

EFFECTS OF AN EVIDENCEBASED DANCE PROGRAM (TANZPRO-BIODANZA®) FOR KINDERGARTEN CHILDREN AGED FOUR TO SIX ON IMMUNEGLOBULINE A, TESTOSTERONE AND HEART RATE

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Abstract

Present study addresses the question of the effects of the evidence based TANZPRO-Biodanza®-Program (Stueck & Villegas, 2009, Stück, 2013) based on BIODANZA by Rolando Toro and Cecilia Luzzi (Toro, 2010). TANZPRO-Biodanza® is the nonverbal part of the School of Empathy concept by Marcus Stueck (Stueck, 2013), which was developed in the project "Healthy Lifestyles in Kindergartens" of the German Ministry of Health (2009 until 2011). Biodanza is a contact and motion-based intervention method with auto-regulative claim on immune competence and the autonomic system of children of kindergarten age. The evaluation took ten weeks. A TANZPRO®-Biodanza class with girls aged four to six was carried out from September 2011 until December 2012. The immunological parameters immunoglobuline A and testosterone as well as the autonomic heart rate parameters were collected before and after each TANZPRO®-Biodanza sessions of the course as a process variable. Especially, the reduced testosterone levels after the meetings in the saliva of children show positive effects of the method on the immune system. The decrease of IgA levels after TANZPRO®-Biodanza in the saliva of children towards age norm might be due to an immune regulative effect. The specific effects of TANZPRO®-Biodanza on heart rate towards a mean level show improvement of physical autoregulatory processes.

Key words: auto regulative immune competence, empathy, Immunoglobuline A, TANZPRO®-Biodanza, testosterone.

Introduction

Biodanza was developed in the 1960's by the Chilean Rolando Toro; it is an intervention method combining music, movement and human contact and it promotes emotion to generate

intense experiences (so called *vivencias*, intense moments in one's life). Moreover it promotes authentic expression of human feelings and physical (bodily) empathic interaction within the human group; this is characterized by the self-regulation and personality of each of the participants.

In 2009 the evidencebased TANZPRO-Biodanza® program for children was developed by Stueck and Villegas at the University of Leipzig as the nonverbal part of the School of Empathy (SoE; Stueck, 2010) based on the BIODANZA-method by Rolando Toro. The verbal part in School of Empathy is used the evidencebased programme Respectful Communication based on Marshall Rosenberg (Rosenberg, 2007).

School of Empathy (Marcus Stueck)

School of Empathy 1: The language of Life (Marshall Rosenberg)

Verbal aspects of Respectful
Communication
Body to Head



Evidence-based Program (Language-verbal)

RESPECTFUL COMMUNICATION®

(Marion and Norman Müller Pörschmann,
Marcus Stueck, Sebastian Schoppe)

School of Empathy 2: Dance of Life (Rolando Toro)

Nonverbal aspects of Respectful
Communication
Head to Body



Evidence-based Program (Dance-nonverbal)

TRANZPRO-Biodanza®

Dance-oriented program with Biodanza for
children (Marcus Stueck, Alejandra Villegas,
Cecilia Luzzi, Rolando Toro)

Figure 1: Overview: School of Empathy (by Stueck).

Problem of Research

As mentioned above this contact and body-oriented intervention method for children was adapted from the theoretical and methodological concepts of Rolando Toro and Cecilia Luzzi (Toro, 2010). The program is a specified version of the Biodanza method for children, and thus can be conducted by school teachers after a minimum of training. The program consists of ten weekly sessions each with a different topic (e.g. dancing the Snow White Story for kindergarden children, travel to Brasil, China etc. for school children). Each session includes a brief discussion of the topic and also provides an opportunity to speak about experiences at the beginning and end of the session. The TANZPRO-Biodanza® exercises have elements of dance, movement, affective encounter and non-verbal communication; these are accompanied by music and supported using activating exercises with faster music to promote not only the vitality but also the creativity of children. Then quieter exercises together with slower music

are used to promote relaxation. More especially, the quiet part of a session contains appropriate (partner) exercises; these can improve the perception and acceptance of emotions as well as emotional regulation and empathy with others. The individual sessions had durations of 45 to 60 minutes.

Research Focus

The present research deals with the extent to which TANZPRO®-Biodanza affects physical function areas such as immune competence and the autonomic nervous system in children of kindergarten age. This is based on a study with kindergarten children taking part in TANZPRO®-Biodanza from 2011/2012. Immunoglobuline A (IgA), one of the immunological investigated parameters, is the immunoglobuline that is most strongly represented in external secretions and is of great importance for the suppression of bacteria in the oral mucosa (Tomasi, 1976). It prevents their colonization and penetration into the body. In a study with children aged up to six years (D'Amelio et al, 1982. From Hennig, 1994) for children of kindergarten age a mediated IgA concentration of 69 g / dl was determined, whereas studies on the secretory IgA concentration in adults (Aguirre et al, 1987. from Hennig, 1994), found mean secretory IgA concentrations to 100 micrograms / dl were. In Table 1 the mean IgA concentrations of the children are shown by age levels.

Table 1. Age-dependent mean IgA concentrations in saliva of children of kindergarten age (modified after Hennig, 1994).

Age in years	N	IgA-Concentration in µg/dl
0-1	14	94.7
1-2	102	53.3
2-3	161	70.6
3-4	363	71.7
4-5	538	70.1
5-6	361	68.4

Findings of various studies show positive effects of the essential, common components of TANZPRO®-Biodanza - music, movement and encounter as well as the triggering of emotions, their integration and regulation of the immune system. The investigation of the IgA values before and after the meetings of an open music therapy group showed an increase in the concentrations and secretion rates of the meetings (Müller, 1994). Loetzerich et al. came in an endurance trial (30-45 minutes) to the conclusion that the movement has a stimulating effect on the immune competence. However, Ran & Tree (1997), found a decrease in the amounts of IgA production after extreme sporting loads, indicating that the stress intensity is an important factor in physical activities with respect to their immunological effects. Speaking of the relationship between psychological and immunological variables, the results of a study with children who were in psychotherapy show that their IgA levels had increased at the end of psychotherapy (Hewson-Bower and Drummond, 2001).

Triggering positive emotions and improving emotion regulation are essential elements and aims of both, Biodanza and TANZPRO®-Biodanza intervention. Further influencing factors (eg, music, movement) promote immune competence. The found positive effects on the levels

of IgA in a Biodanza study in 6 of 10 Biodanza sessions (6 sessions with the lowest mean baseline IgA) were significant (Stueck, 2008). In children associated with TANZPRO®-Biodanza such effects could not yet be shown. However, in the evaluation of the projects discipline problems (Jäger & Vogelsang, 2011), restlessness and implementation difficulties in younger preschoolers concerning some of the exercises were found. As a consequence these 3-year-old were excluded from the evaluation and it was suggested to change practice elements in the TANZPRO®-Biodanza program. Also the study sample containing 20 subjects in each was too low and requires further investigations. Another fundamental explanation for the different results of adults and children could also be the respective IgA output values. This represents the average output value in 9 of 10 sessions was in a range of 27-47 g / dl, well below the indicated mean 100 micrograms / dl for adults of Hennig (1994). In the studies with children the mean IgA session output values are always at least about 120 g / dL, in some cases considerably higher (up to about 300 micrograms / dl), and thus from the beginning comparatively high. The emotion-regulating, pro-social approach of TANZPRO®-Biodanza also suggests a decrease in the hormone testosterone. So testosterone levels are positively correlated with aggressive behavior and negatively correlated with social behavior and corresponding competencies (Dabbs, 1997). It should however be noted that the production of the androgen testosterone in the preschool age is lowest and relatively stable. Favorable changes in this parameter would be especially for the success of emotion regulation and improvement of social skills. There is also evidence of a positive association between testosterone and cortisol (Schoenichen & Höselsbarth, 2013), that Watamura et al. (2010) ascribe a negative effect on immune competence. The results of previous studies on the effect of TANZPRO®-Biodanza on testosterone levels of kindergarten children and elementary school students (Jäger & Vogelsang, 2011) have no clear conclusions so far. Thus, the testosterone levels could be reduced due to a TANZPRO®-Biodanza at one school, but not at the other. However, the number of only three examined TANZPRO®-Biodanza sessions at the nursery group is too small for reliable conclusions.

Clearlier than the above mentioned immunological parameters, an improvement of auto regulation due TANZPRO®-Biodanza should be reflected on the cardiovascular system, as it is very sensitive to psycho-physiological processes. This is to be expected especially in preschooler's regulation of heart rate. In the investigation of students regarding social complexity of a situation, Käppler (1994) found a positive correlation with the heart rate, but not the blood pressure, and in kindergarten, the high density of social life should be a major stressor stimulus. Again, the previous studies on the effects of TANZPRO®-Biodanza give only limited information. Jäger and Vogelsang (2011) failed to detect significant changes as a result of TANZPRO®-Biodanza sessions in primary school students in relation to the heart rate. However, in the studies of the pre-post comparison, the heart rate of children in the first minutes of the initial talk of the session was compared with the heart rate in the first minutes immediately after the last activation part of a TANZPRO®-Biodanza –session. The possible effects may have been masked by a higher physical stress immediately before the post-measurement. This was also observed by Jäger and Vogelsang (2011) who found a decrease in heart rate values in the following minutes.

Reviewing previous studies and their results as well as theoretical considerations following research questions were modified:

In which way are the immunological parameters immunoglobulin A, and testosterone, as well as the autonomic heart rate parameters influenced by the intervention method TANZPRO® Biodanza?

Methodology of Research

General Background of Research

Experimental design

In Figure 2 the test parameters are summarized.

Dependent Variables	
Immunological: • Immunglobuline A • Testosterone	vegetative: • Pulse
Independent Variables	
• Measurement time	

Figure 2: Variable plan.

The factor time of measurement is systematically varied:

Process evaluation:

Measuring time: PRE1-10, Post1-10 - before and after each TANZPRO®-Biodanza Session (immunological parameters only the sessions 1, 3, 5, 7 and 9)

The investigation is based on the following schedule:

TanzPro: ProCess evaluation 2012	
28th September until 7th December	TANZPRO® weekly sessions (one-week break after the first half of the course due to short-term sick leave of the course instructor)

Figure 3: Time Schedule.

Sample of Research

For generating a suitable experimental group, kindergarten teachers who completed the TANZPRO®-Biodanza course training in the educational project «Strong Roots» in the district of North Saxony were asked to perform a TANZPRO®-Biodanza course in their daycare center. The conducted course was evaluated scientifically with the questions and hypotheses of this study. An agreement came from the Kindergarten «Sonnenschein» from Mockrehna.

Study sample includes twelve girls aged four to six years, because this was a special offer for girls in the school. However, the immunological parameters could only be detected in ten of the girls. The course analyzes to determine longer-termed effects of TANZPRO Biodanza® were performed of ten of the girls of the sample and the immunological parameter with the data of seven children.

Instruments and Procedures

Immunological parameters (recovery and analysis of saliva samples)

Saliva samples were taken from the subjects using cotton rolls both before and after the sessions. The saliva samples were frozen in a salivette, then later analyzed at the Immunological Institute in Leipzig using radial immuno diffusion (RID). A centrifuge was used so that the saliva was extracted from the cotton wool, and collected at the bottom of the salivette. It was distributed onto immuno diffusion plates and the respective concentration parameters were determined.

Heart rate

Heart rate was determined using the pulse watches PM 55 and associated chest straps the Brand Beuer®, the heart rate was recorded by sensors on the chest straps and then sent to the pulse at the wrist watches of children. To read out the data of heart rate by the minute, the EasyFit software program was used.

Data Analysis

For all statistical comparisons, data were first subjected to the Kolmogorov-Smirnov test for normal distribution. Then, simple pre-post comparisons using the t-test for paired samples were used. Because the sample size was small, any changes were considered relevant if any one of the following three criteria were passed (i) significance of $p \leq 0.05$ (ii) effect size above an intermediate level of $d = 0.50$ (Cohen, 1988) or (iii) power above an average level of $1 - \beta = 0.60$ (Faul & Erdfelder, 1992). The treatment followed the approach of Schoenichen & Höselbarth (2013) for the relevant parameters.

For additional comparisons of subgroups (in terms of cortisol levels and cognition) and found in the course of analysis, the «analysis of variance with repeated measures» application, which has been in post hoc comparisons corrected with «Bonferroni». Moreover, a significant result only in conjunction with at least moderate effect size of $\eta^2 = 0.25$ (Bortz & Döring, 2002) assessed as relevant. Correlative relationships were calculated for «Pearson». Only effect sizes and power were calculated using a different program, the G * Power 3® from septic and Erdfelder (1992). The determination of cluster boundaries for the study of changes in the parameters depending on their starting level based on the mean and standard deviation of the pre-readings, but also at frequencies of values, taking into account normal distribution within each cluster. For the investigation of cognitive parameters dependent on the cortisol levels the clustering was performed by dichotomizing the average cortisol levels of children during the investigation period.

Results of Research

Immunoglobulin A - Short-term Effects

General effects on the immunoglobuline-A levels

To illustrate short-term changes in IgA levels in saliva by individual TANZPRO®-Biodanza sessions on the TANZPRO®-Biodanza group, averaged pre-and post-IgA concentrations are shown in the following bar chart for all five measurement time points. Results of the significance or relevance test are indicated next to means and standard deviations in Table 2.

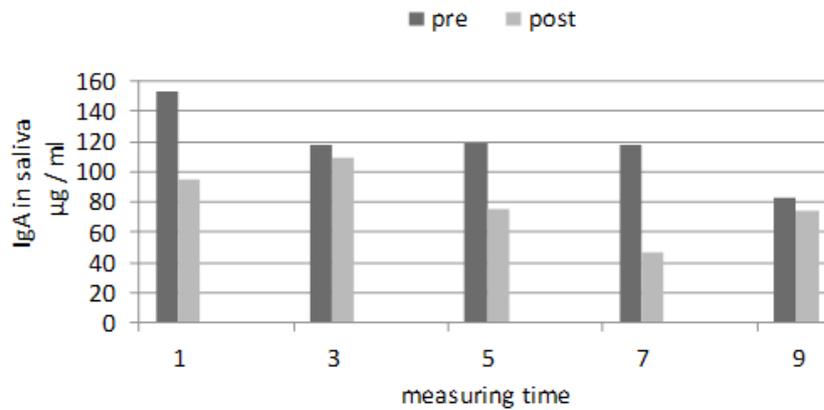


Figure 4: IgA- Mean values of TANZPRO®-biodanza group before and after the meetings.

Table 2. Statistical inference PRE-post comparison of IgA concentration (t-test - paired Samples).

Measurement time		M	SD	N	Significance (2-tailed)	Effect size d'	Power 1-β
Session 1	PRE	153.42	95.23	8	0.14	0.60	0.31
PRE_1 x Post_1	POST	94.88	54.65				
Session 3	PRE	118.38	97.78	10	0.77	0.09	0.06
PRE_3 x Post_3	POST	109.26	75.09				
Session 5	PRE	118.91	81.31	9	<u>0.06</u>	<u>0.72</u>	0.48
PRE_5 x Post_5	POST	75.67	32.70				
Session 7	PRE	117.60	156.58	9	0.18	0.49	0.25
PRE_7 x Post_7	POST	46.71	33.57				
Session 9	PRE	82.91	50.52	10	0.53	0.20	0.09
PRE_9 x Post_9	POST	73.89	40.94				

A comparison of the concentrations of IgA in saliva of children before and after the session, the group means show none of the expected 5 session's positive change in the form of a post-increase of IgA titers in saliva. In all five sessions the measured post-average is below the corresponding PRE value. The Pre-post differences, however, are significantly in either session. A significant trend ($p \leq 0.1$) is detectable only in Session 5 - a medium effect size. However, considering the IgA elevations of TANZPRO®-Biodanza course as a whole, the average IgA concentrations of children in Pre-post comparison reveal a marked significant decrease (* $p = 0.02$, $d' = 0.89$) in an average power of $1-\beta = 0.71$ (see Figure 5).

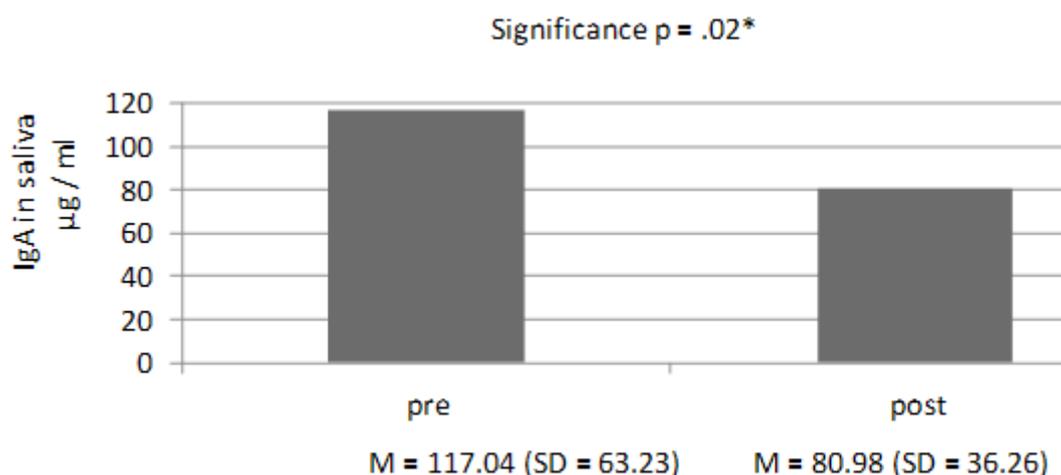


Figure 5: Average IgA levels averaged over the TANZPRO®-Biodanza group specific effects of the IgA levels in saliva.

The results of the study of specific effects of TANZPRO®-Biodanza sessions depending on the output level of IgA levels in saliva are presented graphically and in tabular form below:

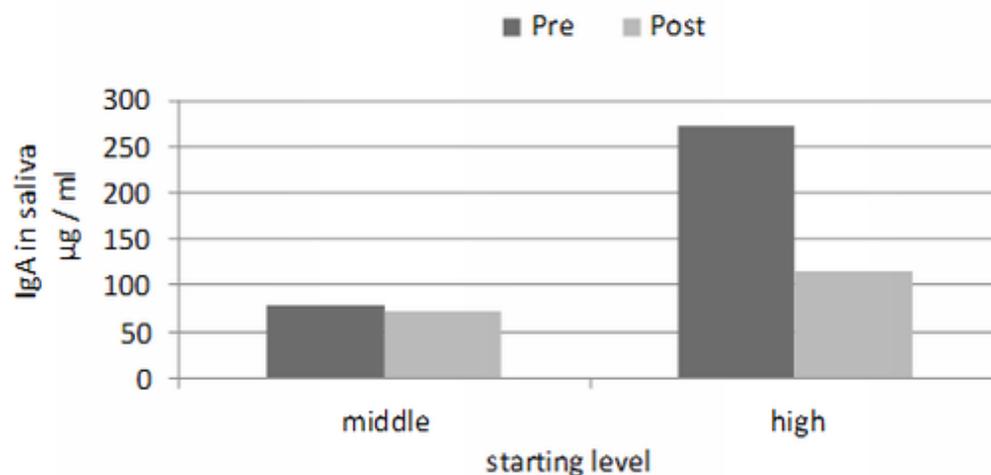


Figure 6: IgA-mean values of the clusters medium and high IgA at the beginning and at the end.

Table 3. Statistical inference pre-post comparison of the IgA levels of the clusters (t-Test – paired samples).

Cluster		M	SD	N	Significance (2-tailed)	Effect size d'	Power $1-\beta$
middle	PRE	78.73	48.62	37	0.49	0.11	0.10
	POST	71.95	50.31				
high	PRE	272.87	103.60	9	0.00**	1.40	0.96
	POST	114.42	51.20				

It is clear that only the cluster with high concentrations' PRE (from 200 g / ml) was significantly lower the post-values. IgA levels in the cluster with average output level (up to 200 ug / ml), however, does not change the PRE-post comparison significant. Even the post-mean of the cluster with a high output level does not fall under the Pre-and post-mean values of the cluster of cases with moderate IgA output level, but only on these approaches.

Testosterone Short-term Effects

General effects on testosterone levels in saliva

To illustrate short-term changes in levels of testosterone in saliva by individual TANZPRO®-Biodanza sessions that the TANZPRO®-Biodanza group averaged Pre-and post-testosterone concentrations are shown in the following bar chart for all five measurement time points. In the table below the results of the significance and relevance test are indicated next to means and standard deviations.

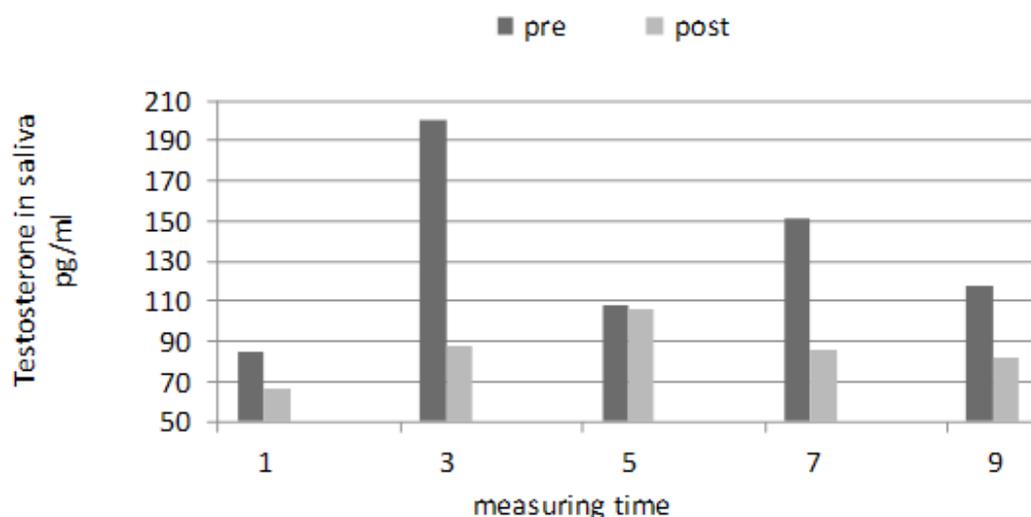


Figure 7: Average testosterone level of the TANZPRO®-Biodanza-group before and after the sessions.

Table 5. Statistical inference PRE-post comparison of testosterone (t-test for paired samples).

Mean		M	SD	N	Significance (2-tailed)	Effect size d'	Power 1-β
Session 1	PRE	84.60	17.07	8	0.26	0.43	0.18
PRE_1 x Post_1	POST	65.95	37.42				
Session 3	PRE	200.75	161.91	10	0.05*	0.71	0.52
PRE_3 x Post_3	POST	87.55	70.86				
Session 5	PRE	108.20	62.54	9	0.90	0.04	0.05
PRE_5 x Post_5	POST	106.36	37.05				
Session 7	PRE	151.32	95.69	9	0.01**	1.22	0.89
PRE_7 x Post_7	POST	86.00	69.72				
Session 9	PRE	118.03	92.39	10	0.31	0.34	0.16
PRE_9 x Post_9	POST	82.02	64.26				

In a comparison of the testosterone concentrations before and after the session, the measured post-group average values are in all sessions under the corresponding 5 PRE-group average value. The Pre-post differences are, however, only in 2 of the 5 sessions significantly - at medium to high effect size and power.

Considering the testosterone elevations of TANZPRO®-Biodanza course a whole (see Figure 5.14), as can the average testosterone concentrations of children in the PRE-post comparison, a significant decrease ($p = 0.02 *$) recognize. There were even whole provides a large effect ($d = 0.89$) and a mean power of $1 - \beta = 0.71$ observed.

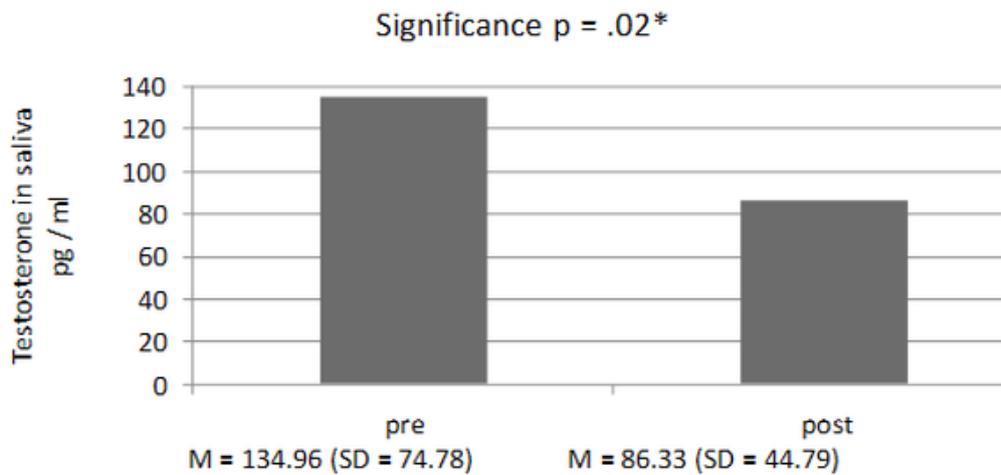


Figure 8: Average testosterone levels of the children averaged over the TANZPRO®-Biodanza group.

Specific effects on testosterone levels in saliva

The results of this study of specific effects of TANZPRO®-Biodanza sessions, depending on the initial level of testosterone in saliva are presented graphically in tabular form below:

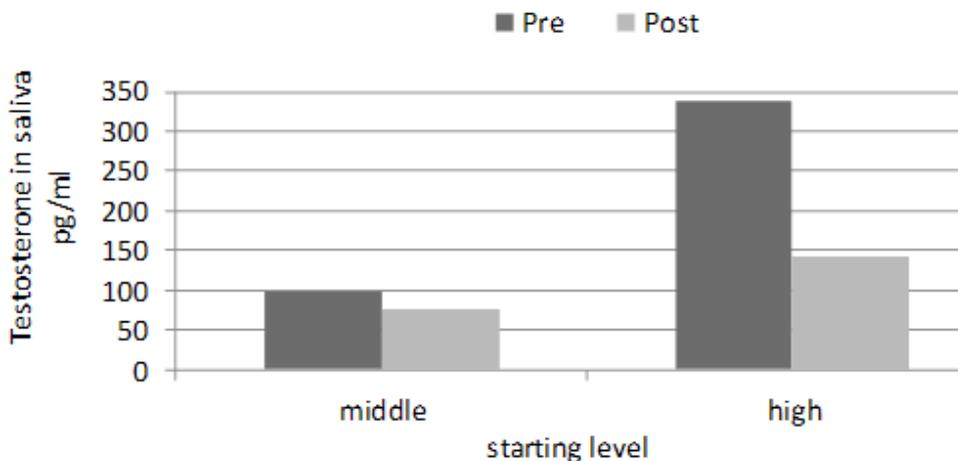


Figure 9: Testosterone-mean values of the clusters medium and high IgA at the beginning and at the end.

Table 6. Statistical inference PRE-post comparison of the testosterone level of the cluster (t-test for paired samples).

Cluster		M	SD	N	Significance (2-tailed)	Effect size d'	Power 1-β
Mean	PRE	98.28	45.53	39	0.02*	0.39	0.66
	POST	76.06	45.47				
High	PRE	338.18	111.29	7	0.02*	1.24	0.78
	POST	141.17	87.03				

The Pre-Post-decrease of testosterone is significant in the cluster with the higher pre-values (at least 230 pg / ml) and in the cluster with the mean pre values (from 45 pg / ml). As expected, the effect is rather small in the latter, whereas the cluster with the higher testosterone output values has seen a large decrease in the post-testosterone in saliva.

Heart Rate Short-term Effects

General effects on heart rate

To illustrate short-term changes in heart rate by single- TANZPRO® Biodanza sessions, the corresponding on- TANZPRO® Biodanza group averaged Pre-and post-values are shown in the following bar chart for all sessions. In the table below, the results of Significance testing, the effect size and power are indicated next to means and standard deviations.

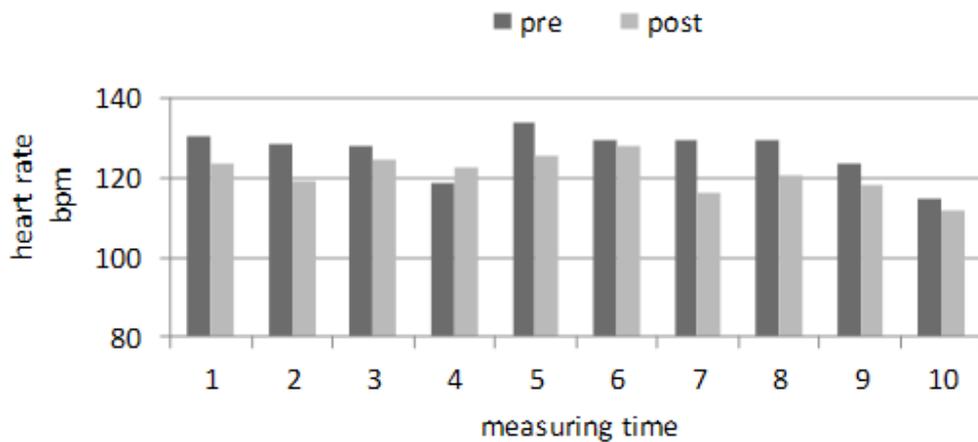


Figure 11: Mean values of heart rate TANZPRO®-Biodanza group before and after the sessions.

Table 9. Statistical inference pre-post comparison of heart rate (t-test for paired samples).

Measurement time		M	SD	N	Significance (2-tailed)	Effect size d'	Power 1-β
Session 1	PRE	130.61	20.39	7	0.30	0.43	0.16
PRE_1 x Post_1	POST	123.86	15.44				
Session 2	PRE	128.53	28.58	10	0.27	0.37	0.18
PRE_2 x Post_2	POST	119.45	17.32				
Session 3	PRE	128.03	24.70	9	0.74	0.11	0.06
PRE_3 x Post_3	POST	124.67	23.82				
Session 4	PRE	118.81	18.05	7	0.60	0.21	0.08
PRE_4 x Post_4	POST	122.64	4.66				
Session 5	PRE	134.10	31.32	10	0.47	0.24	0.10
PRE_5 x Post_5	POST	125.48	13.88				
Session 6	PRE	129.46	41.87	10	0.91	0.04	0.05
PRE_6 x Post_6	POST	127.98	10.20				
Session 7	PRE	129.64	32.73	7	0.36	0.38	0.14
PRE_7 x Post_7	POST	116.46	4.83				
Session 8	PRE	129.59	33.73	8	0.48	0.26	0.10
PRE_8 x Post_8	POST	120.55	11.38				
Session 9	PRE	123.55	13.60	8	0.07	0.75	0.45
PRE_9 x Post_9	POST	118.19	7.97				
Session 10	PRE	114.95	9.74	10	0.49	0.23	0.10
PRE_10 x Post_10	POST	112.10	8.50				

A comparison of the heart rate before and after the session, the measured post-group average values are in 9 of 10 sessions on the relevant pre-value - on but lack Significance at the $p \leq .05$ level and generally rather small effect size and very low power. Only in the penultimate TANZPRO®-Biodanza session, the pre-post decrease in heart rate to a significant trend in average, almost high effect size and rather low power. The only Pre-Post-average growth in the 4th TANZPRO®-Biodanza session is not significant and only just meets the criterion of a small effect size at power also insignificant.

The elevations of heart rate in TANZPRO®-Biodanza course for each child as a whole, across all sessions considered away, the pre-post differences in terms of heart rate decrease significantly ($p = 0.04$ *, $d' = 0.77$, $1-\beta = 0.68$ - see Figure 12).

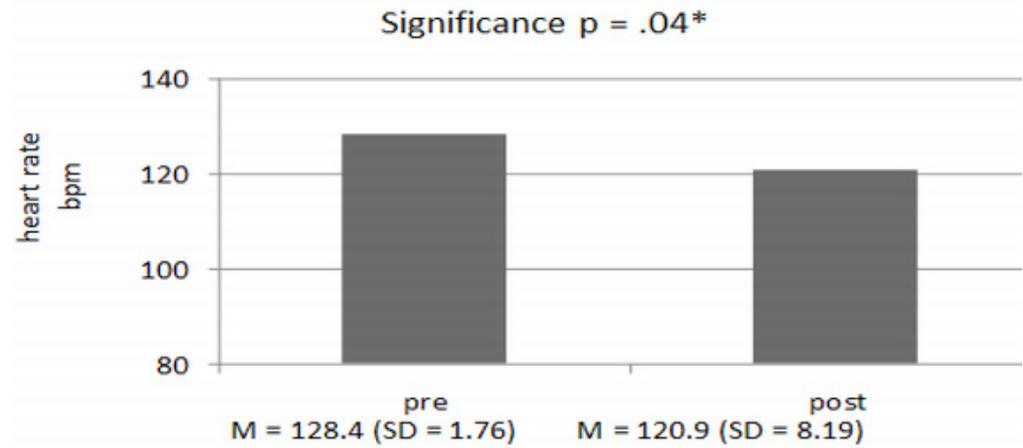


Figure 12: Average heart rate of children averaged over the TANZPRO®-Biodanza group.

Specific effects on heart rate

The results of the study with specific effects of the TANZPRO®-Biodanza sessions depending on the output level of the heart rate are presented graphically and in tabular form below:

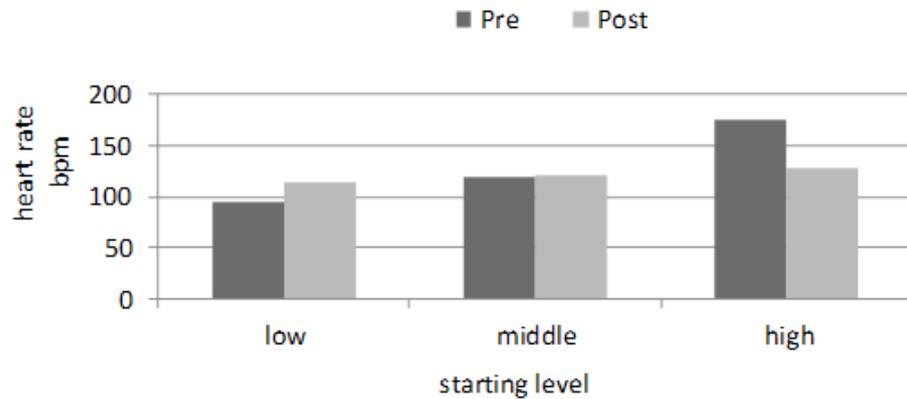


Figure 13: heart rate mean values of the clusters with low, medium and high output level.

Table 10. Statistical inference pre-post comparison of the clusters heart rates (t-test for paired samples).

Cluster		M	SD	N	Significance (2-tailed)	Effect size d'	Power 1-β
Low	PRE	95.52	4.95	8	0.00**	1.66	0.98
	POST	114.75	10.97				
Mean	PRE	119.95	10.74	64	0.76	0.06	0.77
	POST	120.46	11.37				
High	PRE	175.75	26.04	14	0.00**	1.35	1.00
	POST	128.24	20.52				

Both, in the cluster with relatively low initial level (up to 100 Bpm) and in the cluster with a high initial level of heart rate (from 153 Bpm), the pre-post comparison, a significant change in direction mid-range at very high Effect sizes and also high power. In contrast, the post-values of the cluster with average output level (101-144 Bpm) compared with the pre values not significantly different. In this cluster, the standard deviation within the TANZPRO®-Biodanza sessions hardly changed, whereas the standard deviation in the cluster with a high heart rate level of output is small, and thus underscores the significant specific effect. In clusters with low cardiac output frequency level, the standard deviation increases in the TANZPRO®-Biodanza sessions, suggesting that the heart rate was not controlled in all cases alike. Accordingly, the descriptive analysis results in a reduction of the total scattering. The heart rate values deviate above all not so far in the high range. As well as the post-trend line is the following scatter plot balanced and less steep than the pre-trend line and confirmed a post-change in heart rate in the direction of mid range.

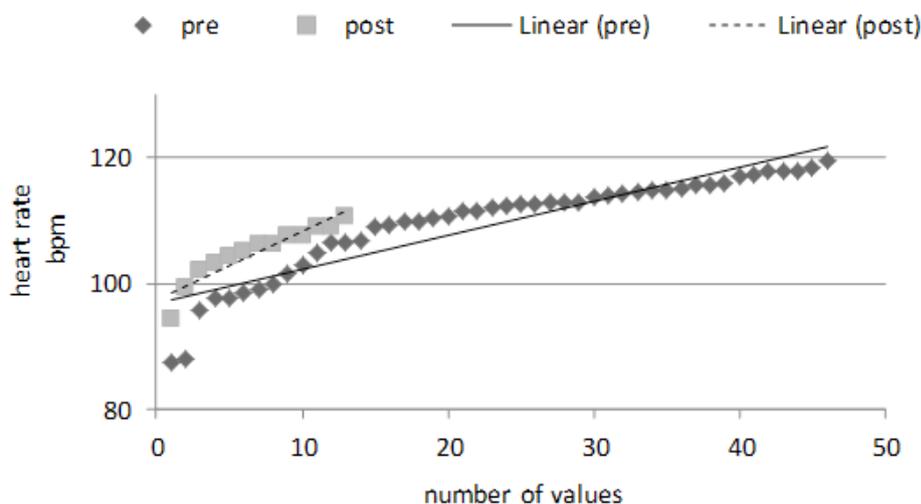


Figure 14: Distribution of all pre-post heart rate readings.

Discussion

The findings in relation to the levels of IgA in the saliva of kindergarten children from falling contrary to our assumptions. We have short-term (due to single TANZPRO®-Biodanza sessions) effects of TANZPRO®-Biodanza intervention on these immunological parameters in the form of IgA increase expected. Indeed, we found significant reductions in the short term antibodies in saliva. It occurs primarily but at very high IgA output level and then approach a mean IgA level only at. Here, perhaps even a non-expected positive effect of TANZPRO®-Biodanza sessions will be visible - in the sense of a regulatory excessive immune activity. Falls below a mean IgA levels after the TANZPRO®-Biodanza sessions a connection with the motion behavior of children is likely. Maybe a lot of movement, especially with lower fitness leads to a short-term immunological weakness.

For a regulation of the immune system by TANZPRO®-Biodanza is supported by the decrease in testosterone concentrations in saliva of children within the TANZPRO®-Biodanza sessions. The production of testosterone is positively related to the amount of cortisol in saliva (Schoenichen & Höselbarth) and the studies of Watamura et al. (2010) According to cortisol is more likely to adversely affect the immune competence. As expected, the concentrations of

testosterone secretory changes depending on the respective output levels with a correspondingly large decrease in hormone levels at high concentrations of secretory before the sessions.

Conclusions

TANZPRO-Biodanza® has a short term positive effect on the immune competence of the tested children (as measured by testosterone and immunoglobuline A). In addition, it also shows at least short-term regulation of heart rate that the auto regulatory potential of TANZPRO®-Biodanza sessions also extends to the autonomic system, and consequently to various areas of physical function. However, it was noted that further studies should be implemented in order to prove the reliability of the effects found due to the small sample size. This is an open topic and should be followed up with further investigations.

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