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PILOT STUDY INTO SUSTAINED AND SELECTIVE ATTENTION USING THE BAPNE METHOD

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Abstract

The aim of this research is to show the possible stimulation of sustained and selective attention by means of a quantitative study. The study was carried out using a research protocol which was quasi-experimental and designed to include pre-test, intervention and post-test. The sample consists of an experimental group plus a control group, n=57. The study was carried out in the province of Alicante in an area which exhibits medium to low sociocultural and socioeconomic levels. The evaluation tools used are the d2 test and the Caras-R test, both published by TEA. The intervention was delivered using a protocol of activities which are explained in the publication 'Programación didáctica'. The study was carried out with the experimental group over the course of six months, with sessions twice weekly on Tuesdays and Thursday. Each session lasted 50 minutes. The results show, following the post-test on the experimental group, that there are noticeable improvements in the cognitive aspects of sustained attention, selective attention, processing speed, and concentration. The control group pursued their normal routines and did not undergo any major change to their cognitive development.

Keywords: Body percussion, BAPNE, secondary education, selective attention, sustained attention.

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1. Introduction

Music and impact it has upon cognition have been studied by several different authors (Altenmuller & Gruhn, 2002; Rauscher, 1999; Bilhartz, Bruhn, & Olsan, 2000; Pascual-Leone, 2005; Cencec, Wilson, & Prior, 2006) who have shown that music can lead to specific improvements in cognitive functions, including when it is used in children's coordination games (Sulkin, 2009; Sulkin & Brodsky, 2007). For this reason, the combination of movement alongside music practice and motor coordination is the subject of an increasing number of studies. These studies show improvement in executive functions (Cencec et al., 2006; Gómez-Pinilla & Hillman, 2013; Piek et al., 2004; Brodsky & Sulkin, 2005; Cameron et al., 2012, Kubesch et al., 2009).

The present pilot study is part of a wide-ranging study involving a battery of tests and questionnaires designed to assess executive functions such as planning, concentration, sequencing, working memory, inhibition, impulse control, and attention, specifically sustained attention and selective attention (Sohlberg & Mateer, 1987). Two tests were applied – d2 and CARAS-R – which are both accredited in Spain and reviewed by TEA.

It is important to remember that this study has a fairly small sample size for an educational study, as there are fewer than 60 subjects in this pilot study. As a result, we will conduct subsequent studies and increase the number of subjects in both the control and experimental groups.

We followed the line of enquiry of previous studies which confirm that there is an improvement in executive functions brought about by movement (Erickson et al., 2011; Zatorre, Chen, & Penhune, 2007).

In BAPNE, we have thus followed this line of research with our publications and specific programmes containing a series of activities which are constantly changing (Romero-Naranjo, 2011; Romero-Naranjo, 2017) consisting of short, sharp bursts which require high levels of attention and are fun. Participants enter a state of flux (Csikszentmihalyi, 2012) and avoid any suffering. It is also important to consider the ability of the performer to carry out the activities. There is a link between the level of difficulty of the activities and the level of stimuli and cognitive development reached by the end of the study.

The BAPNE Method fosters overall development (cognitive, socioemotional, psychomotor) and promotes appropriate psycho-evolutionary development (Carretero-Martínez, Romero-Naranjo, Pons-Terrés, & Crespo-Colomino, 2014; Pons-Terrés et al., 2014).

Therefore, the goal of this pilot study is to study the possible influence and effectiveness of implementing a neuromotor programme involving the BAPNE Method which uses body percussion, music and movement as tools to develop the different types of attention.

2. Problem Statement

For this research we have consulted various academic search engines (Eric, Web of Science, Rilm, Scopus, JSTOR, Dialnet). Several authors talk about the therapeutic benefits of music and movement (Piek et al., 2004; Hodges, 2000), and the importance of motor control and cognitive development (Sulkin & Brodsky, 2007; Hyde et al., 2009; Catterall & Rauscher, 2008, Gromko & Poorman, 1998).

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Although there are several written pieces about body percussion in the field of teaching, most of them are not justified and quantified. The BAPNE Method uses validated neuropsychological tests in order to prove the possible cognitive stimulation (Trives-Martínez et al., 2014; Díaz Pérez, 2016; Moral-Bofill, Romero-Naranjo, Albiar-Aliaga, & Cid-Lamas, 2015; Romero-Naranjo, 2013).

3. Research Questions

Do students who are in their first year of secondary school and who participate in a programme of cognitive stimulation using neuromotricity by means of the BAPNE Method improve their attention levels significantly compared to students who do not participate?

4. Purpose of the Study

To investigate the effect of the BAPNE Method on attentional processes amongst subjects in a pilot group.

5. Research Methods

5.1. Participants and context

This study was carried out in the province of Alicante, and the experimental group came from Virgen de las Nieves school in Aspe (Alicante) and the control group from the Leonardo da Vinci Secondary School in Alicante. The investigation was carried out with a t sample of n=57 participants. The experimental group (n=28) consists of 13 boys and 15 girls. There was one Russian student. The control group (n=29) consisted of 18 boys and 11 girls. There was one student from Algeria, and six students who were repeating a year of school. The socioeconomic and sociocultural characteristics of the individuals tested were low to average.

5.2. Measurements

In order to check if the BAPNE Method has a significant positive influence on sustained and selective attention, the d2 and CARAS-R tests were used. Both of these are quantitative and published by TEA.

5.3. Process

While the control group continued with their regular music lessons, the experimental group followed the activities published in the two manuals (Body Percussion - Programación Didáctica volumen 1 y 2), and the manuals on the foundation (Body Percussion - Método Bapne Volumen 1- 5).

5.4. Design and data analysis

The design of this investigation was quasi-experimental and inter-subject. When analysing both tools (d2 and CARAS-R), the design *t*-Student was used to compare mean averages for independent samples with a sample big enough to apply the central limit theorem.

Due to the quasi-experimental nature of this study, two groups which already existed in the two establishments in the province of Alicante were used. The design consists of an experimental group

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(Virgen de las Nieves school in Aspe (Alicante)) where the BAPNE Method was used twice a week for 50 minutes at a time during their music lessons, and a control group (Leonardo da Vinci School, Alicante), which followed their normal musical education. The pre-test for both groups was conducted in December and the post-test was conducted in June. The program IBM SPSS 24 for Mac was used for the analysis of the results. This allowed us to calculate the difference between the experimental and control groups.

6. Findings

T-Student test was used for the analysis of the data. This allowed us to compare mean averages for independent samples. Statistical significance levels of 0.05 were used. The statistical software employed was IBM SPSS 24. The graphs and tables were made using Microsoft Excel for Mac. This was chosen for greater visual appeal.

Using the d2 test: in order to check which group had improved their score from the pre- to the post-test, a variable was created which measures the difference between the post and pre-test scores to see if the differences are greater or smaller between the experimental and the control groups.

Statistically significant differences were identified between the mean averages by subtracting the pre-test measurements the post-test measurements in the following variables ($p<0.001$): total responses (TR), total correct answers (TCA), total effectiveness of the test (TET), concentration index (CON) and variation (VAR) index ($p=0.024$). These differences were positive (190.011; 81.679; 193.45; 87.56 and 4.596 respectively), which indicates that the experimental group saw a larger change than the control group.

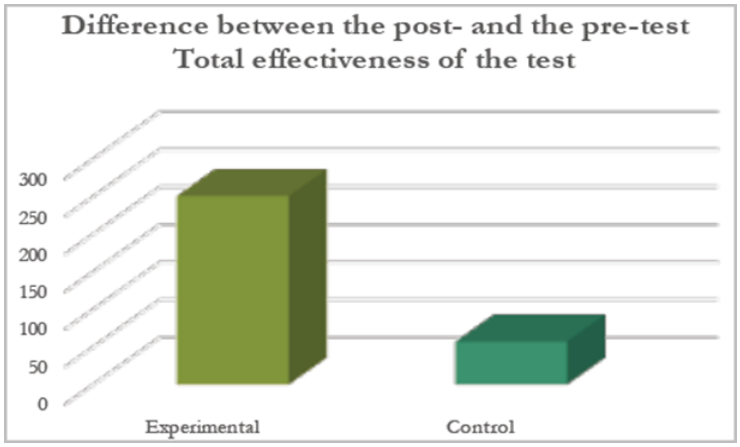

Figure 01. Difference between the post- and the pre-test.

Table 01. Group Statistics

	Group	N	Mean	Std. Deviation
TR	Experimental	28	229.57	74.333
	Control	25	39.56	59.217
TA	Experimental	28	104.68	40.472
	Control	25	23	27.58

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TOT	Experimental	28	250.25	97.22
	Control	25	56.8	57.145
CON	Experimental	28	102	48.145
	Control	25	14.44	51.741
VAR	Experimental	28	-0.96	7.219
	Control	25	-5.56	7.095

Table 02. Independent Samples Test

Levene's Test for Equality of Variances				**t-test for Equality of Means**			
		F	**Sig.**	**t**	**df**	**Sig.**	**F**
TR	Equal variances assumed	1.247	0.269	10.209	51	0	190.011
	Equal variances not assumed			10.341	50.386	0	190.011
TA	Equal variances assumed	2.631	0.111	8.481	51	0	81.679
	Equal variances not assumed			8.661	47.833	0	81.679
TOT	Equal variances assumed	2.248	0.14	8.693	51	0	193.45
	Equal variances not assumed			8.94	44.451	0	193.45
CON	Equal variances assumed	0.369	0.546	6.381	51	0	87.56
	Equal variances not assumed			6.354	49.274	0	87.56
VAR	Equal variances assumed	0.028	0.867	2.332	51	0.024	4.596
	Equal variances not assumed			2.335	50.511	0.024	4.596

Using the CARAS-R test: we did not find statistically significant differences between the two groups when we carried out the pre-test. However, there are differences which are statistically significant when conducting the post-test in the quantity of correct answers (p=0.001) and net correct answers (p=0.001), showing a difference in mean averages of 6.775 and 7.585 respectively. The difference between the post- and pre-tests was measured, and statistically significant differences were found in the same variables (p=0.003 y p=0.004 respectively).

Table 03. Independent Samples Test

Levene's Test for Equality of Variances				**t-test for Equality of Means**			
		F	**Sig.**	**t**	**df**	**Sig. (2 tailed)**	**Mean difference**
POST CARAS A	Equal variances assumed	0.036	0.85	3.376	52	0.001	6.775
	Equal variances not assumed			3.389	51.974	0.001	6.775

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POST CARAS A -E	Equal variances assumed	0.013	0.91	3.414	52	0.001	7.585
	Equal variances not assumed			3.407	51.11	0.001	7.585
CARAS A	Equal variances assumed	1.008	0.32	3.164	52	0.003	5.629
	Equal variances not assumed			3.186	51.329	0.002	5.629
CARAS A-E	Equal variances assumed	0.091	0.764	2.998	52	0.004	6.121
	Equal variances not assumed			2.992	51.111	0.004	6.121

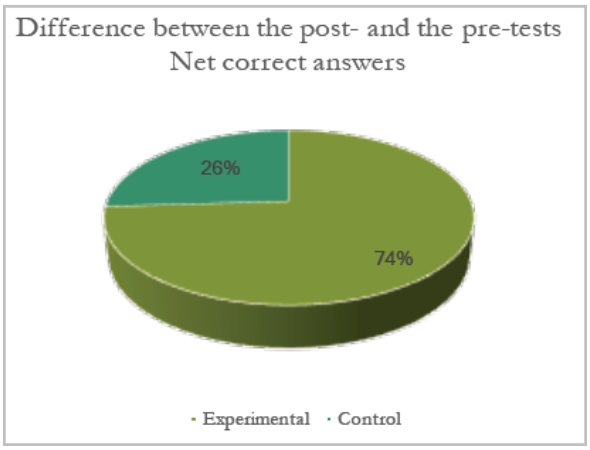

Figure 02. Difference between the post- and the pre-tests

Table 04. Group statistics

	Group	**N**	**Mean**	**Std. Deviation**
POST CARAS A	Experimental	28	49.43	7.705
	Control	26	42.65	6.985
POST CARAS A - E	Experimental	28	47.89	7.932
	Control	26	40.31	8.394
CARAS A	Experimental	28	10.32	7.097
	Control	26	4.69	5.864
CARAS A-E	Experimental	28	9.43	7.29
	Control	26	3.31	7.714

7. Conclusion

With this study, and looking at the results obtained, we can state that the information obtained from the d2 and CARAS-R test in terms of the development of attentional processes is satisfactory. Furthermore, we can confirm the viability of the implementation of the neuromotor programme using the BAPNE Method for the possible stimulation of the executive functions in the group under study.

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Attention is the capacity to select those stimuli which are most relevant, and it is important to remember that attention is a vital cognitive progress to carry out all learning processes (Ríos-Lago, Periáñez, & Rodríguez-Sánchez, 2011). Many studies stress the importance of physical exercise to improve attention (Zatorre, 2003; Peretz & Zatorre, 2005; Sibley & Etnier, 2003). This is also borne out by our study.

After the neuromotor programme, the attentional aspects were analysed when the BAPNE Method was used in secondary school students. There were statistically significant improvements obtained in sustained and selective attention, which thus confirm our initial hypothesis. Having analysed the data obtained, it can be confirmed that there are differences between the two groups (control and experimental) between the pre- and the post-test in all the variables; there was no homogeneity between the two groups. However, whilst all the students improved, the experimental group improved more significantly.

It is important to stress that in future investigations it will be crucial to look for a control group similar to the experimental group so that the sample in the pre-test can be homogeneous and thus avoid extraneous variables. The duration of this programme was 20 weeks, but it would be useful in future studies to plan for 12 months. This would allow the data to be more significant and reliable.

In conclusion, this pilot study with a sample of 57 participants (28 in the experimental group and 29 in the control) lays the path for future studies to corroborate the improvement in the different attentional variables. It also proves the benefits that the BAPNE Method can bring about in terms of the development of the executive functions.

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