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Integrating neurobiology of emotion regulation and trauma therapy: reflections on EMDR therapy

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Abstract: Emotion dysregulation is a frequent feature in trauma-related disorders. Different kinds of emotion dysregulation seem to be linked to particular psychiatric conditions, and there is growing evidence of the association between neurobiological correlates and those dysregulation patterns. Nevertheless, many of the recent findings from the field of the neurobiology have not been translated into clinical practice and are insufficiently contemplated in trauma-oriented therapies. The aim of this article is to review recent developments in the field of emotion regulation connecting these issues with the practical implementation of psychotherapeutic procedures. The evaluation of emotion dysregulation patterns can guide decision making during the therapy independently to the approach, but there are some findings that can be especially useful for some concrete modalities of therapy. In this article we will focus our discussion on how emotion dysregulation may influence eye movement desensitization and reprocessing (EMDR) treatment in trauma-related disorders. EMDR is a well-defined and protocol-based intervention, with a strong empirical support for post-traumatic stress disorder (PTSD). We describe how different patterns of emotion dysregulation may influence EMDR treatment and procedures, and also how the application of EMDR beyond non-dissociative PTSD should take into account the predominant emotion-regulation strategies in specific posttraumatic disorders.

Keywords: dissociation; EMDR; emotion regulation; therapy; trauma.

Introduction

Eye movement desensitization and reprocessing (EMDR) therapy (Shapiro, 1996; Shapiro et al., 1998) is a trauma-oriented treatment that has been recognized as an evidence-based therapy for post-traumatic stress disorder (PTSD) (Bisson et al., 2013). The model on which EMDR is based posits that much of psychopathology is due to the maladaptive encoding or incomplete processing of traumatic or disturbing adverse life experiences. These dysfunctionally stored experiences cannot be integrated in an adaptive manner. EMDR procedures facilitate the effective reprocessing of those experiences and associated beliefs, to an adaptive resolution. Specific procedural steps are used to access and reprocess information which incorporates eye movements or alternating bilateral stimulation of the brain through auditory or tactile stimuli, called bilateral stimulation (BLS). The treatment consists of eight phases: phase 1 covers patient history and treatment planning, identifying memories of events that were not elaborated and integrated. In the preparation phase 2, the therapist prepares the patient for the EMDR reprocessing of selected targets. In phases 3–7, BLS is incorporated to promote the processing of the memory. Phase 8 consists in a re-evaluation of the processed memory. BLS has demonstrated to be an active ingredient of this psychotherapy (Lee and Cuijpers, 2013), but the basis of its effect is still under study.

The effect of BLS and EMDR procedures has been analyzed from different paradigms. The more predominant ones are those based on the role of the working memory and the orientation reflex (Andrade et al., 1997; Kavanagh et al., 2001; Van den Hout et al., 2001; Barrowcliff et al., 2003; Christman et al., 2003).

From a theoretical perspective, Shapiro (2001, 2012) has developed the adaptive information processing (AIP) model, proposing that BLS may unblock the inmate system of information processing in the brain. Afterward, the memories that could not be processed due to the impact of the traumatic experience can be connected to the adaptive memory networks and would be finally integrated. However, the information processing is not only a cognitive process or a simple brain function, but also a complex phenomenon that has only been partially studied and understood. Models of information processing come

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mainly from cognitive neuroscience. Still, the area of emotion regulation may offer interesting insights for a comprehensive understanding of the mechanisms underlying posttraumatic symptoms and the process involved in EMDR reprocessing of those traumatic memories.

Emotion regulation and EMDR therapy

Good emotion-regulation capacities are considered by some EMDR authors as a prerequisite to proceed with stages of the trauma processing therapy, namely in complex trauma cases. The Dissociative Disorders Task Force considered a good affect tolerance as a necessary pre-condition for trauma-oriented work in dissociative clients. However, most of the concerns toward this matter affect patients with extreme emotional activation. Those patients usually feel overwhelmed by emotional contents and experience their emotions as very arousing and out of control. Some contributions have been designed to enhance regulatory capacities in dysregulated patients, most of them proposing the use of hypnotic or mindfulness techniques in the preparation phase (phase 2) of EMDR therapy. In this line, Omaha (2004) proposed different techniques for affect management, as containment, grounding and present-orientation strategies. Nevertheless, emotion regulation is not a simple phenomenon and a more elaborated conceptual paradigm to encompass it has to be developed. Emotion regulation has been extensively studied during the last few decades, from the point of view of many different areas of knowledge such as cognitive neuroscience, neurobiology and brain-body interaction research. All these new data are still not fully integrated into the EMDR theory and clinical practice.

Coubard (2015) proposed that EMDR procedures may function as an emotional neurotraining, increasing ‘meta-emotion’ – the ability to think about one’s emotions – and preventing avoidance. The development of mindfulness stance and somatic awareness has also been considered as potential active elements in EMDR processing (Solomon and Shapiro, 2008). Coubard says that, taken together, EMDR may act as an emotional neurotraining as it develops emotional control, which involves at least four essential skills: (1) to identify your own emotional state and others; (2) to understand the natural course of emotions; (3) to reason and argue about emotions; and (4) to deal with and control emotions.

The previous considerations could be different for people with good premorbid capacities to regulate their

emotions, than in individuals with severe emotion-regulation disruptions. Reprocessing with EMDR could function differently for both cases and could need from additional interventions than those of standard treatment protocols. Emotion-regulation strategies may influence how patients understand and explain their present problems and early experiences (phase 1 of assessment in EMDR therapy). Depending on these strategies, they can be prone to work on traumatic memories, to be reluctant to do it, or to consider that they have overcome those situations. Thus, according to the functionality of their emotion-regulation strategies, some people can experience overwhelming emotions, others face distress adaptively and some feel emotionally disconnected from the experience when trying to access the perceptual, cognitive, emotional and sensorial components of a memory (phase 3).

Continuing the process of EMDR therapy, we enter in phase 4 that is also called desensitization. At this point of the procedure, the patient is in contact with the perceptual, cognitive, emotional and sensorimotor components of the memory, while sets of BLS are interweaved. Following the AIP model, after accessing the memory with these different elements in phase 3, BLS would activate and unblock the innate system of information processing. The working memory model hypothesis about EMDR functioning comes from cognitive neuroscience and memory models. Nevertheless, the information processed is not purely cognitive; it also includes emotional and sensorial elements. This type of information only has begun to be analyzed by recent research in emotion regulation and the neurobiology of emotions.

In this article, we will focus on phase 4 of desensitization, pondering how different emotion-regulation strategies may influence memory processing. More specifically, the reflections would be oriented to hypothesize how dysfunctional emotion-regulation styles could be activated when information processing systems are unblocked by BLS. It seems that when dysfunctional emotion-regulation styles are not pervasive, long-lasting and rigid, EMDR procedures may act as an emotional neurotraining (Coubard, 2015), influence conditioned fear (Boccia et al., 2015) or improve cognitive processing of emotions in children with complex trauma (Trentini et al., 2015). When a person has a strong tendency to use dysfunctional emotion-regulation strategies, if additional interventions are not introduced, the standard EMDR procedure is not enough for the memory to be processed and integrated.

In this article we will review different areas and their implications for trauma work and specifically for EMDR therapy: (1) the classic view of hyper-/hypo-arousal and the concept of tolerance window; (2) the more recent

proposals from the Polyvagal theory; (3) how dysfunctional emotion-regulation strategies as avoidance or some types of attentional deployment and suppression may influence EMDR processing; and (4) the role of over- and under-controlling regulatory strategies.

Hyper- and hypo-arousal and the tolerance window

In 1884, James linked emotional states and autonomic nervous system (ANS) activation (James, 1884). But nowadays, the ANS is known to be not completely autonomous and its relations with limbic and prefrontal areas are well acquainted. When emotional contents are being processed, the final arousal state is the result of a physiological response mediated by the ANS but also of top-down regulatory phenomena. This is especially important when we approach trauma-related disorders. In those disorders hyper-aroused patients usually manifest increased emotional reactivity, while hypo-aroused individuals usually show blunted affect, as a result of the complex interactions between the ANS and central regions linked to emotion regulation (Del Río-Casanova et al., 2016b). This idea of arousal fits well with some research finding in which the typical amygdala activation described during the processing of threatening stimuli is usually increased in patients with PTSD (Shin et al., 2006). But PTSD is not a uniform disorder and a dissociative PTSD subtype has been recently described. In this subtype, the typical amygdala hyper-activation with low prefrontal activation is substituted by the opposite pattern, characterized by low amygdala activation with a hyper-active prefrontal area (Lanius et al., 2010). The clinical reality is even more complex, and this polarity among hyper- and hypo-aroused patients is only one among many aspects on emotion-regulation processes and has many exceptions. Some patients have incongruent and variable responses where the subjective feelings and physiological measures do not correspond with each other (Kozłowska, 2007). Indeed, in the classic PTSD clinical picture, over- and under-arousal symptoms frequently alternate. This alternation has been explained as a result of an arousal instability (Fisher, 2014) or as a result of the circulation between different parts of the personality (Van der Hart et al., 2006).

The association between arousal level and information processing was proposed long ago by Yerkes and Dodson (1908), who stated that there is an empirical relationship between optimal arousal and performance.

Wilbarger introduced the concept of ‘optimal arousal zone’ related to the brain processing state. Siegel (1999) retrieved that idea and proposed the existence of an ‘emotional tolerance window’, defined as a window of autonomic arousal in which various intensities of emotional and physiological arousal can be processed without disrupting the functioning of the system. Other authors proposed a modulation model that has outlined the need for the patient to be within this tolerance window in order to successfully integrate information and, therefore, benefiting from the therapeutic interventions (Ogden and Minton, 2000).

The tolerance window is a widespread concept among trauma therapists that consider it intuitive and clarifying. This model is based on understanding emotional responses as a whole, from a quantitative (not too much, not too less) perspective. The intensity of emotions should be in the middle zone of the tolerance window to allow the processing to take place. The word ‘tolerance’ does not refer to ‘how much emotion’ the patient is feeling, but to ‘how acceptable it is’ for the patient. This way, a specific level of emotion intensity could be adequate for information processing, but the patient may dislike to feel it. The optimal situation would comprise a medium intensity of emotions and good tolerance of them.

But, of course, things in the human brain/mind are not so simple. Even from a polarized dimensional perspective, there are more dimensions that should be considered to explain emotional processing. The circumplex model considers arousal and valence (positive vs. negative emotions) as the two main dimensions of emotions, but other authors have emphasized the existence of others such as approach avoidance (Mauss and Robinson, 2009). On the other hand, some authors have also remarked the relevance of considering discrete emotions (anger, sadness, etc.) and their differential neurobiological underpinnings instead of their general attributes (Ekman, 1999; Panksepp, 2010). Furthermore, the level of arousal, the patient’s awareness of this arousal, the way the patient communicates (or not) his or her emotional state, and the clinician’s perception and understanding of patient’s arousal are not equivalent phenomena. Previous research findings point to these aspects, for example, two people may experience a similar level of arousal with different intensity (Maunder et al., 2006), some patients who are aware of social desirability may tend to under-report negative emotions (Paulhus and Reid, 1991; Welte and Russell, 1993) and finally, alexithymic patients may experience intense emotions without a clear awareness about what they feel and why they get the given feeling (Luminet et al., 2004).

Dissociative symptoms are frequent posttraumatic responses, and in some proposals these dissociative responses are included in the ‘tolerance window’ concept, as types of hyper- or hypo-activation phenomena (Brisch, 2012). Although dissociative symptoms are diverse and can be associated with different patterns of arousal, the perspective which considers dissociation as a response placed in both extremes of an emotional intensity continuum puts aside other dissociative symptoms such as identity confusion and alteration. These two symptoms are very characteristic of more severe dissociative disorders and they have even been considered as core symptoms (Van der Hart et al., 2006).

Other reflections regarding the tolerance window are EMDR specific. Differently from other trauma therapies, EMDR includes as an active ingredient eye movement or other forms of BLS with a well-documented parasympathetic effect (Wilson et al., 1996; Sack et al., 2008). Clinically, we can see in many cases how BLS sometimes dramatically decreases high levels of arousal. In those cases, we could hypothesize that BLS helps the patient to return to the ‘tolerance window’, instead of needing this previous optimal activation to be effective in diminishing disturbance. Besides, a negative influence of higher levels of emotional intensity in the complete reprocessing of memories has not been demonstrated at the moment. The emotion-regulation strategy subtype, the underlying ANS pattern of activation or the emergence of a dissociative part of the personality could be other factors related to processing blockages as will be described below. The level of emotional arousal and the tolerance toward emotions should be considered one of the elements to have in mind for working with trauma in the more dysregulated patients, but is not the only issue concerning emotion regulation that we have to take into account.

The Polyvagal theory

An alternative concept to understand the meaning of different levels of activation has been proposed by Stephen Porges in his Polyvagal theory (Porges, 2007, 2009). The author postulates a hierarchical structure in the ANS mediated by different branches of the vagus nerve. The myelinated vagus would be related to social engagement and represents the most evolved autonomic system. When this system fails or is underdeveloped, sympathetic activation predominates (hyper-arousal), leading to mobilizing strategies such as fight/flight responses (Sledjeski and Delahanty, 2012). Extreme hypo-arousal would be a result of a more primitive response mediated by the

primitive unmyelinated vagal system that leads to shutdown responses or feigned death (atonic immobilization strategies). These different autonomic states could be related to different dissociative responses such as dissociative parts mediated by fight/flight action systems, or more primitive collapse responses.

The Polyvagal theory offers interesting insights and possible hypothesis about the EMDR effect, but also about why in some situations the effect of BLS can be paradoxical (increasing symptoms) or null (no changes). Eye movements used in EMDR therapy have been consistently related to a parasympathetic action (Wilson et al., 1996; Sack et al., 2008). This parasympathetic activation may have very different effects in hyper-arousal states, mediated by sympathetic hyper-activation, than in dorsal-vagal parasympathetic states linked to collapse responses (extreme or subtle). In the first case, the patient can be extremely hyper-aroused and then BLS would be effective. In the second case, nothing happens (or things get worse) when the therapist proceeds with the standard ‘go with that’. Some authors from the EMDR field have proposed to have in mind these aspects in the clinical decision making during the processing of a traumatic memory (Giovannozzi, 2016).

Porges’ concepts are also easier to integrate with the theory of structural dissociation of the personality, a very comprehensive trauma model that presents a unitary framework to understand diverse trauma-related responses, from simple PTSD to severe dissociative disorders (Van der Hart et al., 2006). For the theory of structural dissociation of the personality, different parts of the personality (called dissociative emotional parts) are based on diverse defensive subsystems that remain rigidly blocked in traumatic experiences. From this point of view, fight/flight responses based on sympathetic activation can appear when the subject is facing traumatic issues, but in complex dissociative disorders, these responses are rooting dissociative parts with different levels of mental structure and autonomy. These unintegrated parts can be connected with different emotions such as rage and fear, to different action systems (aggressive/avoidance responses) and to diverse parts of the memories. This activation of dissociative (emotional) parts may be clinically expressed through auditory hallucinations, egodystonic phenomena, somatic symptoms, processing blockages or, in the more extreme dissociative cases, overt personality switching. In addition, dorsal-vagal activation is characteristic of life-threatening situations with no chance to escape (when there is nothing to do). In this second situation (equivalent of a ‘system shutdown’) the presence of a structured dissociative part is not so frequent.

Other strength of the Polyvagal theory is that it includes two relevant additional elements. The first one is the brain-body connection, remarked by Porges as a core aspect of his hypothesis. Emotions are not understood just as brain-generated phenomena, but as a result of a constant feedback between the central nervous system and the visceral ANS afferents coming from the entire body. This brain-body understanding of emotion regulation is very interesting as a source of potential explicative hypothesis of psychotherapy as EMDR, which include body sensations as essential features in emotional processing of memories.

Finally, another relevant but not less important issue in the Polyvagal theory is the inclusion of relational regulation in the equation. Social engagement is a preferential source of regulation in humans. The baby (whose prefrontal areas are still immature) seeks caregiver's soothing in order to modulate his or her amygdalar responses and his or her emotions in general. When social engagement fails due to severe attachment disruptions, this system can remain underdeveloped or turn malfunctioning. Many people who look for psychotherapy have a history of dysfunctional attachment. In different trauma-oriented psychotherapies including EMDR, memories, sensations and beliefs related to attachment are strongly activated in the context of a (therapeutic) relationship (Steiner, 2006; Stern, 2010). With a ventro-vagal system that is not working properly in the patient, the therapist's presence may become a trigger more than a source of reassurance and calm. The patient may be afraid of doing it wrong in front of the clinician as it may have happened with the father during childhood, or he or she may be angry because the therapist has been too close to the patient's vulnerability, when this has been experienced as very dangerous early in life. In these cases the patient can be hyper-aroused, but the basis is not just a question of 'too much emotion', nor a problem of 'tolerance' toward any specific emotional contents.

In spite of the possibilities of Polyvagal theory, it is important to have in mind that it is a hypothesis in development and that, by the moment, more empirical support is needed to demonstrate its proposals.

Dysfunctional emotion-regulation strategies

Gross describes emotion-regulation strategies (what I do with my emotions) as a sequential model (Gross, 2015; Sheppes et al., 2015). A person may select the situations

in order to maximize the possibility of experiencing desirable emotions or minimize the possibility for undesirable emotions. He or she can be active in modifying the situation while it is happening, and redirect attention to a specific part of the situation in order to increase or decrease some specific emotions. When experiencing the emotion, he or she can modify the cognitive perspective about it (reappraisal), and at the end of it, he or she can modulate the final response in order to relieve the tension, to express what he or she feels or to engage in any activity that may help regulating his or her emotional state.

From all this process, the most interesting issue linked to trauma-oriented psychotherapy is how the patient reacts toward the experienced emotion itself. Reappraisal is considered to be an adaptive strategy that can be reflected in the cognitive insights and perspective changes that spontaneously arise during the EMDR desensitization phase. On the contrary, suppression (characterized by decreasing emotion-expressive behavior, while the individual is emotionally aroused) does not help to decrease disturbance and increases sympathetic and amygdala activation (Gross and Levenson, 1997; Demaree et al., 2006; Goldin et al., 2008). People prone to use suppression may activate this strategy during EMDR reprocessing, because their system is programmed that way. Therefore, their system does not tend to an adaptive resolution, but to a blockage in the memory processing (with or without BLS).

Early attachment is the school where people learn how to regulate their emotions by experiencing the interactive feedback coming from the caregiver-infant dyad. Dysfunctional attachment encourages repeated activation and suppression of emotions (Shaver and Mikulincer, 2007). Secondary attachment strategies as anxious hyper-activation and avoidant deactivation are put in motion as substitutes of syntonic and attuned interactions, and may become chronic patterns (Bowlby, 1973). Avoidantly attached individuals usually attempt to block or inhibit emotional reactions, preventing the activation of the attachment system (Shaver and Mikulincer, 2007). During EMDR desensitization (if they agree to involve in it) they may tend to refer no disturbance or say 'nothing is coming'. Anxiously attached individuals may tend to perceive their emotions as related to attachment goals that they desperately continue searching for, and they may try to sustain or exaggerate their emotional states in order to achieve other's attention, support and care (Cassidy and Shaver, 2008). Anxious hyper-activation and avoidance may be triggered by the contact with some relational memories or by the relationship with the therapist. These patients may openly show their emotions, but they do not try to think about them or regulate them. Both extremes

could be related to the over- and under-controlling emotion-regulation strategies described below.

In a more general way, experiential avoidance understood as the unwillingness to stay in contact with unwanted inner experiences such as emotions, thoughts, sensations or memories has been considered a dysfunctional coping strategy that leads to exacerbate emotional distress (Hayes et al., 1996). Patients who tend to avoid emotions present specific difficulties with trauma-oriented work, and, in our experience, it is probable that they are not represented in systematic research (when these types of patients are proposed to participate in a study focused on trauma treatment, they may probably refuse to do it). They may be reluctant to engage in EMDR procedures and to approach some specific memories. If they are avoidant but also compliant, they can start processing a memory but that can be trying at the same time not to do it (something equivalent to brake and accelerate at the same time).

A related but different mechanism is attentional deployment, in which different attentional processes are recruited to shape the affective experience (Wadlinger and Isaacowitz, 2011). Gross (1998) defined three primary strategies of attentional deployment: distraction, concentration and rumination. All these phenomena may lead to different problems in emotional processing and, when they become preferential strategies for a patient, they could be activated by BLS.

(a) Attentional distraction involves either shifting attention from one aspect of a situation to another one or to stay entirely away from the situation (Gross, 1998). It can be a functional and positive regulatory ability that allows us to decrease disturbing emotions. But in its dysfunctional version (which has also been called ‘disengagement distraction’), it is a filtering mechanism that occurs at early stages of cognitive processing of emotional information and prevents the elaborative processing to be carried out (Sheppes et al., 2011). Discriminating between both tendencies is not easy in the EMDR desensitization phase, where association with sometimes apparently unrelated elements is part of a productive processing of a memory. Patients who suddenly connect a very disturbing issue to a pleasant and calm element are probably using distraction as an unproductive regulatory mechanism that does not allow real processing to happen. Sometimes going back to the target memory and continuing using BLS is enough to decrease disturbance and to make disengagement distraction unnecessary. In this line, some studies show that emotion intensity may be associated with differences in using distraction to regulate affect (Shafir et al., 2015), so when BLS helps

to decrease disturbance, other emotion-regulation strategies can take place. In other cases, this mechanism is so automatized in the system, or the specific memory and related emotions targeted are so unbearable, that constant distraction makes desensitization unproductive.

- (b) During concentration strategies, cognitive resources are focused within an activity. This regulatory strategy is used in meditation techniques, for example, directing attention toward breathing, sounds or visual stimuli (Brefczynski-Lewis et al., 2007). A typical (and dysfunctional) concentration strategy during EMDR desensitization appears when the patient counts the number of eye movements or pays attention to its rhythm or mechanic characteristics. Another possible situation is that the patient over-focuses on the target memory, disregarding other associations by considering them irrelevant, intentionally trying to retain the image or literally following the therapist’s instructions of ‘concentrate on that’.
- (c) Rumination is the process of thinking with perseverance about one’s feelings and problems, and when it happens with negative emotions, it is a dysfunctional strategy present in many pathologies (Nolen-Hoeksema et al., 2008). Ruminative people tend to be over-focused on negative contents and emotions. During EMDR reprocessing, those individuals could tend to have difficulties letting the associative process to flow or to connect with positive information. Due to the fact that rumination can be associated with depressive states (Nolen-Hoeksema and Morrow, 1993), antidepressant treatment could decrease problems in EMDR desensitization through rumination’s decrease. A frequent clinical observation in EMDR therapy is that severely depressed people tend to present never-ending negative association chains that do not tend to an adaptive resolution, finding that is sometimes reversed when mood is improved after adequate medication. There are two studies comparing EMDR against antidepressant medication (Van der Kolk et al., 2007; Arnone et al., 2012), but to our knowledge, there is not any study analyzing the role of antidepressants as enhancers of EMDR therapy efficacy in depressive people.
- (d) These emotion-regulation strategies can be general or specific for some concrete emotions. Sometimes guilt is unbearable, but it is not open or evident for the subject, and remains hidden under other emotions as anger, or it is externalized, for example, blaming others instead of feeling guilty (Stuewig et al., 2010). Shame memories do not impact on depression symptoms *per*

se, but rather the unwillingness to experience them and the attempt to control them (Dinis et al., 2015). Generally, individuals have different levels of tolerance toward different emotional states (Bernstein and Brantz, 2013) and different thresholds for needing to regulate each one of them. People may choose to regulate those emotions that they find more difficult to tolerate, whereas they may involve less regulatory effort in response to more tolerable emotions (Dixon-Gordon et al., 2015). Depending on those issues, when the problematic emotions arise during EMDR reprocessing, different dysfunctional regulatory strategies may be used, being absent at other moments.

Over- and under-controlling emotion-regulation strategies

Apart from the specific regulatory strategy used with emotions, there are differences in how much the patient is trying to control it, both conscious/intentionally or unconscious/automatically (Del Río-Casanova et al., 2016a). Responses in which the individual is not able to reduce the emotional onrush have been called under-regulation of affect responses. Those in which the individual performs excessive emotional self-control have been called over-regulation of affect, and will cause affective drowning (Van Dijke et al., 2010). Under-regulation would be related to a decrease in the prefrontal inhibition over limbic regions, and during over-regulation strategies, ventromedial prefrontal cortex and anterior cingulate are hyper-activated facilitating limbic inhibition (Forrest, 2001; Del Río-Casanova et al., 2016b).

Different trauma-related disorders have been associated with different emotion-regulation patterns. Borderline personality, non-dissociative PTSD and dissociative and conversive cases where hyper-arousal is predominant may be characterized by under-regulation of affect (Frewen and Lanius, 2006; Gratz et al., 2009; Uliaszek et al., 2012). Other patients showing alexithymic features, somatization and dissociative and conversive symptoms (including dissociative PTSD) with more predominant hypo-arousal could be linked to over-regulation of affect. Dissociative symptoms may be understood, not just as a disconnection due to an extreme emotional intensity, but as an activation of different dysfunctional patterns (Van Dijke et al., 2010; Del Río-Casanova et al., 2016a). Far from simple presentations, many individual combinations of both emotion-regulation strategies can be present, with a rapid cyclization between arousal states and emotion

strategies (Giesbrecht et al., 2006; Hetzel-Riggin and Wilber, 2010; Fisher, 2014).

The effect of EMDR therapy has been more clearly established in non-dissociative PTSD. In this disorder, where a limbic hyper-activation and prefrontal underfunction have been consistently described, EMDR has shown to reverse this dysfunctional pattern, decreasing amygdalar activation and increasing prefrontal activation (Pagani et al., 2013). EMDR function in this pathology (related to an under-controlling emotion-regulation strategy) cannot be directly translated to the opposite pattern: dissociative PTSD characterized by an over-controlling strategy (Lanius et al., 2002). In the complex combination of both strategies found in dissociative disorders (Del Río-Casanova et al., 2016a), the situation can be even more difficult to manage.

It could be relevant to include the level of emotional control as one of the parameters to be analyzed in EMDR therapy. Patients sometimes give up trying to control their emotions, as it has been commented for anxious attachment, and this leads to a progressive increase in emotional intensity. In other cases, cognitive control is extreme, and the individual is overthinking, judging or deciding what he or she must feel and what he or she does not. Alexithymic people and also some subtypes of dissociative presentations could be an example of over-controlling strategies that take place more at a non-conscious level. In all of these cases, patients would need more than BLS to achieve an adaptive resolution.

Conclusions

Understanding predominant emotion-regulation strategies in each patient, and the specific strategies activated along the processing of each concrete memory, could help to improve trauma treatment effectiveness and EMDR procedures. Avoidance tendencies, attentional disengagement, concentration, rumination, suppression and over-/under-control of emotions are part of the information processing system that is proposed to be activated by BLS in EMDR. A system with an underdeveloped social engagement, or a tendency to sympathetic or dorsal-vagal reactions in front of non-threatening stimuli, could also present specific characteristics when EMDR procedures are performed. The inclusion of those concepts in trauma-oriented psychotherapies, taking into account the particular characteristics of each therapeutic approach, could help to optimize clinical applications.

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