

Drums Alive® – Interventions in Healthy Adults, Seniors & Children

-Summary of relevant research studies- (Abstracts)

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1 RESEARCH IN HEALTHY ADULTS

1.1 Changes of physiological parameters in a sportive DRUMS ALIVE®-Drumming Activity and its effects on concentration and awareness performance

THE DRUM BEAT – Chemnitz Drumming Project

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Objectives

This article will discuss the interim results of a study that investigated a fitness trend that uses elements of drumming and aerobics called Drums Alive®. The focus of the analysis lies on the behaviour of physiological parameters during this intervention in adults of different ages. This should produce information on the typical work intensity of this exercise. Furthermore, the effects on acute concentration and awareness performance after a session of Drums Alive® in students were investigated. The here presented study is part of a bigger project „THE DRUM BEAT – Chemnitz Drumming Project“, which evaluates the possibilities of using this type of drumming exercise in various areas of fitness, education and therapy.

Methods

The study design included two sessions to allow the subjects to get used to the movement patterns of Drums Alive® and a third testing session with 27 adults (14 students, 18-22 years and 13 older adults who were between 30 and 65 years of age, described here as AC 30-65). During the testing session physiological data was collected which included heart rate, blood lactate, range of perceived exertion and exemplary spirometry data in two subjects as well as concentration and awareness tests using the d2-test in the students group only (N=16; the d2 students intervention group had two more subjects in this group compared to the physiological data). In order to compare the latter data (concentration performance) a control group of 17 students was used.

Results

All physiological parameters showed a significant increase compared to the resting values. The intervention can therefore be described as an effective exercise. The blood lactate values showed a mean increase from 1.16 ± 0.31 to 3.75 ± 1.91 [mmol/L] in the overall group (students and AC 30-65, N=27), which corresponds with the changes in heart rate. An



increase from 84 ± 14 to 155 ± 16 could be shown. This is also reflected in the high RPE-values of 16 towards the end of the main phase of the Drums Alive® session. The results of the d2-tests showed a slightly better performance in the intervention group (students) compared to the control group, but no significant difference.

Conclusions

This study proved significant physiological effects in the Drums Alive® exercise session and gave hints on a positive effect on concentration performance. However, more research is necessary before a final statement on the effects of this type of sportive drumming exercise can be given.

2 RESEARCH IN CHILDREN

2.1 Effects of a Drums Alive Intervention in Children with developmental delays and intellectual disabilities

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Introduction

In Germany, there are 7.5 Million people with handicaps. 11% thereof are suffering from intellectual disabilities (Statistisches Bundesamt, 2013).

Motor disorders, mainly in coordination, such as hand-eye-coordination are one of the integral parts of intellectual disabilities (Lehmkuhle, 2007; Van der Schoot, 1990). Therefore, exercise therapy, with coordinative elements seems to be an important intervention for these patients.

In this context drumming, dancing and music are important forms of communication since mankind evolved. It seems that drumming has great acceptance, not only cross-cultural, but also across social borders and different age groups as well and therefore could be used as a medium to introduce a wider population to exercise. That's why we have been investigating conventional drumming and sportive drumming exercises since 2009. Drums Alive as a sportive drumming intervention uses big gymnastic balls and usual Drum Sticks to move to the music, with aerobic and dance elements as well as strength training and is of course highly coordinative. It can be very emotional and regarding the investigated populations it has great potential as patients can literally drum out their emotions and aggressions.



Especially regarding neurological diseases, the release of neurotransmitter through physical exercise and also through drumming and dancing are a very important key factors and already proven.

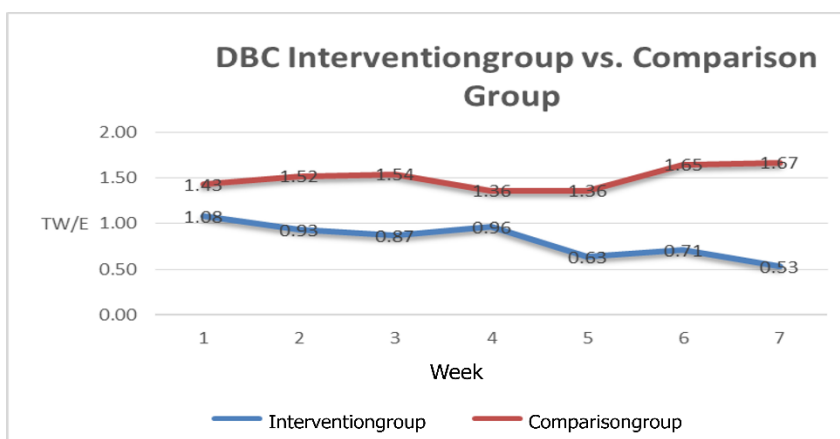
Therefore, a Drumming Exercise Intervention that combines endurance, strength training and highly coordinative and emotional elements could be a worthy intervention for children with developmental delays and intellectual disabilities.

Methods

15 children with mental disabilities at the age of 13.9 ± 2.7 years were allocated to two intervention groups and either attended the conventional school sports (SG) only or participated in two additional Drumming Exercise Intervention classes (DG) twice a week. Before and after the seven-week lasting intervention the children's motor performance was tested through the German Motor Test by Bös (DMT). Furthermore, children's behaviour was determined through the *Heidelberg Competency Inventory (HCI)* and a questionnaire for developmental disorders (*Behaviour Questionnaire for developmental disorders-VFE*) as well as the monitoring of children's behaviour through the teachers (DBC).

Results

Results showed significant improvement of the DG in motor performance compared to the SG. Regarding the children's behavior, the DG also showed obvious, but not significant improvements compared to the SG.



Group	Week 1	Week 7	p
IG (n=9)	1.08 (0.64)	0.52 (0.25)	P=0.344
CG (n=5)	1.42 (0.36)	1.66 (0.47)	P=0.062
p	P=1	P=0.007	

Figure 1: Results of the DBC-Monitoring



Figure 1 shows a significant difference ($p=0.007$) in behaviour between both groups after the seven weeks of intervention.

20-m Sprint	Time(Sec.) Pre	Time(Sec.) Post	P-value	Medicine ball shot	Distance (m) Pre	Distance (m) Post	P-value
IG	4,28 (0,81)	4,15 (0,61)	P=0,491	IG	4,9 (1,79)	4,8 (1,52)	P=0,583
CG	4,3 (0,7)	4,3 (0,79)	P=1,00	CG	3,5 (1,43)	3,36 (1,24)	P=0,431
P-value	P=0,98	P=0,711		P-value	P=0,162	P=0,098	
Balancing backwards	(Steps) Pre	(Steps) Post	P-value	Sit ups	Pre	Post	P-value
IG	24,22 (10,75)	29,67 (10,42)	P=0,045	IG	18,11 (7,06)	22 (6,08)	P=0,015
CG	24,4 (11,63)	28,2 (9,09)	P=0,135	CG	17 (2,82)	19 (4,47)	P=0,176
P-value	P=0,977	P=0,797		P-value	P=0,947	P=0,348	
Jumping back and forth	(Jumps) Pre	(Jumps) Post	P-value	Standing long jump	Distance (m) Pre	Distance (m) Post	P-value
IG	23,77 (9,23)	27,16 (11,65)	P=0,038	IG	1,46 (0,46)	1,52 (0,42)	P=0,032
CG	18,9 (4,6)	19,8 (5,39)	P=0,221	CG	1,22 (0,34)	1,24 (0,28)	P=0,728
P-value	P=0,295	P=0,212		P-value	P=0,325	P=0,220	
Forward bend	(cm) Pre	(cm) Post	P-value	6-minute-Run	Distance (m) Pre	Distance (m) Post	P-value
IG	-1,58 (6,36)	-1,83 (5,87)	P=0,633	IG	1008 (189,48)	1079,56 (184,71)	P=0,011
CG	-20,2 (3,4)	-19,7 (6,51)	P=0,686	CG	1021,20 (97,45)	971,80 (137,20)	P=0,500
P-value	P=0,003	P=0,004		P-value	P=0,888	P=0,279	

table 1: Results of the Motor Skill Test 1

Results of the Motor Skill test show significant differences pre to post intervention in five tasks in the Intervention group only. Differences between groups are non-significant with except of the forward bend.

Categories

1. Disruptive behaviour*
2. Self absorbed behaviour*
3. Communication
4. Social relations
5. Anxiety*
- 6. Total behaviour***

	Total Behaviour Score Pre	Total Behaviour Score Post	p-value
IG (n=10)	39.7 (22.71)	25.10 (14,3)	P=0.08
CG(n=5)	36.4 (2,01)	29, (27.8)	P=0.345
p-value	P=0.951	P=0.668	

Table 2: Results of the VFE

Table 2 shows significant differences in total behaviour in the IG ($p=0.08$) but not in the CG.

Conclusion

A Drumming Exercise intervention has significant effects on motor performance and inappropriate behavior in Children with intellectual disabilities, which in turn leads to more



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Independence and better social integration in everyday life and therefore, better quality of life.

Hence it seems to be a useful additional therapeutic approach in the field of intellectual disabilities and confirms the findings of Wright et al. 2012 (Effects of a Drums Alive Intervention in children with developmental delay).

2.2 Drums Alive Intervention in children with developmental delays

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Introduction

Children all over the world more frequently show developmental delays and/or disorders in different areas that impacts the children's social activities, self-confidence and self-development. To prevent these limitations, promotion at an early stage is needed. In this context the use of different interventions that include a connection of music- and exercise therapy seems to be especially interesting. Drumming could be a promising approach, as humans are drumming since mankind evolved and percussion has always been a significant part within different cultures (FIGL, 2003). It can therefore be assumed that there would be a high compliance for interventions that include drumming, especially in children.

Hence this study examined the effects of a DRUMS ALIVE® Intervention, including aspects of music therapy as well as exercise in children with developmental delays (behaviour, motor performance, speech) comparing to a control group at the same age.

Methods

The aim of the study was to examine the effects of Drums Alive on motor performance and behaviour of nursery-school children with developmental delays, in the area of motor performance, concentration and impulse control (n=16; 4.9-6.7 years).

The intervention was conducted twice a week for 45-60 min over the duration of four weeks and was integrated into daily routine. Different movement- and drumming patterns were combined to age appropriate music.

Baseline and Re-tests included the following measurements:

- Motor performance test of the Heinrich Heine University in Dusseldorf
- Weight, Height
- Documentation of behaviour

Results

Motor performance in the intervention group improved significantly from 20.4 (SD 5.5) to 26.4 points (SD 5.3) which corresponds 33% ($p \leq 0.01$). Following the results are shown in a graph.

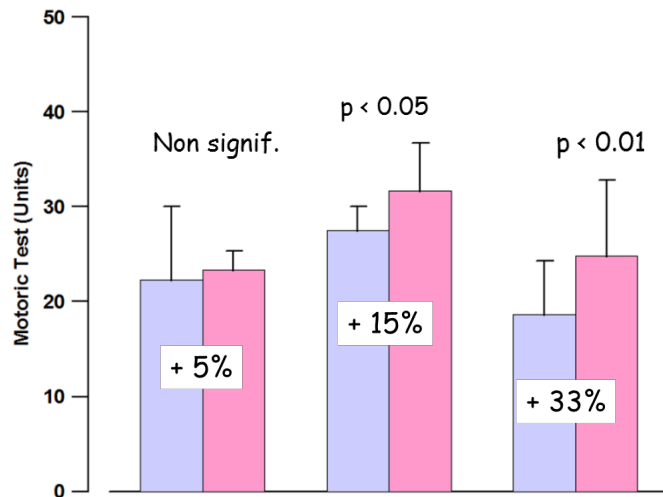


Figure 2: results of the motor test

The documentation of behaviour (compliance with rules, better concentration and persistence, more creativity) showed individually better results in the intervention group compared to the control group.

Conclusion

All children of the intervention group showed partly significant improvements in different motor areas. The positive statements of the children and the results of the behaviour monitoring show the potential of Drums Alive as an additional therapeutic approach. The children have been caught emotionally and developed high pleasure in learning which makes DRUMS ALIVE potentially more effective than other interventions.

A final comparing evaluation with other exercise interventions based on this pilot study, is not possible, but the potential of an age specific DRUMS ALIVE Intervention should be further investigated.

2.3 Physiological and cognitive effects of a Drums Alive[®] Intervention in children with Dyslexia and ADHS

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Objectives

This study examined the effects of a Drums Alive[®] Intervention in children with dyslexia and ADHS regarding physiological and cognitive parameters. As Drums Alive combines emotional drumming and music aspects with physical exercise, it can be assumed that this type of intervention could lead to improved physical fitness as well as concentration and awareness performance paired with a high compliance of children with ADHS. Therefore, Drums Alive could be an additional therapeutic exercise Intervention approach for this population.

Methods

33 pupils of the 3rd grade (aged 9-11) with dyslexia conducted a Drums Alive Intervention twice a week over a period of 3 weeks. Six of them were diagnosed with ADHS and all 33 children (12 female, 21 male) were participating in an early childhood development programme. Subjects were divided into three groups in accordance with the school classes they belonged to, just to keep them in their usual structure. To examine the physiological effects heart rate and rate of perceived exertion were measured. Regarding the cognitive effects, the “d2-test” was used to investigate concentration and awareness performance.

Results

Heart rate before the intervention was $89.02 \pm 10 \text{ min}^{-1}$. During the warm up phase heart rate increased to $147 \pm 23 \text{ min}^{-1}$ and during the main phase to $168 \pm 29 \text{ min}^{-1}$. Hence heart rate was affected significantly ($p= 0.003$). Regarding the rate of perceived exertion, values increased from $11 \pm 1,1$ during the warm up to $15,7 \pm 1,3$ after the main phase.

The following graph shows the results concerning “fun” and “motivation”. Children assessed the experienced fun as “enormous high” in the mean, which slightly decreased from week 1 to week 3.

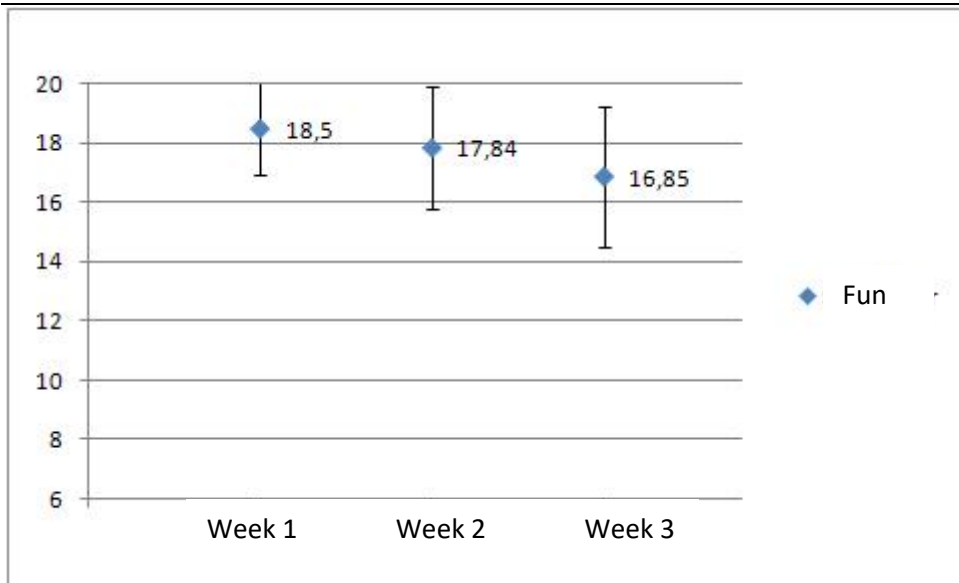


figure 3: results of the fun scale, week 1 to week 3

The results of the concentration performance that was assessed after each of the six classes, showed a highly significant improvement ($p=0.001$) from Baseline 93 to 145 in the mean after the 3-weeks intervention. The following graph shows the results from week 1 to week 3.

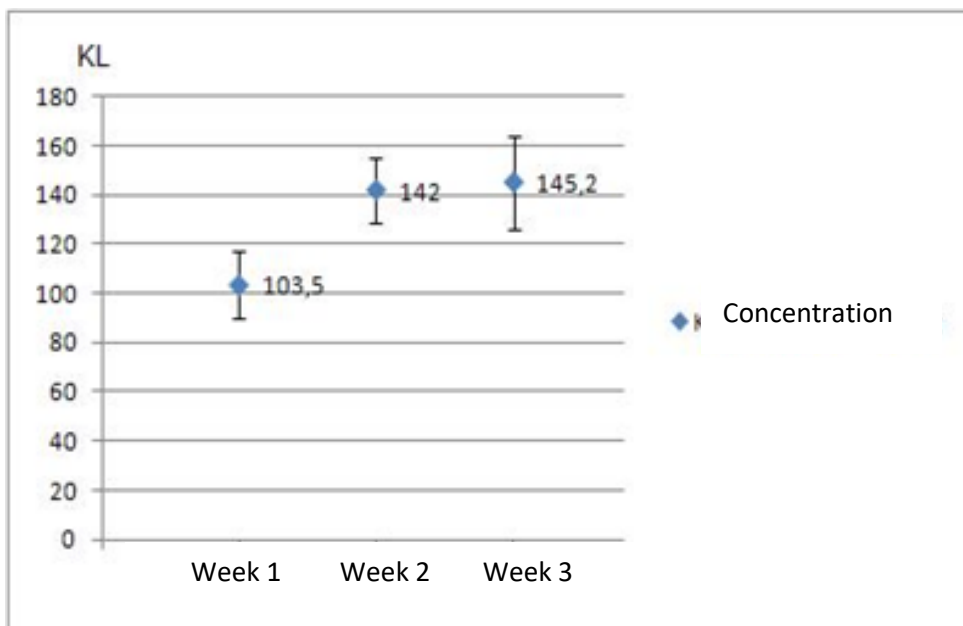


Figure 4: results of the "d2 Test" for all intervention weeks



Conclusion

Drums Alive seems to be an effective additional intervention regarding physical and cognitive parameters for children with dyslexia and ADHS. The intervention also enjoyed broad acceptance among the children.

A final comparing evaluation with other exercise interventions based on this pilot study, is not possible, but the potential of a specific DRUMS ALIVE Intervention should be further investigated within a Randomised Control Trail and a longer intervention period.

3 RESEARCH IN SENIORS

3.1 Effects of a Drums Alive® Intervention on activities of daily living (ADL), cognition and physical fitness in older adults in nursing homes

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Objectives

This study examined the effects of DRUMS ALIVE®, that includes aspects of exercise therapy as well as music therapy, on activities of daily living (ADL) as well as cognition and physical fitness of older adults in nursing homes.

Methods

11 male and 15 female subjects of 2 nursing homes with a mean age of 82 years (min. 64 years, max. 92 years) were divided into two intervention groups. Over a period of four weeks the subjects either conducted an age specific 'Drums Alive Intervention' (n=14) or a 'Body Percussion Intervention' (n=12) once a week. The pre- and post-test consisted of measurement of Blood Pressure, Stick-fall-test, Chair-raise-test, 6-minute-walk-test as well as memory and concentration tests. Furthermore balance was tested, with the help of dynamometric pressure measurements that examined the „point of pressure“.

Results

Systolic and diastolic pressure was significantly reduced [$p < 0,046$ und $p < 0,036$] in the Drums Alive Group. Regarding reaction time in the stick-fall-test, highly significant improvements could be shown [$p < 0,001$] from 65.51 ± 15.00 [cm] to 47.64 ± 16.93 [cm]. The Chair Raise Test



also showed significant improvements [$p < 0,009$] from 8 ± 4 [repetitions] to 11 ± 4 [repetitions]. Concerning short-term-memory and concentration there were no significant differences pre- to post-test as well as for the 6-minute-walk-test.

Conclusion

An age specific Drums Alive® Intervention has mild positive haemodynamic effects. As it is shown in other types of physical activity as well. Especially changes regarding the activities of daily living (ADL) such as rising and reaction time have to be assessed as very positive. In following studies, it is possibly recommended to work with higher intensities to achieve significant improvements for aerobic fitness as well. A final comparing evaluation with other exercise therapy interventions based on this pilot study, is not possible.

3.2 Effects of a Drums Alive / Golden Beats intervention on the fall behaviour of older adults

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Introduction

The goal of this study was to examine the effects of a Drums Alive / Golden Beats intervention on the fall behaviour of older adults. There are already numerous interventions, studies and reviews on the topic of falls. The research has recognized the relevance of the topic of falls and fall prevention on their own and has been able to generate important findings. New, particularly multi -modular intervention programs need to be evaluated in terms of their efficacy in the context of fall prevention. Drums Alive / Golden Beats is just such a new approach.

Methods

The pilot study analysed the preventative character of the Drums Alive intervention in relation to the fall behaviour of older adults with low to moderate fall risk. Effects in regards to changes in fall and stumbling incidents, fear of falling, social parameters, physical activity, the evaluation of fall relevant sensory functions and the motor indicators of mobility, balance, strength and the habitual gait speed were analysed. The intervention program Drums Alive / Golden Beats was evaluated within the framework of a ten -week, 20-unit



comprehensive RCT study. Time and interaction effects were evaluated using a waiting control group. All subjects underwent a pretesting period before the start of the intervention (t1). The post-tests were conducted directly after the end of the intervention (10 weeks) to record the short-term effects (t2). A follow-up test three months after the end of the intervention provided data for analysing the longer term maintenance of the intervention effects (t3).

Results

The results of the Drums Alive /Golden Beats intervention showed direct beneficial effects (t2) on the parameters of stumbling frequency, balance ability, motor mobility (with and without additional tasks), intensive physical activity as well as improved assessment of sensory functions relevant to falling. Regarding the motor mobility indicators with additional tasks, female participants benefited more from the intervention than the male participants in terms of balance ability, assessment of sensory functions, and intensive, moderate and overall physical activity. The intervention effects listed above have been verified in the long-term too (t3). It is to be expected that the intervention causes behavioural changes - taking all limitations into account - which have a sustainable effect on the level of the parameters. For the parameters of fall frequency, cognition and fear of falling, social indicators, dimensions of mild, moderate and overall physical activity as well as for the parameters of strength and habitual gait speed, neither short-term (t2) nor long-term (t3) positive changes have been shown. However, by including a comparison with the control group, it could be determined that the intervention had at least a maintenance effect for the parameters of strength and social contact and support and prevented a backwards development which was shown to be the case for the control group.

In addition to the data recorded by the measuring instruments, the observations and conversations of the participants among themselves or with the study and the course leaders provided insight into the effects of the intervention, even if those insights need to be interpreted with caution. Participants repeatedly reported an overall improved feeling of wellbeing and general condition as well as an increase in attentiveness.

Conclusion

The results of the intervention study are generalisable, as already discussed, only to older adults with low to moderate fall risk. And this is only under observation of the limits described for the study. Regarding further research efforts, it would be interesting to look at (1) whether an optimized selection, combination, and integration of stress criteria in regards to the intervention program could deliver more beneficial effects within the framework of fall prevention. Absent effects should be attributed partially to the weaknesses of the measuring instruments in this study. Thus, it would be meaningful for a follow-up study to (2) use measuring instruments which are more sensitive or can differentiate more or to modify the existing instruments accordingly. (3) Further findings could also be found by



another testing of the intervention with a random sample of subjects with high or very high risk of falling. Then, explicit statements about the effect of the intervention for this target group in relation to fall prevention could be made. (4) The same applies to the target group of older adults who are no longer living independently. Considering the limited personnel, financial and time resources of these facilities, it should be of extraordinary importance to maintain the mobility of these older adults as long as possible. For self-motivated physical activity among this target group, improving the parameters related to fall risk should be of enormous relevance.

4 RESEARCH IN SPECIAL POPULATIONS

4.1 Physiological, Symptom Specific and Cognitive Effects of a Drums Alive® Intervention compared to Conventional Exercise Therapy in Patients with Depression in a Clinical Setting

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Introduction

Worldwide 121 Million people suffer from depression (WHO,), which is, besides dementia, one of the commonest mental illnesses in old age. About 27% are affected by depressive symptoms (Hautzinger, 2015). In this context, the costs for early retirement in Germany, in consequence of depression are about 1.5 Billion Euros. (Deutsche Depressionshilfe, 2012). There is manifest evidence for exercise therapy on depressive symptoms (Cochrane Collaboration, 2010). Especially the release of neurotransmitter through physical exercise (Jung, 2001) and also through drumming (Drumbl, 2010), dancing and music in general (Hagendorf, 2011) are important regarding the fact, that predominantly neurobiological factors are crucial to the incurrance of depression (Kaspar, 2009). Hence this study examined the physiological, symptom specific and cognitive effects of a coordinative demanding Drumming Exercise Intervention in patients with depression in a clinical setting.

Method

In this study, 11 patients with depression conducted twice a week either the conventional exercise therapy (CG, n=5) or a Drumming Exercise Intervention (DG 2, n=6) over a period of three weeks in a clinical setting. To measure the physical and psychological effects the following parameters have been investigated: aerobic performance (modified Havard Step Test), coordination (Flamingo Balance Test/Ruler Drop Test), concentration and awareness



(d2 test) as well as the psychosocial health status (HEALTH 49) and the severity of depressive symptoms (BECK Depression Inventory-BDI-II). During the intervention also heart rate, blood lactate levels, RPE and fun/motivation were measured.

Results

The results showed no significant differences between CG and DG referred to the physiological and psychological/cognitive parameters. Only the subjective feeling regarding fun and motivation was significant higher in the DG.

Main results of the study:

1. Both interventions showed positive effects on aerobic performance and coordination with no significant differences.
2. Fun and motivation were significantly higher in the Drums Alive Group than in the conventional exercise therapy group which, in general, could lead to a better compliance.
3. Regarding the psycho-social health status there were no significant differences between groups.
4. According to the depressive symptoms there were also no significant differences between groups.

Conclusion

Regarding the symptom specific and physiological effects of exercise therapy in patients with depression there seem to be no significant differences between the conventional exercise therapy and a drumming exercise intervention. However, a drumming exercise intervention is able to arouse significant more enthusiasm which in turn can lead to a better compliance regarding physical activity in general.