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Research paper

A compassion-based treatment for couples with the female partner suffering from current depressive disorder: A randomized-controlled trial

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ABSTRACT

Background: Studies have shown that depression and interpersonal relationships are interdependently connected and that including the intimate partner in treatment for depression has beneficial effects. Given evidence that compassion is both an interpersonal quality and a promising treatment target, the goal of this study was to examine the effects of a compassion-based, contemplative treatment for couples employing a multi-method approach for evaluation.

Methods: In a pre-post-follow-up design, $n = 53$ different-sex couples including women with current depression were randomly assigned to a 10-week-long CBCT®-*fC* (Cognitively-Based Compassion Training/intervention for couples) or treatment-as-usual (TAU) condition. Multi-level linear regression models and post-hoc contrasts were calculated to determine changes in depressive symptoms, mindfulness and self-compassion, interpersonal functioning and neuroendocrine markers collected during a partnership appreciation task (PAT) in the laboratory before and after CBCT-*fC* treatment.

Results: While CBCT-*fC* led to a comparable decrease of depressive symptoms as TAU, the training specifically increased self-compassion and mindfulness versus TAU. Interestingly, interpersonal functioning did not improve, which was also reflected in participants' preferred self-focus in-between-session practices, instead of practices with interpersonal focus. There were no group-specific changes in psychobiological stress-marker reactivity.

Conclusions: CBCT-*fC* was effective in decreasing current depressive symptomatology and increasing mindfulness, and self-compassion. Especially the motivation to participate, such as improving interpersonal functioning, should be addressed and intrinsic motives of the partners to be involved. In highly burdened individuals, self-regulation may need to be improved before co-regulation can be addressed, which would requiring longer treatments. Facilitating factors for engaging in the practice between-sessions seem meaningful.

Abbreviations: CBCT-fC, Cognitively-based Compassion Training – for Couples; CBI, Compassion-based Interventions; IG, Interventions-Group; CG, Control-Group; sAA, saliva Alpha-Amylase; sCort, saliva Cortisol; SAM, sympathoadrenal medullary; HPA, hypothalamic pituitary adrenal; PAT, Partnership Appreciation Task; TSST, Trier Social Stress Test.

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1. Introduction

Major depression is one of the most widespread mental disorders (GBD 2019 Mental Disorders Collaborators, 2022) causing high direct and indirect economic burden by sick-leaves, the use of psychosocial support services, and a high risk of relapse and chronicity (Jain et al., 2022). Affected domains expand from emotional to important social deficits (Kupferberg et al., 2016), which involve attachment disruptions and insecurities (Cortés-García et al., 2020), increased sensitivity to social rejection (Kirchner et al., 2022), as well as social anhedonia (Sagud et al., 2021). The difficulty of perceiving and differentiating others versus one's own emotions plays an important role (Di Tella et al., 2020), as do deficits to (affectively) empathize (Guhn et al., 2020), and to take perspective of others (Bora and Berk, 2016).

Major depressive disorders (MDD) can therefore lead to detrimental social consequences within work and private contexts (Herrman et al., 2022). Since most adults live in couple relationships, the risk of partner burden and the potential negative relationship dynamic need to be addressed (Hickey et al., 2005). Happy couples benefit from their romantic relationships by stress-buffering dyadic coping (Bodenmann and Cina, 2006), social support, closeness, trust, etc. (e.g. Ditzen and Heinrichs, 2014). In contrast, for couples living with depression, various evidence-based interpersonal theories (e.g. Actor-Partner-Interdependence Model: Kenny, 2018; e.g. Interdependence Theory: Rusbult and Lange, 2003) suggest that depressive interaction cycles increase the individual distress of both partners and the likelihood of a decline in relationship quality. In a reciprocal accumulation process, the dysfunctional interactions worsen psychosocial distress due to increased arguments and hostile expectations. Closeness, trust, and intimacy can diverge to social withdrawal and social isolation (Aguilar-Raab et al., 2022; Kronmüller et al., 2011). Couple research therefore suggests that including the partner into therapy can improve interpersonal distress and dyadic coping in depression (Baucom et al., 2014; Whisman and Baucom, 2012) and indeed, couple interventions for depression have shown equal effects as individual evidence-based treatment but longer-lasting improvements in relationship functioning (Bodenmann et al., 2008).

As a mediating factor, psychobiological processes play a significant role in the development and maintenance of MDD (Pariante and Lightman, 2008; Strain, 2018). While overall in depression relationship quality is reduced, some individuals who suffer from depression were shown to perceive social interactions as a burden and to benefit much less from social buffering than the healthy (Kupferberg et al., 2016). As a consequence, constantly increased stress levels might mediate the health-detrimental effects of depressive disorders in the long-term (Robles, 2014; Slatcher and Schoebi, 2017; Slatcher and Selcuk, 2017), although the exact mechanisms are still subject to controversy (Booij et al., 2015). Salivary cortisol (sCort) and alpha-amylase (sAA) as end-products of the hypothalamic pituitary adrenal (HPA) axis and the sympathoadrenal medullary (SAM) system are indicators of the chronic and acute stress response (Stapelberg et al., 2018). However, in depressed individuals, women in particular, HPA axis responses measured via sCort as a result of an acute social stressor indicated significantly *lower* concentrations (Cunningham et al., 2021; Mazurka et al., 2017), suggesting altered HPA-axis feedback-mechanisms. Indeed, in a recent laboratory experiment using instructed positive couple interaction (Partnership Appreciation Task - PAT, see below), data suggested higher increases in sCort in the depressed, compared to healthy controls. Additionally, we found a similar, but non-significant, trend for sAA, and increases were accompanied by improved momentary relationship satisfaction. Thus, these increases might reflect higher *positively* valued arousal due to unfamiliarity with positive social engagement (Warth et al., 2020). It is such counter-intuitive patterns in particular, that make psychobiological stress indicators in the evaluation of treatments a valuable adjunct to understand effects more comprehensively (Fischer and Zilcha-Mano, 2022).

Clinical data suggest that in depression, individuals tend to suffer from rumination and self-criticism. Therefore, compassion-based interventions (CBIs) are gaining increasing attention in the treatment of MDD (Kirby et al., 2017). Given the particular transdiagnostic role of increased self-criticism (Porter et al., 2019), the majority of clinical studies focuses on self-compassion (MacBeth and Gumley, 2012), because it is associated with lower self-criticism, less rumination and more adaptive emotion-regulation (Karl et al., 2018; Paucsik et al., 2022). In line with these findings, Compassion-focused Therapy CFT (e.g. Gilbert, 2014) demonstrated a significant reduction in symptoms, negative affect, self-criticism and shame (Craig et al., 2020; Förster and Kanske, 2022). A variety of non-clinical CBI studies showed increases in positive emotions, social support, perceived social connectedness, caring, and pro-sociality following different trainings aiming at cultivating compassion for others (e.g. Singer and Engert, 2019), indicating a potential benefit in the treatment of depression and its social dimension.

CBCT® (Cognitively-Based Compassion Training) is one of the most studied "compassion for other" group programs leading to symptom reduction and various health-related outcomes (Desbordes et al., 2012; Desbordes et al., 2014; Mascaro et al., 2018; Mascaro et al., 2013; Pace et al., 2009; Pace et al., 2010; Shonin et al., 2015). Current clinical trials employing CBCT® focus on breast cancer survivors (Gonzalez-Hernandez et al., 2018), HIV immune non-responders (Titanji et al., 2022), African-American suicide attempters (LoParo et al., 2018), and PTSD in veterans (Lang et al., 2020), all indicating promising results.

However, although compassion for *others* is an interpersonal quality, no study to date has applied the training for couples in a group treatment for depression with a CBI (Winter et al., 2021). Therefore, the aim of this study was to evaluate the effects of CBCT® adapted for couples in which women experienced an acute depressive episode with regard to: (1) the reduction of depressive symptoms, (2) the enhancement of contemplative qualities such as mindfulness and self-compassion, (3) the increase in perceived relationship quality and perceived social support within the couple, and (4) altered stress responses measured via sCort and sAA to an instructed positive couple interaction in the lab, before and after the CBCT® training.

2. Materials and methods

2.1. Participants

Couples were included if, (1) both different-sex partners were at least 20 years old, (2) they were in a romantic relationship for at least two years, and (3) women were diagnosed with a current depressive disorder (ICD-10: F32.0-F32.2, F33.0-F33.2), as measured in a Structured Clinical Interview for DSM-5 (SCID) and the observer-based Hamilton Depression Rating Scale (HDRS $\geq$12). General exclusion criteria were, (1) pregnancy, chronic or severe metabolic endocrinological, neurological, nephrological, cardiac or hepatic conditions, (2) substance abuse/acute addiction, (3) psychotherapy (individual or couple therapy with $>$ six sessions[2]), (4) current mindfulness- or compassion-based group training, (5) psychotic symptoms, bipolar disorder or acute suicidal tendency and (6) any current psychiatric disorder in men. The a priori power analysis of this pre-registered trial (NCT03080025) can be obtained from the study protocol (Aguilar-Raab et al., 2018).

2.2. Study design and procedures

The present randomized controlled trial (RCT) was conducted between March 2017 and May 2019, comparing CBCT-*fC* (IG) with a

[2] This is related to the German health care system, in which the first psychotherapeutic sessions as psychotherapeutic consultation hours and probation or biographical anamnesis are still counted as part of the phase before the actual start of psychotherapy.

parallel, TAU control group (CG). Outcome variables were measured at four measurement points: At baseline (T1 at 8–10 weeks after recruitment start), after completion of the intervention (T2 at 20–21 weeks after recruitment start), and at two follow-ups (T3 at 4 weeks and T4 at 12 weeks post CBCT-*fC*). After an initial telephone screening, couples were invited for two consecutive laboratory days at the Institute of Medical Psychology, Heidelberg University. At laboratory day one, participants were assessed with the SCID and HDRS, self-report questionnaires and a medical screening including blood draw and ECG measures.[3] Participants were asked to wear a heart rate sensor for 24 h. On the second laboratory day, couples were instructed to a PAT, which included the instruction to positively communicate with each other and exchange appreciation for specific characteristics and behavior of the partner and the relationship. Four saliva samples were collected before and after the PAT. Heart rate sensors were returned after the PAT following a couple diagnostic interview. The randomization of couples was performed by a researcher, who was not part of the present study. The procedures were repeated at T2 excluding SCID and couple diagnostic interview. Participants provided written informed consent. Each couple received 100 € for study completion. Medical Faculty at Heidelberg University's local ethics committee approved the study protocol (S-021/2016). The research was conducted in accordance with the Declaration of Helsinki.

2.3. Intervention: Cognitively-based Compassion Training for Couples (CBCT-fC)

Participants assigned to the IG received a CBCT-*fC* which followed the CBCT®-protocol established at Emory University and which was adapted for the clinical and couple context (see details on adaptation Aguilar-Raab, 2020a, 2020b; Aguilar-Raab et al., 2018). Main goals were to increase compassion for self and other, especially for the partner, to strengthen resiliency, well-being and interpersonal resources. The control group received TAU, while they were offered to take part in the CBCT-*fC* after full study participation.

CBCT-*fC* followed the structure of six modules described by Ash et al. (2021), which can be divided into two phases focusing on self- and other/co-regulation: the first phase focused on security priming by familiarization with a nurturing moment to create the base for compassion. This was followed by practice of focused attention on the breath to increase the ability to maintain a stable and clear focus on the object (Module 1), and by cultivating an inner observer to detach from identifications with thoughts, feelings and sensations to improve self- and emotion-regulation (Module 2). Eventually, this was followed by a phase of cultivating self-compassion, including a cognitive re-appraisal (acceptance, resource focus, expectation-reality alignment; Module 3). The second phase was characterized by practices on how to relate to others starting by reflecting on our tendency to categorize others into friends, enemies or strangers and by learning to identify with the similarities we share with others, the longing for well-being while trying to avoid suffering (Module 4). This was followed by deepening feelings of connectedness cultivating the conviction that everybody and every phenomenon is highly interconnected and depended on each other (Module 5). Ultimately, if these steps of cultivation are practiced continuously, compassion for others – the aspiration in the face of suffering to help them or reduce their suffering – is expected to develop (Module 6).

The six modules were delivered in a 10-week framework (see Supplement 1 for additional information). All sessions were led by a certified CBCT® trainer and licensed psychotherapist (CAR) and accompanied by a co-therapist. Additionally, the CBCT trainer (CAR) received supervision by senior trainers and supervisors (TH, TN).

[3] Which are not the focus of the current manuscript.

2.4. Outcome measures

(1) The reduction of depressive symptoms was measured with the Hamilton Depression Rating Scale (HDRS; Hamilton, 1960) as an observer rating and with the Patient Health Questionnaire-9 (PHQ-9; Kroenke et al., 2001) as a self-rating[4] as primary outcomes. (2) Contemplative aspects such as mindfulness were measured with the Kentucky Inventory of Mindfulness Skills (KIMS; Bear et al., 2004), whereas self-compassion was assessed with the Self-Compassion Scales (SCS; Neff, 2003). (3) Focusing on the relationship, compassion for others (in the present study it refers solely to the partners) was measured with the Compassionate Love Scale (CLS; Sprecher and Fehr, 2005), relationship quality was surveyed with the Partnership Questionnaire (PFB; Hahlweg, 1979) and social support was assessed with the Berlin Social Support Scales (BSSS; Schulz and Schwarzer, 2003).[5] (4) Saliva for the analyses of sCort (ng/mL) and sAA (U/min) was collected using SaliCaps (RE69985 IBL International GmbH Hamburg, Germany) (−20 min, pre PAT, post PAT, +20 min relative to the PAT, both at T1 and T2; for details see Supplement S1 and Warth et al., 2020).

2.5. Statistical analysis of observer- and self-report data

Data management and analysis of the observer- and self-report outcomes were conducted using Stata 15.1 SE (StataCorp., 2021).

Baseline characteristics were described in terms of either means (*M*) and standard deviations (*SD*) or as absolute (*N*) and relative frequencies (%). To test for potential between-group differences at baseline, χ^2 for categorical and *t*-test or Wilcoxon signed-rank test for continuous variables were calculated.

All outcome data incorporating repeated observations (nested within individuals) were analyzed using two-level hierarchical linear regression models (maximum likelihood (ML)-estimation, variance type independent). Repeated measures of each outcome were modelled as level-1 variables. Group assignment (IG vs. CG) was regarded as a level-2 predictor (individual level). The observations were assumed to be independent across couples but not necessarily within couples (i.e., intra-couple dependencies are expected). Thus, standard errors were specified to cluster within couples to make them robust against this intragroup correlation, basically relaxing the model requirement of independent observations.

Following methodological recommendations, four models were calculated for each self-report (Meteyard and Davies, 2020). Thus, to test whether the training showed effectiveness in the three domains (symptom-, contemplative- and relationship measures), we analyzed the respective additive information (Model M1 = null model including outcome and random intercept; M2 = M1 plus main effect; M3 = M2 plus interaction effect of group * time; M4 = M3 plus three-way interaction effect of group * time * sex) using χ^2-test for model improvement in the log-likelihood. To aid interpretation, AIC and BIC were reported. In addition, ANOVA-style post-hoc contrasts were calculated using χ^2-squared tests for linear hypotheses of overall group differences as well as to compare single time point differences by group. To aid model interpretation, marginal means were estimated for group * time * sex and plotted with all other variables at their observed average (e.g., average sample age). Type-I error probability were set at $\alpha = 0.05$ for all tests. Data based on an intention-to-treat approach and were compared with a completers-only dataset (per-protocol) in the course of sensitivity analyses.

Item non-responses were left at missing and the according scale was

[4] The Beck Depression Inventory (BDI, Beck et al., 1996) was also obtained; due to an implementation error, about half of the sample received the BDI I and the other half received the BDI II, so we also conducted the analyses based on the means.

[5] See Supplement 1 for details of the used measures.

not calculated. Missing observations at follow-up timepoints were not imputed. One of the advantages of hierarchical linear regression models are compensations for unbalanced designs.

2.5.1. Statistical analysis of salivary markers

Controlling for smoking (no/yes), caffeine intake (no/yes), medication intake, BMI (kg/m^2), age (years), sex (male/female), continuous in-session time (0, +20, +30, and +50 min) and interaction of group * time as focal predictors, mixed-effects three-level models (measurement nested in individuals nested in dyads) were calculated in the statistical environment R (R Core Team, 2020) using the "lme" function of the "nlme" package (Pinheiro et al., 2020).

3. Results

3.1. Participant flow, participant characteristics and descriptives

Eventually, $n = 27$ couples of the IG started with the treatment, whereas $n = 22$ couples were assigned to the CG (Flowchart: Fig. 1). Table 1 includes demographic information, baseline scores in study variables and testing for significant differences between IG and CG as well as information about current medication etc. (Supplement Table S1 ITT all measurement points; Table S2 for PP sample).

3.2. Treatment response

Seven cohorts with four to seven couples each participated with an attendance of on average 83.04 % of the ten sessions.

Overall, the mean practice time in-between sessions for the *modules 1–6* was $M = 523$ min. On average, "Attentional Stability", "Open Awareness" and "Self-Compassion" were practiced the most.

3.3. Intervention effects: model comparisons and within-contrasts

In Table 2, the model comparisons per outcome are reported for the ITT sample (PP sample see Supplement 3 Table S3 indicating equivalent conclusions). We performed contrast analysis to verify where exactly the differences originated (Table 3). The graphs in Fig. 2 provide a comprehensible understanding of the differences in the trajectories of each subgroup outcome.

(1) The models, contrasts and trajectories observed in the graphs of observer-based ratings (HDRS) and self-report measures (PHQ; BDI) of depressive symptoms comprise similar results. Overall, HDRS and PHQ (as well as BDI) values decreased between T1 and T2 in both groups significantly. Due to the inclusion criteria, the depressed patients showed higher overall HDRS and PHQ (as well as BDI) values compared to their male counterparts. Thus, with regard to the HDRS, women benefited more from the intervention as shown in the significant three-way-interaction model (see Table 2). For PHQ and BDI, the time only-effect model showed the best model-fit. For all measures, within-group contrasts showed a significant reduction in both groups, which were more pronounced for the observer-based clinical ratings. Reduced values of depression measured with PHQ and BDI were maintained throughout follow-up 1 (T3) and 2 (T4) in both groups, but with lower values in the IG.

At the descriptive level, the following percentage improvements, deteriorations, and no changes, respectively, were obtained: IG, HDRS: 52.17 % improved (PHQ: 63.64 %), 34.78 % remained the same (PHQ: 36.36 %), and 13.05 % worsened (PHQ: 0 %). CG, HDRS: 43.75 % improved (PHQ: 42.86 %), 50 % remained the same (PHQ: 35.71 %), 6.25 % worsened (PHQ: 21.43 %).

(2) The largest effect of the training was found for mindfulness and especially for self-compassion. In both outcomes, the three-way interaction models of group * time * sex showed the best model-fits (see Table 2). In the within contrasts, a significant increase in mindfulness and particularly in self-compassion for the pre-post, pre-FU1, and pre-FU2 comparisons was evident only for the IG and here most pronounced for the burdened women, while the male partners of the IG showed slight increases compared to no changes in the CG (Table 3; Fig. 2).

(3) Of all relational measures (compassionate love, relationship quality and social support) only the subscale "actual received social support" showed a significant model fit for the three-way interaction model of group-by-time-by-sex, whereas the subscale "need for social support" indicated a significant model fit only for the main effect-model. The IG, especially men but also women, seemed to benefit most in terms of actually received social support, compared to a decrease in the CG pre-post training, although the men of the IG reported a considerable drop at FU2 (see Tables 2, 3; Fig. 2).

(4) Non-significant interaction terms of group-by-time emerged for sAA ($b = -0.177$, $p = .247$) and for sCort ($b = 0.093$, $p = .460$).[6] This indicates that changes in reactivity of the salivary markers over time from pre- to post-intervention did not significantly differ between both groups.

4. Discussion

We aimed at evaluating the newly developed CBCT-*fC* with the female partner suffering from current depressive symptoms. The outcome assessment included four domains: symptomatology, contemplative factors such as mindfulness and self-compassion, interpersonal factors and psychobiological indicators sCort and sAA as proxies for the HPA and SNS regulation.

(1) Generally, CBCT-*fC* led to a reduction of depressive symptomatology in depressed women, these effects were more pronounced in the observer-based clinical than in the self-report ratings (see for literature on communalities/differences of observer-/self-report assessments of depressive symptoms: Carter et al., 2010; Schneibel et al., 2012; Uher et al., 2012; Vares et al., 2015). However, the reduction of depressive symptoms was found similarly in both CBCT-*fC* and TAU. One reason for that might be that we basically only recorded to a limited extent what exactly the individuals in the control group received as part of the TAU and at the same time did not strictly exclude completely additional pre-therapeutic interventions of up to six sessions in the IG (see footnote 2), which might seem quite a lot in view of a relatively short treatment of ten weeks in total.

Another important aspect of what is at stake concerns the compassion intervention itself: CBCT was designed as a training within a prevention framework, but not as a therapeutic treatment itself. A comparison of underlying specific and general therapeutic mechanisms revealed that both increased over the course of the training (Winter et al., 2022). However, on the one hand, it can be assumed that training to increase certain competencies or qualities in a clinical context requires significantly more time than for healthy participants. On the other hand, more therapeutic elements to deal with different cognitive and affective impairments and interactional, conflictual patterns could have been explicitly included to a greater extend – as is the case, for example, in the evolution of MBSR towards MBCT. In addition, our study did not differentiate which specific depression patterns our patients may have been dealing with (e.g., anaclitic vs. introjective forms of depression), based on which our intervention could have been better tailored (e.g., selecting depressed patients with more self-critical patterns, for which self-compassion is an effective intervention).

(2) The pivotal effect of the compassion treatment is demonstrated by the increase in mindfulness and especially in self-compassion in the depressed women compared to the CG in the pre-post comparison – which was also maintained across the FU time points and which is comparable to previous findings of similar treatments (Ferrari et al.,

[6] The same applies to aggregated values – here, too, no significant effects were found.

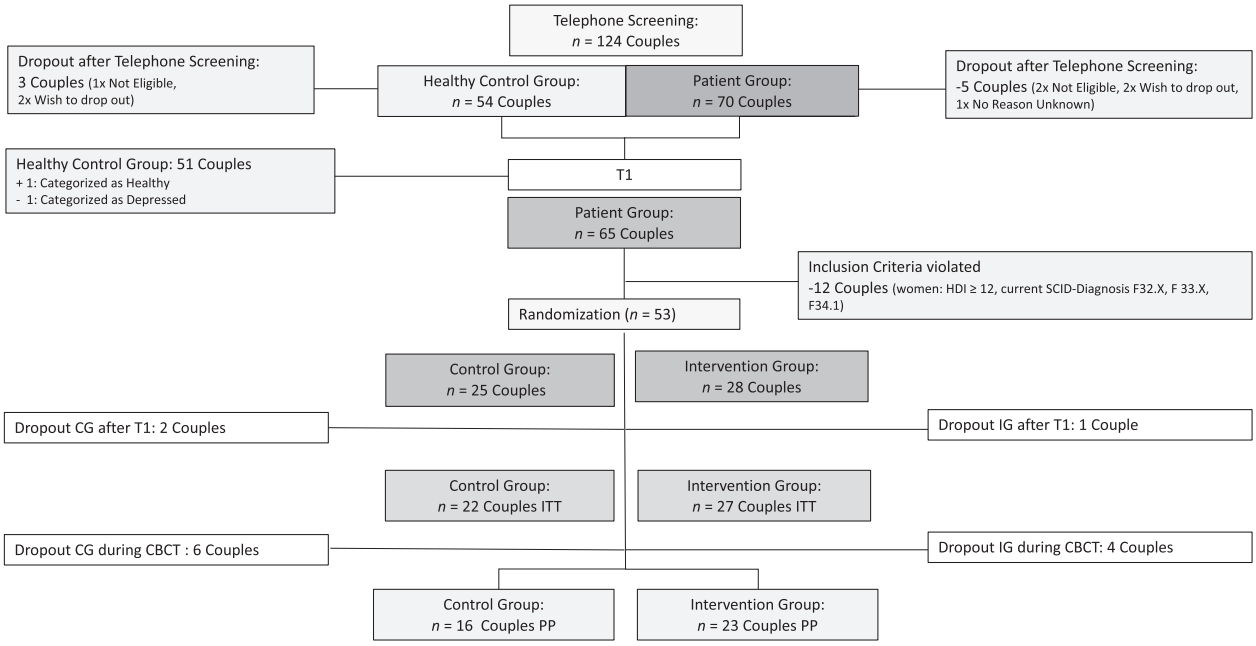


Fig. 1. Flowchart of study participants. Healthy control group was included in Warth et al., 2020.

2019). Since the CG showed a slight decrease in self-compassion over the course, the effects of the treatment may also be seen as a preventive buffer effect.

An important consideration in connection with the increase in mindfulness and self-compassion and decrease in the depressive symptomatology is that higher awareness and self-reflection in dealing with sorrowful parts initially continues negative experience in a certain way, because it is primarily about accepting, tolerating and embracing experiences, less about changing the valence of experiences per se. It may take more time for the tolerance and acceptance, and thus the well-being, that comes with mindfulness and self-compassion practice to emerge, especially when self- and emotion-regulatory strategies are less appropriately available, as in depressive disorders. Thus, the question of operationalization of outcome measures at the self-report level becomes pertinent; the focus on classic depression scores may fall short (Cuijpers, 2019). Yet, our results lead to the notion that the selection of the duration, frequency, and period of the treatment may have an impact on the outcomes found. It stands to reason that a 20-h training is too short for the relatively high level of burden, which has been shown not only in recently published studies such as on CFT (Craig et al., 2020), but also in the practice behavior of our study participants. Overall, study participants practiced comparatively little in-between sessions with an average of 523 min over the course of 10 weeks, approx. 8 min per day or about 60 min a week. According to a review by Parsons et al. (2017), participants practice 30 min per day in MBCT trials and there appears to be a positive, albeit small association between practice and outcomes. In our trial, those who practiced at home focused on the elements of mindfulness practice "Focused Attention" and "Open Awareness" as well as "Self-Compassion", which is directly related to the effects found, and which also may have corresponded with the needs of the participants. It stands to reason that depressed individuals focus first on attentional and emotion regulation strategies rather than co-regulatory and caring engagement with their partner.

(3) Contrary to expectations, the treatment had virtually no effects on interpersonal aspects. Yet the couples included here were not among the most dissatisfied couples overall: No particular treatment effects were found for the ratings of relationship quality. Both partners rated their relationship quality at baseline as rather high, potentially limiting treatment effects and indicating being able to rely on a social resource despite the symptom burden. However, being socially included or being in a romantic relationship does not equate to the ability to actively shape everyday interactions in a positive way or to perceive the other person in a positive light and to feel at ease in the relationship. The questionnaire used at this point mainly consists of items that are aimed at the behavioral level in the majority of cases assessing how the other partner behaves towards that person, but less so how the behavior or interpersonal aspect in question is perceived emotionally. The acquisition of dyadic stress, constraints in dyadic coping or of the perceived association between interpersonal functioning and individual (depressive) burden could have been enlightening at this point.

On the level of actual received social support women and men benefited from pre to post treatment, although men showed a significant drop at FU2. This suggests that active compassion in terms of perceived care shown by the other did increase. The decline in men at FU2 could indicate their need to be supported by the framework provided by the treatment and the group, and that the male partners perceived their female partners as more preoccupied with themselves rather than taking care of the relationship.

Overall, the results on the interpersonal level could also be explained by the fact that the couples dedicated little time at home for informal and formal dyadic exercises. The treatment may have led to a stronger focus on oneself in women potentially linked to a stronger demanding character, but cannot be directly verified with our data. Additionally, there also seems to exist evidence that more time is needed for interpersonal changes (Lopes et al., 2015). Further, Renner et al. (2014) showed that improvement in depressive symptomatology is not necessarily related to improvement in interpersonal functioning – although it should be noted that there is high heterogeneity in the operationalization of interpersonal measures (Aguilar-Raab et al., 2022).

Another important issue was the motivation to participate: While couples indicated that they wanted to improve their relationship, the primary focus was on reducing individual distress, which is also consistent with previous findings (Pepping et al., 2016). Previous couple research shows that women rather than men desire change within their relationships (Heyman et al., 2009). This might reflect the higher prevalence of burden due to mental disorders in women and is in line with the clinical impression that often in couple therapy, the claim is that the partner should change. In this regard, understanding the

Table 1
ITT sample characteristics and descriptive data prior to CBCT-fC.

Variable	Sex	IG		CG		Statistics
		N	*M* (*SD*)	*N*	*M* (*SD*)	
Age (years)	Women	27	43.91 (11.44)	22	39.26 (15.39)	$t(47) = 1.212$, $p = .116$, $d = 0.35$
	Men	27	45.79 (12.66)	22	42.00 (16.77)	$t(47) = 0.901$, $p = .372$, $d = 0.26$
Relationship (years)	Women	25	9.86 (6.67)	21	11.71 (12.16)	$t(44) = -0.652$, $p = .741$, $d = -0.19$
	Men	27	10.61 (7.89)	22	11.32 (11.75)	$t(47) = -0.251$, $p = .803$, $d = -0.07$
Time since onset (years)	Women	23	11.89 (11.98)	18	9.53 (8.42)	$t(39) = 0.710$, $p = .482$, $d = 0.22$
	Men	2	0.88 (0.18)	6	10.82 (11.47)	$t(6) = -1.163$, $p = .289$, $d = -0.95$
HDRS total	Women	27	28.48 (11.05)	22	32.55 (8.22)	$t(47) = -1.431$, $p = .921$, $d = -0.41$
	Men	27	5.56 (4.40)	22	8.91 (6.29)	$t(47) = -2.193$, $p = .033$, $d = -0.63$
PHQ-9 mean	Women	27	1.42 (0.62)	22	1.58 (0.54)	$t(47) = -0.980$, $p = .332$, $d = -0.28$
	Men	26	0.61 (0.57)	22	0.69 (0.45)	$t(46) = -0.500$, $p = .619$ $d = -0.14$
Partner burden (PBD mean)	Women	–	–	–	–	–
	Men	27	19.89 (6.33)	22	24.68 (7.16)	$t(47) = -2.485$, $p = .017$, $d = -0.71$
Self-compassion (SCS mean)	Women	26	2.54 (0.65)	22	2.31 (0.53)	$t(46) = -1.309$, $p = .099$, $d = 0.38$
	Men	27	3.34 (0.62)	22	3.23 (0.60)	$t(47) = -0.590$, $p = .558$, $d = 0.17$
Mindfulness (KIMS mean)	Women	27	2.98 (0.41)	21	2.90 (0.42)	$t(46) = 0.588$, $p = .560$, $d = 0.17$
	Men	27	3.40 (0.38)	22	3.29 (0.42)	$t(47) = 0.892$, $p = .377$, $d = 0.26$
Compassionate love (CLS mean)	Women	27	5.32 (1.06)	21	5.38 (0.80)	$t(46) = -0.218$, $p = .828$, $d = -0.06$
	Men	27	5.58 (0.74)	22	5.61 (0.80)	$t(47) = -0.136$, $p = .892$, $d = -0.04$
Perceived social support (BSSS mean)	Women	26	3.49 (0.60)	22	3.20 (0.69)	$t(46) = 1.574$, $p = .122$, $d = 0.46$
	Men	27	3.46 (0.38)	22	3.49 (0.37)	$t(47) = -0.334$, $p = .740$, $d = -0.10$
Received social support (BSSS mean)	Women	26	3.12 (0.64)	22	3.28 (0.58)	$t(46) = -0.893$, $p = .377$, $d = -0.26$
	Men	27	3.21 (0.52)	22	3.34 (0.43)	$t(47) = -0.972$, $p = .336$, $d = -0.28$
Need for social support (BSSS mean)	Women	26	3.18 (0.71)	22	3.30 (0.72)	$t(46) = -0.546$, $p = .588$, $d = -0.16$
	Men	27	2.71 (0.51)	22	2.91 (0.58)	$t(47) = -1.255$, $p = .216$, $d = -0.36$
Relationship quality (PFB mean)	Women	27	2.51 (0.57)	21	2.48 (0.47)	$t(46) = 0.198$, $p = .844$, $d = 0.06$
	Men	27	2.49 (0.44)	22	2.44 (0.39)	$t(47) = -0.387$, $p = .701$, $d = 0.11$
Childhood trauma (CTQ sum)	Women	27	55.48 (15.40)	21	55.90 (16.29)	$t(46) = -0.092$, $p = .927$, $d = -0.03$
	Men	27	43.81 (10.49)	22	48.59 (13.02)	$t(47) = -1.422$, $p = .162$, $d = -0.41$
PSI evaluation (pleasant mean)	Women	27	3.96 (1.02)	22	4.36 (0.66)	$t(47) = -1.593$, $p = .118$ $d = -0.46$
	Men	27	4.07 (0.96)	22	4.18 (0.80)	$t(47) = -0.422$, $p = .675$, $d = -0.12$
PSI evaluation (positive mean)	Women	27	3.81 (1.11)	22	4.32 (0.72)	$t(47) = -1.836$, $p = .073$, $d = -0.53$
	Men	27	4.07 (1.11)	22	4.36 (1.18)	$t(47) = -0.885$, $p = .380$, $d = -0.25$

Variable	Sex	EG		CG		Statistics
		N	*N (%)*	*N*	*N (%)*	
Education (high school)	Women	27	18 (66.67)	22	15 (68.18)	$\chi^2(4) = 7.844$, $p = .097$
	Men	27	14 (51.85)	22	14 (63.63)	$\chi^2(4) = 4.152$, $p = .386$
Nationality (German)	Women	26	26 (100)	22	19 (86.36)	$\chi^2(1) = 3.792$, $p = .052$
	Men	27	26 (96.3)	22	22 (100)	$\chi^2(1) = 0.832$, $p = .362$

(*continued on next page*)

Table 1 (*continued*)

Variable	Sex	EG		CG		Statistics
		N	*N (%)*	*N*	*N (%)*	
Couple therapy (past three months)	Women	19	1 (5.23)	16	1 (6.3)	$\chi^2(1) = 0.016$, $p = .900$
	Men	8	0 (0)	7	2 (28.57)	$\chi^2(1) = 2.637$, $p = .104$
Current medical or psychological therapy	Women	13	8 (61.54)	6	3 (50)	$\chi^2(1) = 0.224$, $p = .636$
	Men	4	1 (25)	2	0 (0)	$\chi^2(1) = 0.600$, $p = .439$
Prior experience (meditation/mindfulness/compassion)	Women	27	20 (74.07)	22	10 (45.45)	$\chi^2(1) = 4.183$, $p = .041$
	Men	26	8 (30.77)	22	16 (72.73)	$\chi^2(1) = 0.071$, $p = .791$
Prior experience (regular practice)	Women	21	6 (28.57)	13	2 (0.15)	$\chi^2(1) = 0.776$, $p = .378$
	Men	8	1 (0.13)	8	5 (62.5)	$\chi^2(1) = 4.267$, $p = .039$
Psychotropic drugs	Women	25	7 (28)	20	10 (50)	$\chi^2(1) = 2.288$, $p = .130$
	Men	26	2 (7.69)	21	3 (14.29)	$\chi^2(1) = 0.531$. $p = .466$

Note. IG = Intervention group, CG = control group, *N* = number of people in sample, *M* = mean, *SD* = standard deviation, HDRS = Hamilton Depression Rating Scale, PHQ-9 = Patient Health Questionnaire-9, PBD = Partner Burden Questionnaire (only measured in men), SCS = Self-Compassion Scale, KIMS = Kentucky Inventory of Mindfulness Skills, CLS = Compassionate Love Scale, BSSS = Berlin Social Support Scales, PFB = Partnership Questionnaire, CTQ = Childhood Trauma Questionnaire, PSI Evaluation (Pleasant) = Post PSI question how pleasant the conversation was scaled 1 (very unpleasant) – 5 (very pleasant), PSI Evaluation (Positive) = Post PSI question how positive the conversation was scaled 1 (very negative) - 5 (very positive), Education = number of participants with high school leaving certificate, Nationality = number of participants with German nationality, Couple Therapy = number of participants who were engaged in couple therapy during the past three months, Current Medical or Psychological Therapy = number of participants who were currently in individual treatment, Prior Experience = Any prior lifetime experience in mindfulness or compassion meditation, Psychotropic Drugs = number of participants currently taking psychotropic drugs, Time Since Onset = time since onset of any chronic psychological disorder, *t*-test for independent samples and Cohen's *d* for continuous variables, χ^2-tests for categorical variables.

reciprocal interaction dynamics also had to be actively and repeatedly discussed in our intervention groups and in individual couple sessions. Emotional injuries often became apparent, especially around the issue of "forgiveness," which could not be adequately addressed within ten sessions. The participating women in our study were predominantly seeking support for their depression after having already undergone repeated treatments. In addition, there is a high correlation between intrinsic motivation and pleasure, whereby precisely the ability to experience pleasure is strongly impaired in depressively burdened individuals (van Hooff and Baas, 2013). In fact, one would expect that the higher the intrinsic motivation, the more likely the added value from such a treatment. However, in depression treatment, motivation itself is

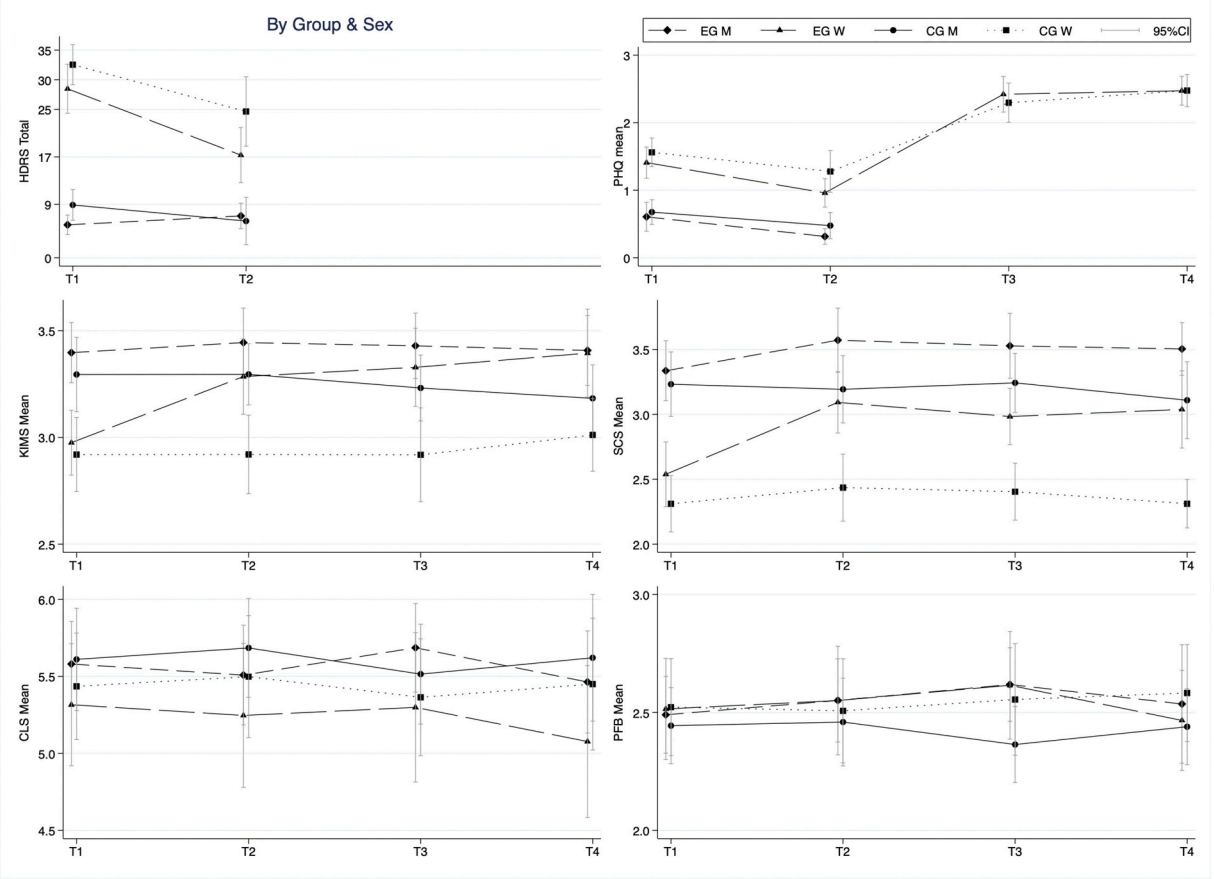


Fig. 2. Trajectories of outcome variables in detail for groups and sex at all measurement points using marginal means; M: men; W: women; IG: Intervention group; CG: control group; HDRS Total: Hamilton Depression Rating Scale sum score; PHQ Total: Patient Health Questionnaire-9 mean score; KIMS Mean: Kentucky Inventory of Mindfulness Skills mean score; SCS Mean: Self-Compassion Scales mean score; CLS Mean: Compassionate Love Scale mean score; PFB Mean: Partnership Questionnaire mean score.

Table 2
Two-level hierarchical linear regression models for ITT.

DV	Obs.		Model numbers	Model specification	Fixed effects added	Random effects	Model fit				LR-test against nested		
							AIC	BIC	LL	df_1	df_2	χ^2	$p > \chi^2$
HDRS sum	$n =$ 176	$n = 98$ (Ind.)	M1	RE only	–	Intercepts	1382.11	1391.62	−688.06	3	–	–	–
			M2	M1 + FE main effects	Group + Time	Intercepts	1276.20	1295.23	−632.10	6	3	111.91	≤ 0.0001
			M3	M2 + Interaction	Group * Time	Intercepts	1278.18	1300.37	−632.09	7	1	0.03	0.865
			M4	**M3 + Interaction**	**Group * Time * Sex**	**Intercepts**	**1259.03**	**1290.73**	**619.51**	**10**	**4**	**25.18**	**≤ 0.0001**
PHQ-9 mean	$n =$ 237	$n = 98$ (Ind.)	M1	RE only	–	Intercepts	423.96	434.42	−208.98	3	–	–	–
			M2	**M1 + FE main effects**	**Group + Time**	**Intercepts**	**354.16**	**382.04**	**−169.08**	**8**	**5**	**79.80**	**≤ 0.0001**
			M3	M2 + Interaction	Group * Time	Intercepts	359.60	397.93	−168.80	11	3	0.57	0.904
			M4	M3 + Interaction	Group * Time * Sex	Intercepts	362.07	410.86	−167.04	14	6	4.09	0.664
KIMS mean	$n =$ 309	$n = 98$ (Ind.)	M1	RE only	–	Intercepts	183.13	194.34	−88.57	3	–	–	–
			M2	M1 + FE main effects	Group + Time	Intercepts	161.24	191.11	−72.62	8	5	31.89	≤ 0.0001
			M3	M2 + Interaction	Group * Time	Intercepts	193.91	152.84	−65.42	11	3	14.40	0.002
			M4	**M3 + Interaction**	**Group * Time * Sex**	**Intercepts**	**137.96**	**205.16**	**−50.98**	**18**	**10**	**43.28**	**≤ 0.0001**
SCS mean	$n =$ 311	$n = 97$ (Ind.)	M1	RE only	–	Intercepts	454.02	465.24	−224.01	3	–	–	–
			M2	M1 + FE main effects	Group + Time	Intercepts	394.34	424.26	−189.17	8	5	69.68	≤ 0.0001
			M3	M2 + Interaction	Group * Time	Intercepts	382.64	423.78	−180.32	11	3	17.70	0.001
			M4	**M3 + Interaction**	**Group * Time * Sex**	**Intercepts**	**385.47**	**452.79**	**−174.74**	**18**	**10**	**28.87**	**0.0008**
CLS mean	$n =$ 309	$n = 98$ (Ind.)	M1	RE only	–	Intercepts	611.20	622.40	−302.60	3	–	–	–
			M2	M1 + FE main effects	Group + Time	Intercepts	616.69	646.56	−300.35	8	5	4.50	0.479
			M3	M2 + Interaction	Group * Time	Intercepts	617.351	658.42	−297.68	11	3	5.34	0.148
			M4	M3 + Interaction	Group * Time * Sex	Intercepts	630.34	697.54	−297.17	18	10	6.36	0.785
PFB mean	$n =$ 309	$n = 98$ (Ind.)	M1	RE only	–	Intercepts	164.57	175.77	−79.28	3	–	–	–
			M2	M1 + FE main effects	Group + Time	Intercepts	170.61	200.47	−77.30	8	5	3.96	0.555
			M3	M2 + Interaction	Group * Time	Intercepts	170.10	211.16	−74.05	11	3	6.51	0.089
			M4	M3 + Interaction	Group * Time * Sex	Intercepts	180.34	247.54	−72.17	18	10	10.27	0.417
BSSS perceived mean	$n =$ 203	$n = 97$ (Ind.)	M1	RE only	–	Intercepts	282.19	292.13	−138.10	3	–	–	–
			M2	M1 + FE main effects	Group + Time	Intercepts	286.15	309.35	−136.08	7	4	4.04	0.401
			M3	M2 + Interaction	Group * Time	Intercepts	285.29	315.11	−133.65	9	2	4.86	0.088
			M4	M3 + Interaction	Group * Time * Sex	Intercepts	291.82	338.21	−131.91	14	7	8.33	0.304
BSSS received mean	$n =$ 203	$n = 97$ (Ind.)	M1	RE only	–	Intercepts	314.65	324.59	−154.32	3	–	–	–
			M2	M1 + FE main effects	Group + Time	Intercepts	321.01	344.20	−153.50	7	4	1.64	0.802
			M3	M2 + Interaction	Group * Time	Intercepts	312.64	342.46	−147.32	9	2	12.37	0.002
			M4	**M3 + Interaction**	**Group * Time * Sex**	**Intercepts**	**313.82**	**360.21**	**−142.91**	**14**	**7**	**21.18**	**0.003**
BSSS need mean	$n =$ 203	$n = 97$ (Ind.)	M1	RE only	–	Intercepts	356.01	365.95	−175.00	3	–	–	–
			M2	**M1 + FE main effects**	**Group + Time**	**Intercepts**	**342.35**	**365.54**	**−164.17**	**7**	**4**	**21.66**	**≤ 0.0001**
			M3	M2 + Interaction	Group * Time	Intercepts	345.95	375.77	−163.98	9	2	0.40	0.820
			M4	M3 + Interaction	Group * Time * Sex	Intercepts	350.47	396.86	−161.24	14	7	5.88	0.554
BDI mean	$n =$ 203	$n = 97$ (Ind.)	M1	RE only	–	Intercepts	319.91	331.04	−156.96	3	–	–	–
			M2	M1 + FE main effects	Group + Time	Intercepts	224.19	254.85	−104.10	8	5	105.72	≤ 0.0001
			M3	M2 + Interaction	Group * Time	Intercepts	229.29	270.07	−103.65	11	3	0.90	0.825
			M4	**M3 + Interaction**		**Intercepts**	**220.79**	**287.52**	**−92.49**	**18**	**10**	**23.40**	**0.009**

Note. DV = dependent variable, Obs. = number of observations, LRT = Likelihood Ratio Test, AIC = Akaike Information Criterion, BIC = Bayesian Information Criterion, LL = Log Likelihood, Ind. = Number of individuals, M1/2/3/4 = Model Numbers, RE = Random Effects, FE = Fixed Effects, HDRS = Hamilton Depression Rating Scale, PHQ-9 = Patient Health Questionnaire-9, SCS = Self-Compassion Scale, KIMS = Kentucky Inventory of Mindfulness Skills, CLS = Compassionate Love

Scale, BSSS = Berlin Social Support Scales, BSSS perceived = perceived social support, BSSS received = received social support, BSSS need = need for support, PFB = *Partnership Questionnaire*, BDI = Beck's Depression Inventory.
The significant characteristic values of a whole row, printed in bold, indicate the preferred model.

Table 3
Post-hoc contrasts within groups between different measurement points (1–4) of the ITT-sample.

	Comparison Within IG						Comparison Within CG					
	2 vs 1	3 vs 1	4 vs 1	3 vs 2	4 vs 2	4 vs 3	2 vs 1	3 vs 1	4 vs 1	3 vs 2	4 vs 2	4 vs 3
HDRS sum	**−4.909*****	–	–	–	–	–	**−5.298*****	–	–	–	–	–
PHQ-9 mean	**−0.354*****	**−0.402****	**−0.374****	**−0.048**	**−0.020**	**0.028**	**−0.256****	**−0.367****	**−0.328****	−0.111	−0.072	0.039
BDI mean	**−0.269*****	**−0.345*****	**−0.296*****	**−0.076***	−0.027	0.048	**−0.241****	**−0.283*****	**−0.213****	−0.042	0.028	0.070
KIMS mean	**0.179*****	**0.194*****	**0.220*****	0.015	0.041	0.025	−0.002	−0.033	−0.011	−0.030	−0.009	0.022
SCS mean	**0.395*****	**0.319*****	**0.336*****	−0.076	−0.058	0.017	0.043	0.052	−0.061	0.009	−0.104	−0.113
CLS mean	−0.071	0.044	−0.179	0.115	−0.108	**−0.223***	0.069	−0.082	0.013	−0.151	−0.056	0.095
PFB mean	0.048	**0.114***	−0.003	0.066	−0.051	**−0.117***	−0.002	−0.022	0.028	−0.020	0.030	0.050
BSSS perceived support mean	0.054	–	−0.135	–	−0.189	–	−0.120	–	−0.016	–	0.104	–
BSSS received support mean	**0.167****	–	−0.197	–	−0.365	–	−0.169	–	−0.012	–	0.157	–
BSSS need for support mean	−0.152	–	−0.036	–	0.115	–	−0.075	–	0.019	–	0.094	–

Note. Model comparisons reported in Table 2; HDRS = Hamilton Depression Rating Scale, PHQ-9 = Patient Health Questionnaire-9, BDI = Beck's Depression Inventory, KIMS = Kentucky Inventory of Mindfulness Skills, SCS = Self-Compassion Scale, CLS = Compassionate Love Scale, PFB = Partnership Questionnaire, BSSS = Berlin Social Support Scales.
Significant values in bold: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$).

an important target, which was also addressed in our treatment, but there may have been too little time to consolidate this constituent, precisely because contemplative methods tend to be associated with more effort for novices (Tang et al., 2015). The men were mainly interested in participating for their partner's well-being, often paired with the feeling of great powerlessness in the face of their partners' repeatedly depressive episodes. Thus, the non-depressed men in our study are not comparable to self-selected and highly interested participants in common contemplative-based interventions. Working with couples or in a multi-person setting may require a more differentiated approach to the various initial conditions of the involved persons and, anticipating this, to work more on the personal motivation for participating in a treatment. Especially in relationships in which there is an imbalance between a "sufferer" and a "healthy" person, a role conception often arises with positions in which one is supported and one who supports; the equality in the fulfillment of one's own needs, also in the relationship, is thus ignored, but is essential for a healthy shaping of the intimate relationship.

(4) On the level of psychobiological measures, the training did not reveal treatment effects on sAA and sCort. However, a possible explanation could be that the PAT is not comparably strong as a valid social stress-test or a standardized couple problem-talk. For example, a previous study showed that a couple training significantly reduced sCort as a result of a problem talk, although this was mediated in part by increases in relationship quality (Ditzen et al., 2011) – whereas in our treatment, relationship quality did not significantly improve. Additionally, Perrone-McGovern et al. (2014) were able to show that a positive interaction condition was not significantly related to physiological arousal. Lastly, it might be possible that the treatment effects would have become more salient if the evaluation of the treatment would have covered the everyday life. Prior research has shown that social interactions in everyday life – especially their valence – are associated with improved functioning of the stress-axes and can foster social stress buffering (Stoffel et al., 2021).

4.1. Strengths and limitations

The uniqueness of our study resides in the application of a compassion intervention in the clinical setting including the social context: It is the first study to date that combines contemplative techniques with therapeutic elements of different approaches in a multi-couple setting showing that, while depressive symptoms did not improve stronger than in a TAU condition, mindfulness and self-compassion increased considerably. Our results can be understood as relatively robust, as both ITT and PP samples resulted in comparable outcomes. Moreover, we included not only self-report but also other-report as well as psychobiological measures in a quasi-experimental task for evaluation.

Contrary to our anticipated protocol, it was not possible to recruit exclusively couples including women with mild-to-moderate recurrent depression, we had to include also those with severe symptomatology. Overall, we had to extend the study by almost two years because recruiting the burdened couples proved to be extremely difficult. Due to the substantial psychobiological component in the overall project, we focused on depressed women and did not include depressed men. Because of limited resources, we could not include persons of other sex, or other relationship types such as same-sex couples. In addition, the included couples were comparatively well-educated, tended to be of higher socioeconomic status, had been together for an average of ten years, and were middle-aged. In addition, the couples tended to have a high relationship quality. As especially low relationship quality is a particular risk factor for depression (Teo et al., 2013), and this should be defined as inclusion criteria in future clinical couple-studies. Overall, we cannot generalize our findings to younger or distinct older couples, as well as to other relationship types or low socioeconomic status.

Recent studies point to the importance of capturing adverse effects of contemplative practices (Britton et al., 2021), which we did not encompass. However, we tested feasibility in an initial pilot-group and conducted an anonymous evaluation of the treatment at the end, both of which did not reveal any adverse side effects or subsequent harms at any point, rather than satisfaction with the form and content of the treatment and the gained achievements.

The issue of motivation is, in our view, a powerful element in contemplative interventions – perhaps even more so in clinical samples – especially in terms of establishing a continuous practice. Motivation is crucial here not only for engaging in the methods but also for aligning the inner stance of cultivating compassion for one's partner, which was probably not explicitly the case in our sample. Our study participants were interested in minimizing their level of suffering related to depression, not necessarily increasing their compassion for the other partner but rather experiencing more compassion *from* their partner.

Moreover, cultivating compassion for others in the original context of CBCT® is not only about one's own partner, but about extending it to others who are close to us, who are strangers or even adversaries. The cultivation of compassion for others is often very abstracted, whereas the confrontation with personal relationship structures usually reveals much greater difficulties – not only due to the complexity itself, but also due to the accompanying assumption of responsibility for one's own contribution to the respective relationship dynamics.

5. Conclusion

This is the first study to show that both partners benefit from a group-based compassion treatment for depression-affected couples. Employing a multidimensional approach helped to reveal different perspectives of outcomes: CBCT-*fC* led to an increase and maintenance of mindfulness and self-compassionate skills, yet, also to a decrease in depressive symptoms. In order to strengthen the perspective on and the experience of the romantic relationship as a resource and to link self-regulatory with co-regulatory processes on the basis of compassion, an appropriate treatment should include more than ten sessions, deploy booster sessions and should emphasize more on promoting everyday implementation. To pave the way from self- to compassionate co-regulation in depression, there should be much more focus on understanding interdependence, that the well-being of self and others are interrelated. Yet, the contemplative dimension in the treatment of depression implies fostering a tolerating stance regarding suffering of self and other while decreasing the tendency for experiential avoidance. One important step towards engaging in empathic concern and caring may be achieved by reducing emotional reactivity to negative-valenced experiences due to self-distancing, perspective broadening and cognitive re-appraisal.

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CRediT authorship contribution statement

CAR, MNJ and BD designed the study. CAR, MW and FW collected the data. MS supervised the assessment of endocrine markers. FW, MW, MNJ, CAR and MS prepared the different data sets, CH supported this process. MM programmed and monitored the data collection of practice time during CBCT-*fC* treatment. MNJ, CAR and FW performed the analysis, while MS analyzed the data of the endocrine markers. CAR modified the CBCT protocol, offered the treatment, did the couple diagnostic interviews and offered additional couple therapy sessions. LN and TH supervised the course of treatment. TP supervised for psychobiological aspects of the whole project. FW and MW performed the SCIDs. CAR, FW, MNJ wrote the first draft of the manuscript, MS contributed to all sections with regard to endocrine markers. All authors contributed to and have approved the final manuscript.

Declaration of competing interest

All authors declare no conflicts of interest.

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