

The joy dance

Specific effects of a single dance intervention on psychiatric patients with depression

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Abstract

This study investigated the specific effects of a dance intervention on the decrease of depression and the increase of vitality and positive affect in 31 psychiatric patients with main or additional diagnosis of depression. Patients participated in one of three conditions: a dance group performing a traditional upbeat circle dance, a group that listened just to the music of the dance (music only), and a group that moved on a home trainer bike (ergometer) up to the same level of arousal as the dance group (movement only). While all three conditions alleviated or stabilized the condition of the patients, results suggest that patients in the dance group profited most from the intervention. They showed significantly less depression than participants in the music group ($p < .001$) and in the ergometer group ($p < .05$), and more vitality ($p < .05$) than participants in the music group on post-test self-report scales immediately after the intervention. Stimulating circle dances can thus have a positive effect on patients with depression and may be recommended for use in dance/movement therapy and other complementary therapies.

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Depression is affecting about 121 million people worldwide (WHO, 2007). It is among the leading causes of disability and causes the highest loss of productivity worldwide. In Germany, it is the most commonly diagnosed psychiatric disease with between 4 million and 20 million persons affected. In the United States about 17 million persons suffer from depression. Worldwide, women suffer twice as frequent from the disease as men. Within the U.S. public health system, costs for depression treatment even exceed the costs of heart disease treatment (Greenberg, Stiglin, Finkelstein, & Berndt, 1993). Depression has thus very high social and financial costs and discovering inexpensive, non-intrusive and effective treatment methods is an important public health goal.

Art therapies are important complementary approaches in the treatment of depression (Lehofer & Stuppäck, 2005). Using a resource-oriented approach they allow the patient to use or gain strength in certain nonverbal modes of expression such as painting, sculpting, playing music or theatre, dancing or moving. While music therapy and art therapy have a number of evidence-based studies supporting their effectiveness with psychiatric patients with unipolar depression (Hanser & Thompson, 1998; Kersting, Kuschel, Reutemann, Ohrmann, & Aroldt, 2003; Maratos & Gold,

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2003), dance/movement therapy (DMT) and drama therapy (DT) have only general meta-analyses to support their effectiveness for psychiatric patients with depression amongst other diagnoses, usually with a small sample size (Kipper & Ritchie, 2003; Ritter & Low, 1996). The relative small number of evidence-based studies does not mean that there are only few positive outcomes from art therapies; the problem is rather that so far there is no monetary funding for related research.

DMT effects on depression: a brief literature review

The meta-analysis on the effects of DMT of Ritter and Low (1996) quotes two studies involving psychiatric patients with depression (Brooks & Stark, 1989; Heber, 1993) and five studies on persons with depression altogether (Dosamantes, 1990; Dosamantes-Alperson & Merrill, 1980; Kuettel, 1982). The effect sizes these studies report are moderate to high. The meta-analysis should be read together with the methodological critique by Cruz and Sabers (1998), who found that the actual effect sizes were in fact bigger than the ones reported by Ritter and Low (1996). Kipp, Herda, and Schwarz (2000) investigated the effects of occupational therapy (ergo therapy), and movement therapy on psychotic ($n=47$), depressive ($n=40$) and other patients ($n=25$). They found positive effects in all conditions, and they were strongest for patients with depression. DMT had a more positive effect on body image and affect of the patients than occupational therapy. In a pilot study on the effects of DMT on patients with depression Gunther and Hölter (2006) evaluated the outcome of an intensive dance/movement therapy intervention of two to three months with 45 patients with depression in a psychiatric psychotherapeutic day care center. Results suggest positive effects of dance therapy on the dimensions of movement and well-being, body and self-perception, perception of relationships and biography.

Women suffer twice as frequently from depression than men. The risk for young girls emerges earlier and increases faster than that for boys. DMT is a treatment approach that frequently is particularly attractive for female patients. Improvement of body image, mood, affect, gender role and libidinal aspects (joy, lust) can be easily evoked. There are two recent clinical randomized studies on the preventive aspect of DMT for young women. Jeong, Hong, Lee, Park, Kim, and Suh (2005) assessed psychological health and changes in neuro-hormones of adolescents with mild depression following 12 weeks of DMT. Forty middle school teenagers participated in the study and were randomly assigned into either a dance/movement group ($n=20$) or a control group ($n=20$). All subscale scores of psychological distress and global scores decreased significantly after the 12 weeks of DMT. Plasma serotonin concentration increased and dopamine concentration decreased in the DMT group. These results suggest that DMT may stabilize the sympathetic nervous system. DMT may thus be effective in beneficially modulating serotonin and dopamine, and improving psychological distress in adolescents with mild depression (Jeong et al., 2005). Likewise, in a study from Sweden, Groenlund, Renck, and Vaboe (2006) have found that depression in teenage girls was alleviated by three months of dance/movement therapy.

There are only few DMT studies that exclusively treat the effects of DMT on depression. However, many clinical trials do assess or consider depression scores in their designs because many clinical diagnoses include depression (e.g., anorexia, psychoses, neuroses, psychosomatic diagnoses, post-traumatic stress disorder, pain, or cancer). Many studies focusing on other diagnoses are thus valuable resources on depression as well (Bojner Horwitz, 2004; Bojner Horwitz, Theorell, & Anderberg, 2003; Bräuninger, 2006; Dibbell-Hope, 2000; Kong, 2005; Lacour, 2006; Mannheim & Weis, 2006; Moore, 2006; Sandel, Judge, Landry, & Faria, 2005). Pre-/post-tests of many of these studies report significant decrease of depressive symptoms throughout. Central dependent variables on which DMT for clinical populations in general shows good effects are vitality, mood/affect, anxiety, self-efficacy/coping and body image (Goodill, 2006). Following DSM IV, at least three of these factors are directly relevant in depression the other two are correlatively related to depression.

Further, there are randomized control trials from body psychotherapy, physiotherapy and sports therapy all showing that movement has beneficial effects on depressive symptoms. An overview on the effects of exercise on depression can be found in a meta-analysis by Craft and Landers (1988). Last but not least, there are a good number of diploma and master's theses on the topic of DMT and depression, many of which have contributed to the body of knowledge with qualitative studies or case studies (e.g., Briski, 1995; Cook-Auerbach, 1990; Herbstritt, 2003; Körner-Morlinghaus, 2004; Lichtsinn, 1998; Marcus, 1988; Radeke, 2002; Schmidt, 1999; Scholefield, 1991; Storck, 1998; Vella, 1992).

Lack of vertical movement in patients with depression

Research on embodiment¹ of patients with depression suggests that they show reduced gait velocity, reduced stride length, increased standing phases, and increased gait cycle duration (Wendorff, Linnemann, & Lemke, 2002). However, these studies are restricted to lower limbs and to the sagittal body dimension. Michalak, Troj, Schulte, and Heidenreich (2006) in a recent empirical investigation used three-dimensional analysis of gait data, taking into account sagittal, lateral and vertical movement. They found that currently depressed patients differed significantly from never depressed patients, in that they showed more pronounced lateral and reduced sagittal and vertical movement (vertical movement of head, sternum, shoulders, hand, hip and knee movement differed significantly from patterns of non-depressed patients, $p < .01$), in velocity (3.69 versus 4.47 km/h; $p < .001$), and in bowed posture (-1.60 versus -0.53 ; $p < .001$). The authors extended previous findings to the whole body and to formerly depressed patients as well. Results suggest that currently depressed patients show lower arm and leg swings, lower vertical movements of the body, and more pronounced lateral swaying movements of the upper body. Formerly depressed participants still showed lower vertical movements (Michalak et al., 2006). Our study consisted in a single dance intervention. We followed the research question of what dance can do for patients with depression and what its specific effects are. The dance we used in the study utilizes jumping rhythms (Kestenberg Amighi, Loman, Sossin, & Lewis, 1999) in the vertical dimension, with the intention to stimulate this missing aspect of the patients' movement repertoire.

Our study

How much joy sleeps inside of us and we do not awaken it

This study used a three-group repeated-measure design, comparing the treatment group (dance) to both a music-only (music) and a movement-only control group (home trainer). The goal of the study was to investigate specific effects of dance/movement therapy. A simple structured form of dance that can be used at the beginning or the end of DMT sessions was selected: a circle dance from Israel (Hava Nagila—"Let us have joy") geared to evoke joy. The lively music of the dance facilitated that all dance elements were performed with small jumps throughout, and movement therapists and student helpers of the study used jumping as models. Starting from the bidirectionality assumption of embodiment theory (Niedenthal, Barsalou, Winkielmann, Krauth-Gruber, & Ric, 2005) that predicts afferent feedback from movement to affect, cognition, and behavior (Adelman & Zajonc, 1987), and from KMP-theory (Kestenberg Amighi et al., 1999) predicting joy to be evoked by the use of jumping rhythms, we hypothesized that the dance intervention would have positive effects on cognition, affect and behavior of the patients. We expected less depression, more vitality and positive affect, and an increase in gait velocity after the session. These benefits were expected from all three interventions. Movement was assumed to have a positive activating effect per se, movement with music and particularly the joy-related jumping rhythms (Kestenberg, 1995; Kestenberg Amighi et al., 1999; Fig. 1) was hypothesized to yield superior improvements compared to movement only (home trainer) and to music only. Music only was expected to lead to a partial simulation of the jumping rhythms (the joyful aspect of the movement) in sensorimotor areas of the brain as predicted by embodiment theory (Barsalou et al., 2003; Niedenthal et al., 2005). Movement on the home trainer was selected because biking does not imply jumping rhythms, and no vertical upper body motion. We hypothesized significant improvements of depression, vitality and affect in the dance group and smaller improvements in the two control groups. Gait velocity was assessed on an explorative basis.

¹ Barsalou, Niedenthal, Barbey, and Ruppert (2003) define embodiment as body phenomena (such as postures, arm movements, facial expressions, etc.) that play a central role in information processing. Niedenthal et al. (2005) add that "embodiment refers both to actual bodily states and to simulations of experience in the brain's modality-specific systems for perception, action, and introspection." (p. 184). One important line of embodiment research concerns afferent body feedback such as facial feedback or postural feedback. Body feedback has been researched using relatively static postures without considering movement as the primary source of influence. Embodiment theories operate on neuroscientific findings and a model of knowledge representation that assumes a sensorimotor representation of any cognitive activity (Barsalou, 1999; Barsalou et al., 2003).

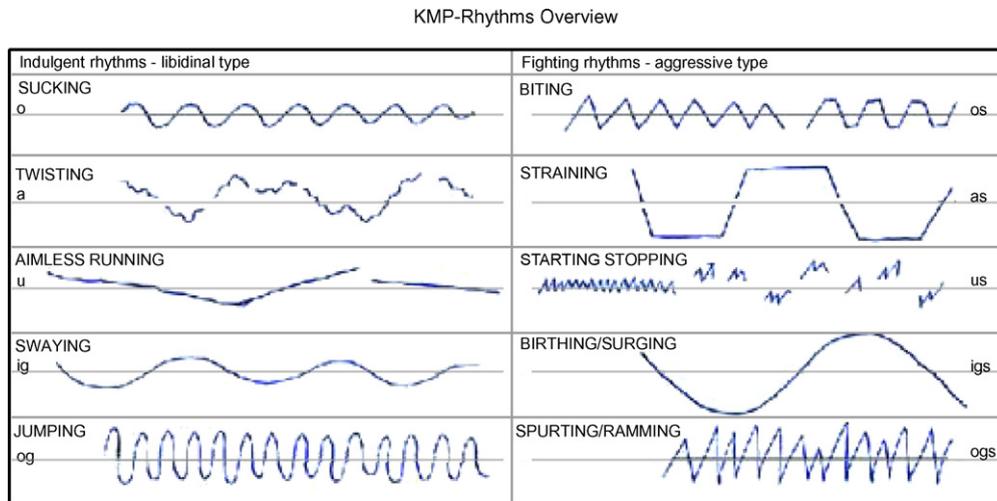


Fig. 1. Overview of the Kestenberg rhythms. *Note.* These are the ten prototypical pure developmental movement rhythms following KMP-theory (cf. Kestenberg Amighi et al., 1999). The jumping rhythm is the indulgent rhythm of the fifth developmental year (og = outer-genital phase).

Method

Sample

Thirty-one patients from the Psychiatric University Hospital in Heidelberg volunteered to participate in this study (18 men and 13 women). Mean age was 42.7 (S.D. = 14.9, range 21–66). All were diagnosed with depression using ICD 10, either by main or additional diagnosis. There were 21 patients with a main diagnosis of depression (moderate or severe recurrent depressive disorder; moderate or severe depressive episodes; schizoaffective disorder, depressive type; bipolar affective disorders, current episode moderate or severe; all without psychotic symptoms) and 10 patients with the additional diagnosis of depression (main diagnoses: agoraphobia; mixed obsessional thoughts and acts; persistent somatoform pain disorder; emotionally unstable personality disorder; histrionic personality disorder; narcissistic personality disorder).

There were seven patients with a severe degree of depression, 12 with a moderate degree of depression, and 12 with a mild degree of depression as classified by their physician or psychologist at the time of the study. Only patients over 18 years and of good physical condition were selected for participation. They were matched by gender and degree of depression and then randomly assigned to one of the three conditions. In two cases, we switched persons (a man and a woman) with respective degree of depression from the home trainer group to the second dance group, because not all patients assigned to the group appeared on site. In the end, 11 patients participated in the dance group, 10 in the music group, and 10 in the home trainer group. Each condition consisted of patients from at least three different wards.

Procedure

Patients were first contacted by their physician or psychologist on their ward and received patient information on the study. In the week of the study, the movement therapist asked all pre-selected patients ($N = 39$) whether they would be participating and handed them the assigned times for their group. Thirty-three agreed to participate, 31 participated, among them four new patients who received their patient information at the site of the study. We conducted two movement and two music groups and assessed patients on the home trainer in pairs (while one was biking the other completed a distracter task). All groups were conducted by at least two project partners, one movement therapist (either the first or the second author) and a student helper². Movement and music groups were conducted in the hospital's

² Thanks to Stefanie Glawe, Constanze Eib, Sabine Kibgies, Sabrina Bechtel and Rebecca Schmidt for helping to collect the data. Thanks to the patients for volunteering.

movement therapy room, home trainer sessions were either conducted in a movement therapy complementary room (for single patients) or on a ward. For the first movement and music group, we additionally measured the times patients took on their way to and back from the movement therapy room. In all sessions, patients first received the study information and informed consent information orally and then in written form which they signed and returned. After they completed a 12-item measure about how they feel at the moment, the intervention started. The dance groups moved together in a circle formation. They first danced without music until the steps of the dance were understood and fluently performed. Then a trial with music followed (the music piece was exactly three minutes long). At the end, the pulse of three patients was taken in order to know which level the home trainer group needed to reach ($M = 120/\text{min}$). Then they completed the 12-item measure once again, and then they provided final information on whether they knew the music, which therapy helped them most so far, and demographics. Then the patients were asked whether there were any remaining questions or comments. Finally, they were released to their wards.

The music group was asked to just sit down with both feet on the ground, relax and listen to the music (the identical music the dance group had used for the circle dance). Pre- and post-test were given in the same way. The home trainer group additionally had to complete a distracter task asking patients to count slowly from 100 to 0 (and to restart, if it took less than three minutes, which was the case for three patients). All groups took between 20 and 30 min altogether. In none of the groups researchers interacted with patients in a therapeutic sense (no processing of feelings, etc.), since the main goal was to test whether the interventions per se would cause change in the expected direction.

Instruments

Scale for main dependent variables

We used a bipolar 12-item state inventory, the Heidelberger Befindlichkeitsskala (HBS; Fig. 2), with a range from “1” to “9” and the dimensions depression, vitality, affect, anxiety, motivation, and coping, and two additional items (tired—awake; fighting—indulging). This scale had been constructed for the use with clinically depressed patients and has been tested and factor analyzed in previous studies with bigger samples. The internal consistency (means of pre- and post-test) of the entire scale was Cronbach’s $\alpha = .63$. Of the depression subscale the internal consistency was $\alpha = .72$, of the vitality subscale $\alpha = .89$, and of the affect subscale $\alpha = .87$.

Velocity

On an exploratory basis, we assessed the gait velocity of a part of the patients expecting an increase in velocity after the intervention (Bargh, Chen, & Burrows, 1996). Two student observers stopped the times patients took to cross a medium-size patio in the middle of the hospital before and after the group sessions. Using stopwatches they measured the times of the patients of the first dance and music group ($n = 9$) from the release of the handle of the first door to the grab on to the handle of the second door at the other end of the patio.

Therapy ranking

In the final questionnaire patients were asked which therapy form offered in the context of the psychiatric hospital has helped them most so far. They had three options to freely insert the therapy forms that came to their mind. Options were labeled from “1” to “3,” thus implying a ranking.

Design

We employed two one-factorial designs. Independent variable was condition (dance versus music; and dance versus home trainer). Dependent variables were the difference score of depression, vitality and affect. Sum scores of items of these three dimensions were created and a difference score Δ was computed subtracting the pre-test value of each dimension from the according post-test value.

Results

Two one-way ANOVAs were computed to analyze how condition (dance versus music, and dance versus home trainer) affected the difference score Δ of depression, vitality and affect. All three dependent variables were correlated between $r = .60$ and $r = .85$. The alpha level chosen was $p < .05$. Results suggest that depression decreased significantly

Heidelberger Befindlichkeitsskala (HBS)

Ich fühle mich im Moment:

entspannt	1	2	3	4	5	6	7	8	9	angespannt
guter Stimmung	1	2	3	4	5	6	7	8	9	schlechter Stimmung
motiviert	1	2	3	4	5	6	7	8	9	unmotiviert
depressiv	1	2	3	4	5	6	7	8	9	nicht depressiv
ängstlich, besorgt	1	2	3	4	5	6	7	8	9	nicht ängstlich, sorglos
leblo, leer	1	2	3	4	5	6	7	8	9	lebendig, erfüllt
müde	1	2	3	4	5	6	7	8	9	wach
fit mit der Welt umzugehen	1	2	3	4	5	6	7	8	9	mit der Welt überfordert
energiegeladen, ressourcenreich	1	2	3	4	5	6	7	8	9	ohne Energie/Ressourcen
positiv	1	2	3	4	5	6	7	8	9	negativ
kraftvoll, stark	1	2	3	4	5	6	7	8	9	kraftlos, schwach
genießend	1	2	3	4	5	6	7	8	9	ankämpfend

Heidelberg State Inventory (HBS)

At the moment, I am in the following state:

Relaxed	1	2	3	4	5	6	7	8	9	Tense
In good mood	1	2	3	4	5	6	7	8	9	In bad mood
Motivated	1	2	3	4	5	6	7	8	9	Unmotivated
Depressive	1	2	3	4	5	6	7	8	9	Not depressive
Anxious	1	2	3	4	5	6	7	8	9	Not anxious
Lifeless, empty	1	2	3	4	5	6	7	8	9	Full of life
Tired	1	2	3	4	5	6	7	8	9	Awake
Prepared to deal with the world	1	2	3	4	5	6	7	8	9	Not prepared to deal with the world
Full of energy, and resources	1	2	3	4	5	6	7	8	9	Without energy, resources
Positive	1	2	3	4	5	6	7	8	9	Negative
Strong, vital	1	2	3	4	5	6	7	8	9	Weak
Indulgent	1	2	3	4	5	6	7	8	9	Fighting

Fig. 2. Heidelberger Befindlichkeitsskala (HBS). *Note.* The dimension of *depression* consisted of mean of items “depressive” and “lifeless, empty”, the dimension of *vitality* consisted of mean of items “full of energy” and “strong, vital”, and the dimension of *affect* consisted of mean of items “in good mood” and “positive”.

in the dance group only as compared to the music-only group ($F(20, 1) = 14,19; p = .001; d = 1.28$) and the movement only group ($F(20, 1) = 4,57; p = .046; d = .90$). Further, participants in the dance group showed a significantly higher increase in vitality than participants in the music group ($F(20, 1) = 5,17; p = .035; d = .86$). Effects on the difference score of affect were not significant. Significance levels for single effects are provided in Fig. 3, descriptive values are provided in Table 1.

Table 1
Means and standard deviations of main dependent variables

Condition	Depression			Vitality			Affect		
	Dance	Music	Home trainer	Dance	Music	Home trainer	Dance	Music	Home trainer
<i>N</i>	11	10	10	11	10	10	11	10	10
<i>M</i> pre-test	4.82	3.75	4.55	4.18	5.60	4.75	5.59	6.15	5.10
<i>M</i> post-test	3.59	4.00	4.60	5.82	5.95	5.35	5.82	6.75	5.80
<i>M</i> (Δ^a)	1.23	0.25	0.05	1.64	0.35	0.60	0.23	0.60	0.70
<i>SD</i> (Δ)	0.81	0.97	1.65	1.41	1.33	1.68	1.01	0.81	1.29

^a Post-test minus pre-test scores rendered the difference score $M(\Delta)$ that served as main dependent variable for the group comparisons; for *depression* lower post test scores represent improvement, for *vitality* and *affect* higher post test scores represent improvement.

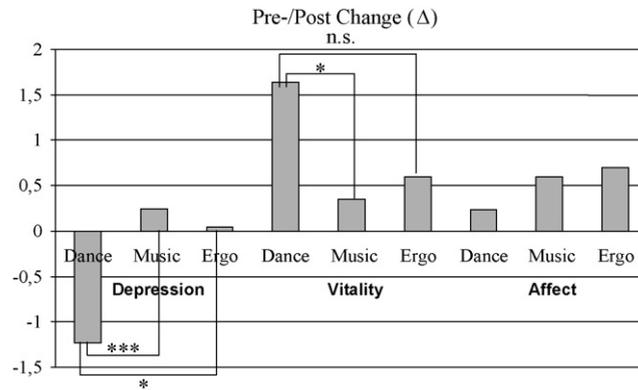


Fig. 3. Results of the group comparison. *Note.* Δ was computed by subtracting pre-test from post-test scores; positive values signify an increase, negative values a decrease in the according dependent measure. *** $p < .001$; * $p < .05$; n.s. = non significant.

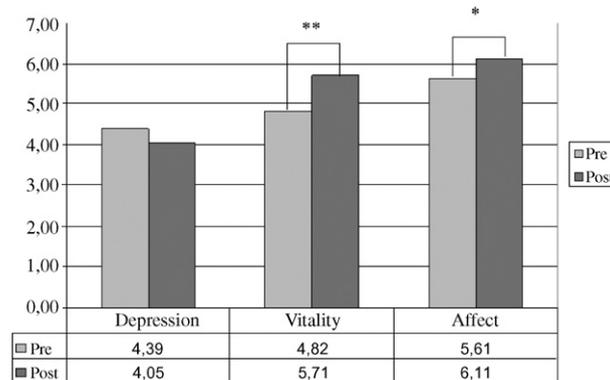


Fig. 4. Mean pre-/post test differences across groups ($n = 31$). *Note.* p -values were computed with a paired sample t -test and corrected for multiple testing. ** $p < .01$; * $p < .05$.

Pre-/post-test effects across groups were computed with t -tests for paired samples. We found a significant increase in vitality ($t(31, 30) = -3.20, p = .003$) and affect ($t(31, 30) = -2.67, p = .012$), but no significant decrease of depression ($t(31, 30) = 1.41, p = .16$) across conditions. Values remained significant after correction for multiple testing (see Fig. 4).

Behavioral measure

The stopping of the time to and back from the movement room served as an additional variable on exploratory basis. In the subsample of the patients observed, there was no difference in the times that patients walked to or back from the movement room (way to the room: $t_{\text{Dance Group}} = 15.41$ s; $t_{\text{Music Group}} = 15.04$ s; way back from the room: $t_{\text{Dance Group}} = 15.52$ s; $t_{\text{Music Group}} = 15.76$ s).

Therapy ranking

One of the final questions was “which therapy helped you most so far” with three open answer fields labeled “1” to “3.” Out of 28 answers, 20 patients named complimentary therapies in the first place: 12 named creative arts therapies (5 movement, 5 music, and 2 art therapy), eight named occupational therapy in the first place, six named talk therapy/psychotherapy and two named medical treatment. In the second place, 16 named creative arts therapies (8 movement, 6 music, 2 art), three named occupational therapy, one psychotherapy, one massage and two activities in the open (jogging, walking). In the third place, patients named behavior therapy (7), movement therapy (4), talk therapy (4), massage and walking. In sum, medication and massage were named twice, activity in the open three times,

behavior groups seven times, talk therapy 11 times, occupational therapy 12 times, and creative arts therapies 32 times (17 movement, 11 music, and 4 art).

Discussion

Considering the small sample size (with just the minimum number of participants to do the computations) the results obtained in this study are very encouraging and helpful in setting priorities for future studies. Participants in the dance group showed a significant decrease of depression, whereas depression scores did not change for participants of the other two groups. Dance acted thus specifically on depression reduction. Further, participants in the dance group showed a significantly higher increase in vitality than participants in the music group. Vitality and affect increased significantly from pre- to post-test across conditions. Between conditions, there were no significant differences of increase in affect. The biggest pre-/post-test changes were found in the dance group: on a single-item basis, motivation, coping, strength, energy and enjoyment increased, while depression, lifelessness, anxiety, tension and tiredness decreased.

This study was a first attempt to gain an understanding of the specific factors effective in dance with psychiatric patients suffering from depression as compared to two control groups. We expected benefits for patients participating in all conditions, which resulted to be significant for vitality and affect in the pre/post comparison. Dance was the only condition that did significantly decrease depression after the intervention. Patients in the music and home trainer condition felt just as depressed after the intervention as before. The difference in post-test depression scores between the dance and the music-listening group could potentially have resulted from the fact that with the combination of the upbeat music and the movement the sensory-motor stimulation may have been just at the right level for the dance group, whereas for the music group just listening to the music may not have been suited to “meet the patients where they are at.” For the music group, the sensory stimulation may thus not have been strong enough (or qualitatively inappropriate) to lead to an active embodiment, i.e., a simulation of the upbeat “jumping” rhythm on the level of the organism, while in the dance group active embodiment was asked for and “in synch” with the upbeat music.

The depression pre-test scores of patients in the dance group were slightly but not significantly lower than that of the music group, yet patients of the dance condition showed the biggest improvement. Comparison of means suggest that improvements are bigger for men than for women and biggest for the patients with the most severe degree of depression. This observation corresponds to [Deimel and Hölter’s \(in press\)](#) analysis of the benefits of general movement therapy for patients with depression. The authors conclude from an empirical review that usually the patients with the highest level of depression benefit most from movement therapy. The strongest effects are found for patients with a main diagnosis of depression, weaker effects for those with a complementary diagnosis of depression. They further stress that the secondary effects of dance/movement therapy compared to pharmacotherapy are positive. While medication can cause tremor, change of muscle tone, and nervousness, movement therapy effects the body in a positive strengthening fashion, thereby causing secondary effects such as the prevention of heart disease and obesity, reduction of anxiety, etc. ([Deimel & Hölter, in press](#)).

Limitations of the study include the brevity of the intervention, the typicality of the intervention (circle dances are just one of the elements used in DMT, and usually not in the main part of the session), and possible demand effects from the side of the researchers. Because the researchers and movement therapists who established the hypotheses were also the ones who conducted the study, we cannot exclude that expectancy effects have occurred. The researchers might unconsciously just have been slightly more enthusiastic in the dance groups compared with the other groups, even though they intended to act in a standardized fashion. Given this possibility, this may have additionally caused a mirroring effect of positive affect (with the consequence of improved factual positive, vital and non-depressed feelings) in the dance group more than in the other two groups. Furthermore, a number of conditions covaried with the dance: patients stood in a circle (group), held hands (touch), learned more, and needed to rely more on the interaction with co-patients and therapists/helpers than in the other two groups. Generally, the question is whether a repetitive exercise without vertical movement in trunk and upper limbs (home trainer group) or a group passively listening to the music of the dance (music-only group) can truly be valid comparisons to the rather holistic, social and engaging condition of the dance.

In future studies, movement therapists guiding the sessions should ideally be blind to the hypotheses. The study should be replicated with a bigger sample. Further studies should try to focus more closely on the specific factors effective in dance. The specificity of the jumping rhythm and the other Kestenberg rhythms needs to be tested empirically. In order to test the specificity of the jumping rhythm, for example, a dance with jumping rhythms could be compared to

a dance without jumping rhythms. In order to additionally control for the effects of music combined with the jumping rhythm, jogging (with jumping rhythms) could be compared to biking on the home trainer (without jumping rhythms), or biking while standing – which implies the use of the vertical upper body jumping rhythms – could be compared to biking while sitting. A design with two circle dances would further have the advantage of allowing better experimental control of the covarying factors above identified as problematic. Moreover, it would be interesting to gather information on the longevity of the outcomes: how long do these interventions continue to show an effect? And what processes on brain and neurotransmitter level are implied?

Results of this study suggest benefits of the use of activating circle dances with jumping rhythms in the course of dance/movement therapy or other complementary therapy sessions for patients suffering from depression. Such dances can be employed, for example, as rituals at the beginning or the end of a therapy session in order to – at least temporarily – decrease depression and help the patients to feel more alive.

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