

Essay: Anxiety, Physical Education and Music: paper discussed in Athens (Institute for Education and Research Human Development Research Unit of Sport) at the 8th Annual International Conference on Kinesiology and Exercise Sciences 25th-28 June 2012 Athens, Greece Maria Rosaria D'Acerno Associate professor University in Napoli Italy.

Keywords: physical exercise, music stress, depression, the right and left side of the brain, endocrine system, cortisol, the brain.

1) Introduction

The main aim of this study was to reduce stress and consequently depression to children (age 6 to 9); a stress, which gave them problems linked to physiological perceptions (vomiting, sweat, shallow and frequent breaths, a sense of choking and muscle pain) and psychological disorders derived from either a sense of separation or social anxiety, excessive shyness, fear of new situations involving new people and new environments, etc. The children were divided into two groups of ten. One belonged to the middle-class native children, and it acted as a control group, the other to immigrant low-class families. We tried to raise their self-esteem by providing them physical exercises under the listening of music, since physical activity and music release neurotransmitters and endorphins, chemicals in the brain that relieve depression. The focus of the experiment was to link the activities controlled by the right as well as the left hemisphere.

2) We are a machine with soul and mind: the brain

As a machine, we are made up of organs, which give the human body the possibility to function properly when there is a perfect balance within the inside and the outside pieces of the machine. The brain is the 'headmaster' who sends commands to each organ in order to develop an activity, which in turn stimulates, by altering or reducing the effects of the endocrine system, the whole body.

The endocrine system regulates the hormones deputed to stress which are of two types: 1) cortisol, affecting the metabolic system and 2) norepinephrine, playing a role in depression and hypertension.

In the brain *dopamine* (a chemical released by nerve cells which, by inducing pleasure and a calming effect, inhibits the release of the stress hormone: cortisol) functions as a neurotransmitter to send signals to other nerve cells.

It is very important to control cortisol since higher levels of cortisol can lead to a decreased immune response. Severe anxiety disorders are often a result of imbalanced brain chemistry. But how can we control cortisol if we are always stressed because of our stressing life?

Soul and mind might help the machine.

When the brain sends commands, it means that it has also received inputs from the environment, which in turn stimulates our soul and then our mind. Our reaction influences our feelings, so that we are stimulated to achieve the object of our desire. A long chain, made up of emotions and chemical reactions, has been established, and we start producing movements and, consequently, hormones. In so doing, when we feel something wrong within our body we have to intervene with our mind suggested by our soul. If we feel that stress is the cause, we need to control it, first of

all by reducing our exposure to stressing situations. Stress alters the whole chemistry of our body by disrupting it and, consequently, generating negative reactions. As a consequence, cortisol increases, and so becomes higher, the immune system decreases, the blood pressure increases and all the organism becomes vulnerable.

Physical and psychological imbalances are the first phenomena showing higher levels of cortisol due to stressing situations. Traditional researches focused on cerebral dominance by distinguishing the abilities linked to the right and left hemispheres. They attested that the right side of the brain was deputed to control spatial abilities, face recognition, visual imagery, music and in general all the abilities linked to art. Rather, the left hemisphere controlled logic, language, mathematics, etc. More recent studies attest that this previous division is not so sharp, rather there is a strong suggestion that the two hemispheres work together and share much more information we can imagine because they are connected through the corpus callosum. One example is offered by gymnastics and music since they involve both sides of the brain.

Music: The right side of the auditory cortex processes pitch and some aspects of rhythm, melody, and harmony; the left side processes rapid changes in music intensity and frequency. Both sides of the brain perceive rhythm; furthermore, rhythm perception also involves the frontal cortex of the brain.

Physical exercises: Generally speaking, we know that the left side of the brain controls the right side of the body, while the right side is controlled by the left side of the brain. Thus, because gymnastics uses the whole body by coordinating the movements of both left and right sides, as a consequence, the brain works in unison in order to send signals to the right as well as the left side of the body. From the psychological point of view, we know that gymnastics helps to achieve a well-balanced body and mind. Our feelings ask help to our mind, so that it suggests activities that induce leisure: sport and music are the most important of them. They both relax the tension accumulated by producing dopamine, and also by activating both hemispheres, thus balancing their functions. I have chosen these two activities, because I personally prefer, among other issues, physical activity, listening to music and playing a musical instrument (violin). In fact, the best thing to do is to choose whatever you like more; only by doing that, you achieve gratification and all the benefits deriving from pleasure. In addition, there are many studies that attest real improvement from both the physiological and psychological side linked to these subjects. These researches consider the two items (sport and music) as isolated means to achieve better conditions while controlling the body and the mind. In my experiment, I have linked them when asking the children (see slide 3) involved in the experimental group to choose the pieces of music they liked more, alternating them in order to satisfy everyone. The physical exercises were chosen according to the age of the children and to their problems.

The main aim was to reduce stress, which gave them problems linked to physiological perceptions (vomiting, sweat, shallow and frequent breaths, a sense of choking and muscle pain) and psychological disorders derived from either a sense of separation or social anxiety, excessive shyness, fear of new situations involving new people and new environments, etc. (see slide 6). The children were divided into two groups of ten (see slide 3 - 6 boys and 4 girls; age between 7 and 9). The age was chosen in order to have a balance for both their and our expectations, based on an

almost common experience derived from an average social condition. One of the two groups belonged to the middle class. Even though their families seemed quite simple and with no particular problems, also paying enough attention to their children, those showed anxiety disorders.

The most important thing to teach them is to develop their self-esteem. In order to stimulate self-esteem growth, it is necessary to spend a long time with children trying to speak to them by inducing answering at the many questions expressing their opinions. While verbal communication is something natural for human beings, it is extremely difficult to use language when there are either a non-stimulating environment or any lack of linguistic knowledge, due to a multilingual context. The way is not to teach grammar or vocabulary from the formal side but to find out other means, which might influence the growth of the whole personality. These features were common to both groups, and we hope that once resolved these problems, both groups of children will overcome their anxiety disorders. Starting from the knowledge of one's own body seemed the best way to pursue our aim.

Gymnastics is the first answer used to stimulate certain confidence in the body: how to control it, how to balance it, how to coordinate movements, how to follow others, how to regulate time and space. But, just following the teacher's command is not enough. The child has to acquire the ability to link the teacher's command to a musical sequence, too, which, while sending rhythmic impulses, coordinates and synchronizes the whole body in order to follow a certain numerical sequence. Then, if the music listened during the exercise period is a song, children unconsciously develop linguistic features, too, because they link single words and phrases to the performance they are trying to develop. In so doing, they activate body and mind while concentrating on physical activity to both keep balance and to combine time and space.

The focus of the experiment was to link the activities controlled by the right as well as the left hemisphere. The middle-class children used much more the right hemisphere, since, at home, they were used to be involved with temporal, logic, linear, rational functions, while the immigrant children used the right hemisphere much more since they were involved with spatial, non-rational, global, concrete functions. They both did not use verbal communication enough: middle-class children, because their parents did not have time to speak with them, immigrant children because they did not feel enough confident in both the target language and the family language. Since nowadays researches attest that music and sport are elaborated by many areas of the brain included in the two hemispheres (the right and the left), I have decided to stimulate body movement through music. In so doing, the children had the opportunity to really balance not only the chemistry of their body but also their cognitive and behavioural development, while listening to language through songs. Then, while socializing with one another, they had the opportunity to develop verbal communication. Music and sport help our machine to produce two hormones: serotonin and endorphin. These are two neurotransmitters which contrast the imbalanced brain chemistry caused by anxiety disorders derived by stress.

Physical activity and music release neurotransmitters and endorphins, chemicals in the brain that relieve depression. Exercises, while boosting the immune system, by providing calming effects that reduce anxiety and depression, also bring people into contact with other subjects who enjoy physical activities (dance, gymnastics, or sport);

thus, a healthy atmosphere stimulates the improvement of mood. In addition, physical activities supply people with plenty of oxygen, which reaches the muscles, and also improves cardiovascular functioning while regulating the respiratory system.

Furthermore, either muscle coordination or flexibility as well as physical and physiological balance improve greatly, while clearing and resting the mind. Coordination/synchronization also develops a better breathing, which, while being a natural performance, rather, includes a series of appropriate exercises inducing the subject to practice different breathing exercises which touch abdomen and nose. The expansion of the diaphragm and that of the lungs as well as a rhythmical and conscious breathing is helpful to alleviate a stressful situation, in which people tend to take shallow breaths leading to hyperventilation. It is important to know that chest breathing coordinated by mouth should be avoided, since it increases the feeling of anxiety.

Conclusion

The analysis resulted very difficult, because, apparently everything was in its place: nice parents, nice relatives, good wages, good social conditions, comfortable houses, a lot of friends, a lot of parties, a lot of toys, etc. Comparing these children to the other group observed (immigrant children belonging to a low social class), it has been more difficult for us to perceive the very nature and reason of the symptoms belonging to the former group (see slide 4). Immigrant children seemed easy to analyze because they had nothing: parents too busy to survive, no proper house, no toys, no relatives, a few friends also busy to survive, no parties, in one word they had nothing. So that, even though at a first glance the two groups seemed former easy, the latter difficult to analyze, after a few meetings they both appeared difficult. The reason is that children elaborate their cognitive and behavioural growth from a very personal perspective. What seems acceptable for us might generate in their mind a totally different reaction. At last, our conclusion was that every subject has a very subjective way to afford life, and even the smallest nuances might provoke exaggerated and unexpected reactions, not only because of the environment and the people around the child, rather because the child responds to external stimuli by mixing up even past experiences almost without any meaning for adults.

The conclusion of this experiment is still far to be reached, but after one year, now the children are much better (see slide 22). The most important point is that they started to socialize with all the subjects of the groups; they started to appreciate music; they started to synchronize melodies and body movements. Our first aims, which were communication, movement synchronization, and socialization have been fully achieved.

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ATHENS INSTITUTE for
EDUCATION and RESEARCH
8° Annual International
Conference on Kinesiology and
Exercise Sciences
25-28 June 2012, Athens,
Greece
Maria Rosaria D'Acierno
Università Parthenope Napoli
Italy

Presentation

ANXIETY through **Music** and
Gymnastics

Physiology and **Psychology**
of human beings

Analysis

Group 1)- It seemed very difficult to find the cause of those children's anxiety, due to an apparent well balanced familiar environment (comfortable houses, lots of toys, many relatives, good socio-economic conditions, etc.).

Group 2)- It seemed very simple to find the cause of anxiety, because of the many problems linked to these families (economic, cultural, linguistic, lack of relatives, no proper houses, no toys, etc.).

Children elaborate problems from a very personal way. They mix up present and past experiences in a very subjective perspective. Many times, **environment** and the **people** around the child cannot solve his/her problems.

They need new experiences to stimulate, from the physiological point of view, positive hormones and, from the psychological side, **self-esteem** and **communication**.

Physiological disorders: headache, vomiting, shallow and frequent breaths, a sense of choking, muscle pain for lack of oxygen, etc.

Psychological disorders: fear of separation, social anxiety, fear to meet new people and new places, excessive shyness, fear to speak, to solve a new problem, excessive fear of the unknown, etc.

Human Beings: machine and mind

Machine: 1) organs regulated by **hormones**
2) brains regulated by our **soul** and **mind**.

Soul and mind are stimulated by the physical environment and by the cultural context. Our soul receives inputs and reacts, so that our feelings are influenced and they send inputs to our brain which in turn sends commands to our organs in order to fulfill the object.

The endocrine system

The brain sends commands to each organ in order to develop a given activity.

Different activities stimulate the whole body by altering or reducing the effects of the **endocrine system**.

The **endocrine system** regulates the **hormones** deputed to **stress** which are of two types: 1) **Cortisol**, affecting the metabolic system, 2) **norepinephrine** playing a role in depression and hypertension.

Severe anxiety disorders are often a result of imbalanced brain chemistry.

Can we control cortisol?

Of course, we can.

How? By sending commands to the brain according to the inputs our soul has received by the surrounding environment as well as by our body.

When we feel stressed the whole chemistry of our body has been disrupted, thus negative physical reactions start: cortisol becomes higher, immune system decreases, blood pressure increases, etc.

Dopamine is a chemical released by nerve cells, which, by inducing pleasure and a calming effect, inhibits the release of the stress hormone:

cortisol.

In the brain dopamine functions as a neurotransmitter to send signals to other nerve cells. It is important to control cortisol, since higher levels of cortisol can lead to a decreased immune response.

Physical and psychological imbalances are the first phenomena showing higher levels of cortisol due to stressing situations.

Music and physical exercises might be the answer.

They both relax the tension accumulated by producing dopamine and also by activating both hemispheres, thus balancing their functions.

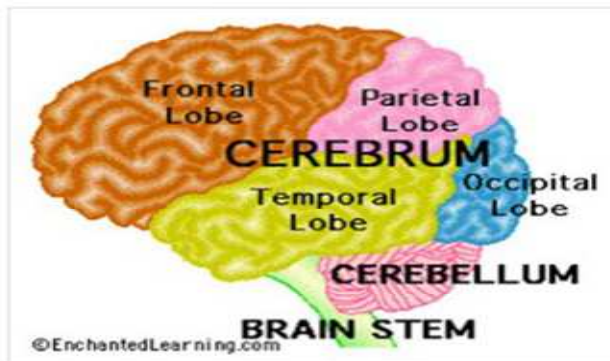
Cerebral Dominance

Right Hemisphere: Spatial abilities, Face recognition, Visual imagery, Music.

Left Hemisphere: Language, Math, Logic.

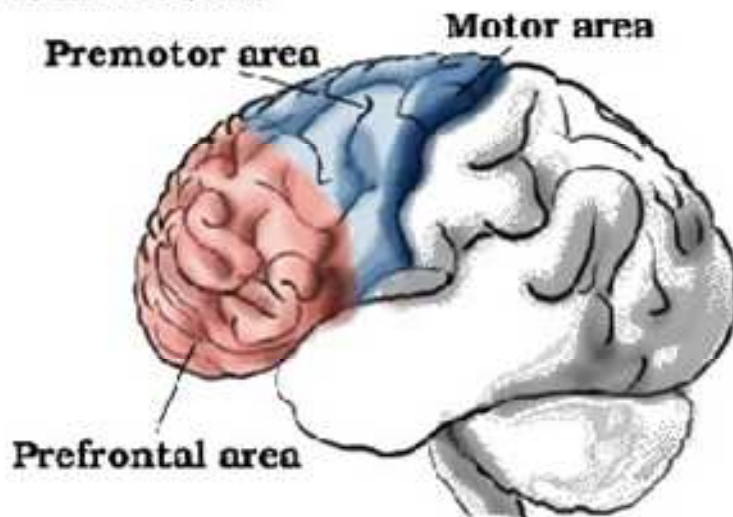
These are generalizations and in normal people the two hemispheres work together, they are connected and share information through the **corpus callosum**.

Functions of Human Brain



The Brain has three main parts, the cerebrum, the cerebellum, and the brain stem. The brain is divided into regions that control specific functions.

Frontal Lobe:



Music and Gymnastics

1) **Gymnastics** is the first answer; it gives more oxygen to the muscles; it helps to acquire confidence, because it helps the knowledge of one's own body; it coordinates movements; it includes you in a group; it helps to regulate time and space.

2) **Music** should be linked to exercises; it might be a rhythm or a song; the child has to choose the music he/she likes, and has to learn to link the teacher's command to a musical sequence of impulses in order to follow a certain numerical sequence. Songs gives children linguistic inputs, too.

The left side of the brain controls the right side of the body;

the right side of the brain controls the left side of the body.

Gymnastics, by using the whole body, coordinates the movements of the left and the right sides of the body.

In conclusion, when performing physical exercises, the brain works in unison in order to send signals to both the right and the left sides of the body.

Conclusions

- 1) The **middle-class children** used the left hemisphere more. They were much more involved with temporal, logic, linear, rational functions.
- 2) **Immigrant children** used more the right hemisphere. They were involved with spatial, non-rational, global and concrete functions. They both did not use verbal communication enough; **middle class children** because their parents were too much involved with their jobs; **immigrant children** because they were not enough fluent in both the host language and in their cultural language.

While practising **physical exercises** at the rhythm of **music** children used 1) both hemispheres, thus balancing them. Then, 2) **music** and **exercises** provided **neurotransmitters** and **endorphins**; two chemicals that, by providing calming effects, reduce anxiety and depression. **Oxygen** in the muscle improved the coordination of movements as well as flexibility. 3) Working in group facilitated **socialization**, as well as 4) **breathing exercises, which by using abdomen and nose** did the rest. The expansion of the **diaphragm** and that of the **lungs** following musica sequences provided a further **coordination of movements** at conscious level.

Very Conclusions

After one a.y. the children are much better. Three of the middle-class still have problems, but at a reduced level. Four of the immigrant children have problems and two of them still have relevant panic attacks.

The most important point is that **they socialized** not only within their own group, but socialization happened between the two groups. They worked separately but at the same hour, so they just met in the dressing room. The suspicious behaviour of the first days ended with warming welcomes and a few children (middle-class) also asked immigrants simple questions.

Communication, our main aim, has been achieved, and it led less stress.