



Exploring blended group interventions for depression: Randomised controlled feasibility study of a blended computer- and multimedia-supported psychoeducational group intervention for adults with depressive symptoms



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ABSTRACT

Background: Blended interventions aim to capitalise on the strengths of both computer-based and face-to-face therapy. Studies on this innovative treatment format remain scarce. This especially accounts for the group treatment of depression.

Method: The present study applied eclectic psychotherapy methods to an adult sample exhibiting a variety of depressive symptoms ($N = 46$). Participants were recruited by a newspaper inlet and randomised either to a treatment or a waiting list condition. Computer supported components were multimedia group sessions, e-learning, online videos and worksheets, remote therapist-patient communication and online pre-post-assessment.

Results: Large between-group effect sizes on primary outcome depressiveness (CES-D) ($F_{(1,44)} = 4.88$, $p = 0.032$; $d = 0.87$) and secondary outcome personal resources (resource scales) ($F_{(1,44)} = 9.04$, $p = 0.004$; $d = 0.73$ to $F_{(1,44)} = 8.82$, $p = 0.005$, $d = 1.15$) were found in the intention to treat analysis (ANOVA). Subjective evaluation of the intervention revealed high treatment adherence (91%) and high perceived relevance of supportive computer and multimedia components. Participants rated computer and multimedia components comparable to treatment elements such as group interaction or specific cognitive behavioural exercises, and 25% associated the utilisation of those components with treatment success. Depressiveness and age did not predict the utilisation and the appraisal of computer and multimedia components.

Discussion: Results provide preliminary support for the acceptability and feasibility of the investigated blended treatment in a group with non-specific depressive symptoms. However, small sample size and lack of diagnostics restrict generalizability. Additional research in clinical settings is needed.

1. Introduction

Mental disorders are highly prevalent and impose considerable suffering and a heavy burden on those they afflict and on society as a whole. They are also costly, and thereby affect both health systems and national economies (Vigo et al., 2016). Amongst others, major depressive disorder (MDD) is one of the leading contributors to, and a major risk factor for, somatic diseases (Lett et al., 2004), non-compliance in medical treatment (DiMatteo et al., 2000), mortality (Barth et al., 2004) and suicide (Brown et al., 2000). In Europe, about 14 million out of every 34 million depressed individuals go untreated on an annual basis (Kohn et al., 2004). Moreover, mental health care treatment gaps exist in many Western countries, such as Austria. Amongst others, fear of

stigma, lack of trained professionals, long waiting lists (Emmelkamp et al., 2014) and high private treatment costs (Spitzbart, 2004; Ayanian et al., 2000) act as treatment barriers. According to mental health experts, current top research priorities include health policy and systems research on how to deliver cost-effective interventions in a low-resource context (Tomlinson et al., 2009).

Online interventions hold promise to constituting such a low-resource translational strategy for mental health care (Andersson et al., 2014). Solid evidence for the effectiveness and cost-efficiency of such remotely delivered interventions exists, especially in the treatment of mental disorders like depression (Cuijpers et al., 2015) or anxiety (Pasarelu et al., 2017). Therapist guidance and support often appear crucial in maximising treatment effects and reducing dropout

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from these interventions (Johansson and Andersson, 2012; Richards and Richardson, 2012).

Within online interventions, an additional branch of research has recently been developed, aiming to merge classical face-to-face therapies with online interventions into the hybrid treatment format of “blended therapy” (cf. Kooistra et al., 2016). The professed goal of blended therapy is to combine the advantages of classical psychotherapy (e.g. personal contact) and online interventions (Kemmeren et al., 2016). As blending depends on contextual aspects and the number of possible configurations is high, it remains difficult to define exactly what blended therapy constitutes (Krieger et al., 2014). Blended therapy might be considered as any combination of web-, mobile- or technology-based application with face-to-face therapy. van der Vaart et al. (2014) consider blended therapy as “[...] a combination of online and face-to-face therapy, in which online sessions replace or substitute some (parts) of the sessions with a health professional [...]”. In other studies (cf. Craske et al., 2009) computer provide in-session support for the therapist in order to improve the delivery of evidence-based therapy methods. Kooistra et al. (2014) add that the combination of online and face-to-face components should result in one integrated treatment. For our study’s purpose we define blended therapy as an integrated combination of face-to-face sessions with in- and inter-session computer support, aiming at improving the delivery of evidence-based therapy. Usually, online components of blended treatments include psychoeducation, specific computer-adapted cognitive behavioural techniques as well as text- or video-based testimonials that guide participants through the intervention (Kooistra et al., 2016; Romijn et al., 2015). Content can be presented via e-learning, but there also exist simply structured applications for mobile phones (Ly et al., 2015). In many rationales, face-to-face sessions, online sessions and remote feedback on online sessions alternate every one or two weeks.

Concept studies on blended therapy indicate good acceptance of this new treatment format. For example, Craske et al. (2009) treated patients with anxiety disorders via a computer-assisted intervention and showed sustainable therapy outcomes and high participant satisfaction. A proof of concept study by Mansson et al. (2013) investigated the usefulness of an online support system for depression and anxiety, consisting of basic cognitive behavioural therapy (CBT) components and a library of internet cognitive behavioural therapy (iCBT) manuals. Involved therapists and patients evaluated the support system as beneficial in terms of providing structured therapy, facilitating communication and reducing therapist drift away from evidence-based treatment manuals. Moreover, blended treatment has the potential to reduce therapist time while maintaining efficacy. In an early comparative study (Wright et al., 2005), a computer-assisted short-term treatment for depression was found to be equally effective as an eight-session standard cognitive therapy. Currently, a European multicenter study is being undertaken in eight countries (E-Compared) with the aim of evaluating the cost-effectiveness of blended cognitive behavioural therapy (bCBT) on a large scale (Kleiboer et al., 2016). At same time, findings from naturalistic studies identify possible challenges that could arise from the integration of blended care into routine practice. Here, suboptimal implementation strategies might result in failures of expected time or cost savings (cf. Kenter et al., 2015).

While the blended treatment format has been investigated several times in individual therapy, little is known about its actual importance in group interventions. Psychological group interventions have a long history and a broad range of applications. They are well-suited to meeting patients’ needs, and when it comes to social interaction and social learning (Haight and Gibson, 2005) they are almost as effective as individual therapy (Mcdermut et al., 2001; Cuijpers et al., 2008) while remaining reasonably inexpensive, costing just half of what individual therapy does (Vos et al., 2005). Thus, mental healthcare stakeholders in Germany (Weber and Strauss, 2015) and Austria (Riedel, 2015) are currently promoting group interventions to increase their uptake.

Utilisation of technology in group interventions has been investigated in various contexts, such as chat-based group therapy (Barak and Wandler-Schwartz, 2000), online peer-to-peer support (Eysenbach et al., 2004; Hoey et al., 2008), chat groups for relapse prevention (Bauer et al., 2011) and as an adjunctive gamification tool (Miloff et al., 2015). However, only a few studies have integrated computer components more profoundly into the treatment rationale—as suggested by the above definition of blended therapy. Still, blended group intervention studies for some frequent disorders, such as generalised anxiety disorder (GAD) and social phobia, exist. Przeworski and Newman (2004) developed a group treatment for social phobia entailing Palm-top-supported relaxation, cognitive restructuring and self-control desensitisation modules. Findings suggest good acceptability of blended group treatments and possible savings of therapist time. A comparative study (Gruber et al., 2001) found equal effects in an 8-session blended group treatment for social phobia as a 12-session standard cognitive behavioural treatment. In a more recent controlled trial (Newman et al., 2014), comparable treatment outcomes were observed in a 6-session Palmtop computer-assisted group therapy for generalised anxiety disorders as a 12-session standard group therapy. However, literature on blended group interventions remains scarce and older studies do not adequately account for rapid changes modern technology and user behaviour have undergone in the last decade. Efforts to develop seamless software designs that better fit intuitive user behaviour are only one example. From a face validity standpoint, the lack of developed applications might be even more surprising, when considering that blended learning originates from group settings and is widely used — for example, as an integrative tool for teaching or cooperative training (Zumbach, 2010). Regarding the treatment of depression we have not been able to find any studies on acceptability and effects of blended group treatments.

2. Intervention

With respect to this situation, we merged both treatment strategies and created a blended psychoeducational group intervention for depression. Due to the demand for less stigmatising and more appealing treatments (Ellis et al., 2013), we designed an eclectic intervention with emphasis on positive and resource-oriented psychology. Resource-oriented psychotherapy focuses on current concerns and tries to build on personal skills in order to achieve set goals (cf. Grawe, 2004). The transtheoretical model of behaviour change (TTM; Prochaska and Diclemente, 1982) served as the underlying framework. TTM is a generic process model suggesting four common stages of change: contemplation (thinking about change), preparation (planning to change), action (adopting new habits) and maintenance (practising new behaviour). Course modules were aligned to the stages of the TTM (see Table 1). Here, psychoeducation, positive psychology as well as acceptance and mindfulness address more cognitive aspects of depression, while later stages (stress-, time and self-management) relate to behavioural treatment strategies.

The entire course included eight multimedia-supported group sessions (lasting 90 min), eight video-supported online homework modules (offered via an e-learning platform), a 180-slide handout, a semi-structured diary and daily brief relaxation in the first two weeks. Detailed information on the course modules is presented in Table 1. An unpublished one-arm pre-pilot study (student sample, N = 18) preceded the present trial to ensure its applicability and to adjust the intervention to participants’ needs. Subsequent adjustments merely concerned minor changes, such as swaps of single tasks or the introduction of a mid-course break and a slight reduction in total workload. Observed within subjects effect sizes ranged from $d = 0.6$ to 1.0.

Table 1
Psychoeducational lectures and computer-supported components of the “Adventure Self” intervention.

Week	Lectures & psychoeducation	Computer & multimedia components
	Pre-assessment	Worksheet 1
C.1	Opening and information on course structure. Psychoeducation on positive psychology, self-actualisation & self-management. Introduction to the current concerns concept. Instruction for current concerns diary, and relaxation.	Video 1 PPT-presentation Worksheet 2
C.2	Discussion of homework assignments. Psychoeducation on human perception and cognitive biases. Discussion on human defence mechanisms. Psychoeducation on acceptance and mindfulness core principles and instruction for the mindfulness-based diary task.	Video 2 PPT-presentation Mobile phone diary*
P.3	Discussion of homework assignments. Psychoeducation on human memory and learning processes. Discussion on learned behaviour patterns and human change. Introduction to self-instructive writing, based on diary content.	PPT-presentation Worksheet 3 Mobile phone diary*
P/A.4	Discussion of homework assignments. Psychoeducation on psychological motivation theories and goal setting, with emphasis on Vroom's VIE-theory (1964). Group exercise on “SMART” goal setting and instruction for Goal-Attainment-Scaling. Break	PPT-Presentation Online goal Attainment-scaling with feedback
A.5	Revision of sessions 1–4. Psychoeducation on self-regulation and self-control. Group exercise on strengths and weaknesses profile. Discussion and refinement of individual goals. Instructions for weekly diary task.	PPT-presentation Contract with myself-Worksheet 4 Mobile phone diary*
A.6	Discussion of homework assignments. Psychoeducation on time management, realistic time scheduling and the “small steps concept” by Kanfer. Group exercise on “time-thieves”. Group discussion on practical aspects of time management and prioritisation. Introduction to specific time management methods.	PPT-presentation Worksheet 5 Mobile phone diary*
M.7	Discussion of homework assignments. Psychoeducation on psychological stress, cognitive and somatic factors of stress and stress management. Group discussion on common psychological stressors and coping strategies. Group exercise “stress traffic light” and guided mindfulness meditation.	PPT-Presentation Video 6 + worksheet 6 Mobile phone diary*
M.8	Revision of sessions 5–7. Psychoeducation on slow and problematic change patterns and handling of setbacks. Group discussion on problematic change and relapse prevention. Course conclusion. Post-assessment	PPT-presentation

Note: Letters C to M: Course stages (C = contemplation, P = preparation, A = action, M = maintenance); PPT-presentation = in-session PowerPoint presentation; mobile phone diary* = participants were free to choose between a mobile phone diary or a handwritten diary.

3. Research questions and hypotheses

In keeping with the stage model of behavioural therapy research (Rounsaville et al., 2006), the aim of the present feasibility study was to test the previously developed intervention by evaluating its acceptability and efficacy in a self-selected sample of adults exhibiting a variety of depressive symptoms. We expected high acceptance of our intervention, resulting in good adherence and high acceptability ratings. We assumed that our intervention would reduce self-reported depressive symptoms and enhance personal resources. In addition, we hypothesised that participants would evaluate multimedia and computer components as relevant and useful treatment features.

4. Design and methods

4.1. Subjects' inclusion and exclusion criteria

Participants living in the area of Salzburg (Austria) who were familiar with the use of computers and had home access to the internet were invited to participate. Exclusion criteria were the following: aged under 18 or above 65, simultaneously undergoing psychotherapy or counselling, a history of suicide attempts or current tendency toward self-harm, current alcohol or drug addiction or suffering from a severe psychiatric condition, such as manic or psychotic conditions, and bipolar disorder that could interfere with treatment (assessed via online-screening). Due to restricted resources we did not assess any diagnoses based on clinical interviews and the appraisal of depressiveness relied solely on self-reported depressiveness (CES-D).

4.2. Recruitment and study design

The calculated sample size for a two-way repeated measures ANOVA using G*Power (Faul et al., 2007) was $N = 64$ for an effect size of $d = 0.8$ (alpha-error $\alpha = 0.05$, power $\beta = 0.80$). Effect size estimations were based on prior results of the pre-pilot study. Subjects were recruited by public announcement in a local newspaper. The

announcement contained information on the intervention components and procedure. Computer and multimedia utilisation was mentioned but not touted as special feature. During the three-week registration period, 74 individuals enrolled online. A total of 47 participants completed the online questionnaire and were randomised to either the treatment or a waiting list control group, using a true random number service (www.random.org). Out of those a minor number of participants ($n = 10$) reported above average symptoms of depression but remained slightly under the CES-D cut-off for depression. Due to the study's tight time schedule, we decided to include those subjects as minor subclinical subpopulation. The intervention and data acquisition took place over a period of five months, beginning in January 2014. Ten weeks after treatment started post-measurements were completed by 21 of the 23 participants in the intervention group and by 17 of the 24 participants in the control group. One participant had to be excluded from ITT analysis. Fig. 1 presents the flowchart demonstrating the recruitment and research procedure in detail.

4.3. Sample

Demographic, behavioural and clinical characteristics of both groups at baseline are presented in Table 2. Behavioural data refers to possible daily life habits (relaxation and regular diary use) which formed part of applied intervention techniques.

4.4. Outcome measures

4.4.1. Primary outcome

The primary outcome of the study was a reduction in depressiveness. Accordingly, the primary outcome measure was the short form of the German translation of the CES-D, the Center for Epidemiological Studies depression scale (Hautzinger and Bailer, 1993). This questionnaire assesses the emotions, motor functions and interactive, cognitive and somatic symptoms associated with depression on a 16-item, 4-step Likert-type scale. According to the authors, the German version's cut-off value (CES-D > 17) has very high discriminative validity, indicated by

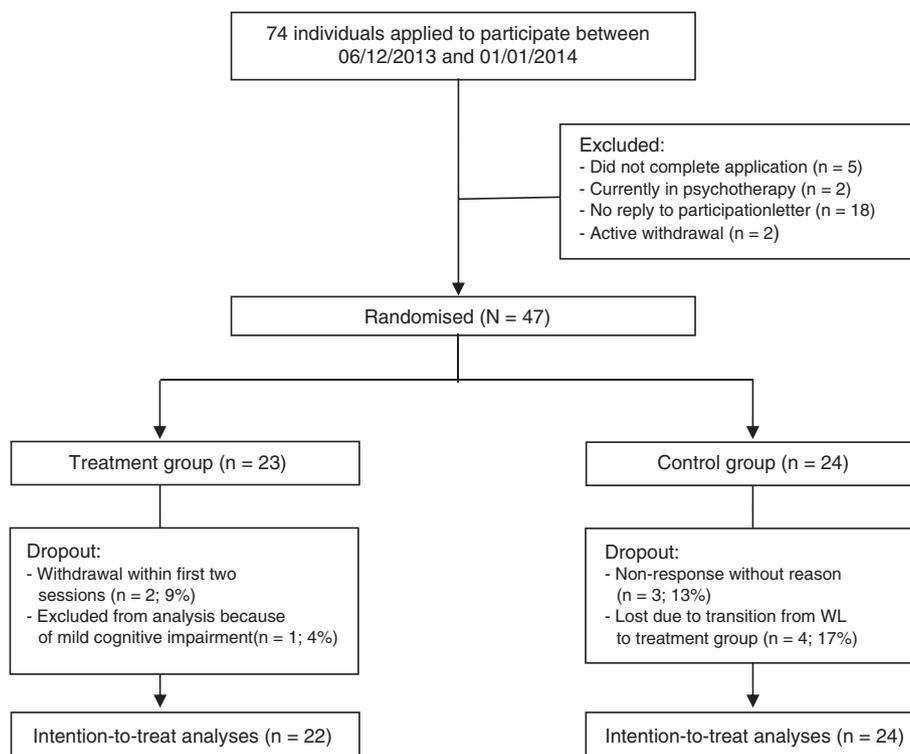


Fig. 1. Study's flow chart.

a sensitivity of 90%, a specificity of 87% (Hautzinger and Bailer, 1993) and an AUC value (area under the curve) of 0.94 (Lehr et al., 2008). The reliability of the CES-D has been shown to be excellent (Hautzinger et al., 2012). Cronbach's alpha in the present study was 0.91.

4.4.2. Secondary outcome

Since the intervention was designed as a resource-oriented program, the German "Fragebogen zur Erfassung von Ressourcen und Selbstmanagementfähigkeiten - Gesamtressourcen (FERUS; Jack, 2007) (Questionnaire for the Assessment of Resources and Self-Management Abilities - common resources), consisting of the subscales "coping", "self-awareness", "self-efficacy", "self-verbalisation" and "hope" (44-item, 7-step Likert-type scale), was applied. Cronbach's alpha of the total scale was 0.92 in the present study.

As many aspects of our eclectically arranged intervention were not covered by the first secondary outcome (FERUS), we decided to apply a short self-designed measure that would better fit the variety of applied psychological techniques and related constructs. This decision was

impelled by the explorative nature of the study and the fact that only a few resource questionnaires have been translated into German. One of them (the German version of the Ryff scales of psychological well-being; Risch et al., 2005), exhibited low reliability in prior studies and was therefore regarded as unusable for our small trial. Thus, the self-developed "Fragebogen zur Erfassung von Achtsamkeit und Selbstmanagement" (SEL-B; Questionnaire for the Assessment of Mindfulness and Self-Management), consisting of the subscales "awareness" (4 items), "acceptance and commitment" (8 items), "goal orientation" (4 items), "delay of gratification" (4 items), "structured behaviour" (6 items) and "reinforcement" (4 items) (altogether a 30-item, 7-step Likert-type scale) was applied, assessing additional resources and abilities specifically related to the intervention. Cronbach's alpha of the scale was 0.95.

4.4.3. Usefulness of the intervention

Usefulness was measured by a five-item scale. According to the course of the intervention (see Section 2, as well), usefulness questions were based on the transtheoretical model of behaviour change (TTM).

Table 2 Demographic, behavioural and clinical characteristics of the study samples at pre-treatment.

	Experimental group (n = 23)	Waiting list control group (n = 24)	Statistics
Demographic characteristics			
Gender: female, n (%)	18 (78.3)	14 (58.0)	$\chi^2_{(1, N = 47)} = 1.45, p = 0.147$
Age: mean (S.D.)	47.5 (12.0)	44.3 (11.8)	$t_{(45)} = 0.91, p = 0.370$
Education: ≥ 12 years, n (%)	16 (69.6)	20 (83.4)	$\chi^2_{(1, N = 47)} = 1.10, p = 0.270$
Behavioural data (pre)			
Habitual use of some private diary or organiser: n (%)	7 (30.4)	3 (12.5)	$\chi^2_{(1, N = 47)} = 1.49, p = 0.137$
Habitual timeouts or relaxation: n (%)	8 (34.8)	7 (29.2)	$\chi^2_{(1, N = 47)} = 0.41, p = 0.683$
Therapy and counselling			
Prior experience: n (%)	5 (21.7)	8 (33.3)	$\chi^2_{(1, N = 47)} = 0.88, p = 0.380$
Depressiveness (pre)			
CES-D > cut-off: n (%)	18 (78.3)	19 (79.2)	$\chi^2_{(1, N = 47)} = 0.08, p = 0.940$

Note: CES-D cut-off > 17 scale points.

The scale comprised one general usefulness item and four items on the usefulness of the training according to the four stages of change of TTM: contemplation (thinking about change), preparation (planning to change), action (adopting new habits) and maintenance (practising new behaviour). Ratings had to be given on a 7-step Likert-type scale and Cronbach's alpha in the present study was 0.93.

4.4.4. Relevancy of the intervention components and perceived working factors

Perceived working factors: To avoid priming effects, an open-ended question was posed in the first section of the post-treatment questionnaire. Participants were instructed to respond telegraphically to the question: "From your own perspective, which factors caused the positive or negative effects the intervention had on you"? Two independent raters applied hybrid inductive-deductive content analysis (Fereday and Muir-Cochrane, 2006). In this approach, the deductive theory-driven perspective (e.g. code manual) meets the inductive data-driven perspective and, thus, is suited to looking at the data abductively and identifying aspects that contradict or do not fit with the existing theory (Timmermans and Tavory, 2012). Content analysis was carried out using open access online text analysis software (QCAmap; Mayring and Fenzl, 2016). The software aims to standardise rule-guided qualitative categorisation and entails automated quantitative analyses of category frequencies. A directory containing common psychotherapy working factors and information on intervention content served as a code manual, but the raters were free to designate other, or new, categories. Inter-rater agreement for the main categories, according to a weighted Cohen's Kappa, was $K = 0.77$ (77% agreement) and agreement for the main and subcategories was $K = 0.43$ (43% agreement). Subsequently, both raters had to determine which of their category systems best fit the data. After selecting one category system for revision, both raters and one of the authors (RS) met for revision and agreed to rename one category (tag "a" in Table 5) and to specify 3 categories (tag "b" in Table 5).

Relevancy of intervention components: After having answered the open format question on perceived working factors, participants evaluated the relevancy of different intervention components by assigning 40 points to the components "lectures", "group", "multimedia" and "exercises". The participants were instructed as follows: "Please assign a total of 40 points, according to your perceived relevancy of the following intervention components". The same evaluation was used to assess the time spent on the homework tasks "relaxation", "diary", "multimedia" and "specific exercises": "Please assign a total of 40 points, representing the time you spent on the following homework tasks".

4.5. Data analysis

Statistical analyses were carried out using IBM SPSS 22. Demographic data were analysed using chi-square tests and independent *t*-tests. Relevancy rankings of seminar components (reported in Section 5.4) were not normally distributed and, thus, have been calculated using Mann-Whitney *U* tests. Treatment effects were calculated using ANOVA based on an intention-to-treat analysis (ITT). Missing data was imputed by the last observation carried forward (LOCF) method (Spokas et al., 2008). For the assessment of change between-group effect sizes were calculated, using Cohen's *d* formula (Cohen, 1988) and applying pooled standard deviation at baseline.

The change scores of all applied measures (CES-D, FERUS, SEL-B) were evaluated by calculating the reliable change index (Jacobson and Truax, 1991) which controls for measurement errors in the twofold application of the instruments. The concept of clinically significant improvement was applied to depressive symptoms and is defined as reliable change combined with a post-treatment score below the CES-D cut-off of > 17 (Hautzinger et al., 2012). Accordingly, participants were deemed to have made a clinically significant improvement if they scored below the cut-off value of > 17 at the post-treatment measure-

ment while also having improved by at least 4.72 points. Conversely, a person was deemed to have reliably worsened if she or he scored at least 4.72 points above the pre-treatment CES-D score (cf. Rozenant et al., 2017).

4.6. Procedure

The study was conducted at the Department of Psychology of the University of Salzburg (Austria). There was no compensation for participation and informed consent was obtained before intervention began. Ethical approval for the study was received from the University of Salzburg's research ethics board. Two trained graduate students, both at the end of their Master's study in clinical psychology, applied the intervention in a single training session (90 min) to six groups consisting of seven or eight participants each. Participants could not be blinded to their assigned trial condition, but they were blinded to the status of the waitlist as a control condition. By collecting data online, arrangements were adopted to standardise evaluation. A web-portal provided detailed information on the intervention and the online registration. One week before the intervention began, the participants were asked to complete a 168-item pre-questionnaire online. The course was scheduled in two, four-week blocks, interrupted by a one-week break in between. If the participants missed a session, they were invited to participate in the parallel group. Each session started with a 20-minute discussion sharing their thoughts on, and experiences with, the last week's homework. Subsequently, a 50-minute midsession followed containing psychoeducation presented in a classical teacher-centred format using a projector. Participants were encouraged to ask questions at any time. The midsession was interrupted by a 10-min break. The closing procedure was a 20-minute reflection on the session, with a focus on the important aspects and critical issues. The first session was preceded by a text-based online homework task. All homework was accessible via an e-learning platform and weekly reminders were sent out via e-mail. These reminders eventually included organisational information, exemplarily a Doodle survey to replace a missed session. One week after the intervention had ended, participants completed the post-questionnaire.

5. Results

5.1. Primary outcome

A significant time \times group interaction was found for the CES-D, resulting in an *F*-value of $F_{(1,44)} = 4.88$, $p = 0.032$. Pairwise comparisons found significant decreases of depressiveness in the experimental group ($p = 0.019$) but not in the control group ($p = 0.967$). According to Cohen's criteria (Cohen, 1988), the post-treatment between-group effect size of $d = 0.87$ (95% CI: 0.26 to 1.46) can be categorised as high. Reliable change (RCI) was observed in 55% of the intervention group and clinically significant improvement was found in 50%. Reliable deterioration was observed in three participants (13%), but two of them improved reliably on the remaining scales. In contrast RCI was significantly lower in the control condition (17%). Reliable deterioration again was observed in three participants (13%). Further information on group means, effect sizes (within- and between-groups) and confidence intervals of CES-D scores can be gained from Table 3. Taking wide confidence intervals into account (Table 3), magnitude of within and between-group effect size corresponded and there was no difference at pre-measurement ($p = 0.448$).

5.2. Secondary outcomes

A clearly significant time \times group interaction was found for the FERUS, resulting in an *F*-value of $F_{(1,44)} = 9.04$, $p = 0.004$. Pairwise comparisons found significant increases of personal resources in the experimental group ($p = 0.001$) but not in the control group

Table 3
Means, standard deviations and effect sizes (Cohen's *d*) for CES-D, FERUS and SEL-B.

	<i>n</i>	Observed means (SD)		Effect sizes (based on observed means)		<i>p</i> -Values	
		Pre	Post	Pre- to post-within effect sizes	Post-between-effect sizes	Pre- to post comparison	Post comparison
CES-D							
Treatment group	22	22.0 (5.41)	18.1 (5.82)	0.71 [0.11–1.28]	0.87 [0.26–1.46]	<i>p</i> = 0.019	<i>p</i> = 0.005
Control group	24	23.5 (7.28)	23.5 (6.65)	0.01 [– 0.57–0.56]	–	<i>p</i> = 0.967	–
FERUS							
Treatment group	22	5.01 (0.69)	5.61 (0.56)	0.96 [0.34–1.56]	0.73 [0.12–1.30]	<i>p</i> = 0.001	<i>p</i> = 0.020
Control group	24	5.02 (0.66)	5.09 (0.84)	0.09 [– 0.47–0.66]	–	<i>p</i> = 0.492	–
SEL-B							
Treatment group	22	4.67 (0.90)	5.45 (0.68)	0.98 [0.35–1.54]	1.15 [0.51–1.74]	<i>p</i> < 0.001	<i>p</i> < 0.001
Control group	24	4.36 (0.78)	4.54 (0.89)	0.22 [– 0.36–0.78]	–	<i>p</i> = 0.076	–

Note: Standard deviations are shown in parentheses and 95% confidence intervals are shown in square brackets. CES-D: Center for Epidemiological Studies-Depression Scale; FERUS: Questionnaire for the Assessment of Resources and Strengths; SEL-B: Questionnaire for the Assessment of Mindfulness and Self-management.

(*p* = 0.492). The post-treatment between-group effect size was *d* = 0.73 (95% CI: 0.12 to 1.30) and reliable change was found in 75% of the intervention group (17% of control group). As a questionnaire assessing personal resources and self-management abilities, the self-designed SEL-B displayed comparable outcomes: $F_{(1,44)} = 8.82$ *p* = 0.005, *d* = 1.15 [95% CI: 0.51 to 1.74] and RCI = 65% (25% of control group). Here, pairwise comparisons found a significant increase of personal resources in the experimental group (*p* < 0.001) and a tendentially increase in the control group (*p* = 0.076). Exact information on group means, effect sizes (within- and between-groups) and corresponding confidence intervals can be gained from Table 3. Again, magnitude of within- and between-group effect sizes corresponded (Table 3) and there were no differences at pre-measurement (*p* = 0.926 and *p* = 0.219).

5.3. Acceptability

With only two individuals withdrawing within the first two sessions, adherence can be described as high (91%). The overall usefulness of the intervention was rated high with a median of 6.25 ($Q_{(25-75)} = 6-7$) on a 7-step Likert-type scale. According to the transtheoretical model of behaviour change (TTM), usefulness was rated for the different stages of behaviour change: thinking about changes: *Md* = 6.55 ($Q_{(25-75)} = 6-7$), planning to change: *Md* = 5.65 ($Q_{(25-75)} = 5-7$), adopting new habits: *Md* = 6.10 ($Q_{(25-75)} = 6-7$) and practising new behaviour: *Md* = 6.35 ($Q_{(25-75)} = 6-7$). The item “planning to change” differs tentatively from the average rating ($\chi^2_{(19)} = -1.81, p = 0.07$).

5.4. Relevancy of the intervention components and perceived working factors

Participants evaluated the perceived relevancy of four main intervention components and the time spent doing homework by giving two, 40-point ratings (see Table 4). Lectures ranked top in the relevancy ratings, differing significantly from group interaction and discussion, computer and multimedia components and specific exercises ($Z_{(19)} = 2.2, p = 0.028$). Computer and multimedia components were described as comparably important to group interaction and specific exercises. In the homework rating, computer and multimedia components were described as the components people spent the most time on. However, only relaxation deviated significantly from computer and multimedia ($Z_{(19)} = -2.67, p = 0.007$) and specific exercises ($Z_{(19)} = -2.42, p = 0.016$), resulting in a lower perceived relevancy for relaxation. While reported engagement was high, perceived workload was low.

Quantitative analysis of open format subjectively perceived working factors resembles these ratings to some extent (see Table 5). In total, data from 20 participants were entered into the analysis and *N* = 66

Table 4
Distribution of two 40-point ratings on the relevancy of the intervention components and on the weekly time spent for each homework task (*n* = 20).

Perceived relevancy	Assigned points	<i>p</i> -Value	Homework spent on	Assigned points	<i>p</i> -Value
Lectures	12.00*	<i>p</i> = 0.016	Diary tasks	9.37	<i>p</i> = 0.388
Group and discussion	8.85	<i>p</i> = 0.187	Relaxation (unguided)	7.42**	<i>p</i> = 0.007
Computer and multimedia	9.20	<i>p</i> = 0.611	Computer and multimedia	11.53	<i>p</i> = 0.141
Exercises	9.70	<i>p</i> = 0.834	Specific exercises	11.00	<i>p</i> = 0.207
		+ workload hours/week		2.5 (2–3)	
		<i>MD</i> (Q_{25-75})		2 (1–3.8)	
		+ overload on 7 Likert <i>MD</i> (Q_{25-75})			

* *p* < 0.05.
** *p* < 0.01.

factors were observed, resulting in an average count of 3.3 working factors per participant. Applying content analysis, the following main working factors were found: group interaction (19.7%), specific exercises (16.7%) and lectures and psychoeducation (13.6%). Multimedia and computer components were mentioned to a lesser degree (7.6% of all statements; 25% of participants). The relative position of multimedia and computer components in the texts was $\Delta_0 = 0.44$ (0 = beginning of text, 1 = end of text).

5.5. Additional findings

5.5.1. Age, depressiveness and appraisal of computer components

One might also wonder if depressiveness and age predict the utilisation and the appraisal of computer and multimedia components. CES-D pre-treatment scores related to neither perceived relevancy of multimedia and computer components ($r = -0.094, p = 0.695$), nor to their self-reported utilisation ($r = 0.143, p = 0.558$). There was no relation between age and utilisation ($r = 0.052, p = 0.832$) or appraisal of multimedia and computer components ($r = -0.142, p = 0.561$). With respect to improvement of self-reported depressiveness, we found a high correlation between levels of CES-D pre-treatment scores and symptom reduction ($r = 0.587, p = 0.007$). Higher pre-treatment symptom intensity resulted in stronger reductions of it. Accordingly, participants scoring above the CES-D cut-off (> 17 scale points) exhibited a more pronounced reduction of depressive symptoms (*d* = 1.05; 95% CI: 0.30 to 1.67) than those below this threshold.

5.5.2. Completers-only analyses of ANOVA

Completers-only analyses included 20 individuals in the treatment

Table 5
Subjectively perceived working factors of the blended group intervention ($n = 20$).

Working factor	<i>n</i> counts (main categories)	<i>n</i> counts (sub- categories)	% of all factors	% of all participants
Group	13		19.7	65
-Group		4		
-Self-disclosure in group		3		
-Discussion ^b		2		
-Model learning ^b		2		
-Weekly meetings & cohesion ^b		2		
Specific exercises	11		16.7	55
-Exercises		4		
-Goal attainment scaling		3		
-Strengths & weaknesses analysis		2		
-Contracts		2		
Lectures, content, psychoeducation	9		13.6	45
-Course content		3		
-Interesting content		2		
-Lectures		2		
-Thought provoking/ inspiring content		2		
Trainer	6		9.1	30
Multimedia and computer	5		7.6	25
-Videos		3		
-Media material		1		
-Online exercises		1		
Self- & time management	4		6.1	20
Homework	3		4.6	15
Diary	3		4.6	15
Awareness and acceptance	3		4.6	15
Resource activation	3		4.6	15
Self-reflection	2		3.1	10
Meditation	2		3.1	10
Motivational clarification	1		1.5	5
Positive thinking ^a	1		1.5	5
Total number of factors	66		100	
Average factors per participant	3.3			

Note: *n* counts = number of counts associated with a specific working factor; % of all factors = proportion of all factors; % of all participants = proportion of all participants.

^a Renamed category.

^b Specified category.

and 17 individuals in the control condition and revealed similar treatment effects. Group \times time interaction was $F_{(1,35)} = 4.92$, $p = 0.033$ for CES-D ($d = 0.87$; 95% CI: 0.19 to 1.55). Statistics for resource-scales were $F_{(1,35)} = 6.82$, $p = 0.013$ for FERUS ($d = 0.79$; 95% CI: 0.12 to 1.05) and $F_{(1,35)} = 6.19$, $p = 0.018$ for SEL-B ($d = 0.92$; 95% CI: 0.24 to 1.60).

6. Discussion

The primary aim of the present feasibility study was to pilot a new blended group intervention for the treatment of depression by evaluating its acceptability in a self-selected sample of adults exhibiting a variety of depressive symptoms. Due to short treatment period and eclectic arrangement of psychological intervention techniques we were also interested in the achievable magnitude of treatment effects. As hypothesised the intervention reduced self-reported depressiveness and promoted personal resources and self-management abilities. Multimedia and computer components were described as important features and perceived as active treatment factor.

Regarding participants' satisfaction and usefulness of the blended format results are encouraging. The overall treatment satisfaction was high and findings correspond to other studies employing face-to-face and computerised intervention components in individual therapy for depression (Hoifodt et al., 2013; Mansson et al., 2013) and group

therapy for anxiety disorders (Gruber et al., 2001; Przeworski and Newman, 2004). Usefulness ratings were somewhat lower for TTM stage *planning of behaviour changes*. Here, fostering self-management by adding behaviour activation tools could lead to additional improvement of the rationale. That is similar to what Ly et al. (2015) found. They investigated a blended behaviour activation treatment utilising smart phones as a supportive treatment feature to plan and monitor activities.

With respect to treatment adherence, high treatment acceptability was indicated by a low withdrawal rate (9%). Literature points to withdrawal rates of between 36 and 47% for psychotherapy across various settings (Garfield, 1994; Sparks et al., 2003; Wierzbicki and Pekarik, 1993), an average withdrawal rate of 19% for group treatments of depression (Mcdermut et al., 2001) and comparable rates for computerised or web-based treatment programs (Melville et al., 2010; Waller and Gilbody, 2009). Whether high satisfaction and adherence can be transferred into naturalistic settings warrants future investigation.

As for the computer and multimedia components of our study our results are very promising. The relevancy of those components was rated comparable to treatment factors established in literature and participants engaged extensively with given homework assignments. Although high acceptability-rates of online components seem to emerge consistently from blended (group) intervention studies (see also Craske et al., 2009; Przeworski and Newman, 2004) many questions still remain open for future investigation. Research on blended group interventions for example might identify additional helpful online features, such as gamification (Miloff et al., 2015) or interactive post-treatment activities (Bauer et al., 2011). It seems reasonable to assume that exact forms and ratios of blends (van der Vaart et al., 2014) vary depending on investigated disease (cf. Tillfors et al., 2008) but also as a function of setting (e.g. individual vs. group). Here, research should determine to which extent certain rules regarding indication and appearance of blended therapy can be generalised across different settings (Wentzel et al., 2016).

When it comes to the subjectively perceived treatment factors, 25% of our participants retrospectively named computer and multimedia components when attributing treatment effects (8% of all treatment factors). Due to the complex processes taking place in psychological (group) interventions (Yalom and Leszcz, 2005; Grawe, 2004), this proportion seems substantial. Concluding that computer and multimedia components constitute active treatment factors appears somehow illogical, as the medium is not usually the agent itself. Thus, participants' explicit appraisals may actually suggest enhanced transportation of some other (nameable) active factors by computer and multimedia components (cf. psychoeducation; van der Vaart et al., 2014). For example, in many group discussions, and also during post-treatment debriefing, participants referred to videos featuring expert talks or sequences of psychological documentaries. This might reflect the participant's need to understand their problems and possible problem solving strategies (e.g. motivational clarification; Grawe, 2004). On the other hand, it may indicate the relevancy of external (expert) knowledge as a source of information and credibility (cf. imparting information; Yalom and Leszcz, 2005).

Despite these very promising results, possible side- and negative effects of new interventions have to be examined carefully (Rozental et al., 2014). Literature suggests deterioration in 10 to 16% of group psychotherapy patients (Roback, 2000). In our sample, three participants (13%) experienced reliable deterioration in terms of increased self-reported depressiveness. None of them had prior therapy experience. While two of them rated the seminar helpful and reported reliable improvements in their resources and self-management abilities, one participant reported a decrease in her personal resources and no change in her self-management abilities. These observations underpin the importance of multi-construct and complementary evaluations (Hanson et al., 2005) when interpreting deteriorations.

Due to the exploratory nature of the study and the small sample size,

several limitations have to be considered when interpreting our findings. In the following, we will discuss four main points in this regard. *First*, important clinical properties of our sample are uncertain as we did not apply any clinical criteria to select our sample and the sample was drawn through a public announcement. Therefore, safe conclusions about the clinical effectiveness of our treatment cannot be drawn. On the other hand too firm inclusion criteria run the risk of applying a restrictive, non-naturalistic exclusion policy, which in turn might undermine external validity (Mcdermut et al., 2001). Additionally, participants with high pre-treatment depression levels tended to demonstrate stronger reductions of symptoms and positive usefulness ratings were independent from depressiveness. However, further research in clinical settings is warrant. *Second*, some data have been assessed by non-standardised measurements (one secondary outcome measure and usefulness of the treatment rationale) and there was no follow-up assessment. This limits comparability to other studies and impedes conclusions about stability of observed effects. *Third*, two of the study's authors (RS and IL) were involved in the treatment and its evaluation, thereby resulting in a heightened risk of bias. To minimise such biases, all specifications were met beforehand, all questionnaires were automatically applied online, results were reported comprehensively and qualitative data were evaluated by two independent psychologists. *Fourth*, even though findings are encouraging, the present study involved only a small number of participants and a non-active waiting list control group. As a consequence the extent to which observed effects are specific to particular intervention elements (e.g. computer and multimedia components) cannot be inferred. Due to the small sample size our trial was underpowered, resulting in less statistical reliability (e.g. reported effect sizes). Additionally, smaller between-group effect sizes are expected in samples exhibiting some recovery in the control group or if treatment is compared to an active control condition (Feng et al., 2012; Cuijpers and Smit, 2008). Finally, LOCF is a wide spread but also debated statistical method to impute missing data (Verbeke et al., 2010). As stability check, we received equally effects when applying completers-only analyses.

7. Conclusion

In summary, we found evidence for the acceptability of our blended group treatment for depression. Although the lack of diagnostic assessment weakens the study's validity as it relates to the treatment of depression, many reasonable arguments for its feasibility can be found. Further work is required to test the treatment in a clinical sample. From a wider perspective blended therapy seems to offer a variety of applications for in- and out-patient group treatments as it facilitates knowledge acquisition, monitoring and exercising and can open alternative pathways of patient-to-patient or patient-to-therapist communication.

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Conflict of interest

None of the authors has, or has had, any financial, personal or other relationship with people or organisations that would interfere with the interpretation and presentation of this study's findings.

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