needs of psychiatric inpatients and to fit in the clinical setting. Each session includes a second meditation or exercise, which differs in its structure and build-up process. The theoretical input is variably integrated, depending on the specific focus of the session [22]. A detailed description of the 6-week program and its comparison to the original program is given in the initial study [19]. Figure 1 provides an overview of the session content for both the original and the adapted MSC

programs. PMR sessions were conducted by a male clinical psychologist trained in this relaxation technique [17, 18].

### Measures

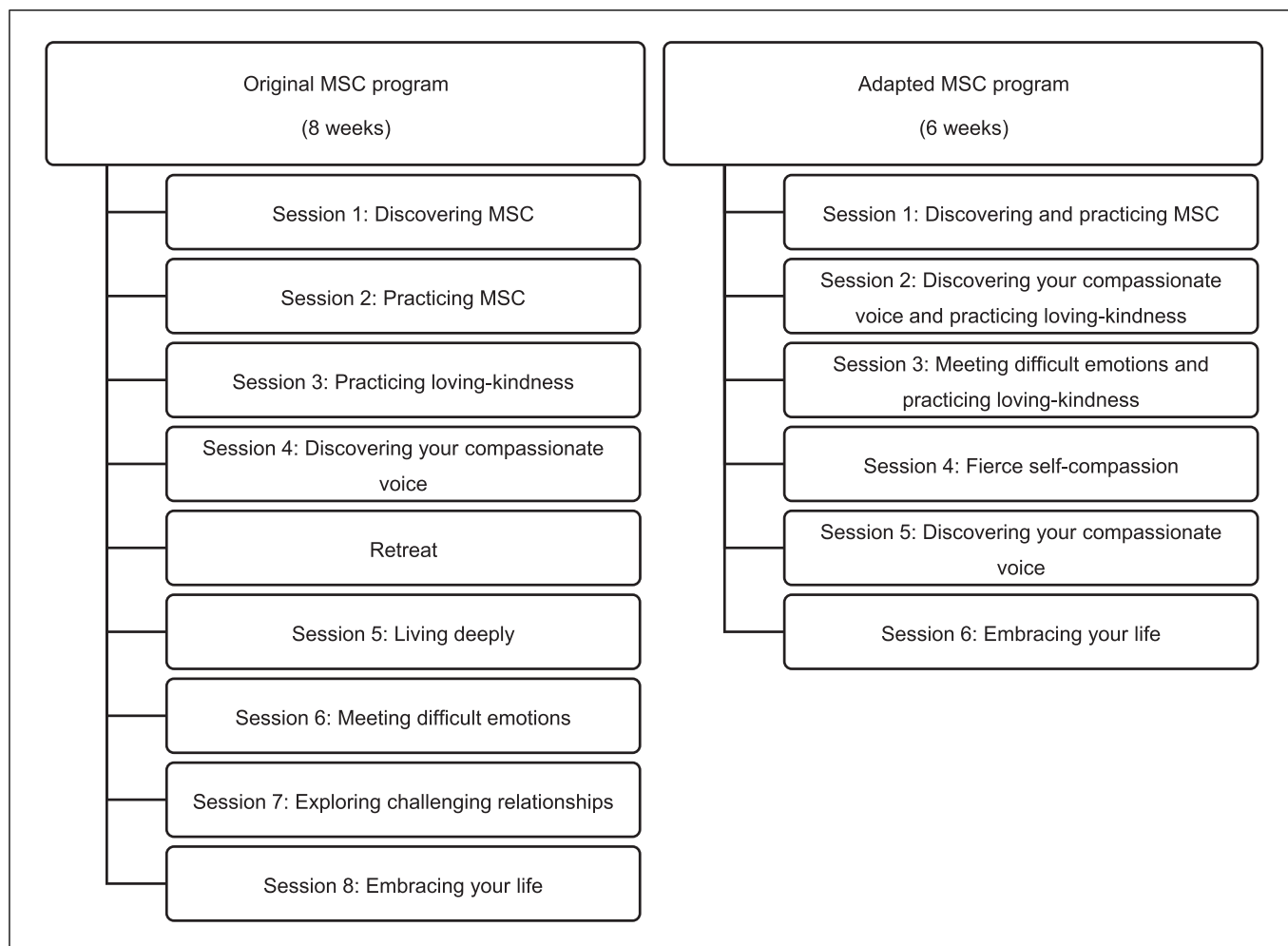
In this paper, we focus exclusively on measures related to ER and self-compassion. Results pertaining to other outcomes have been previously published [20]. A sociodemographic questionnaire was used to collect information on demographic characteristics (e.g., age, sex, education, employment), health-related factors (e.g., psychiatric diagnoses, medications), and prior experiences with meditation, mindfulness, and yoga.

The Self-Compassion Scale (SCS) [23, 24] assesses self-compassion using 26 items rated on a five-point Likert scale (1 = *almost never* to 5 = *almost always*). It comprises six subscales: Self-Kindness, Self-Judgment, Common Humanity, Isolation, Mindfulness, and Over-Identification.

The Positive and Negative Affect Schedule (PANAS) [25–27] measures positive affect (PA) and negative affect (NA) through 20 items on a five-point Likert scale (1 = *very slightly or not at all* to 5 = *extremely*). PA reflects the degree of enthusiasm, activity, and alertness, while NA indicates the level of distress or unpleasurable engagement.

The Emotion Regulation Questionnaire (ERQ) [4, 28] assesses two ER strategies: cognitive reappraisal and expressive suppression. It consists of 10 items rated on a seven-point Likert scale (1 = *strongly disagree* to 7 = *strongly agree*). Cognitive reappraisal is an antecedent-focused strategy involving reinterpretation of a situation to alter its emotional impact. Expressive suppression is a response-focused strategy that involves inhibiting outward signs of emotion [4].

Additionally, a modified version of the Reappraisal Inventiveness Test (RIT) [29–32] was administered at the end of treatment. It includes four anger-evoking vignettes, which were pre-tested to closely match the original format [30–32]. Participants were instructed to generate as many different reappraisals as possible to reduce or prevent anger [31, 32]. Two scores were derived: RIT fluency (total number of reappraisals generated) and RIT flexibility (number of categorically distinct reappraisals). After completing all four vignettes, participants rated how strongly each scenario would provoke anger in real life on a seven-point Likert scale (0 = *not angry at all* to 6 = *extremely angry*). RIT fluency and RIT flexibility were independently rated by two raters, with inter-rater reliabilities of ICC = 0.94 for RIT fluency and ICC = 0.95 for RIT flexibility.



**Fig. 1.** Original and adapted content for each of the sessions in the MSC program. MSC, Mindful Self-Compassion, original manual based on Germer and Neff [13, 21], adapted by Pollheimer and Kaufmann [22].

### Statistical Analysis

Data analyses were conducted using IBM SPSS Statistics, version 29. Only patients who participated at both time points (baseline and end of treatment) were included in the analyses as the focus was on changes over time and reappraisal inventiveness was assessed only at the end of treatment. Chi-square tests were used to compare nominal variables between the MSC and PMR groups at baseline, while independent-samples *t* tests were applied for continuous variables. To examine within-group and between-group differences in self-compassion, affect, and ER variables, mixed-design analyses of variance were performed. Since reappraisal inventiveness was assessed only at the end of treatment, group comparisons for this variable were conducted

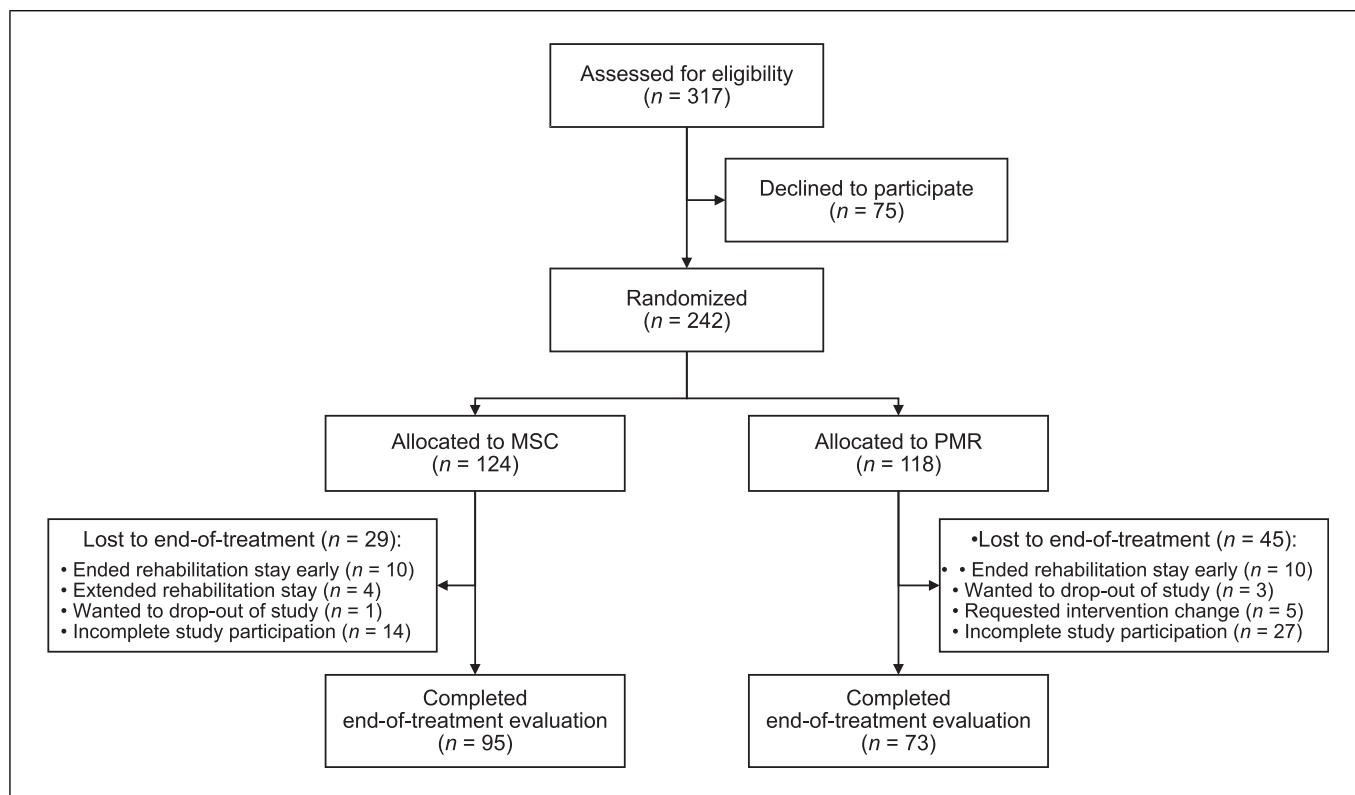
using *t* tests. For all analyses, the significance level ( $\alpha$ ) was set at 0.001 (two-tailed) to avoid alpha-error-accumulation.

### Results

#### Characteristics of Participants at Baseline

After exclusion, 168 patients were included in the analysis (MSC:  $n = 95$ ; PMR:  $n = 73$ ). Participant flow is detailed in Figure 2.

All baseline characteristics were balanced between the MSC and PMR groups, although there were tendencies. First, for the diagnosis of burnout ( $p = 0.005$ , ns after alpha-error correction), 11.6% of participants were diagnosed in the MSC group and 28.8% diagnosed in the



**Fig. 2.** Participant flow in the RCT. MSC, Mindful Self-Compassion; PMR, Progressive Muscle Relaxation.

PMR group. Second for education level, more participants in the PMR group (69.9%) had completed high school or higher education than in the MSC group (53.7%;  $p = 0.033$ , ns after alpha-error correction). Further baseline characteristics are presented in Table 1.

#### *Changes in Outcome Variables*

Self-compassion was significantly higher at end of treatment when compared to baseline. No significant group difference nor significant interaction of group and time was found.

At end of treatment, positive affect was significantly higher when compared to baseline in the MSC and PMR groups. There was no significant between-group difference nor a significant interaction of time and group. Regarding negative affect, patients showed significantly lower values at end of treatment than at baseline. No significant difference between the two groups or a significant interaction of time and group was detected.

Suppression did not significantly change over time and no significant difference between MSC and PMR groups was found. Furthermore, the interaction of

time and group was not significant. Compared to the baseline, patients showed a significant increase in reappraisal at end of treatment. There was no significant group difference between MSC and PMR groups and no significant interaction of time and group.

Regarding reappraisal inventiveness, no significant within- or between-group differences were detected: RIT fluency, the number of generated reappraisals, did not differ significantly between the MSC and PMR groups. Also, no significant group difference was detected in RIT flexibility, the number of categorically different generated reappraisals. All values of outcome variables are presented in Table 2.

## **Discussion**

Our study provides insights into changes in ER among psychiatric inpatients following a 6-week rehabilitation program. Although no significant differences were found between the MSC and PMR groups, both demonstrated improvements by the end

**Table 1.** Baseline characteristics of participants

Variable	MSC (n = 95)	PMR (n = 73)	Group differences	
			$\chi^2$ or t	p value
Mean age (SD), years	46.29 (11.92)	46.70 (11.70)	0.22	0.827
Female sex	69 (72.6)	43 (58.9)	3.50	0.061
High school or higher education	51 (53.7)	51 (69.9)	4.53	0.033
Employment			0.17	0.982
Employed	50 (53.8)	37 (50.7)		
In training	1 (1.1)	1 (1.4)		
Retired	12 (12.9)	10 (13.7)		
Unemployed	30 (32.2)	25 (34.2)		
In a relationship	42 (44.2)	31 (42.5)	0.05	0.821
Having children	45 (57.7)	37 (60.7)	1.24	0.724
Religion			1.24	0.538
Christianity	56 (58.9)	40 (54.8)		
Other	4 (4.2)	6 (8.2)		
None	35 (36.8)	27 (37.0)		
Psychotropic medication	81 (85.3)	61 (83.6)	0.09	0.762
Antidepressants	77 (81.1)	58 (79.5)	0.07	0.796
Antiepileptics	13 (13.7)	13 (17.8)	0.54	0.464
Anxiolytics	5 (5.3)	3 (4.1)	0.12	0.728
Antipsychotics	31 (32.6)	23 (31.5)	0.02	0.877
Benzodiazepines	15 (15.8)	10 (13.7)	0.14	0.706
Hypnotics	2 (2.1)	3 (4.1)	0.57	0.449
Mood stabilizer	3 (3.2)	0 (0.0)	2.35	0.126
Psychostimulants	0 (0.0)	1 (1.4)	1.31	0.253
Previous experience with meditation	51 (53.7)	37 (50.7)	0.15	0.700
Previous experience with yoga	39 (41.1)	31 (43.1)	0.07	0.795
Previous experience with mindfulness	53 (55.8)	35 (48.6)	0.85	0.357
(ICD-10) Diagnosis				
F10–F19: mental and behavioral disorders due to psychoactive substances	12 (12.6)	10 (13.7)	0.04	0.839
F30–F39: affective disorders	70 (73.7)	48 (65.8)	1.24	0.265
F40–F48: neurotic, stress-related, and somatoform disorders	43 (45.3)	33 (45.2)	<0.01	0.994
F60–F69: disorders of adult personality and behavior	13 (13.7)	4 (5.5)	3.06	0.080
F20–F29, F50–F59, F80–F89, F90–F98	7 (7.4)	6 (8.2)	0.04	0.838
Z73.0: burnout	11 (11.6)	21 (28.8)	7.91	0.005
Mean self-compassion (SCS) (SD)	2.56 (0.65)	2.47 (0.60)	–0.90	0.368
Mean PANAS (SD)				
Positive affect	2.61 (0.75)	2.70 (0.84)	0.72	0.472
Negative affect	2.19 (0.90)	2.23 (0.85)	0.33	0.741
Mean ERQ (SD)				
Suppression	3.99 (1.43)	3.63 (1.42)	–1.64	0.104
Reappraisal	3.79 (1.04)	3.49 (1.17)	–1.73	0.086
Mean symptom severity (BSI-18) (SD)	26.13 (14.82)	27.42 (15.00)	0.56	0.578
Somatization	6.57 (5.09)	6.71 (6.02)	0.16	0.873
Depression	9.77 (6.05)	11.00 (5.76)	1.32	0.189
Anxiety	9.79 (6.04)	9.73 (5.53)	–0.07	0.946

Values are presented as numbers (%) unless otherwise stated.  $\chi^2$  tests or independent sample *t* tests. Diagnosis with *n* < 5 were combined for this calculation (F20–F29: schizophrenia, schizotypal, and delusional disorders, F50–F59: behavioral syndromes associated with physiological disturbances and physical factors, F80–F89: disorders of psychological development, F90–F98: behavioral and emotional disorders with onset usually occurring in childhood and adolescence). SD, standard deviation; MSC, Mindful Self-Compassion; PMR, Progressive Muscle Relaxation; SCS, Self-Compassion Scale; PANAS, Positive and Negative Affect Schedule; ERQ, Emotion Regulation Questionnaire; BSI-18, Brief Symptom Inventory.

**Table 2.** Results of mixed-design ANOVAs and independent-samples *t* tests regarding self-compassion and ER

Variable	MSC ( <i>n</i> = 95)	PMR ( <i>n</i> = 73)	Effect	<i>F</i> ( <i>df</i> )/ <i>t</i> ( <i>df</i> )	<i>p</i> value	Partial $\eta^2$ /Cohen's <i>d</i>
	M (SD)	M (SD)				
SCR			T	52.06 (1,164)	<0.001*	0.241
Baseline	2.55 (0.65)	2.47 (0.60)	G	0.54 (1,164)	0.466	0.003
End of treatment	2.86 (0.73)	2.81 (0.66)	T × G	0.15 (1,164)	0.704	0.001
Positive affect			T	41.14 (1,164)	<0.001*	0.201
Baseline	2.62 (0.75)	2.70 (0.84)	G	0.20 (1,164)	0.655	0.001
End of treatment	3.09 (0.92)	3.11 (0.86)	T × G	0.26 (1,164)	0.611	0.002
Negative affect			T	18.91 (1,164)	<0.001*	0.103
Baseline	2.18 (0.90)	2.23 (0.85)	G	0.71 (1,164)	0.401	0.004
End of treatment	1.85 (0.73)	1.98 (0.79)	T × G	0.35 (1,164)	0.553	0.002
Suppression			T	2.66 (1,165)	0.105	0.016
Baseline	4.00 (1.44)	3.63 (1.42)	G	1.50 (1,165)	0.223	0.009
End of treatment	3.69 (1.45)	3.59 (1.29)	T × G	1.62 (1,165)	0.205	0.010
Reappraisal			T	43.32 (1,165)	<0.001*	0.208
Baseline	3.80 (1.04)	3.49 (1.17)	G	1.94 (1,165)	0.165	0.012
End of treatment	4.37 (1.21)	4.27 (1.09)	T × G	1.00 (1,165)	0.319	0.006
Reappraisal inventiveness						
RIT fluency	14.56 (6.62)	14.86 (6.80)		0.293 (166)	0.770	0.015
RIT flexibility	11.88 (5.00)	12.07 (4.70)		0.243 (166)	0.808	0.038

M, mean; SD, standard deviation; T, effect of time; G, effect of group; T × G, interaction effect of time and group; MSC, Mindful Self-Compassion; PMR, Progressive Muscle Relaxation; SCS, Self-Compassion Scale; PANAS, Positive and Negative Affect Schedule; ERQ, Emotion Regulation Questionnaire; RIT, Reappraisal Inventiveness Test. \**p* < 0.001.

of treatment. Specifically, participants in both groups reported increased positive affect and use of cognitive reappraisal, alongside reduced negative affect compared to baseline. No significant changes were observed in the use of expressive suppression, either over time or between groups. These findings align with previous research highlighting the beneficial effects of self-compassion on ER [10, 11] and support evidence suggesting that self-compassion is a negative predictor of ER difficulties [33]. However, the literature presents some inconsistencies. For instance, a study involving an age- and sex-matched nonclinical sample did not observe significant improvements in reappraisal following an MSC program [6]. Similarly, although self-compassion has been associated with reduced avoidance of negative emotions [12] and emotional avoidance more broadly [7, 13], these effects were not replicated in our sample. The mechanisms underlying such discrepancies remain unclear. Recent research suggests that various mediators may influence these relationships. For example, Murfield and colleagues [34] found that reduced ER difficulties mediated the association between self-

compassion, mindfulness, and lower psychological distress.

Interestingly, our analyses did not reveal significant between-group differences. One possible explanation is that mindfulness – one of the three core components of self-compassion – may have also improved in the PMR group. PMR, although primarily aimed at inducing physiological relaxation, involves present-moment awareness through focused attention on the process of tensing and relaxing muscles [17, 18], as suggested by Gao et al. [35]. While PMR and MSC differ in their primary therapeutic targets, with MSC emphasizing emotional and cognitive aspects and PMR focusing on somatic relaxation [17, 18], both may enhance mindfulness to some degree. Borghi and colleagues [36] reported that mindfulness is positively associated with perceived stress and may be diminished under stressful conditions, suggesting that maintaining mindfulness during daily challenges can be difficult. Nevertheless, our findings showed positive changes across both the MSC and PMR groups over the course of the rehabilitation program. This may indicate that participants were able to engage meaningfully with the interventions

and benefit from their respective therapeutic components, although it is unclear if the results described were caused by specific components of the psychiatric rehabilitation stay. The lack of observed differences between the MSC and PMR groups may represent a comparatively stronger effect of psychotherapy than MSC or PMR as psychotherapy appears to be beneficial on ER [37, 38].

#### *Strengths, Limitations, and Future Perspectives*

A key strength of this study lies in its implementation within a psychiatric inpatient rehabilitation setting and its relatively large sample size. However, several limitations should be noted. First, burnout was the only diagnosis not evenly distributed between sexes, which future studies should address, especially considering diagnostic updates in the ICD-11. Second, the study experienced a relatively high dropout rate, particularly due to missed end-of-treatment assessments scheduled on the day of discharge. Conducting assessments during a regular treatment day may help improve participation rates. Additionally, some participants re-entering the clinic expressed a preference for the MSC intervention, with which they were already familiar. Although informed consent and randomization had occurred, these individuals were disappointed when assigned to the PMR group, potentially affecting retention. The implementation of a control group without treatment was not pursued as this would have required major structural changes to the rehabilitation clinic, which were not feasible at the time of data collection. Yet we suggest including a study group without treatment intervention (MSC nor PMR) to be able to determine the extent to which MSC program seem to be beneficial in addition to the standard treatment program alone. Furthermore, the potential influence of psychotherapy should be considered. As part of the 6-week rehabilitation program, patients also participated in weekly individual and group psychotherapy sessions delivered by the psychotherapeutic staff of the rehabilitation clinic. An effort was made to balance different psychotherapeutic schools between the MSC and PMR group. Nevertheless, no questionnaires regarding psychotherapy and therapeutic alliance were given although these factors may have contributed to treatment outcomes (e.g., [37, 38]).

Moreover, the study did not examine gender- or sex-specific effects. Prior research has identified gender differences in self-compassion, with men reporting

higher self-compassion levels and women more likely to internalize negative emotions, consistent with gender role socialization [5, 39, 40]. Given the differing prevalence rates of affective disorders across sexes [41], further research into these dimensions would be valuable. Nonetheless, the randomized design of the present study ensured equal sex distribution across both intervention groups.

Individual-level assessment of possible adverse effects (e.g., aggravation of symptoms), as suggested by Baer and colleagues [42], was not conducted. Patients in the rehabilitation clinic were closely monitored throughout their stay. However, we recommend that future studies pay closer attention to this issue, especially when implementing the adapted MSC program in outpatient setting.

#### **Conclusion**

The findings of this study do not provide clear evidence that either the MSC or PMR intervention alone leads to superior improvements in ER as no significant between-group differences were observed. However, this does not suggest that the interventions lacked overall effectiveness. Rather, the results underscore the potential of self-compassion to positively influence ER strategies, supporting the need for further research into its specific mechanisms of action. A deeper understanding of these mechanisms may inform more targeted and evidence-based recommendations for the implementation of MSC programs in psychiatric rehabilitation settings.

#### **Acknowledgment**

The authors thank Corrina Perchtold-Stefan for her expert assistance with the RIT.

#### **Statement of Ethics**

The study was ethically approved by the Ethics Committee of the Medical University of Graz (32-191 ex 19/20) and the Ethics Committee of the state Burgenland (109/2020) as well as registered at [clinicaltrials.gov](https://clinicaltrials.gov) in 2021 (Identifiers: NCT04917081, Unique Protocol ID: MUGrazXXX, brief title: "Go With the Flow": Effects of Mindful Self-Compassion in Psychiatric Rehabilitation; <https://clinicaltrials.gov/study/NCT04917081?term=MUGrazXXX&rank=1>). Written informed consent was provided by all patients included in the study.

## Conflict of Interest Statement

The authors have no conflicts of interest to declare.

## Funding Sources

This study was not supported by any sponsor or funder.

## Author Contributions

A.A., M.H., and H.-F.U. conceptualized the study. A.A. and C.S. acquired the data. A.A., H.S., and S.K. analyzed and interpreted the data. A.A., M.H., H.S., and H.-F.U. drafted

and revised the article based on the CONSORT guidelines. P.K., E.P., J.P., A.K., and H.-P.K. critically reviewed the article. All authors gave their final approval of the manuscript.

## Data Availability Statement

The data that support the findings of this study are available on reasonable request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions. Restrictions apply to the availability of these data, which were used under license for this study.

## References

- Lammers CH, Berking M. Emotionsregulation: Trend in der Psychotherapie. *Psychotherapie im Dialog*. 2018;19(01):27–33. <https://doi.org/10.1055/s-0043-123278>
- Gross JJ. The emerging field of emotion regulation: an integrative review. *Rev Gen Psychol*. 1998;2(3):271–99. <https://doi.org/10.1037//1089-2680.2.3.271>
- Gross JJ. Emotion regulation in adulthood: timing is everything. *Curr Dir Psychol Sci*. 2001;10(6):214–9. <https://doi.org/10.1111/1467-8721.00152>
- Gross JJ, John OP. Individual differences in two emotion regulation processes: implications for affect, relationships, and well-being. *J Pers Soc Psychol*. 2003;85(2):348–62. <https://doi.org/10.1037/0022-3514.85.2.348>
- Neff KD. Self-compassion: Theory, method, research, and intervention. *Annu Rev Psychol*. 2023;74:193–218. <https://doi.org/10.1146/annurev-psych-032420-031047>
- Kim S, Song Y, Lee KU. Effect of mindful self-compassion training on anxiety, depression and emotion regulationpdf. *Anx Mood*. 2022;18(1):10–6.
- Inwood E, Ferrari M. Mechanisms of change in the relationship between self-compassion, emotion regulation, and mental health: a systematic review. *Appl Psychol Health Well Being*. 2018;10(2):215–35. <https://doi.org/10.1111/aphw.12127>
- Neff KD, Tóth-Király I, Knox MC, Kuchar A, Davidson O. The development and validation of the state self-compassion scale (Long- and short form). *Mindfulness*. 2021;12(1):121–40. <https://doi.org/10.1007/s12671-020-01505-4>
- Johnson EA, O'Brien KA. Self-compassion soothes the savage EGO-threat system: effects on negative affect, shame, rumination, and depressive symptoms. *J Soc Clin Psychol*. 2013;32(9):939–63. <https://doi.org/10.1521/jscp.2013.32.9.939>
- Finlay-Jones AL. The relevance of self-compassion as an intervention target in mood and anxiety disorders: a narrative review based on an emotion regulation framework. *Clin Psychol*. 2017;21(2):90–103. <https://doi.org/10.1111/cp.12131>
- Ferrari M, Hunt C, Harrysunker A, Abbott MJ, Beath AP, Einstein DA. Self-compassion interventions and psychosocial outcomes: a meta-analysis of RCTs. *Mindfulness*. 2019; 10(8):1455–73. <https://doi.org/10.1007/s12671-019-01134-6>
- Yela JR, Crego A, Buz J, Sánchez-Zaballos E, Gómez-Martínez MÁ. Reductions in experiential avoidance explain changes in anxiety, depression and well-being after a Mindfulness and Self-Compassion (MSC) training. *Psychol Psychother*. 2022;95(2):402–22. <https://doi.org/10.1111/papt.12375>
- Neff KD, Germer CK. A pilot study and randomized controlled trial of the mindful self-compassion program. *J Clin Psychol*. 2013;69(1):28–44. <https://doi.org/10.1002/jclp.21923>
- Yip VT, Tong E. Self-compassion and attention: self-compassion facilitates disengagement from negative stimuli. *J Posit Psychol*. 2021;16(5):593–609. <https://doi.org/10.1080/17439760.2020.1778060>
- Neff KD, Germer CK. *The mindful self-compassion workbook*. New York: The Guilford Press; 2018.
- Neff KD, Germer C. The role of self-compassion in psychotherapy. *World Psychiatry*. 2022;21(1):58–9. <https://doi.org/10.1002/wps.20925>
- Hofmann E. Progressive Muskelentspannung: Ein Trainingsprogramm [Progressive muscle relaxation: a training program]. Hogrefe; 2020.
- Jacobson E. Progressive relaxation. *Am J Psychol*. 1925;36(1):73–87. <https://doi.org/10.2307/1413507>
- Gaiswinkler L, Kaufmann P, Pollheimer E, Ackermann A, Holasek S, Kapfhammer HP, et al. Mindfulness and self-compassion in clinical psychiatric rehabilitation: a clinical trial. *Mindfulness*. 2020;11(2):374–83. <https://doi.org/10.1007/s12671-019-01171-1>
- Andorfer A, Kraler S, Kaufmann P, Pollheimer E, Spah C, Fuchshuber J, et al. Psychophysiological stress response after a 6-week mindful self-compassion training in psychiatric rehabilitation inpatients: a randomized post-test only study. *Front Psychiatry*. 2023;14: 1098122. <https://doi.org/10.3389/fpsy.2023.1098122>
- Germer C, Neff KD. *Teaching the mindful self-compassion Program. A guide for professionals*. Guilford Press; 2019.
- Pollheimer E, Kaufmann P. *Achtsames Selbstmitgefühl – ein 6-wöchiges Programm für die stationäre Behandlung [Mindful Self-Compassion – a 6-Weeks Program for Inpatient Treatment]*. Unpublished Manual; 2018.
- Hupfeld J, Ruffieux N. Validierung einer deutschen Version der Self-Compassion Scale (SCS-D) [Validation of a German version of the Self-Compassion Scale (SCS-D)]. *Z Klin Psychol Psychother*. 2011;40(2): 115–23. <https://doi.org/10.1026/1616-3443/a000088>
- Neff KD. The development and validation of a scale to measure self-compassion. *Self and Identity*. 2003;2(3):223–50. <https://doi.org/10.1080/15298860309027>
- Janke S, Glöckner-Rist A. Deutsche Version der Positive and Negative Affect Schedule (PANAS) [German version of the Positive and Negative Affect Schedule (PANAS)]. In: Daner D, Glöckner-Rist A, editors. *Zusammenstellung sozialwissenschaftlicher Items und Skalen*. GESIS; 2014.
- Krohne HW, Egloff B, Kohlmann CW, Tausch A. Untersuchungen mit einer deutschen Version der “Positive and Negative Affect Schedule” (PANAS) [Investigations with a German version of the Positive and Negative Affect Schedule (PANAS)]. *Diagnostica*. 1996;42(2):139–56.

- 27 Watson D, Clark LA, Tellegen A. Development and validation of brief measures of positive and negative affect: the PANAS scales. *J Pers Soc Psychol.* 1988;54(6):1063–70. <https://doi.org/10.1037//0022-3514.54.6.1063>
- 28 Abler B, Kessler H. Emotion Regulation Questionnaire - eine Deutschsprachige Fassung des ERQ von Gross und John [Emotion Regulation Questionnaire – a German version of the ERQ by Gross and John]. *Diagnostica.* 2009;55(3):144–52. <https://doi.org/10.1026/0012-1924.55.3.144>
- 29 Weber H, Loureiro de Assunção V, Martin C, Westmeyer H, Geisler FC. Reappraisal inventiveness: the ability to create different reappraisals of critical situations. *Cogn Emot.* 2014;28(2):345–60. <https://doi.org/10.1080/02699931.2013.832152>
- 30 Perchtold CM, Papousek I, Koschutnig K, Rominger C, Weber H, Weiss EM, et al. Affective creativity meets classic creativity in the scanner. *Hum Brain Mapp.* 2018;39(1):393–406. <https://doi.org/10.1002/hbm.23851>
- 31 Papousek I, Weiss EM, Perchtold CM, Weber H, de Assunção VL, Schuster G, et al. The capacity for generating cognitive reappraisals is reflected in asymmetric activation of frontal brain regions. *Brain Imaging Behav.* 2017;11(2):577–90. <https://doi.org/10.1007/s11682-016-9537-2>
- 32 Fink A, Weiss EM, Schwarzl U, Weber H, de Assunção VL, Rominger C, et al. Creative ways to well-being: reappraisal inventiveness in the context of anger-evoking situations. *Cogn Affect Behav Neurosci.* 2017;17(1):94–105. <https://doi.org/10.3758/s13415-016-0465-9>
- 33 Finlay-Jones AL, Rees CS, Kane RT. Self-compassion, emotion regulation and stress among Australian psychologists: testing an emotion regulation model of self-compassion using structural equation modeling. *PLoS One.* 2015;10(7):e0133481. <https://doi.org/10.1371/journal.pone.0133481>
- 34 Murfield J, Moyle W, O'Donovan A, Ware RS. The role of self-compassion, dispositional mindfulness, and emotion regulation in the psychological health of family carers of older adults. *Clin Gerontol.* 2024;47(2):316–28. <https://doi.org/10.1080/07317115.2020.1846650>
- 35 Gao L, Curtiss J, Liu X, Hofmann SG. Differential treatment mechanisms in mindfulness meditation and progressive muscle relaxation. *Mindfulness.* 2018;9(4):1268–79. <https://doi.org/10.1007/s12671-017-0869-9>
- 36 Borghi O, Voracek M, Tran US. Day-to-day associations between mindfulness and perceived stress: insights from random intercept cross-lagged panel modeling. *Front Psychol.* 2024;15:1272720. <https://doi.org/10.3389/fpsyg.2024.1272720>
- 37 Iwakabe S, Nakamura K, Thoma NC. Enhancing emotion regulation. *Psychother Res.* 2023;33(7):918–45. <https://doi.org/10.1080/10503307.2023.2183155>
- 38 Sønderland NM, Solbakken OA, Eilertsen DE, Nordmo M, Monsen JT. Emotional changes and outcomes in psychotherapy: a systematic review and meta-analysis. *J Consult Clin Psychol.* 2024;92(9):654–70. <https://doi.org/10.1037/ccp0000814>
- 39 Yarnell LM, Stafford RE, Neff KD, Reilly ED, Knox MC, Mullarkey M. Meta-analysis of gender differences in self-compassion. *Self and Identity.* 2015;14(5):499–520. <https://doi.org/10.1080/15298868.2015.1029966>
- 40 Yarnell LM, Neff KD, Davidson OA, Mullarkey M. Gender differences in self-compassion: examining the role of gender role orientation. *Mindfulness.* 2019;10(6):1136–52. <https://doi.org/10.1007/s12671-018-1066-1>
- 41 Rubinow DR, Schmidt PJ. Sex differences and the neurobiology of affective disorders. *Neuropsychopharmacology.* 2019;44(1):111–28. <https://doi.org/10.1038/s41386-018-0148-z>
- 42 Baer R, Crane C, Miller E, Kuyken W. Doing no harm in mindfulness-based programs: conceptual issues and empirical findings. *Clin Psychol Rev.* 2019;71:101–14. <https://doi.org/10.1016/j.cpr.2019.01.001>