



**Spotlight on Psychology: From the psychopharmacology by trial
and error to a psychology neuroscientifically informed**

**Afirmar a Psicologia: De uma psicofarmacologia por tentativa e
erro a uma psicoterapia neurocientificamente informada**

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Abstract

This article aims to explore with scientific knowledge the efficacy and impact of psychotherapy on brain structure. Focusing on the most important side effects in order to demystify the belief of the pill as a panacea for all ills and to inform about the risks associated with psychiatric medications. In a complementary perspective, a set of references about the brain is presented and how it is structured, as well as the functioning of psychotherapy and the way it promotes change in the brain. The facts demonstrate the need for a deeper understanding of psychotherapy, in terms of effectiveness and in terms of costs. The efficiency is just as high in relation to psychopharmacology and costs are significantly lower. To recognize and share these results is not to reject psychopharmacology, but a clear process of emphasizing the role of psychology and its professionals.

Keywords: psychopharmacology, brain, psychotherapy, cost-effectiveness.

Resumo

O presente artigo traz à luz do conhecimento científico a eficácia e o impacto da psicoterapia na estrutura cerebral. Após breves considerações sobre a psicofarmacologia, onde se destacam os conceitos de farmacocinética e farmacodinâmica, são referidos os principais efeitos colaterais com vista a desmistificar a crença do comprimido como uma panacea para todos os males e a informar sobre os riscos associados aos psicofármacos. Numa perspectiva complementar e enriquecedora, é apresentado um conjunto de referências sobre o cérebro e a forma como este se estrutura, bem como o funcionamento da psicoterapia e a transformação promovida por esta no cérebro sem efeitos secundários. Adicionalmente, são apresentados diversos estudos sobre a relação de custo-eficácia entre a intervenção psicofarmacológica e a intervenção psicológica. Os resultados demonstram a necessidade de um olhar mais atento para a psicoterapia, quer em termos de eficácia quer em termos de custos, na medida em que a eficácia é tão ou mais elevada relativamente à psicofarmacologia e os custos são significativamente mais baixos. Reconhecer e partilhar tais resultados não é rejeitar a psicofarmacologia, mas sim um processo claro de afirmação da psicologia e dos seus profissionais.

Palavras-Chave: psicofarmacologia, cérebro, psicoterapia, custo-eficácia.

Introduction

According to the European Union, in 2008, approximately 50 million people (around 11% of the population) suffered from some type of mental disorder. In Portugal, one in every five people reveals a mental disorder throughout his life (23%) with an average higher than the rest of Europe (Ordem dos Psicólogos Portugueses, 2011a).

To make things worse, Ramos (2004) states that it is common to prescribe anxiolytic, hypnotic, antidepressant and antipsychotic medication in the same way that antibiotics are prescribed for pneumonia. The belief that all illnesses are only and specially related with the body's biology pushes for the treatment of all conditions with medication (Major, 2009).

The symptoms of most patients are treated with benzodiazepines, analgesics and vitamins (Patel *et al.*, 2003). In a complementary view, Baptista (2011) mentioned that psychiatric medications are prescribed due to the lack of knowledge

about non-drug treatments such as psychotherapy.

In the domain of the philosophy of psychology, Gabbard (2000) notes that by contemplating psychiatry of the 21st century, it is important to avoid dichotomization, which contributes to the unfortunate tendency of considering psychotherapy as the treatment for psychologically based disorders, while biologically based disorders should be treated with chemical intervention. This view is related to the Cartesian dualism that split into mind and brain. However, both are inseparable. Cozolino (2010) also considers that the mind and the brain are indivisible and that the illnesses thought of as a psychological hiatus need to be re-conceptualized in order to include neurobiological mechanisms. Andreasen (1997, as cited in Gabbard, 2000) states that what we call mind may be understood as the brain activity. Thus, the mind is a process simultaneously materialized and relational (Cozolino, 2010).

Possibly due to what was stated in the previous paragraphs, only 5% of those suffering from mental disorders, look for the help of a mental health professional. The remaining 95% look for the help of a family doctor (Lechnyr, 1993, cited in Hunsley, 2002). In the different study, it is estimated that between 50% and 70% of the family doctor cases are related to people whose physical symptoms are associated with psychological factors (VandenBos & DeLeon, 1988, as cited in Hunsley, 2002).

Despite the fact that this is a myth unmasked by science, it is still possible to find signs of one of the most common misunderstandings about mental illness, according to which it is permanently disabling because people never recover fully. Yet, due to stigma and silence, many people never experience the reality of recovery, neither in themselves nor in others (Armstrong, 2008).

In reality, a psychological intervention may effectively treat a large

array of health problems, both in children and adults, including depression, generalized anxiety disorder, post-traumatic stress disorder, eating disorders, substance abuse and chronic pain (Hunsley, 2002).

Investigation proves the existence of effective psychological treatments for health problems that are seen as clinical cases but are often difficult to deal with by the doctor. For instance, type 1 diabetes, chronic headaches, chronic low-back pain, rheumatoid arthritis, chronic fatigue syndrome and several other unexplained physical symptoms (Hunsley, 2002). Additionally, there are a number of physical illnesses that have as their main component the behavior of the patient (Ordem dos Psicólogos Portugueses, 2011a).

Cozolino (2010) considers unthinkable not to study the brain structure when trying to understand human development, mental illness and psychological health.

In the balance amongst psychotherapy and psychopharmacotherapy, Ramos (2004) points out that the clinical practice of psychotherapy, as a mutual construction between two people within a relation, and a psychopharmacotherapy are not competing in any way, being complementary approaches. Patterson, Albala, MacCahill and Edwards (2001, p.56) also emphasize that "there will not be a well succeeded treatment with medications without psychotherapeutic intervention nor psychotherapeutic hope without medication" (translated by the author).

Gobern (2011, as cited in *Ordem dos Psicólogos*, 2011b) stated that the report about the cost-effectiveness of psychological intervention raises pertinent reflections that could be a nuisance for those who regard psychology as a luxury and not an essential need.

Brief Considerations about Psychopharmacology

The human body tends towards the principle of homeostasis, i.e. the tendency of the living organism to maintain balanced and constant conditions in his internal environment. This principle is essential for the continuity of life.

During the treatment of a mental illness, either using therapy and/or medication, the objective is to assist the tendency of the brain and the body to restore the homeostasis and a healthy functioning (Patterson *et al.*, 2011).

At this point the concepts of pharmacokinetics and pharmacodynamics are considered fundamental. The first one refers to the path that the medication undergoes in the organism, including the stages of absorption, distribution, metabolism and excretion (Patterson *et al.*, 2011). The second one is about the way medications affect the body, describing the

therapeutic effects of medication and its side effects (Patterson *et al.*, 2011).

Throughout the whole pharmacokinetic and pharmacodynamic process of the medication, the body's organ systems aim at preserving homeostasis (Patterson *et al.*, 2011).

There is a big interaction in all the activity happening in the whole body (not just in the brain) as a reaction to any psychotropic medication, since it is added to the daily physiology of health or illness of the patient. Each time a medication is taken, the homeostatic mechanism start to work immediately; each time a neurotransmitter is changed a chain of counterreactions is triggered throughout the body. This way, "all the neurotransmitters affect functions in the whole body and in the present moment of the biotechnological development it is simply impossible to administer a medication that only influences one area of the body" (translated by the author) (Patterson *et al.*, 2011, p. 16).

The aim of psychotropic medications are specific areas of the brain, yet in the current stage of development in clinical biotechnology it is not possible to administer the medication only to the desired target. So, the medications transported in our bloodstream apart from reaching the intended targets, are also getting to many unintended brain areas. The name given to this process is distribution which is affected by several factors, such as the characteristics of the medication. The collateral effects generally result from this lack of specificity of the distribution system (Patterson *et al.*, 2011).

Side Effects of Psychopharmacology

The medication must be individually stipulated according to the needs and the particular sensibilities of each patient considering that people may reveal absorption rates and metabolism completely different towards the same drug (Ramos, 2004). Thus, the best

relation risk-benefit is searched for, meaning the objective is to choose a drug that produces the most intense therapeutic effect possible with the least number of side effects (Patterson *et al.*, 2011).

However, the recommendation or the exchange of medications between neighbors, friends or relatives is common. In the basis of this recommendation or exchange is the illusion that if a drug is good for one person it will be also good for everybody else. Additionally, besides this risk behavior, people also tend to stop taking the psychotropic drugs when they want to, but this time having the illusion that they are already in perfect health. Ramos (2004) draws attention to the fact that interrupting the treatment prematurely, as soon as the person feels better, increases the risk of relapse. Patterson and collaborators (2011) agree, because when there is a remission several patients tend to interrupt the treatment without any concern, and consequently the risk of relapse is indeed high.

REVIEW

Medicine contributes to the notion of the pill as being something miraculous, the panacea that makes the resolution of the majority of problems possible. Ramos (2004) sharply states that it is necessary to say, at least in the domain of psychopathology, that this idea is false.

The psychopharmacology should not be used as an easy resource that dismisses the effort of human understanding. Many times drugs are only needed because psychotherapy would not be possible without them. In reality, people who are severely agitated, deprived of sleep for several days, truly depressed or disconnected from reality, are clearly not available to start a process of analysis regarding the determinants of their suffering (Ramos, 2004).

The effect of psychotropic drugs is ephemeral and in a significant number of cases it does not represent an effective treatment of the disorder for which it is urgent to begin a psychotherapeutic process (Ramos, 2004).



Brandão (2000, as cited in Major, 2009) refers that the medication when wrongly prescribed or maintained crystallizes the pathology. This results from the intention to suppress the symptoms without investigating the etiology of the psychological condition. Ramos (2004) refers the situation of some doctors who prescribed drugs to spare their time or reduce their anxiety about the situation. The doctor may unintentionally promote a chronic illness by unnecessarily prescribing drugs, contributing to the false idea that the patient's problems will be solved with pills.

If the individual only achieves a positive result through drugs, it is likely that he will not abdicate from them because they give him the possibility of artificially maintaining a relative feeling of well-being (Ramos, 2004). Turk (2002, p. 361) recalls that "(...) reduction in medication is not a goal of pharmacological treatments".

Usually anxiolytics and hypnotics are wrongly prescribed, i.e. there are a large number of people taking this type of drugs for no reason. Resorting to anxiolytics became widespread in general medicine aiming at dissimulating mental disorders that would benefit a psychotherapeutic intervention. So, the simple prescription of anxiolytics does not solve the problem because it does not provide a solution to the sources of anxiety or conflict, nor does it act on the motives or defenses of the individual (Ramos, 2004).

In what benzodiazepines are concerned, drugs used mainly in anxiety disorders, should be administered in a small dose possible that is still effective, in smallest frequency and for the shortest amount of time possible, as a rule in a period of exceptional stress and always articulated with a non-pharmacological intervention. When administered in a prolonged way and in excessive doses or in personality disorders, they can even

create the conditions for the beginning or the worsening of the depressive symptoms and promote self-aggressive behaviors (Ramos, 2004).

The benzodiazepines may interfere with adaptive skills of an individual increasing in an anomalous way his level of tolerance to pathogenic circumstances and consequently reducing his motivation to face them (Ramos, 2004), as well as resulting in dependency and long-term side effects (Heuzenroeder *et al.*, 2004).

Interrupting benzodiazepines abruptly originates a withdrawal syndrome that implies anxiety, insomnia, irritability, asthenia, headache, tremors, perspiration, vertigo, difficulty concentrating, nausea, anorexia, depressed mood, depersonalization, derealization and sensory and perceptual changes. In the most serious cases, it may cause convulsions and delirium (Paiva, 2006). On the other hand, Ramos (2004) cites as side effects of benzodiazepines depression, sedation, anterograde amnesia (incapacity

to register new memories, suffering amnesia of events occurred after the beginning of the treatment) and physical dependency.

Regarding antipsychotics, Ramos (2004) refers that these are not prescribed very often, but are taken in exaggerated doses.

The first observation to be made is about the wrong but quite common idea that antidepressants have a rapid effect over the mood variations of a person. In reality and as a rule, antidepressants have little results besides undesirable side effects in the first four to 12 weeks (Ramos, 2004). Some patients do not respond at all or respond only partially (Patel *et al.*, 2003).

It is usual for the treatment to last at least approximately nine months (up to three months to achieve complete remission of symptoms and six to drastically reduce the risk of relapse). The reduction of the doses should not happen during this period of the treatment. As a

result, today many patients undergo antidepressant treatment in the amount needed to accomplish remission for a total period of one year before considering interrupting it (Patterson *et al.*, 2011).

If there is no personal or family history of depression, it is wise to keep the same drugs in the same doses at least six months after the individual is feeling well. However, if there is that history, the palliative treatment (acting on the symptoms and not the condition that causes them) should continue for at least one year after the depressive symptoms have disappeared (Ramos, 2004).

Some doctors defend that this treatment should be continued over several years, others hypothesize the continuation of the treatment for the rest of the patient's life in the case of patients who had three or more previous depressive episodes. People with a history of depression have a higher risk of relapse because the bigger the number of previous episodes the higher is the risk (Patterson *et al.*, 2011).

All the antidepressants present a gap between the time when the treatment begins and the moment when clinical response is visible. As time goes by, the probability of good results becomes smaller. So, in the case of no response, it seems cautious to consider changing the treatment after three or four weeks. When a partial response is achieved, this period is usually extended to about six weeks (Patterson *et al.*, 2011).

Patterson and colleagues (2011) indicate as side effects usually related to the treatment by antidepressants insomnia, anxiety, agitation, tremor, convulsions, somnolence, fatigue, diarrhea, dyspepsia (digestion problems), weight increase, hypertension, arrhythmia, dry mouth, heightened sweating, among others. It is impossible not to consider the impact of possible and common side effects in the life of a patient.

A frequent and high impact side effect induced by this type of medication is sexual dysfunction which can include

libido changes (reduction or increase), compromised erectile capacity, delayed ejaculation, painful ejaculation, priapism (painful and persistent erection with no sexual desire), impotence, partial or total anorgasmia and the increase of the clitoris (Harvey & Balon, 1995, as cited in Patterson *et al.*, 2011).

Sexual dysfunction as a side effect should not be contemplated in a passive way during the treatment of depressive individuals. When the doctor does not address this side effect, it will probably affect the patient's self-esteem and the relationship with his spouse or partner (Patterson *et al.*, 2011).

Another alternative, usually more used in bipolar affective disorder is lithium. Yet, Patterson and collaborators (2011) refer that despite lithium being a strong antimaniac medication and an effective prophylactic agent in the prevention of relapses, its mechanism is unknown.

Lithium is effective in a specific concentration in the blood which should be adjusted to each patient. To go beyond the therapeutic range may bring severe side effects, possibly fatal (intoxication by lithium - the quantity of this substance in bloodstream - serum blood levels - needed for the therapeutic effect is very close to that which leads to intoxication). Intoxication by lithium may be the result of any situation that causes excessive intake of the medication or its insufficient depuration in the body (lithium is excreted by the kidneys). Even so, lithium within the therapeutic range produces some side effects in a considerable number of patients, for instance, polyuria (a larger quantity of urine), polydipsia (excessive thirst), hand tremor, increase of weight, lethargy, cognitive effects, gastrointestinal symptoms, hair loss, acne, among others. The treatment with lithium is usually followed by a high risk of relapse when there is an interruption (Patterson *et al.*, 2011).

It is clear why there is a continued request of medication that reduces latency for the beginning of response/remission and is more effective and well tolerated by larger number of patients (Patterson *et al.*, 2011).

Patterson and collaborators (2011) warn to the fact that despite advances in studies about depression and drugs used in its treatment, the understanding of underlying mechanisms is still rudimentary. Consequently, the application of scientific knowledge to the management of clinical cases is seen as a game between science and art, more so as the authors refer "in essence, the strategies with an antidote are of trial and error" (translated by the author) (p. 36).

Today it is fundamental to make clear that it is not the medication efficacy but the set of side effects the doctor takes into account while choosing a drug for a specific patient (Patterson *et al.*, 2011).

Brain: the Basis of Psychological Intervention

According to the warning of several authors (Aires, 2010; Cozolino, 2010; Gabbard, 2000) it is absolutely vital to attend to the brain to better understand psychotherapy.

From the difference between the animal brain and the human brain (the existence of an anatomo-physiological organization unique in humans at the level of the frontal lobe and junction of the parietal, temporal and occipital lobe at the back region of the brain hemispheres) Vegotsky formulated three theses, namely:

- a) Systemic organization of higher nervous functions;
- b) Dynamic localization of higher nervous functions;
- c) Relational origin of higher nervous functions (Aires, 2010, 2012).

The first thesis was presented for the first time on October 9th 1930. It stated that the higher nervous functions (e.g., speech, logical memory, perception,

voluntary attention, intellectual thought) derived from the complex functional system working in an orchestrated way and recruiting the processing of different brain regions. This way, each function results from the systemic function of several brain regions, each one of them cooperating in a specific way with a particular element (Aires, 2010). By recruited areas one should understand that they represent the biggest metabolic activity in the performance of a function (Martins, 2006).

To Vygotsky (1896/1934, as cited in Major, 2009), the components of functional systems are located in the brain and not the functions, which only exist as concepts or academic distinctions.

Deacon (1997, as cited in Major, 2009) stated that each brain function is the corollary of systemic functions of distinct brain regions, whose several integrated components and also orchestrated amongst themselves, cooperate each one in a

specific way with a particular component of that product.

It is important to take into account the participation of the brain as whole, in which the areas are interrelated and interdependent (functional system). As a metaphor, it works as an orchestra that depends on the integration of its components to produce a concert (Costa, Azambuja, Portuguez & Costa, 2004, as cited in Maia, Correia & Leite, 2009).

The second thesis was divulged only two months before he died on April 28th 1934 and it defends that throughout the development the internal structure of the higher nervous functions changes, that is, in different stages of development the same higher nervous functions recruits different brain regions. The way functional systems are organized is not always the same (Aires, 2010, 2012).

Finally, his most revolutionary thesis defends that higher nervous functions have a relational origin, i.e. "the typically human functions, such as

voluntary attention, logical memory, language, etc., are not innate, and do not result from a biology with millions of years of phylogenetic evolution, but are structured in human brain as a relational process with another human" (translated by the author) (Aires, 2010, p.99).

The human brain has proven to be highly plastic, built and rebuilt by our experiences and relations, being a social organ that connects us inextricably to other humans. We live within relations that shape and continue to shape our brain. Contributing to that is the family, the community and society (Cozolino, 2010). Major (2009, p. 120) (translated by the author) emphasizes that "(...) what an individual does today in cooperation with another more experienced one, he will do tomorrow in an independent way", that is, skills do not arise from neurobiological maturation but the social and mediated interaction between experienced and inexperienced individuals is fundamental.

The concept of the original brain introduced by Alexandronova (2002, cited in Aires, 2010) is extremely important and it refers to the neuronal net in the perinatal period, structured based genetic information. In a systemic and dynamic perspective, the human at birth has a brain that is specific of his species, without the neuroprocessors that support adult mental activity being structured. These neuroprocessors are structured by the relational and cultural experiences of each human. "Thus the brain of each adult human mirrors his individual story, as the original brain mirrors the story of the species" (translated by the author) (p.16).

The brain is not a static organ, since it changes continuously as a response to experiential challenges. For this reason, the neuronal architecture of the brain takes the shape of the experience that molded it. The human brain becomes more active, complex and robust when it is challenged, structuring itself in response to challenges and new learning. The neuronal networks

of our brain that built our reality guide our experience and mold our identity (Cozolino, 2010).

Another fundamental concept is plasticity. In *latus sensus*, it means having a structure weak enough to submit to influences but strong enough not to submit permanently (James, n.d., as cited in Cozolino, 2010).

The scientific ground of psychological intervention is based on neuronal plasticity, which is related to the brain ability to regenerate and adapt its morphology (D'Almeida, Pinna, Martins; Siebra & Moura, 2004, as cited in Maia, Correia & Leite, 2009).

Cozolino (2010) considers that when we talk about structuring and restructuring the brain, the neurons are the basic construction blocks (bricks) and neuronal networks are the structures (building) that we build and sculpt. The learning reflects itself on neuronal changes in many ways, including changes in the connectivity between existing neurons, the

expansion of existing neurons and the development of new ones. All these changes are expressions of plasticity or the ability of the nervous system to change its response to experience.

According to Bruner (1990, as cited in Major, 2009), the mind is a part of culture and is made by culture, being the human a result of relational configurations, i.e., the process of production of meanings through cultural and symbolic systems. Cultural evolution continues to mold our synaptic architecture, to influence the way we experience our subjective life and learn how to communicate with one another (Cozolino, 2010).

The important role of culture in the brain, in the development of the brain and its functions, as well as of other cultural instrumentalities available in a meaningful relation, truly change the functional organization of the brain (Major, 2009). For instance, the brain is changed by the acquisition of reading and writing skills or

a second language (Aires, 2010, 2012; Martins, 2006).

Another controversial topic of discussion is the genetic determinism, which, even without realizing, tends to undervalue the relevance of the brain structuring. As mentioned before, this is similar to what happens in general in psychopharmacology, which gives more importance to the pill than to the person.

Gabbard (2000) states that the investigation about brain plasticity revealed that once the genes are activated by the process of cellular development, the rate in which genes are expressed is highly regulated by experiences throughout life. Recent stressful events are the most powerful risk factors to a major depressive episode; genetic factors are of substantial importance but not enough.

Experience results in the expression of certain genes which trigger the synthesis of proteins that influenced neuronal structures. In other words, in existing neurons different types of

receptors grow. This expands their dendritic structures and adjust its biochemical structure according to the experience. As an example, in spite of the fact that monozygotic twins have grown up in the same house and have the same schizophrenia gene, perhaps only one will develop the illness. So, the growth and organization of the brain reflects the complex but subtle interaction between genetic and environmental influences (Cozolino, 2010).

For instance, Fox, Hane and Pine (2007) suggest a plasticity model for the affective neurocircuit, which describes the way genetic dispositions and environmental circumstances interact. So, the brain responds to the environmental through the changing of genes expression (Gabbard, 2000).

It is important to consider that those we relate to in a continuous and meaningful way, behaviorally and psychologically are the mold of our shape. Thus, we have similar behavioral and

structural characteristics, even if we criticize them (Aires, 2006, 2011). This aspect creates an illusion that a number of behaviors or personality traits are genetic. It is common to hear someone say "his father was a drunk too", "he has his mother's temperament" or "it runs in the family, his mother was also depressive".

Today's knowledge about the brain proves with certainty that the human brain contains the conditions for the disposition of functional components in a new synthesis, allowing for new brain organs, i.e., new formations that arise during the ontogenesis (Major, 2009). Experience produces multiple and dissociable changes in the brain, such as the increase of dendritic length, the construction of synaptic formations and the change of metabolic activity, which is the reason why neuroscience is fundamental for clinical practice and for the interpersonal sculpting of the brain (Cozolino, 2010).

Psychotherapy as an element that transforms the brain

After what was referred before, it is clear that it is impossible to look at the psychotherapeutic intervention without also considering the brain structure.

According to Haldane (n.d.), for it to happen, it is necessary to overcome the barrier of behaviorism and psychoanalysis of the 20th century so that the discovery of neurosciences in a systemic and dynamic approach of the brain are integrated in psychology.

Psychotherapy emerged from the brain's vulnerabilities to relational/environmental risks during the development process and it may be considered as a specific type of challenging environment that motivates social and emotional development, integration and complexity of the neuronal process, basically how the brain changes (Cozolino, 2010).

As a means to create or restore coordination between several neuronal

networks, psychotherapy promotes the integration of an a harmonious, creative and meaningful life (Cozolino, 2010) stressing the value and the understanding of that relation (Major, 2009).

In the psychotherapeutic process, the psychotherapist instigates the coping skills of the patient (Patterson *et al.*, 2011), being a motivating element the fact that the future is not drafted yet because it greatly depends on the responsible decisions that are taken (Major, 2009). Therefore, "(...) the wonder of being able to walk with our own life in our hands" (translated by the author) (Aires, 2009, p. 10), a learning that is promoted in psychotherapy.

In the core of the interaction between neuroscience and psychotherapy is the fact that human experience is mediated by two interactive processes. The first one is the expression of our evolutionary past through organization, development and functioning of the nervous system, a process that results from

millions of neurons. The second one is the contemporary molding of our neuronal architecture in a relational context. The human brain is an adaptive social organ structured through the relation, positive or negative, with others. The quality and nature of our relations become coded in neuronal infra-structures of the brain (Cozolino, 2010).

In psychotherapy the focus is in understanding the strong connection between what is right and what is wrong, which occurs throughout a process of development, and how to promote the healthy neuronal functioning. When one or more neuronal networks necessary to a healthy functioning stay unstructured, we witness complaints and symptoms due to which people ask for psychotherapy. This way, when psychotherapy results in the reduction of symptoms or in experiential changes (life changes) the brain was transformed in some way (functional change of the nervous system) (Kandel,

1998, as cited in Cozolino, 2010; Ramos, 2004).

In psychology, language is an essential therapeutic tool (Major, 2009). Language is an historical product, resulting from brain structures not particularly aimed at language nor human relational activity. It stimulates communicational resources of biological origin. In other words, throughout the evolutionary history leading to language, networks of neurons are recruited and integrated in the brain organization. These neurons are not specifically related to language but help the processing of several of its components. That means that these neuronal networks are not of the language but help language (Aires, 2010; Major, 2009).

The networks that participate in language, in emotion and in memory should be connected so that they can recall and tell an important story of emotional content with appropriate words, the correct details and inherent feelings. To put

emotions into words and to build narratives about our experiences is fundamental to the emotional regulation, to the intertwined neuronal networks of emotion and cognition, in contrast to alexithymia (the incapacity to put emotions into words) (Cozolino, 2010).

At the body level, the scientists have proven how people became ill when they do not verbalize the emotions they feel. People who cannot easily translate emotion into words, who only say they feel bad when contradicted, but cannot say they are angry, who say that they do not have the courage to go to a funeral, but do not say that they have no courage because they feel anguished and sad, etc., are people who become ill more easily with problems associated to high cholesterol, high blood pressure, diabetes, asthma, psoriasis, among other problems (Aires, 2011).

It is essential to consider that the ability to verbalize emotions is very important to the development of the

capacity of human relation, but also for the person's physical good health (Aires, 2011), this way becoming clear how central the role of the therapeutic relation is, as well as the importance of expressing emotions and the use of language in psychotherapy (Cozolino, 2010).

In psychotherapy, the concept of personality is important, which is the corollary of the brain organization structured throughout the development of each one of us, being what characterizes us as a person and that is responsible for the way we understand the world, others and ourselves, as well as the way we deal with the world. Consequently, the personality is fundamental in the way we organize a response to be executed by our behavior, i.e., what we want in that moment and from that situation (Aires, 2009).

Marx (1844, as cited in Aires, 2010) considers personality as a particular quality that the natural being acquires in social relations. We are born within relations that influence our individual

identity that is supported by social interactions (Cozolino, 2010).

The lack of integration between networks is closely related to psychopathology. Psychopathology may be caused not only by problems in a specific area of the brain, but also in the interaction between systems. Unsolved traumas may cause continuous deficits in processing information breaking the integrated neuronal processing. Through the activation of multiple cognitive and emotional networks, previously dissociation functions, they become connected and progressively placed under the control of executive cortical functions (Cozolino, 2010).

Psychological disorders are a product of biological dysfunctions (a result of general physical conditions, such as metabolic changes, nutritional deficiencies and those resulting from the action of toxic, infectious or traumatic agents), of adaptation, of environmental conditions or social relations (Ramos, 2004).

The tendency to repeat patterns of thought and behavior constitutes the reason why people tend to stay ill, because they continue to find the same wrong solution for the problems they are trying to solve. (Reich, n.d., as cited in Cozolino, 2010). We are incapable of involving ourselves in random actions because our behaviors are guided by pre-established patterns acquired by learning, to which we come back automatically.

Psychotherapy promotes neuronal plasticity, the growth and connection through establishing a safe and trustworthy relation, the presence of moderate stress levels, the activation of emotional and cognitive spheres and the construction of new personal narratives. Cozolino (2010) gathered information from several authors who consider that moderate stress levels activate neuronal growth leading to new learning.

The power of moderate stress levels to trigger neuronal plasticity is a key element in psychotherapeutic success or in

any learning situation. Contrasting with traumatic experiences, the controlled exposition to stress during psychotherapy creates the opportunity for new learning and increases neuronal integration (Cozolino, 2010).

Healthy functioning requires the adequate development and performance of neuronal networks organizing in conscience the behavior, the emotion and the sensation (Cozolino, 2010). Ferro (2006) defines conscience as the ability to be aware of ourselves, our mental activity and the environment.

Psychotherapy increases neuronal connection through challenges that expand our experience and perspective about ourselves and the world. The challenge to expand consciousness is to go beyond the reflex, the fear and prejudice to promote a state of full attention and acceptance of ourselves and others (Cozolino, 2010). Haldane (n.d.) adds that the relation with the psychotherapist, as well as promoting awareness on the part of the patient

regarding neglected aspects of his experience, provokes changes in the brain.

The repeated exposition to stress in a context of psychotherapeutic interpersonal support results in the capacity to tolerate higher levels of demand. This process reflects the construction and connection of cortical circuits and their growing ability to inhibit and regulate subcortical activation. The affective regulation, specially modulation and inhibition of anxiety and fear, allows a constant cortical processing in emotionally triggering situations. This permits a cognitive flexibility, learning and permanent neuronal connection (Cozolino, 2010).

In this process, the psychotherapist has a fundamental role in making the regulating functions of the social brain possible and its modulation. Since affection is repeatedly evoked in therapeutic relation and managed successfully, the patient internalizes gradually these capacities through the

sculpting of self-regulating neuronal structures (Cozolino, 2010).

Considering the artificial improvement promoted by psychiatric medication, it is possible to discourage the person from understanding himself (in itself, anxiogenic), from his relational patterns with the environment and the underlying pathologic process. The relief of symptoms is only one step towards a more ambitious goal, namely to solve the problems, to improve the surrounding condition, the relation and emotional aspects that lead to the disorder (Ramos, 2004).

The possibilities for psychotherapy to sculpt the brain are clear. Psychotherapists are ready to improve plasticity without resorting to a genetic manipulation or chemical interventions. Relations are capable of building and rebuilding neuronal structures (Cozolino, 2010; Gabbard, 2000).

Psychotherapists are applied neuroscientists who create individualized

and fruitful learning environments aiming at increasing brain functioning and mental health (Holtforth *et al.*, 2005, as cited in Cozolino, 2010).

If psychotherapy is considered a way of learning, then the learning process that occurs in psychotherapy may produce changes in the gene expression and this way change the strength of synaptic connections. The genetic sequence is not affected by environmental experience, but the transcriptional function of the gene (the gene capacity to redirect the production of specific proteins) is without a doubt responsive to environmental factors and is regulated by their influences. In psychotherapy, the learning about oneself influences the brain structure and functions (Gabbard, 2000). Leal (1999) also considers psychotherapy as learning, which is characterized by a dynamic process of transformations resorting to specific techniques.

In sum, the growing conscience that the brain possesses a bigger plasticity

comparing to the majority of the other body organs allows for the conceptualization of an informed neurobiological perspective about psychotherapy, reflecting the dynamic nature of interaction between the genes and environment (Gabbard, 2000). Cozolino (2010) considers important to take into account the many dimensions of sciences in order to understand psychotherapy in a new, more advantageous and hopeful perspective. To be an effective psychotherapist is to understand interpersonal neurobiology, in other words, the intersection between neuroscience and psychotherapy. Linden (2006) adds that psychotherapy needs to base itself on a solid understanding of the biological process involved.

Analysis of Cost-effectiveness of Psychopharmacological and Psychological Interventions

Many authors agree on the urgency of valuing psychological intervention, not only because it is cheaper but also because it is as effective, or even more, than psychopharmacology (Boyce & Wood, 2009; Cozolino, 2010; Hunsley, 2002, 2003; Layard, Clark, Knapp & Mayraz, 2007; Pittman, 2011).

Direct costs include treatment, the use of other health services and other costs (i.e., nontraditional health care services). In some cases, estimating direct cost may include expenses with transportation to treatments, loss of work productivity, loss of time and administrative expenses. Indirect costs usually include expenses with the loss of productivity, absenteeism, underemployment or unemployment, which result from the pathological condition and possible early disability (Hunsley, 2002).

The analysis of cost-effectiveness takes into consideration the relation of monetary cost and the results of the treatment such as the reduction of symptoms and the increase in labor productivity (Hunsley, 2002).

Health economists and psychologists have made cost-effectiveness analysis which allow for the evaluation of efficacy in psychological interventions contributing to the reduction of costs in the health care services. The results reinforce the effectiveness and potential of the psychological intervention in improving the mental health condition of the citizen, as well as in the reduction of direct costs (i.e., number of appointments, days of hospitalization, drugs consumption) and indirect (i.e., absenteeism, reduction of taxes and reduction of productivity) (Ordem dos Psicólogos Portugueses, 2011a).

The London School of Economics and Political Science confirms that psychological intervention presents a

degree of cost-effectiveness which makes it possible not only to pay for the intervention itself but to guarantee profits. This happens because psychological intervention has low costs and high rates of recovery comparing to the high costs of disability. In Canada, psychological intervention allows for a saving of 20% to 30% in direct health costs (Ordem dos Psicólogos Portugueses, 2011a). This way, psychological interventions can not only be more effective, but also have the potential to reduce the costs in the health system (Hunsley, 2002).

Without any doubt, Hunsley (2002) states that for each dollar spent in psychological services, five dollars are saved in medical costs. Psychological treatment is a profitable form of treatment in terms of cost-effectiveness and it may even be more effective than a psychopharmacological intervention (Hunsley, 2002, 2003).

The increase of mental and physical health problems has as a

consequence a bigger use of health and medication resources. Between 2004 and 2009, there was a growth of 25,3% in the intake of anxiolytics, hypnotics, sedatives and antidepressants. In the case of Portugal, this average is higher than in other countries belonging to the Organisation for Economic Co-operation and Development in what the consumption of anxiolytics and antidepressants is concerned (Ordem dos Psicólogos Portugueses, 2011a). In the United States of America, the sales of opioids increased 176% between 1997 and 2006 (Turk, Wilson & Cahana, 2011).

In administrative and cost contention terms, the economic consequence of unemployment due to depression or anxiety was in the United Kingdom of approximately 17 billion pounds that is about 19,5 billion Euros (Ordem dos Psicólogos Portugueses, 2011a). For the North American society, the cost of treating depression is about 12 billion dollars (including hospitalization

costs, psychiatric treatment and medication). In indirect costs, such as absenteeism, reduction of productivity and bigger resort to health care services for non psychiatric medical problems, it is estimated to be about 40 billion dollars. Thus it is clear "(...) that the adequate diagnosis and treatment of depression may have a monumental impact on individual and public health expenses" (translated by the author) (Patterson *et al.*, 2011, p.22).

Indirect costs of depression to society (including the loss of productivity or absenteeism) are at least three times higher than the costs of the treatment of that pathology (Zhan, Rost & Fortney, 1999, as cited in Hunsley, 2002).

The majority of people diagnosed with a depressive disorder is prescribed antidepressants instead of being taken to a psychological intervention. Yet approximately half of those people do not feel better after beginning the treatment with medication (Triveldi, n.d., cited in Pittman, 2011). The patients undergoing

any variant of psychotherapy would more likely improve to a certain degree where they would not be considered clinically depressed any more showing a reduced number of post treatment symptoms (Churchill *et al.*, 2011).

Psychological intervention is the best option in terms of cost-effectiveness in the intervention on depressive major disorders both in the child and the teenager (Haby, Tonge, Littlefield, Cartes & Vos, 2004). It is also possible to take note of a better cost-effectiveness relation in the psychopharmacological treatment in pathological conditions such as panic disorders and depression. In the treatment of depression, investigation shows that psychological intervention may produce results similar or higher than the use of drugs and that pharmacological therapy has a higher rate of dropouts comparing to psychological intervention (Hunsley, 2002).

Hunsley (2002) defends that psychological services should be an

integral component of the health care system because within two years, pharmacological treatments may cost 30% more than the psychological treatment. The cost for the Government would be totally covered by saving in disability benefits and extra taxes resulting from a bigger number of people who can work (Layard *et al.*, 2007).

Comparing to today's practices, psychological intervention by a psychologist of the health service is the best intervention in terms of cost-effectiveness in the depressive major disorder in the case of children and teenagers, going up to savings of 9000 Australian dollars (Habby *et al.*, 2004).

Heuzenroeder and collaborators (2004) stated that psychological intervention by a psychologist of the public health care system is the best intervention in terms of cost-effectiveness both in generalized anxiety disorder and panic disorder, being better than drug interventions. Its implementation requires

a change in politics so that it facilitates a generalized access to a sufficient number of therapists trained in the treatment of anxiety disorders.

The guide-lines of clinical practice recommend a psychological intervention as the first choice treatment due to its proven efficacy. Nowadays, psychopharmacological intervention is recommended as a second option treatment (Haby *et al.*, 2004).

When mental health treatments are performed by mental health professionals and not family doctors, there are savings of 877 dollars per patient a year (Zhang *et al.*, 1999, as cited in Hunsley, 2002). According to Hunsley (2002), after the implementation of a psychotherapy program, the number of times people visited the family doctor dropped 49%, as well as costs which suffered a reduction. As a complement, a significant part of patients who come to general practices receive medication only (Layard *et al.*, 2007).

Gould and collaborators (1995, as cited in Hunsley, 2002) studied the cost of psychological intervention and drug treatment. In psychological intervention, a value of 90 American dollars for the first individual session is estimated, 40 American dollars for a group session and 60 American dollars for the rest of the sessions. In comparison, the values for the psychopharmacological treatment are estimated in 60 American dollars per follow up session, 0.60 American dollars per 1 mg of the generic Alprazolam, 0.09 American dollars per 50 mg of the generic Imipramine and 1.93 American dollars for 20 mg of Fluoxetine (Prozac). Both the psychological treatment and the psychopharmacological treatment should begin with an assessment session of equal cost. The costs of psychological treatments were analyzed considering 15 sessions, one session during the first year of treatment and four additional sessions in the second year. The costs of psychopharmacological treatment were

analyzed considering two sessions in the first month, monthly sessions in the following three months, three additional sessions during the first year and four additional sessions during the second year. Drug dosages were selected in order to reproduce the dosages typically used in clinical trials. There were no estimates about transportation costs, the costs associated to loss of productivity due to attending treatment sessions, nor administrative costs.

Antonuccio and colleagues (1997, as cited in Hunsley, 2002) compared the individual psychological intervention in depression (20 sessions in the period of two years) to the use of Fluoxetine (40 mg of this medication a day and follow up appointments with psychiatrists every six weeks). They estimated that the total cost of treatment for individual psychological intervention was 23.696 American dollars in a period of two years (7.268 American dollars of direct costs to the patient/insurance company, 1.253

American dollars of direct costs to the community and 15.174 American dollars of indirect costs to society). Comparatively, the costs of psychopharmacological treatment went up to a total of 30.733 American dollars in a period of two years (12.738 American dollars of direct costs of treatment to the patient/insurance company, 946 American dollars of direct costs to the community and 17.049 American dollars of indirect costs to society), i.e. 30% more than the individual psychological intervention.

Considering these examples of 15 and 20 psychological intervention sessions, it is timely to make a few considerations about the usual number of sessions in psychotherapy. The President of the Portuguese Professional Psychologists Association, Telmo Mourinho Baptista (2011, as cited in Ordem dos Psicólogos Portugueses, 2011a) states that in average six to eight sessions are enough for a person to achieve results of well-being and reduce relapses in

depression/anxiety episodes. These results reduce work absenteeism (three days/year per worker) and other economic costs. According to other authors (Habby *et al.*, 2004), psychological intervention, as a rule, includes 12 individual sessions of about one hour. Layard and colleagues (2007) consider that the treatment would not involve more than 16 sessions. These numbers provide a guide-line for a reflection about the number of psychotherapy sessions after which the patient should undergo psychological assessment for the psychotherapist to decide whether he should stay in psychotherapy, the beginning of the follow up appointments or discharge.

Besides the fact that psychological treatment is as effective as psychopharmacological treatment, and more effective in the prevention of relapses (unless medications are taken indefinitely) (Layard *et al.*, 2007), pharmacotherapy reports even higher rates

of dropouts than psychological intervention (Hunsley, 2002).

Psychopharmacology is considerably more expensive (1153 American dollars) than an individual psychological intervention (646 American dollars) (Otto *et al.*, 2000, as cited in Heuzenroeder *et al.*, 2004). With apparently different arguments, Pittman (2011) states that for a few patients the access to psychological intervention is more difficult and expensive than the use of medications, which become cheaper with the implementation of generics in the market. Psychological intervention is more costly than medication, at least in short term. And health care plans usually impose limitations to refunds. However, Trivedi (n.d., as cited in Pittman, 2011) states that, in the long term, psychotherapy is really worth its costs because some patients are *stuck* to antidepressants for the rest of their lives. On the other hand, psychological intervention usually happens for a few

months or even a few years but it is stopped when symptoms disappear.

The use of psychological intervention in the health area reveals advantages in the area of mental health, as well as in health care in general. Additionally, it allows the State and patients to save money with positive health results and well-being that continue to grow in time (Hunsley, 2002; Ordem dos Psicólogos Portugueses, 2011c).

Finally and the medical-legal perspective, especially in the civil responsibility, the individual who was injured must be compensated as quickly as possible in order to achieve the same condition we had before the event. Boyce and Wood (2009) wrote in their article that to alleviate psychological discomfort through psychotherapy may be at least 32 times more efficient in terms of costs than financial compensation. So, psychotherapy would be substantially more effective in terms of costs than the financial compensation offered to alleviate

psychological discomfort. The objective of financial compensation in itself seems to be a poor mechanism to alleviate psychological suffering.

Conclusion

The task to communicate with the patient using verbal and emotional means cannot be substituted by the use of drugs (Edelman, 1995, as cited in Major, 2009).

To recognize that psychotherapy may cause changes in the brain does not imply that medication is seen as totally unnecessary in psychiatric intervention, or that psychotherapy can change all biological *substratum*. Relative proof of the impact of psychotherapy in the brain and the impact of environment on genetic expression opens new lines of investigation which may increase our understanding of psychopathology and its treatment (Gabbard, 2000).

A basic assumption of neuroscience and psychotherapy is that the optimal functioning and mental health are

related to higher and higher levels of growth, integration and brain complexity. At neurological level, this means integration and communication of neural networks related to emotion and cognition, emotion and behavior, as well as the balance between arousal and inhibition. At the experimental level, integration is the ability to live, love and work with the least amount of defensiveness (Cozolino, 2010).

In neuroscience, psychotherapy may be understood as a specific type of enriched environment created to increase the growth of neurons and the integration of neuronal networks. The co-evolution of relations, of language and of the brain allows the development of bigger levels of abstract and symbolic functioning. In other words, affective relations from an early age are a fundamental piece in the construction of the evolution of human brain (Cozolino, 2010).

Important factors identified in psychotherapeutic process were the empathic relation, the maintenance of

levels of moderate challenge, the activation of cognitive and emotional areas, as well as the constructions of narratives. A safe and empathic relation establishes an emotional and neurobiological context useful to neuronal plasticity (Cozolino, 2010).

In this field, functional neuroimaging is a promising tool for the investigation of brain changes brought about by psychotherapy (Linden, 2006).

The advantage of psychological intervention is visible in a range of other pathologies not necessarily connected to mental disorder such as heart diseases, oncology diseases, rheumatoid arthritis, chronic pain, among others. The benefits obtained make it possible for a reduction in using health services and the intake of medication, a higher commitment to the treatment and easier change of behaviors (Ordem dos Psicólogos, 2011a).

Psychological intervention reveals a good relation between cost and effectiveness allowing for the relieve of

suffering and disorders, the reduction of costs in health care, the decrease of the negative impact on a set of economic and social variables, as well as the maximization of health care (Ordem dos Psicólogos Portugueses, 2011a).

Certainly, with the increase of health care costs, any specialty that can offer a service of higher quality and lower cost deserves special attention from the several political decision makers (Hunsley, 2002). The importance of improving mental health for the national well-being must be acknowledged and the political decision makers must consider its improvement in the future (Boyce & Wood, 2009). Layard and colleagues (2007) add that it is important for society to question itself about the advantages resulting from psychological treatment being the first choice.

In another context, it is also clear that psychological intervention, as it was shown before, deserves to be implemented in a prison context in order to turn prisons

into a place of rehabilitation for social life and not only a deposit of men and women with serious chances of recidivism. Goleman (2006, p. 420) alerts if there is no change in the intervention made during prison time, it is most likely that primary delinquents choose criminal life increasing significantly the number of crimes. This way, "(...) when someone is caught in the prison system, the chances of ever managing to escape its gravitational force are astoundingly small" (translated by the author).

As a conclusion, this article's objective was not to discredit or antagonize psychopharmacology, especially when practiced in a professional way. It intends to put a spotlight on psychology and represent another step towards acknowledging and recognizing the fundamental contributions of psychological science.

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