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Body percussion and memory for elderly people through the BAPNE method

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Abstract

In this investigation, we present a study carried out on 38 elderly subjects aged 65 with the first signs of senile dementia, to whom the BAPNE method was applied in order to observe their cognitive stimulation. The study was focussed on activities carried out to stimulate executive functions and attention. The pre- and post-tests (eNB and Neglect) have shown evidence of a noticeable improvement in executive functions and changes due to decreased levels of the hormone cortisol. The state of flow of the participants was positive: the DFS-2 and FSS-2 tests carried out confirm a flow of activity with a clear sense of time being lost during the performing of the proposed exercises.

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Keywords: BAPNE; elderly people; body percussion; attention; motor control.

1. Introduction

Music and movement has great health benefits for their physiological and emotional character. Loss of concentration and memory in elderly people is a fairly commonplace occurrence: the aging process leads to deterioration of the brain cells, causing tiredness, problems with balance, and memory loss. It is for this reason that cognitive functions can often be affected, including concentration, memory, decision-making, judgement, spatial orientation, language, visual-constructive skills, thought, reason and communication (Sandu, 2013).

Executive functions have a very important role, as they are vital for problem solving and response inhibition. Dementia affects executive functions, and this is one of its most serious symptoms. For all these reasons, it is important to stress that this illness can be reversible or irreversible depending on the aetiological source of the disorder.

The forms of dementia can be classified into various types:

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(1) Cortical dementias, are caused by degenerative changes in the cerebral cortex and can be seen in patients with amnesia, aphasia, apraxia and agnosia, as well as difficulties in working memory, such as in Alzheimer's.

(2) Subcortical dementias, are the result of a decrease in underlying grey and white matter volume, and affect the basal ganglia, the thalamus, the base nuclei and the connections between these structures and the frontal lobe. They can be seen in patients with more striking changes to their awareness levels and control skills. Patients also show difficulty in processing information, psychomotor delays, difficulty in recalling information, the ability to deal with abstract concepts, problems with developing strategies, and mood and personality changes such as depression and apathy, such as in thalamic dementia, progressive supranuclear paralysis, and dementia associated with Parkinson's.

(3) Axial dementias are a group that some authors class as including dementia resulting from localised lesions in the medial structures of the temporal lobe, the hippocampus, the mammillary bodies and hypothalamus. Sufferers show severe problems in retaining information, disorientation, amnesia, carelessness and a lack of initiative.

2. The BAPNE method as a resource for cognitive stimulation.

This methodology stimulates the different areas of the brain, following Howard Gardner's theory of Multiple Intelligences, and has at its core movement and body percussion. BAPNE is an acronym formed from the words: Biomechanics, Anatomy, Psychology, Neuroscience and Ethnomusicology (Romero-Naranjo, 2008). All are these disciplines are trained together in the exercises proposed in the technique (Romero-Naranjo, 2011).

Body percussion is the art of hitting the body in order to produce various types of sounds for didactic, therapeutic, anthropological and social purposes. Both in the field of musical cultures and in the world of shows and performances, body percussion has had different roles, which can be classified into their different uses, meanings and purposes in each culture. The body is used for these different purposes as an acoustic, rhythmic, dynamic instrument with distinct timbre because it is linked to movement and dance. It is important to stress that in the present day, the media and social networking sites play an important role in their spread, due to their high level of visual and aesthetic content (Romero-Naranjo, 2013).

By carrying out this type of exercise (which are never choreographed), concentration skills improve, as well as attention, memory, and bodily dissociation of the upper and lower limbs. It is important to stress that the BAPNE method can be used both by healthy individuals (from children to adults) as well as by individuals with dyslexia, depression, cognitive disorders, hyperactivity, Parkinson's and Alzheimer's (Romero-Naranjo, 2012).

It is also important to point out that that the activities to be carried out are completely different for each of the pathologies to be treated.

In the BAPNE method, the teacher never uses the body percussion exercises arbitrarily, but presents them with a specific justification in order to develop the Multiple Intelligences. Within the cognitive theories on intelligence, Howard Gardner's proposal to consider it as a collection of mental abilities which are related to one another with a neuroscientific basis, aroused the interest of specialists in the field of education. Gardner's vision was completely new because it defined intelligence as a semi-autonomous system of information processing that manifested itself in the ability to solve problems or create new products that were important for a culture. According to Gardner, all people have the eight multiple intelligences, but differ in the amount and use of each of them, because they show strong points in one or several intelligences and weak points in others.

The theory of multiple intelligences is not a style of learning. Styles of learning can be carried out on any type of content and the multiple intelligences have relative potential for neurological functions that respond to a type of connect, because they are capacities which are developed. In the BAPNE method, we develop all these capacities through the activities that are selected for each of the multiple intelligences. Nevertheless, an intelligence should not be confused with mastering of a piece of knowledge, because an intelligence is a capacity and a mastering of a piece of knowledge is a block of pieces of knowledge which gives the individual the opportunity to reach various degrees of skill or expertise. The teaching sequence of the content in training in the BAPNE method is very methodical, and as such is designed primarily around a biomechanical and neurological basis (through the activation of all the cerebral lobes). Its aim is to develop independence of the upper and lower body, and speaking out loud at the same time.

3. Method

The investigation was carried out with 38 subjects, aged between 65 and 70 in Berlin, and with the first signs of senile dementia. With typical practice of two hours a week, more than 200 activities from the BAPNE method were performed in order to stimulate attention, concentration, memory and, above all, executive functions.

Formal evaluation focused on Mini Mental State Examination (MEC) of 35 items, using cut to detect cognitive impairment about 23/24 points. The study protocol was also performed with the following test: Motor memory program, Spatial Orientation Program and Cortisol study.

The study was carried out with an experiment group, and a control group, each consisting of 38 subjects, and all with the same level of senile dementia. Both groups were made to carry out a test to evaluate all their neuropsychological functions (*eNB*) as well as another to evaluate their attention skills (*Neglect*).

At a neurophysiological level, the hormone cortisol was analysed through five saliva samples before the investigation and in the eight weeks following the investigation.

The BAPNE Method activities were focussed on stimulating the five types of attention, as classified by Posner. The elderly people worked on:

(1) Sustained attention, which consists of the ability to maintain a consistent state of alert, involving the ability to maintain attention continuously for a specific period of time. From a neurological perspective, it can be found in the right hemisphere in the lateral orbitofrontal zone, the dorsolateral frontal zone, the basal ganglia, the thalamus and the parietal cortex.

(2) Selective attention is the process by which an individual responds to one stimulus or task and ignores others. From a neurological perspective, it can be found in the inferior parietal area, the superior temporal area, and the striatum. The posterior parietal cortex in particular has connections with the limbic system (the cingulate cortex), with the thalamus, and certain areas of the brainstem (the reticular formation) as well as motor areas of the cerebral cortex.

(3) Divided attention is the process by which an individual responds simultaneously to two stimuli, causing double cerebral activation. From a neurological perspective, it is primarily activated in the right hemisphere, and particularly in the inferior parietal lobe, the dorsolateral prefrontal cortex and the anterior cingulate cortex.

(4) Alternating attention is the process by which individuals shift their focus of attention between different tasks without becoming distracted. From a neurological perspective, the prefrontal cortex is very important as it generates rules, and changes from one executive rule to a new one, or to a different one. From a neuroscientific perspective, various different dorsolateral resections of the prefrontal cortex are activated.

(5) Focussed attention is the process by which a focus of attention is activated, centred on a stimulus or task in order to direct attention towards a visual, auditory or tactile stimulus. The time spent focussed on the stimulus is of little importance. Initially, this may be a response purely to internal stimuli (pain, temperature, etc) and from a neurological point of view, the prefrontal cortex is activated.

(6) It is important not to neglect the fact that a great number of authors talk of arousal attention which is simply the ability to be awake and be alert. This involves an ability to follow stimuli or orders, and this is the general activation of the organism.

The results were very positive, as post-tests show evidence of a noticeable improvement in executive functions, and clear changes in the level of cortisol, which dropped considerably.

It is also worth stressing that the flow state of subjects was monitored during the activities, by means of a test carried out at the end of the investigation which assessed the experience of the activity labelled DFS-2, and which also assessed the experience of the event FSS-2.

4. Results

The study shows that psychomotor activity carried out in order to develop divided attention greatly stimulates executive functions in patients with senile dementia. Carrying out various activities outside of a choreographic framework, and especially activities which are repetitive, forces the patient to remain in an alert state in order to react to each psychomotor challenge (Thaut, 2008). The BAPNE method is opposed to such creation of

psychomotor choreography, as patients memorise the motor sequence, leading to a drop in levels of attention. Test results are as follows:

Table 1

Experimental group (n=38)				
	Average		P. Wilcoxon	
	Pretest	Postest	Z	Significance value
MEC (Mini Mental State Examination)	29,42 ± 3,67	31,38 ± 3,07	–4,471	0,001*
Total Digits	10,52 ± 2,74	11,60 ± 3,59	–3,025	0,002*
Direct Digits	6,84 ± 1,98	7,35 ± 2,22	–2,283	0,022*
Inverse Digits	3,67 ± 1,22	4,25 ± 1,73	–2,623	0,009*
Motor memory program	4,37 ± 2,97	7,52 ± 2,29	–3,947	0,001*
Spatial Orientation Program	9,12 ± 4,8	10,31 ± 4,0	–3,327	0,001*

The integration of said activities, which are mainly ludic in nature (Bulut, 2012), involves entry into a flow state for the subjects, which allows them to generate a great quantity of oxytocin and, therefore, to decrease their cortisol levels. Cortisol study shows the following results:

Table 2

Cortisol (nmol/L)		
Shooting time	Pre	Post
8 -10	<19.1	<17.8
14:30 – 15:30	<11.9	<10.1
23:00	<3.7	<2.2

From a psychological point of view, it is clear that patients improve along two main lines:

A. Socialisation: An increase in patients' socialising can be seen, as well as improved mood and a great willingness to participate in this type of activity. In this way, the subject improves their quality of life.

B. Neuropsychology: Stimulation and improvement of executive functions and attention levels can be seen. The patient is able to maintain attention levels for a defined period of time. Significant advances can be seen in procedural memory, as repetition of sequences of movement will stimulate learning and therefore is useful to maintain the residual capacity of the patient.

From a neurological perspective, we can see the following aspects. From carrying out tests, it is clear that there is a delay in the onset of symptoms of the illness. The more serious set of symptoms can be seen to progress much more slowly compared to patients who have not been stimulated (control group).

On another note, it is important to point out that patients' endorphin levels increase, as seen in saliva tests. The movements carried out cause the production of this neurotransmitter which creates a sense of wellbeing within the organism. For this reason, carrying out body percussion following the sequence of exercises contained in the BAPNE method is beneficial for patients with senile dementia.

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