



CHANGES OF PHYSIOLOGICAL PARAMETERS IN A SPORTIVE DRUMS ALIVE®-DRUMMING ACTIVITY AND ITS EFFECTS ON CONCENTRATION AND AWARENESS PERFORMANCE

P.R. WRIGHT, P. EHNOLD, R. ROSCHMANN, I. WOLF
Chemnitz University of Technology; Germany

Introduction

Drumming and dancing have been the simplest form of communication since mankind evolved. Even today drumming is still commonly practiced, especially by people in Africa and Asia. It is often the centre of ritual ceremonies and community festivals. The Max-Planck Institute and the University of Manchester for example investigated the acoustic communication forms of Makaka monkeys and found that the drumming with unspecific materials isn't just a side effect of random actions, but a manifest part of their communication and expression repertoire (Remedios R., Logothetis N. and Kayse C., 2009).

Drumming therefore appears to be a universal language – also described by the science of intercultural communication as an *anthropological constant*. Hence, all forms of drumming offer great potential as a universal intervention method. Especially if combined with music and exercise or as a sportive activity in order to generate positive effects. 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. However, looking at the existing scientific literature there don't seem to be any evidence based sport/fitness/exercise interventions using drumming as a key element.

This Presentation discusses 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.

Subjects

Tab. 1: Profile of the cohort - Age Category 18-22 years

	Age	Height (cm)	Body Weight (kg)	Sport activities in h/week
	20	169,1	62,2	6,4
S	1,10	7,45	7,44	3,48
Min	18	158	52	1
Max	21	185	77	12

Literature

Angelis, M. De., Vinciguerra, G., Gasbarri A., Pacitti, C. (1998): Oxygen uptake, heart rate and blood lactate concentration during a normal training session of an aerobic dance class. *Eur J Appl Physiol Occup Physiol*, 78 (2), 7-121.
Brickenkamp, R. (2002): *Test d2-Aufmerksamkeits-Belastungs-Test* (9., überarbeitete und neu normierte Auflage). Göttingen: Hogrefe.
Kin Isler, A., Kosar, S. N., Korkosuz, F. (2000): Effects of Step aerobics and aerobic dancing on serum lipids and lipoproteins. *Percept Mot Skills*, 90 (2), 457-71.
Kindermann, W. et al. (2004): Exercise programmes for patients with chronic heart failure. *Sport Med*, 34(14):939-54.
Loewy, H. Schroetter (1925): Über den Energieverbrauch bei musikalischer Betätigung. *Pflügers Archiv f. d. ges. physiol.* Bd. 211

Tab. 2: Profile of the cohort - Age Category 30-65 years

	Age	Height (cm)	Body Weight (kg)	Sport activities in h/week
	48	167,6	69,7	3,2
S	7,22	7,27	11,38	2,23
Min	39	154	54	1
Max	59	179	88	9

Study Design

Intervention

The same choreography was used in both intervention groups which represented a typical Drums Alive Cardio session with a duration of 45 minutes. This duration was chosen as it reflects the minimum of a typical fitness class which normally lasts 45-90 minutes. The session was divided into a warm up phase, a main phase and cool down. Only a low intensity was used in the warm up with very simple movements and basic steps of the Drums Alive® exercise. During the main phase the choreography was slowly build up using the "Add On" principle commonly used in aerobic dancing classes. All elements were practiced in a slow pace (ca. 60-70 bpm), then combined and finally repeated in an optimal pace using ca. 130-140 bpm. Depending on the individual health situation and fitness the subjects were allowed to choose between "low" and "high" impact, i.e. stepping to one side rather than jumping. The cool down phase consisted of basic Drums Alive® movements with a low intensity as well as stretches. At the end of each phase the physiological data was collected in both groups

d2 Control Group

The control group (N=17) for the d2 concentration and awareness test was tested during the same period of the data collection in the intervention groups – January until April 2010. This cohort showed the same age profile as the intervention group 18-22 years of age. The setting for the data collection was before and after a 60 minute long seminar at university. This data was compared with that of the students' intervention group (N=16, the d2 students intervention group had two more subjects in this group compared to the physiological data).



Results

d2 Concentration and Awareness Test

The analysis criterion for this test is the difference of the concentration performance value before and after the intervention. A descriptive comparison of the groups' mean values showed a better concentration performance in the Drums Alive® group (IG Students) than the control group. The mean value in the IG Students was 41.13 (SD=16.88)

Remedios et.al. (2009): Monkey Drumming reveals common networks for perceiving vocal and non-vocal communication sounds; *PNAS*. 106 (42)
Rixon et.al. (2006): Analysis of the assessment of caloric expenditure in four modes of aerobic dance. *J Strength Cond Res*, 20 (3), 593-596.
SRockefeller, A., Burke, E.J. (1979): Psycho-physiological analysis of an aerobic dance programme for women. *Brit.J.Sports Med*, 13, 77-80.
Smith, M., Draper, St. (2008). Physiological demands of rock drumming: a case study. *British Association of Sport and Exercise Sciences (BASES) Annual Conference*.
Williams, L. D., Morton, A. R. (1986): Changes in selected cardiorespiratory responses exercise and in body composition following a 12-week aerobic dance programme. *Sports Sci*, 4 (3), 189-199

compared to the mean value in the control group of 34.53 (SD=17.79). But this difference couldn't be proven to be significant using inference statistical analysis: T(31) = 1.091; p=0.284.

Blood Lactate

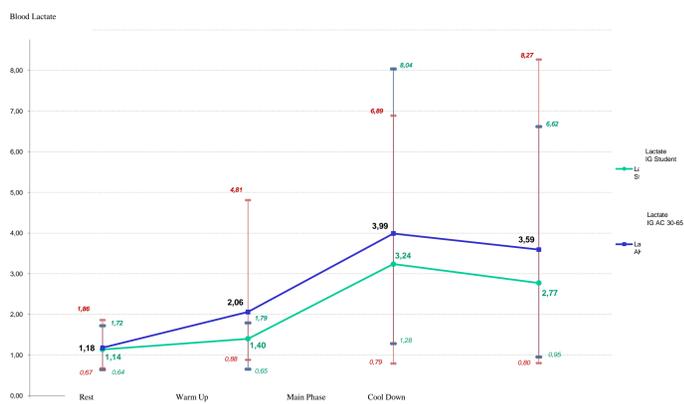


Figure 1: Blood lactate levels of the IG Students and the IG AC 30-65

Heart Rate

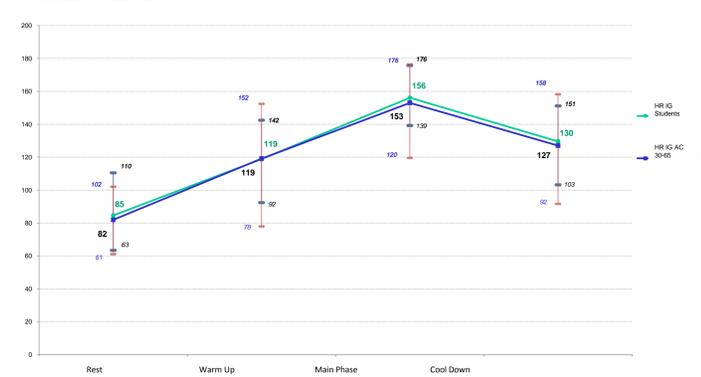


Figure 2: Heart rate behaviour of the IG Students and the IG AC 30-65 during the intervention

Discussion

This study needs to be seen as an explorative study that tries to build a basis for future research in this area. The results point in a direction which identifies Drums Alive® as a physiologically effective exercise. All objective parameters namely heart rate and blood lactate as well as subjective parameters such as the RPE scores increased significantly during the intervention which therefore qualifies Drums Alive® for the use in fitness sports and in health orientated areas as an exercise alternative. However, the relatively high blood lactate values in the age group of 30-65years (3.99 ± 1.93 [mmol/L]) are at the borderline of the anaerobic threshold. The mean heart rate of 153 ± 17 [min⁻¹] is in accordance with the blood lactate levels. Hence, this Drums Alive® intervention needs to be considered as a relatively high intensity workout from a recreational/health perspective for this age group (48 years). This might be of importance when working with certain risk groups.

Nevertheless, it needs to be said that there are various forms of Drums Alive® and the intervention used in this study only reflects on the cardio type of Drums Alive® which in this case proved to be an effective training session. Regardless of exercise intensities it seems that this type of exercise has one major advantage which is the motivation and fun factor of drumming in a group. This effect was notable throughout the period of the intervention, but unfortunately wasn't measured.

Considering the concentration and awareness performance no significant difference between the intervention group and the control group could be proven. Because of the low test power of 0.28; d=0.38 it seems advisable to carry out research in this area in order to confirm these results.

However, a final assessment of this method of exercising cannot be given on the basis of an N=27. Hence, more research is necessary. Especially, longitudinal studies are necessary into the health benefits of Drums Alive® and the use in education and therapy, i.e. in the treatment of depressive patients.

Contact Details:

P.R. Wright, Chair of Sports Medicine,
Institute of Sports and Exercise Sciences, TU-Chemnitz, Thueringer Weg 11, 09107
Chemnitz, Germany
Email: peter.wright@hsw.tu-chemnitz.de

