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Effects of sculpture based art therapy in dementia patients— A pilot study

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Abstract

Art and art therapy open up interesting possibilities for dementia patients. However, it has not been evaluated scientifically so far, whether the art of sculpting has any benefits.

In this non-randomized pilot study with twelve participants, we investigated the feasibility and acceptance of sculptural activity in patients with dementia and the effects on their well-being.

A questionnaire was custom-designed to investigate five key aspects of well-being: mental state and concentration, corporeal memory, self-reliance, self-esteem and physicality. Remarkable improvements were seen in several subscales in the sculptural activity group, but not the control group: Mental state and concentration (nine of thirteen key aspects), self-reliance (four of five), self-esteem (one of one) and physicality (two of two).

The results of this pilot study indicate the multidimensional effects of sculptural activity on patients living with dementia. The field would benefit greatly from further research.

Keywords: Psychology, Psychiatry, Art, Nursing

1. Introduction

The daily life of dementia patients in nursing homes traditionally includes activities of motoric (sporting), domestic (cooking), cognitive (memory training) and spiritual (religious rituals) nature (Eichenseer and Gräbel, 2011; Maier, 2014). Artistic work with dementia patients is not widely practiced and mainly concentrates on the fields of painting, collage and the receptive art therapy of contemplating images in museums such as the Museum of Modern Art (Chancellor et al., 2014; Tesky et al., 2015). Patients in nursing homes are rarely offered the chance to create sculptural works themselves.

Empirical reports repeatedly stress the fact that people living with Alzheimer's disease are able to work artistically and through their work, experience periods of contentment. This is true for trained artists, such as Carolus Horn (1921–1992), Willem de Kooning (1904–1997) and Hilda Goldblatt Gorenstein (1905–1998) as well as amateurs (Wichelhaus 2002; Ganß, 2013).

In a review published in the *Journal of Alzheimer's Disease*, Chancellor et al. (2014) present a comprehensive list of qualitative and quantitative art therapeutic studies, including three randomized studies with a small number of participants (Chancellor et al., 2014) on the effectiveness of art therapy in persons living with dementia.

The pilot study presented in this paper aimed at gathering initial data on the effectiveness of sculpting in male dementia patients.

The sculpting of human-sized tree trunks involves a playful approach to the material. Strength and rhythm are required, allowing the experience of corporality, space and orientation. An upright posture must be maintained. The creation of figures that exhibit a resemblance to humans can increase personal awareness, identification with oneself and relations with others, intensified by group interactions amidst the sensory stimulation of the outdoor world.

The tailored questionnaire focused on the areas of well-being attention and flow. The following criteria are of significance (Csikszentmihalyi, 1992; Menzen, 2004; Wichelhaus, 2002):

Sensation of happiness, sadness, joy, sensation of loneliness, courage, relaxation, annoyance, concentration, attention, play, interest, relatedness, communication.

The corporeal memory, also known as 'implicit memory', stores the sequence of movements and actions that the body has learned over its lifetime, to be carried out automatically if needed. The corporeal memory "re-stages what has been learned in a physical implementation" (Fuchs, 2010).

A patient's personal biography remains present in his visual, audio, haptic and olfactory perception and in the handling of objects (Fuchs, 2010). The reactivation

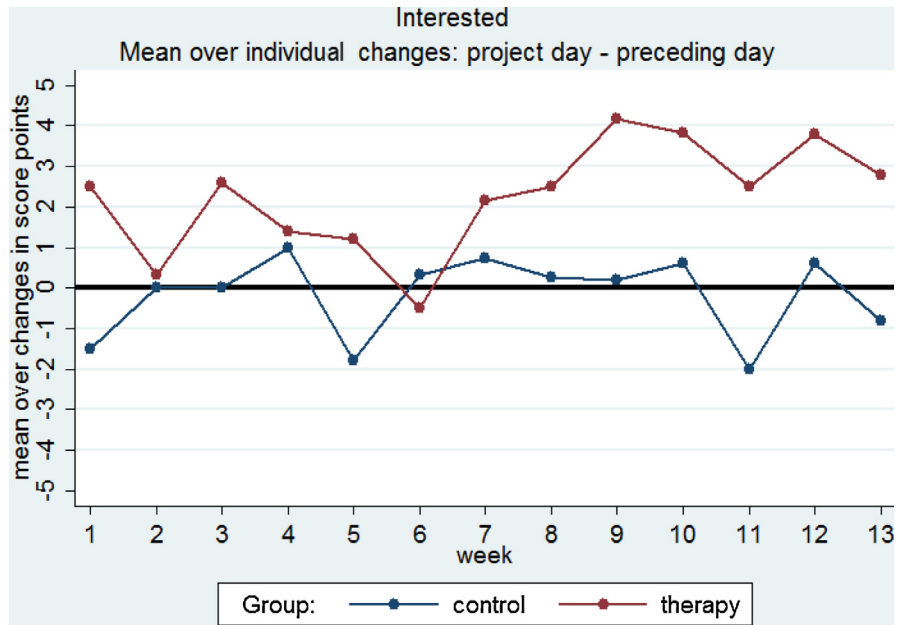


Fig. 1. Average changes in the control and therapy group in the category of interest over the course of the therapy.

of the corporeal memory can also form a doorway to the explicit memory. The implicit memory remains available significantly longer than the explicit memory in patients living with dementia (see Figs. 1 and 2).

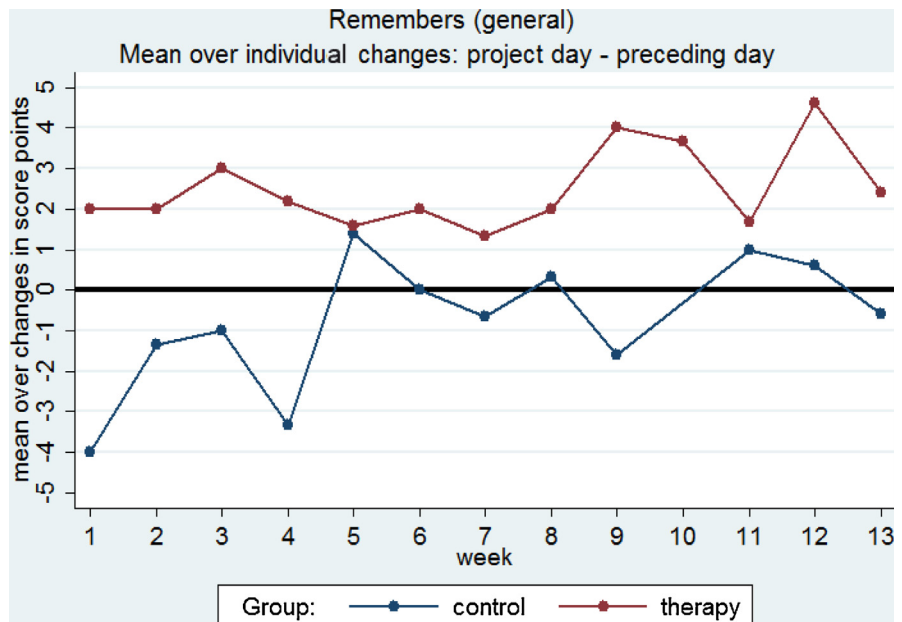


Fig. 2. Average changes in the control and therapy groups in the category of general remembering over the course of the project.

The following questions were raised in the area of corporeal memory:

Did you use to work with wood, sing, paint or play board games? Can you remember your earlier life and, if so, which aspects?

In the areas of self-reliance and self-reference, the following questions were asked:

Do you have the feeling that you have created something?

Do you feel a connection to your creative work?

Answers were rated on an analog scale from 1 to 8 where 1 was “not at all” and 8 was “very much so”.

2. Theory/calculation

Excel 2011, SPSS 22 and Stata 13.1 software were used for the statistical analysis. Simple *t*-tests were always verified through the non-parametric U-test (linked and unlinked).

The thirteen-week course was evaluated using panel data from three weekly checkpoints: the day preceding the project (0), the day of the project (1) and the day following the project (2).

A linear model with cluster correction (by participants and week) was chosen to avoid pseudo-replication. According to research in the *Base Research Manual*, cluster correction is necessary to allow for intragroup correlation and the ‘robust’ option to correct some kinds of misspecification (Stata13.1, 2013).

3. Hypothesis

Our main hypothesis was that sculpting activity improves mental attributes such as mental state, attention, flow and self-reliance as well as corporeal memory and the patients’ appreciation of their creative work (Dannecker, 2006; Menzen, 2004).

The secondary objective was to investigate to what extent sculpting has an influence on cognitive performance and psychiatric symptoms, measured the Mini-Mental-Status-Examination (MMSE) (Folstein et al., 1975) and the Neuro-Psychiatric Inventory (NPI) (Cummings, 1994), respectively.

4. Method

4.1. Experimental design

A non-randomized study with twelve participants, six in the sculptural activity group and six in the control group, was carried out. Consent to participate in the study and in the assigned group was obtained from the custodian.

4.2. Research participants

All participants had been diagnosed with dementia according to DSM-IVR criteria. A homogenous etiology of dementia was not considered critical because we did not expect dementia subtype-specific effects of the intervention. Dementia severity ranged from 0 to 18 (measured with MMSE). The selection and inclusion of the participants was carried out by nursing staff. The subjects' decisions to participate in the activities were voluntary and written consent from the subject's custodians was required.

4.3. Sample characteristics

The participants were all retired and lived in nursing homes. Professional qualifications could be determined for eleven of the twelve participants; two (16%) were without professional qualifications; four (33%) had worked as workmen, mechanics or craftsmen; five (41%) had worked in administrative roles, as teachers at vocational colleges or had been soldiers; none had completed a university degree.

One participant in the control group was diagnosed with dementia and chronic schizophrenia. One person in the sculptural activity group was diagnosed with dementia and oligophrenia. One participant from each group passed away during the course of the project. Therefore, five participants per group were evaluated by MMSE and NPI to measure changes.

4.4. Sculptural activity

The sculptural activity took place once a week (for two hours) over a thirteen-week period. A professional sculptor formed pre-selected wood blocks into rough figures for the participants to work on. The outlines of the figures needed to be vague enough to stimulate the creativity of the non-artists without overstraining their imagination. These preparations guided the participants while giving them the illusion of a free hand.

Activities of the control group consisted of painting, singing and playing board games.

4.5. Scales

Potential changes in the cognitive state and psychiatric symptoms of the patients over the course of the project were measured by means of the Mini-Mental-Status-Examination (Folstein et al., 1975) and the Neuro-Psychiatric Inventory (Cummings, 1994). Information pertaining to the specific parameters of the project was gathered via tailored questionnaires in a pre- versus post-activity test one day before and one day after the sculpting project.

The questionnaire was developed to gather information whether the main hypothesis defined in the introduction was valid. The following mental components were operationalized with several sub-questions rated on an eight-point Likert scale (Reips and Funke, 2008; Uebersax, 2006): Mental state, concentration and flow, corporeal memory, self-reliance, self-reference, esteem, facial expressions and physicality.

In order to evaluate test quality criteria, 38 participants with different psychiatric diagnoses completed our self-developed questionnaire at the same time (around 8:00 p.m.) on two days. The participants consisted of nineteen women and nineteen men between the ages of 23 and 85. Test-retest reliability was employed and the data was evaluated using Excel and Stata. The results vary from .280 with feelings of happiness to .877 with memories of wood work.

The values of the multi-variant regression were approximately equally good. They changed only in the category of the weather condition from .05 to .1397 (see Table 1).

4.6. Evaluation of the secondary target criteria

The sculptural activity group and the control group did not differ significantly in their MMSE-performance prior to the sculptural project (t -test: $p = .1223$; U-test: $p = .0776$) (see Tables 2 and 3) There was no significant difference in the change rate post- versus pre-sculptural project.

In the control group: (verb. t -test: $p = .2016$; verb. U-test: $p = .0897$)

No statistically significant difference could be detected for the MMSE stored values. (t -test: $p = .1223$; U-test: $p = .0776$).

In the sculptural activity group: (verb. t -test: $p = .3883$; verb. U-test: $p = .3386$)

Amongst the patients collectively: (verb. t -test: $p = .1004$; verb. U-test: $p = .0683$),

Between the groups: (t -test: $p = .4133$; U-test: $p = .7496$).

No significant difference could be detected for the NPI pre-project stored values. (t -test: $p = .5110$; U-test: $p = .5144$); there was no difference in the change rate (post-sculptural activity vs. pre-sculptural activity) (see Tables 4 and 5).

No significant difference could be detected for the NPI pre-project stored values. (t -test: $p = .5110$; U-test: $p = .5144$); there is no difference in the change rate (post-sculptural activity vs. pre-sculptural activity).

In the control group: (verb. t -test: $p = .7429$; verb. U-test: $p = .4142$),

In the sculptural activity group: (verb. t -test: $p = .1863$; verb. U-test: $p = .0782$),

Table 1. Multivariate Regression.

Equation	Obs	Parms	RMSE	“R-sq”	F	p
Mental State of Concentration						
Feeling of happiness	99	4	1.605195	0.1731	6.628558	0.0004
Sad	99	4	1.101643	0.0838	2.896232	0.0392
Glad	99	4	1.4179	0.2917	13.03937	0.0000
Lonely	99	4	1.092319	0.1129	4.030635	0.0096
Brave	99	4	1.540693	0.4278	23.67242	0.0000
Relaxed	99	4	2.164686	0.2029	8.058788	0.0001
Annoyed	99	4	1.067238	0.0554	1.855659	0.1424
Concentrated	99	4	1.985705	0.3265	15.35152	0.0000
Attentive	99	4	1.943016	0.2959	13.31102	0.0000
Playful	99	4	0.9709387	0.0129	0.4132286	0.7439
Interested	99	4	1.94402	0.3409	16.37926	0.0000
Connected to other people	99	4	2.107792	0.2516	10.6461	0.0000
Communicative	99	4	2.13729	0.3139	14.49095	0.0000
Corporeal Memory						
Used to work with wood	99	4	2.13028	0.1381	50.72826	0.0027
Used to paint	99	4	1.789566	0.1266	4.588158	0.0048
Used to sing	99	4	2.46882	0.1229	4.438021	0.0058
Used to play board games	99	4	2.382539	0.2039	8.10868	0.0001
General remembering	99	4	2.409203	0.2506	10.59186	0.0000
Self-reliance						
Achieved something on his own	99	4	1.807242	0.3492	16.98915	0.0000
Felt connected with his work	99	4	1.703778	0.4883	30.21587	0.0000
Self-esteem	99	4	1.777014	0.4537	26.30361	0.0000
Physicality						
Happy facial expression	99	4	1.707715	0.3418	16.44343	0.0000
Upright posture	99	4	2.017513	0.3049	13.89223	0.0000
Influence of the weather	99	4	0.7327424	0.0558	1.870961	0.1397

Table 2. Pre-project MMSE Values.

Group	Number (n)	Minimum (Min)	Maximum (Max)	Median (Med)	Mean (M)	Standard Deviation. (SD)
Therapy	6	1	14	9	8.2	4.6
Control	6	3	18	14	13.2	5.6
Total	12	1	18	11.5	10.7	5.5

Table 3. Inter-individual changes of MMSE values during the course of the project. (D-MMSE: post and pre-project values).

Group	Number (n)	Minimum (Min)	Maximum (Max)	Median (Med)	Mean (M)	Standard Deviation. (SD)
Therapy	5*	-4	3	-2	-1.2	2.8
Control	5*	-12	0	-2	-3.4	5.0
Total	10	-12	3	-2	-2.3	4.0

* Two test subjects (one from each group) passed away during the course of the project. Overall, there were no statistically significant changes in MMSE.

Table 4. Pre-project NPI-Values.

Group	Number (n)	Minimum (Min)	Maximum (Max)	Median (Med)	Mean (M)	Standard Deviation (SD)
Therapy	6	4	30	5.5	12.2	11.7
Control	6	2	17	7	8.5	6.1
Total	12	2	30	5.5	10.3	9.1

Table 5. Inter-individual changes in NPI values over the course of the project (D_NPI post and pre-project values).

Group	Number (n)	Minimum (Min)	Maximum (Max)	Median (Med)	Mean (M)	Standard Deviation (SD)
Therapy	5*	-24	1	-3	-7.0	9.8
Control	5*	-14	11	-1	-1.4	8.9
Total	10	-24	11	-3	-4.2	9.3

*Two test subjects (one from each group) passed away during the course of the project. Overall, there were no statistically relevant changes in the NPI.

Amongst the patients collectively: (verb. *t*-test: $p = .1878$; verb. U-test: $p = .0911$),

Between the groups: (*t*-test: $p = .3726$; U-test: $p = .3413$).

No group showed a statistically significant change in the NPI.

Two participants (one from each group) passed away during the course of the project.

4.7. Ethical approval

Trial registration: “Bildhauerei mit dementiell erkrankten Männern im Altenheim”, No. 131/151 of Ethik-Kommission, University of Bonn, 06.06.2015.

5. Discussion

5.1. Evaluation of the sculptural activity effects on the informal questionnaire: changes project day versus preceding day

The positive changes experienced in the sculptural activity group were significantly higher than in the control group. Negative changes in the sculptural activity group (sad, lonely, annoyed, playful, and weather conditions) applied equally to those of the control group and were, with one exception, insignificant. The exception was the influence of the weather, which played an important role for the sculptural activity group working outdoors. This was mirrored in the borderline value of $p = .050$ (see Table 6).

The informal questionnaire to test the base hypothesis (see Table 1) was double-checked against 38 patients without neuro-degenerative disorder and acute psychiatric illness to establish whether the indications of psychological components (mental state/attention, corporeal memory, autarchy, self-worth) and physicality were present on two consecutive days.

5.2. Analysis of process (an example)

On the chart the average changes in each group over time (days) are depicted.

Exemplary reading: (see Fig. 1) In the first week, the therapy group had a score of 2.5, i. e. an average of 2.5 more points on the project day than on the preceding day. Therefore, the short-term therapeutic effect on the project day – compared with the preceding day – was 2.5, whereas in the second week there was no short-term therapeutic effect.

Except for the sixth week, values for the therapy group remained positive for the duration of the project and saw an upward trend towards its conclusion. In other words, there was a continuous improvement in comparison with the day preceding the project. Changes in the control group arose from the growing or waning interest of the test subjects in comparison with the day preceding the project.

Exemplary reading: (see Fig. 2) In the first week, the therapy group had a score of 2, i. e. an average of 2 more points on the project day than the preceding day.

While the values of the test subject in the sculpting group were continuously positive, the values of the control group oscillated between 1.5 and -4 , showing that the test subjects in the sculpting group remembered more.

5.3. Limitations

This study aimed at assessing the feasibility and acceptance of sculptural activities in dementia patients. Furthermore, we wanted to provide a preliminary

Table 6. Therapeutic effects: changes between the day of the project and the preceding day.

Variable	Average Change Within the Group		Therapeutic Effect Therapy-Control	p
	Therapy	Control		
Mental State and Concentration				
Feelings of happiness	1.26	-0.16	1.4	0.000
Sad	-0.08	-0.02	-0.1	0.797
Glad	1.41	-0.03	1.4	0.000
Lonely	-0.10	-0.52	0.4	0.158
Brave	2.04	-0.40	2.5	0.000
Relaxed	0.90	-0.05	1.0	0.030
Annoyed	-0.15	-0.26	0.1	0.713
Concentrated	2.14	-0.10	2.2	0.000
Attentive	2.05	-0.03	2.1	0.000
Playful	-0.19	-0.35	0.2	0.556
Interested	2.25	-0.24	2.5	0.000
Connected to other people	2.21	-0.27	2.5	0.000
Communicative	1.73	-0.49	2.2	0.000
Corporeal Memory				
Used to work with wood	1.70	0.21	1.5	0.001
Used to paint	0.29	0.42	-0.1	0.733
Used to sing	0.84	-0.02	0.9	0.056
Used to play board games	1.75	-0.77	2.5	0.000
General remembering	2.48	-0.67	3.2	0.000
Self-reliance				
Achieved something on his own	2.15	-0.38	2.5	0.000
Felt connected with his work	2.45	-0.04	2.5	0.000
Self-esteem				
	2.64	-0.07	2.7	0.000
Physicality				
Happy facial expression	1.95	-0.25	2.2	0.000
Upright posture	2.04	-0.18	2.2	0.000
Influence of the weather	-0.46	-0.20	-0.26	0.050

demonstration of their effects on several aspects of well-being. The small number of patients and the cluster-randomized design clearly limits the interpretation of the observed effects of the activity. Other limitations of our study include the heterogeneity of the patients with regard to the dementia cause and the non-standardization of the control conditions. Larger, preferably randomized trials with a well-defined control conditions are thus needed to substantiate the findings of the effects of sculptural activity in dementia patients.

6. Conclusions

The pilot study with a small sample size and a non-randomized design answered the following research questions.

The well-being of male patients living with dementia can be influenced positively through supervised sculpting activities. Specific artistic/art-therapeutic criteria closely connected to parameters such as mental state, attention, corporeal memory, self-reliance, self-esteem and physicality are measurable though external assessment for up to six hours after the activity (see [Table 1](#)).

Significant results were obtained in nine of the thirteen categories pertaining to emotional well-being and attention, in four of the five categories pertaining to corporeal memory and in all the relevant categories pertaining to self-reliance, self-esteem and physicality.

Sculpting itself is an ancient art. Wood was used as the medium through which the participants in this project were able to experience sensory and aesthetic sensations. These in turn can activate creative potential and buried emotional and cognitive resources ([Seifert, 2013](#)).

Aesthetic objects are life-affirming, meaningful and constructive ([Schurian, 1986](#)). Aesthetic and artistic processes influence mental well-being, attention and flow, contributing to satisfaction and happiness ([Allesch and Korenjak, 2009](#)). Moreover, the task, material and tools can form a concrete reference to aspects of the patients' former lives, such as work and hobbies.

Further studies should be undertaken in order to corroborate the results presented here.

Declarations

Author contribution statement

Kathrin Seifert: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Klaus Fliessbach: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data.

Annika Spottke: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data.

Competing interest statement

The authors declare no conflict of interest.

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Additional information

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