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Psychological Trauma: Definition, Clinical Contexts, Neural Correlations and Therapeutic Approaches Recent Discoveries

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Abstract

The definition of "psychological trauma", widely accepted by the scientific community, is undoubtedly the one provided by Janet's French psychodynamic school, which identifies it as one or more events that, due to their characteristics, can alter the subject's psychic system, threatening to fragment mental cohesion. This paper deals with a brief overview of psychological trauma with reference to clinical contexts, neural correlates and the most significant therapeutic approaches.

Keywords: Neural correlation; Psychological trauma; Psychological Recent discoveries

Introduction

The definition of "psychological trauma", widely accepted by the scientific community, is undoubtedly the one provided by Janet's French psychodynamic school, which identifies it as one or more events that, due to their characteristics, can alter the subject's psychic system, threatening to fragment mental cohesion [1]. Charcot agreed, but he concentrated more on the diagnostic hypothesis of "traumatic hysteria", caused by a sharp shock. Pavlov instead considered the trauma only as an innate defensive reaction in response to environmental threats, which presented lasting physiological alterations over time.

More simply it can be affirmed that it is one or more events perceived by the subject as "critics", generating impotence and vulnerability, capable of causing such severe stress to threaten the integrity of the person's psychophysical balance. The traumatic event in itself can be of any type: it can concern the loss of a loved one, a mourning for the conclusion of a relationship or the loss of a job that represented for the subject a central point of his existence, and still a serious illness or involvement in a dramatic situation that has generated impotence and vulnerability, such as carnal (rape) or psychological (domestic violence, verbal violence and bullying) violence. All these hypotheses, however, are joined by a common element: the event changes the subject's perception of well-being, making it more fragile and unstable, distorting its identity and transforming it into the "victim" [2-5].

The word "trauma" comes from the Greek and means "to damage, to harm"; it also contains a double reference to a wound with a laceration. Initially about the medical-surgical disciplines, during the eighteenth century, the term was used in psychiatry and clinical psychology to indicate the overwhelming effect of a stimulus on the individual's ability to cope with it [2].

The traumatic event can be "single" or "type 1" (if occasional) or "repeated" / "cumulative" or "type 2" (if the traumatic efficacy reverberates over time, with one or more actions between of them related) [3,4] And if not processed correctly, this condition can become chronic, even rapidly, generating in the subject a real disturbance (which includes feelings of emptiness and despair, hostility and derealization, loss of coherence in the representation of oneself , irritability, problems of emotional dysregulation, tendency to self-injury or inadequate personal protection, and a strong dependence coexisting with an avoidant attachment): this disorder is defined in the specific pattern of "post-traumatic stress" (PTSD) [5,6].

People who have suffered trauma often experience various symptoms. The severity of the trauma varies from person to person, from the type of trauma in question and the emotional support derived from other people. A traumatized individual can also experience more than one. After a traumatic experience, a person can relive the trauma mentally and physically, so avoid the memory of the trauma, also called "trigger" (because it triggers the memory), as this can be unbearable and even painful.

Traumatized people can seek relief in psychotropic substances, including alcohol, to try to escape the feelings of trauma. Reliving symptoms is a sign that the body and mind are actively trying to cope with the traumatic experience. Triggers and symptoms act as a reminder of the trauma and can cause anxiety and other associated emotions. Often the traumatized subject can be completely unaware of the triggers. In many cases, this can lead a person suffering from traumatic disorders to engage in destructive or self-destructive adaptation mechanisms, often without being fully aware of the nature or causes of their actions. Panic attacks are an example of a psychosomatic trigger reaction.

Consequently, intense feelings such as anger can frequently re-emerge, sometimes in very inappropriate or unforeseen situations, and seem to be an ever-present danger, as much as they exist and are the consequence of past events. Shocking memories such as images, thoughts or flashbacks can torment the person, and nightmares can be frequent. Insomnia can manifest itself, as well as hidden fears and insecurity, which keep the person alert and alert to danger, both day and night. The person may not remember what happened, while the emotions experienced during the trauma can be relived without understanding the reason. This can lead to traumatic events that are experienced continuously as if they were happening in the present, preventing the subject from gaining a clear perspective on the experience.

This can produce a pattern of prolonged periods of acute excitement punctuated by periods of physical and mental fatigue. Over time, emotional exhaustion can occur, leading to distraction and clear thinking can be difficult or even impossible. Emotional detachment, as well as dissociation or desensitization, can occur frequently. To dissociate oneself from painful emotion means cancelling all emotions, and then one arrives at emotional desensitization, which leads the person to appear emotionally drained, worried, distant or cold. The person may tend to get confused in ordinary situations and have memory problems. Some traumatized people may feel permanently damaged when trauma symptoms do not disappear and do not believe their situation will improve. This can lead to feelings of hopelessness, loss of selfesteem and often depression. If important aspects of the person have been violated, they can call their identity into question [6].

The DSM-5 [7], the diagnosis of "Disorders related to traumatic and stressful events" is the only one to take the etiological aspect, the trauma, into consideration among the diagnostic criteria. These include the "Reactive Attachment Disorder", the "Uninhibited Social Engagement Disorder", the "Post-Traumatic

Stress Disorder" (PTSD), the "Acute Stress Disorder", the "Adaptation Disorders" and others two disorders with another or without specification. In particular, for the development of a PTSD, it is necessary that:

- a) The person has been exposed to a trauma, such as real death or a threat of death, serious injury, or sexual violence (Criterion A), having a direct or indirect experience of the traumatic event or becoming aware of an event traumatic violent or accidental happened to a family member or a close friend. Traumatic is also the repeated or extreme exposure to raw details of the traumatic event such as happens to first responders who collect human remains or to police officers repeatedly exposed to details of child abuse.
- b) There is the presence of intrusive symptoms related to the traumatic event and arising after the traumatic event itself (Criterion B): memories, dreams, flashbacks that can lead to the complete loss of awareness of the surrounding environment. There may be intense or prolonged psychological suffering and physiological reactivity in response to triggers that symbolize or resemble the trauma.
- c) The subject puts in place a constant and persistent attitude of avoiding the stimuli associated with the traumatic event, which is put in place after the traumatic event (Criterion C). It affects both internal factors such as unpleasant memories, thoughts or feelings relating to or closely associated with the traumatic event, and external factors such as people, places, conversations, activities, objects and situations that can arouse unpleasant memories, thoughts or feelings related to or closely associated with the traumatic event.
- d) There are negative alterations of thoughts and emotions associated with the traumatic event, and that occur after the traumatic event (Criterion D). The person may not remember some important aspect of the traumatic event, develop persistent and exaggerated beliefs or negative expectations about themselves, others, or about the world. Distorted and persistent thoughts may arise regarding the cause or consequences of the traumatic event that lead to blaming themselves or others. You can also experience a negative emotional state and experience persistent feelings of fear, horror, anger, guilt or shame, a marked reduction in interest or participation in significant activities, feelings of detachment or strangeness towards others or inability to feel positive emotions like happiness, satisfaction or feelings of love.
- e) There are marked changes in arousal and reactivity associated with the traumatic event, and that occur after the traumatic event (Criterion E) as irritable behaviour and outbursts of anger (with minimal or no provocation) typically expressed in the form of aggression verbal or physical in relation to persons or objects, self-destructive reckless behaviour, hypervigilance, exaggerated alarm responses, concentration problems, difficulty relating to sleep such as difficulty in falling asleep or being asleep or non-restorative sleep.

- f) The duration of the described alterations is more than one month (Criterion F).
- g) The disorder causes clinically significant distress or impairment in social, occupational or other important areas (Criterion G)
- h) The disorder is not attributable to the physiological effects of a substance such as drugs or alcohol or another medical condition (Criterion H).

Following a stressful event, in addition to developing a PTSD, one could also manifest a specific symptomatology linked to the psychotic spectrum of a dissociative nature of a depersonalizing nature (feeling detached from one's own mental processes as if one was an external observer to one's own body) or derealizing (persistent or recurrent experiences of unreality of the surrounding environment); in this hypothesis, the danger of a psychotic collapse becomes really concrete. An important point that has been discussed a great deal in recent years is whether or not the dissociation is an adaptive response to the trauma, as extreme protection from the painful experience. Although the most widespread hypothesis is that which conceives dissociative symptoms as a defence, some authors, including Liotti, argue, quite convincingly, that dissociation is "a primary disintegration of the fabric of consciousness and intersubjectivity, while protection from pain it is a secondary and collateral aspect that among other things often fails. Furthermore: dissociation would not only not be a protection from pain, but an experience on the verge of annihilation, from which the mind must defend itself so as not to sink into the abyss.

Like a bone that breaks into a thousand pieces after a physical trauma is not the result of a defence mechanism of our body, in the same way, the disintegration of the integrating functions of the conscience consequent to a psychological trauma does not seem to be a defence of our mind, but a devastating side effect, with severe repercussions on the capacity for emotional regulation, on metacognitive abilities and on identity. According to others, it is in the structural dissociation of the personality that lies the essence of traumatization, that is, all the disorders of traumatic origin are based on the structural dissociation of the personality. From this point of view, personality is formed by various psychobiological subsystems that can be organized in a rigid and compartmentalized way in people who have survived traumas. This closure leads to a lack of coordination and coherence in the personality itself. This particular uncoordinated organization of the personality subsystems is the structural dissociation of the personality, which can have three different degrees of structural dissociation: primary, if the pure form of dissociation leads to conversion disorders; secondary, if the most elaborate form of dissociation leads to borderline personality disorder; tertiary, if the most complex form leads to the dissociative identity disorder [2, 6].

The neural correlates and recent discoveries

In recent years, several types of research, between 2014 and 2018 [8-11] have shown that traumas can be handed down

for generations, up to the third, according to the inheritance mechanism. The secret of this inheritance would seem to hide in the "microRNAs", genetic molecules that regulate the functioning of cells, organs and tissues. The trauma alters these 'molecular directors', and the defect is passed to the progeny through the gametes. We are, therefore dealing with short sequences, the vehicles with which the instructions to build proteins are transmitted but also preserve the memory of traumatic events.

In the history of psychoanalysis, however, the hypothesis of transmission of psychic modules from one generation to another has been raised several times. Already S. Freud, in "Totem and taboo" (1913), spoke of phylogenetic transmission of serious and repeated traumas. Freud considered both the hypothesis of a transmission through the unconscious transfer of identifications, and the hypothesis of a hereditary transmission. "The prohibitions have therefore been preserved from generation to generation perhaps only because of tradition, represented by the authority of the parents, or of society, or perhaps, instead, they have organized themselves in successive generations as a hereditary psychic heritage".

In 1923, he defines the psychic instances as Es, Io and Super-e. He defines the psychic inheritance as a heritage of repeated experiences, deposited within the id: "When (the experiences of the Ego) repeat themselves with sufficient frequency and intensity for many individuals of successive generations, they are transformed so to speak into experiences of the id, whose impressions are consolidated through hereditary transmission. In this way, the id, having become the repository of this inheritance, preserves within itself the residues of innumerable existences of Io ". In recent decades, several post-modern schools of psychoanalysis have dealt with the issue of transmitting traumas, concerning transgenerational, that is, the passage of symptoms, defence mechanisms, organization of object relations, guilt feelings from one generation to another. First and foremost, Bowlby, the father of attachment theory. For this author, interpersonal experiences maintain elements of continuity and elements of transformation throughout life. The aspects of continuity depend on the elaboration of the first childhood experiences with one's parental figures. These experiences are codified in systems of representation defined as internal operating models, which will influence the subsequent relationships to become the intergenerational transmission element of interpersonal parental modalities.

Parents influence their lives because the child internalizes the first interactions with the caregiver, in the three aspects: the self-image, the image of the parents, and the image of the relationship. In the course of development, the child will form the representative models of the parents, the self-representative models that reflect the image that the parents have of him, and the models of the relationship between the child and the parent. Subsequently, in the course of life, whenever the child will have to deal with experiences of relationship and with the activation of bonding emotions such as affection, the fear of losing the person, the pain of the loss and the joy of a bond, will compare

the new data with the previous experiences and will tend to give them a coherent meaning to their own meaning structures, or more simply, will interpret the new situations in the light of previous experiences. More recently, reports numerous examples concerning the repetition in several generations of behavioural modules: these are mainly failed acts that lead to self-injuring incidents that can be repeated with a disturbing resemblance from father to son. The author states that the understanding of the psychic mechanism in charge of phylogenetic transmission is still not satisfactory.

However, it presents some hypotheses. Since the uterine life and then throughout the first and second infancy, the child becomes the object of multiple projections by parents and all family members: expectations, fantasies, roles, resemblances with ancestors, assignment of the name of a deceased, but also anxieties, anguish, hostility. Schützenberger herself refers to various clinical studies, starting with Bowlby's, conducted on abandoned children; they have shown that the vast majority of these children bear the psychological wounds of trauma in the form of maladjustment, psychological problems, psychiatric illnesses, etc. but a certain number of them show such capacity for resistance that they can overcome the long traumatic period and build a balanced future, a son of dead Jews in Germany, talked about it in several books and succeeded in becoming a psychiatrist and dealing with the suffering of others. The micropsychoanalysis articulates the phenomenon of transgenerational transmission of traumas to the removal and to the compulsion to repeat, through the action of the image. The Image, in micropsychoanalysis, is defined as an organized set of representations and effects derived from all instinctual experiences.

We consider as instinctual experiences a wide range of phenomena, from sensory, pre-symbolic, proto-emotional experiences of intrauterine life and early childhood, to the great oedipal configurations. We call certain experiences instinctual when they are oriented towards the pursuit of pleasure, understood as Freud intended, or rather as a decrease in tension. Certain experiences, for example, sensory, the perception of the maternal voice, can be fixed as traces in the psychism when they are connected to a situation in which one has satisfied a desire. In this way, a very subjective series of traces are deposited, in the form of representations and affects, whose organization structures the unconscious of each, in the sense that it assigns a personal form [2].

Recently, according to an in-depth neuroscience study on the subject of post-traumatic stress disorder by Dr Jennifer Sweeton, trauma modifies the brain in certain areas. First of all, it is essential to understand that a traumatized brain behaves differently as a result of traumatic events. Just as the brain changes in response to past experiences with the world, it can also change in response to the prediction of future ones. In other words, the brain is plastic and can change. Trauma can alter brain function in many ways, but three of the most critical changes in the traumatized brain appear to occur in the following areas: a) the prefrontal cortex (PFC); b) the anterior cingulate cortex (ACC); c) the amygdala PFC is

the front part of the frontal lobe of the brain. It is involved in various activities that include rational thinking, problem-solving, personality expression, planning, empathy and moderation in social behaviour. When this area of the brain functions properly, we can think clearly, make the right decisions and have a good awareness of ourselves and others. The ACC is the part of the cerebral cortex located in the upper region of the medial surface of the frontal lobes, above the corpus callosum.

This area is responsible (in part) for the regulation of emotions. When this region functions appropriately, we can handle painful thoughts and emotions without being overwhelmed. Finally, the amygdala is a small brain structure that is part of the limbic system and is involved in the management of emotions, including fear. This subcortical zone acts outside awareness or conscious control, and its primary task is to receive all incoming information - all that is seen, heard, touched, smells and taste - and answers a question: "Is it a threat?" If it detects the presence of a threat, a danger, it activates the feeling of fear and makes us alert and reactive. The traumatized brain appears to be different from the non-traumatized brain because on the one hand there would be reduced activation of the prefrontal cortex and the anterior cingulate cortex and on the other hand a hyperactivation of the amygdala. In other words, if the trauma is experienced and symptoms of posttraumatic stress disorder emerge, chronic stress, exaggerated alarm responses, hypervigilance, fear, irritability or outbursts can occur. Difficulties in keeping calm and falling asleep may also emerge. The subject does not feel safe. These symptoms are plausibly related to hyperactivation of the amygdala. At the same time, traumatized individuals may have difficulty concentrating and prolonged attention, and often report not being able to think clearly: symptoms plausibly related to reduced activation of the prefrontal cortex in the traumatized brain. Finally, those who experience the symptoms of post-traumatic stress disorder sometimes complain of feeling unable to manage their emotions. This aspect refers to a dysfunction of the emotional regulation system [6-11].

However, a recent study, this time Italian, has shown that the elaboration of the trauma involves a functional modification of the brain activities. In essence, a trauma if passed changes place in the brain. After a trauma like a grief, a violence, a natural catastrophe, but also the loss of work, the memory of the event remains frozen in the networks of the brain in a non-functional way, the information cannot be processed and continues to cause diseases such as post-traumatic stress disorder (PTSD) and other psychological disorders. The eye movements of EMDR, similar to those of REM sleep and therefore wholly natural, reactivate the brain's self-healing capacity, which finds the resources to metabolize the traumatic event.

After work, patients remember the fact but feel that it is now part of the past. At the end of the EMDR therapy, a significant shift of the electrical activities from the visual brain areas (prevalent during the first EMDR session) to the frontal and temporoparietal brain regions (prevalent during the last EMDR session) was observed. These results suggest that the processing of traumatic

events moves from areas that develop the pathological images of trauma to regions of the brain with a cognitive and associative role, whose activities make it possible to regulate the memories of the traumatic event and of eliminate and control the negative emotions related to it. The decreased psychological malaise and the reduction of post-traumatic symptoms were also correlated to the increase in functional connectivity between the limbic regions and those of multisensory integration [12].

An interesting doctoral thesis has hypothesized the link between the cerebellum worm, the experiences of inadequate attachment and a style of dysfunctional coping underlying the predisposition to post-traumatic stress disorder. Suggestive hypothesis still to be verified empirically.

Clinical strategies for the management of the trauma

In the treatment of trauma, beyond the degree of impairment of cognitive function, cognitive-behavioural therapy should be preferred. In particular, in post-traumatic stress disorder, this type of therapy focuses on cognitive distortions (to correct them), appraisal processes, intrusive traumatic memories (to extinguish them) and therefore on patient desensitization to stimuli associated with trauma through repeated exposure.

There are various possible techniques

- a) "stress inoculation training" (SIT). Conceived by Donald Meichenbaum, it is a type of cognitive-behavioural psychotherapy that has the objective of encouraging the learning of strategies to manage anxiety and stress, and which consists of three phases: conceptualization, acquisition and testing of the ability to face the obstacle.
- "prolonged exposure". Currently, among the Evidence-Based b) therapies for Posttraumatic Stress Disorder, the Prolonged Exposure Therapy (PE), developed by Edna Foa and his group, is one of the manualized procedures together with the EMDR and Process Cognitive Therapy (PCT) more present in efficacy studies and subject to experimentation. The theory behind the conceptualization of Prolonged Exposure Treatment was applied already in the 1980s to anxiety disorders with the name of Emotional processing theory and only later was it applied to post-traumatic stress disorder. The Prolonged Exposure Protocol for PTSD provides 10 to 14 sessions of 90 minutes each and is presented as a treatment for posttraumatic stress disorder and not for general trauma therapy. In this sense the Treatment of Prolonged Exposure intervenes on the components of post-traumatic stress disorder both on the symptomatological aspect (e.g. flashbacks, nightmares, hyperarousal, loss of the present dimension) and on the frequent unrealistic knowledge (e.g. the world is terrible, I am unable to deal with the stress linked to the traumatic event, and I am guilty) and on the emotional component (linked to experiences of fear, guilt, shame, anger,) using two components

of the procession of painful memories, such as Activation and Corrective Information.

- c) "metacognitive therapy". The metacognitive model has extended its theoretical, empirical and applicative reflection also to post-traumatic stress disorder. In particular, the metacognitive approach proposes that traumatic symptoms be functional in the period immediately following the stressfultraumatic event, as they would be part of a Reflexive Adaptation Process (RAP), which influences cognition and attention to identify and use new coping strategies. The brooding belongs to the cognitive-attentional syndrome (CAS). In the case of post-traumatic stress disorder, this cognitive style consists of a repetitive perseveration of thought, attention and memories to find meanings, monitor and prevent similar future threats. According to the metacognitive model, the symptoms of posttraumatic stress disorder would remain because the cognitiveattentional syndrome does not allow a flexible cognitive activity free from the burden of monitoring threatening stimuli. And it would be precisely the metacognitive beliefs (such as, "Continuously analyzing what I did wrong in the past will help me prevent negative things in the future") to push toward the brooding.
- d) Furthermore, some negative metacognitive beliefs related to the uncontrollability of thoughts contribute to an increased perception of threat both in the present and in the future. Metacognitive therapy also appears to be even more effective (with greater effect size) than expository therapy; however, in the follow-up, there are high recovery rates and symptom improvement for both therapies analyzed. Therefore both protocols, according to the research, can be defined empirically useful for the treatment of post-traumatic stress disorder.
- e) "eye movement desensitization and reprocessing" (EMDR). It is a psychotherapeutic technique devised by Francine Shapiro in 1989. This methodology, useful for the treatment of disorders caused by stressful or traumatic events such as post-traumatic stress disorder, takes advantage of alternating eye movements, or other forms of alternating right stimulation / left, to restore excitatory/inhibitory balance. Research has shown that following a stressful event; there is an interruption in the brain's normal way of processing information. The pathology in these cases emerges because of the dysfunctional storage of information related to the traumatic event, with the consequent disturbance of the excitatory/inhibitory balance necessary for information processing.

The saccadic and rhythmic eye movements typical of EMDR therapy, concomitant with the identification of the traumatic image, the negative convictions associated with it and emotional distress, facilitate the re-elaboration of information, up to the resolution of emotional conditioning. In this way, the experience is used constructively by the person and is integrated into a nonnegative cognitive and emotional scheme. EMDR techniques, such as trauma-focused cognitive-behavioural therapy, follow

information processing theories and address disturbing individual memories and the personal meanings of the traumatic event and its consequences, activating the network of fear memories through the presentation of information that activates elements of the structures of fear and introduces corrective information incompatible with these elements.

The imaginative exposure typical of cognitive-behavioural therapy, however, guides the individual to repeatedly relive the traumatic experience as vividly as possible, without taking into consideration other memories or associations; this approach is based on the theory that anxiety is caused by conditioned fear and is reinforced by avoidance. On the contrary, EMDR therapy proceeds through chains of associations, connected with states that share the sensory, cognitive or emotional elements of the trauma. The method adopted is not a directive one; the individual is encouraged to "let anything happen by merely noticing it" while the freely associated memories enter the mind through imaginative exposure, in the form of short flashes. During EMDR therapy, therapists often access only brief details of the traumatic memory and encourage distortion or distancing of the image which, according to traditional theories, should hesitate in a cognitive avoidance.

However, EMDR therapy encourages distancing effects that are considered effective in-memory processing rather than cognitive avoidance. EMDR includes the complex of emotional responses that follow a stressful event by analyzing affective states, physical sensations, thoughts, emotions and beliefs simultaneously. The cognitive change that EMDR therapy evokes shows that the subject may have access to corrective information and link it to the traumatic memory and other associated memory networks. The integration of the positive and negative material that occurs spontaneously during the EMDR desensitization process resembles assimilation into cognitive structures (in line with the theory of adaptive information processing), as happens for the visions of the world, the values, beliefs and self-esteem.

f) the "sensorimotor therapy". It is proposed as one of the most promising approaches and capable of integrating updown cognitive approaches with bottom-up techniques and models, especially for trauma psychotherapy, procured from environmental events or connected to the attachment. The most famous neuro-psychological research models (Schore) and interpersonal approaches (Stern), find a convergence and psychotherapy application very attentive to body patterns in the here and now of the session to achieve a quick stabilization of the hyper/emotional responses hypo-activated of patients who have suffered unprocessed traumas.

Taking up the teaching of Janet, the body is emphasized as the seat of the memory of the events experienced by the person but also as a tool for the elaboration and restructuring of highly problematic and currently dysfunctional learning. Traumatized patients show a dysregulated arousal, with hyperarousal peaks, in which the activation exceeds the integration capacity and ipoarousal peaks, in which the activation is not sufficient to allow integration. In fact, these patients pass very quickly from states of intense emotional reactivity to an emotional detachment that sometimes results in real physical collapse. To be able to integrate and therefore, to process the feelings and the traumatic experience, it is essential to bring the patient back to a stabilization of the activation within a window of tolerance. According to the guidelines, the sensorimotor therapy model involves three phases of intervention: emotional stabilization and symptom reduction; treatment of traumatic memory; personality integration.

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