What can the neuroscience behind Eye Movement Desentization and Reprocessing (EMDR) teach us about trauma within the brain, and how can this invoke new processes to help those who have experienced trauma?

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Part I: Introduction

When you look at a large painting or a picture it can be overwhelming at first. To make sense of the painting, you may begin to break the image up into smaller pieces, then come back to the image with those fragments. This is how looking into the neuroscience behind Eye Movement Desensitization and Reprocessing (EMDR) felt like at first, but after stepping back and breaking the research up into comprehensible pieces, it felt less overwhelming, and the piece of art that is EMDR is fascinating in itself. EMDR is a new, upcoming psychotherapy that has been proven through multiple studies to be an effective treatment for patients who have experienced severe traumatic occurrences in their life, such as war veterans, domestic abuse victims, and sexual assault victims.

Within this paper, trauma is defined as a terrifying event or experience that any one person has endured, witnessed, or learned about, especially one that has perceived itself to be life-threatening or cause physical harm. The experience causes that person to feel intense fear, horror, or a sense of helplessness. It is estimated that 70 percent of adults in the United States have experienced a traumatic event at least once in their lives, and up to 20 percent of these people go on to develop Posttraumatic Stress Disorder, or PTSD (Sidran Institute). Of those struggling with unresolved trauma, many are simply given multiple prescription medications to ease their symptoms, and because of this, an alarming amount of patients become addicted to their medications and are not able to get to the root of their underlying issues. While prescription medications have their assets, the benefits of using EMDR have shown to be more effective through multiple studies. The research behind EMDR has revealed that trauma changes the brain by taking a physical toll and altering the brain, and we can use this new knowledge to help

victims of trauma, and possibly of other mental disorders, better integrate their experiences.] This permits them to better handle their symptoms, and, in turn, highlights other psychological processes that are able to reconstruct the brain.

Part II: Historical Context

Eye Movement Desensitization and Reprocessing was a therapy developed by the American psychologist Francine Shapiro in 1989, built to emphasize the role of deplorable memories in some mental health disorders, particularly Posttraumatic Stress Disorder (PTSD). The discovery of EMDR begins with Shapiro, as she noticed that the severity of a disturbing thought lessened with certain eye movements. She then conducted a scientific study with trauma victims in 1988 and the research was published in the Journal of Traumatic Stress in 1989. She recognized further that when she brought her eye movements under voluntary control while thinking about a traumatic thought, her anxiety and overall uncomfortable feelings had been reduced. Furthermore, Shapiro developed what is now known as EMDR therapy for Posttraumatic Stress Disorder (initially.) She speculated that traumatic events "...upset the excitatory/inhibitory balance in the brain, causing a pathological change in the neural elements" (Shapiro 1989).

The goal of EMDR is to access the brain's working memory area and look into the traumatic memory and associated stimuli that are inadequately processed and stored in an isolated memory network. This reduces the long-lasting effects of distressing memories. The process is done by engaging the brain's natural adaptive information processing mechanisms, thereby relieving the pressing symptoms. The psychotherapy uses an eight-phase, basic protocol

approach that includes having the patient recall distressing images while receiving one of several types of bilateral sensory input, such as side to side eye movements, tones, or tactile movements.

The standard protocol for EMDR has not changed in any extensive way(s) since Shapiro's discovery, and under a therapist's hand, the instructions are to follow an eight step protocol. This protocol follows as:

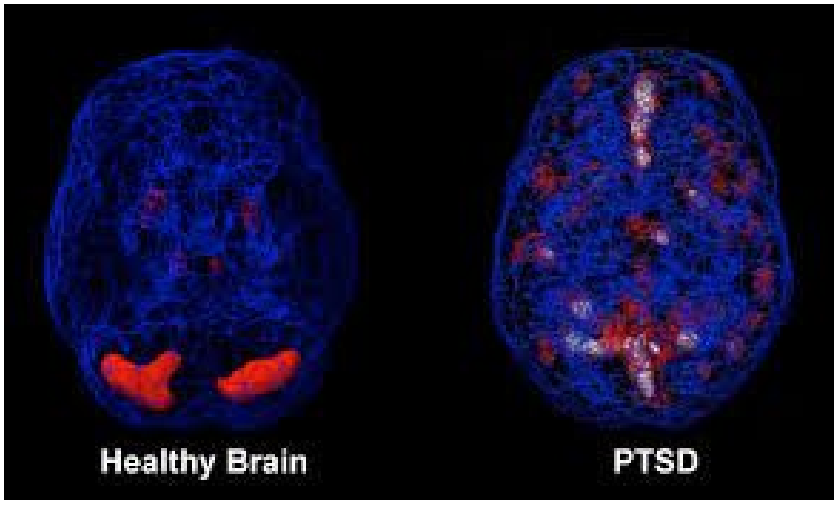
> **1-Client History** (including trauma(s) identification, risk assessment, dissociation, client goals) **2-Preparation** (including psychoeducation, safe place) **3- Assessment** (cross-sectional breakdown of the specific trauma memory on which you have chosen to work) **4- Image**, negative cognition, positive cognition, validity of cognition (VoC), emotions, subjective units of distress (SUDS), physical location of disturbance, **5-Desensitization** (memory reprocessing), installation (installation of positive cognition), **6-Body Scan** (hold preferred belief in mind and scan the body "the body keeps the score"), **7- Closure** (of a complete or incomplete session), and last, **Re-evaluation**. A typical session composes of these use of these eight steps, and for best results, a patient normally undergoes three 90 minute sessions. ("What is EMDR?" 1)

Part III: Research and Analysis

Section A: Trauma

To begin to look into the benefits of EMDR, you must first understand what trauma physically looks like within the brain, and look at how EMDR can change the physiology of the brain. While trauma is most often seen by its external symptoms, it actually affects the larger

amount of the brain as well. As according to Dr. J. Douglas Bremne, “Brain areas implicated in the stress response include the amygdala, hippocampus, and prefrontal cortex. Traumatic stress can be associated with lasting changes in these brain areas.” (Bremne 1) This can also be seen below, where a healthy brain is being compared to a brain with posttraumatic stress disorder (PTSD) through a brain scan:



Through multiple studies, the brain under EMDR has been shown to have increased power in specific regions, ultimately leading to a direct change in brain functioning. In the study *Neurophysiological Correlates of EMDR Sessions: Preliminary Evidence for Traumatic Memories Integration,* the neuroscientists described their results in accordance to specific areas of the brain as: “After EMDR during TM recall, we observed increase of left intrahemispheric EEG coherence, between fronto-parietal and temporal cortical areas (explored by C3 and T5 electrodes), in the beta frequency band. Moreover, we also observed a significant increase of EEG alpha power in the left inferior temporal gyrus.” (B. Farina et al. 464). It can be noted that an increase in functioning in multiple regions of the brain leads to comprehensive decrease in

symptoms of trauma. This increase in brain function has been shown to allow the patients to better cope with their symptoms when they are present. More specifically, the increase of functioning here allows the patient to create newfound feelings of comfortableness as well as satisfaction around the traumatic memories in which have been affecting them. The specific areas that are mentioned above revolve around the brain's emotional and memory storage areas, so this specific increase would be thought of as allowing the patient to create new, more positive emotions when retrieving those stored memories.

Section B: EMDR Process/Features and the Brain

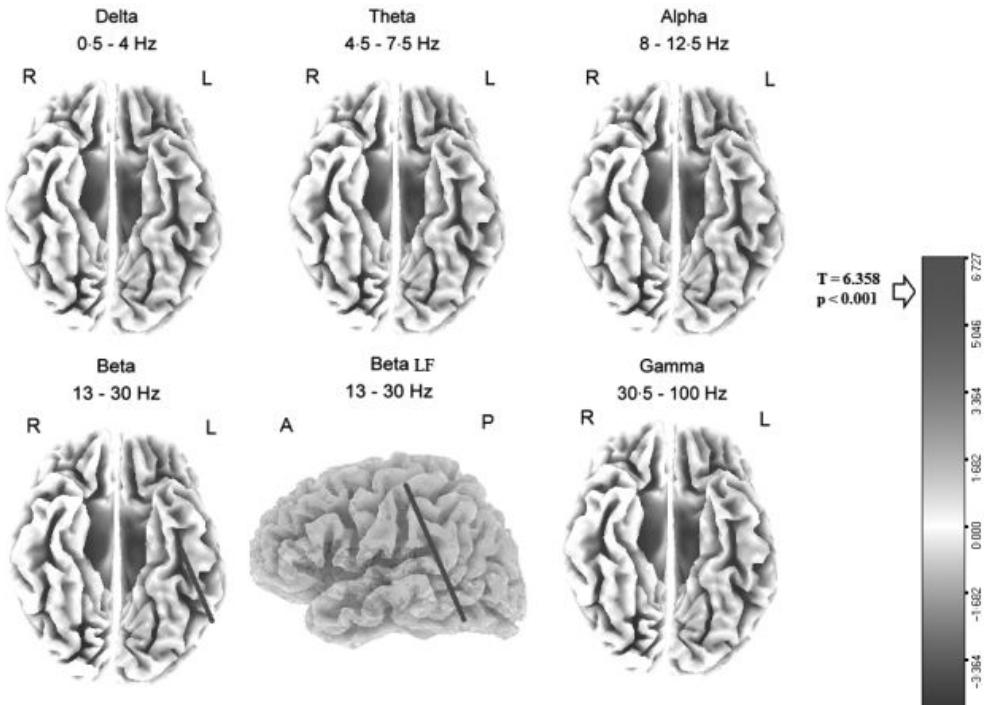
The main goal of EMDR therapy is to allow the patient to isolate the uncomfortable feelings to the traumatic event --no longer experiencing those feelings in different aspects of life. Indeed, the results reflect the action of EMDR in fostering adaptive multisensory integration of dissociated aspects of a traumatic event. In addition to those results, the neuroscientists within the study proclaim,

> Taken together, our results could support the hypothesis that EMDR fosters an adaptive integration of the traumatic memory by enhancing cortical connectivity and consequently decreasing hyperarousal symptoms. Indeed, integration, defined as the 'the capacity of a system to collect information of different nature and combine it to produce new, useful, information' (Zamora-Lopez et al., 2011, pp. 2), seems to be dramatically altered in patients with PTSD (Shapiro, 1995; van Der Kolk et al.,

1997; Bergmann, 2008) and in other trauma-related disorders (Farina et al., 2013).

(B. Farina et al. 465)

In can be taken from these results that the main goal of EMDR is to allow the brain to fully reintegrate serene memories around the already traumatic memory that has been placed into the patient's mind. This process would allow the brain's physiology to undergo change as well. The 'adaptive integration' that the scientists discuss further states that the patient isn't trying to clear any memory out of their minds, yet create new perceptions of what has already been set in place within their brains. To put the results into a visual, the specific changes in the brain are shown in the results table of the study, below:



Interconnected ROIs	Pre-EMDR	Post-EMDR	t	p
C3-T5	0·026±0·125	0·486±0·153	–6·215	< 0·001

Figure 2 Results of the sLORETA comparison of EEG lagged coherence in all frequency bands (pre-EMDR vs post-EMDR). Threshold values (T) are reported in the right of the figure. In the post-EMDR sessions, a significant increase of coherence was observed in beta band between C3 and T5 electrodes A, anterior; P, posterior; R, right; L, left; A, anterior; P, posterior; LF, left hemisphere.

The picture above shows specific regions of the brain such as the delta, theta, and alpha areas having physical movements after the reassociation of a traumatic memory, and after the use of EMDR. The physical movements are not only shown, but also put into a numerical sense shown in the table. The creation of new reactions and emotions around a memory initiates the brain to change and move in ways that allow the patient of trauma to live with these new feelings of ease. The picture above shows almost every part of the brain (Gamma, Theta, Beta, Delta, Alpha, and Beta LF) to move alongside the patients to obtain the newfound feelings, and allow the patient to live with these. In addition, the image shows that in all areas of the brain, EEG lagged coherence, or the measurement of electrical activity in your brain, there is an increase after the use of EMDR. This would allow that with that specific increase in electrical activity, new senses are being established around a negative memory.

As stated earlier, while most patients of EMDR are diagnosed with PTSD, therapists have also offered EMDR to patients of severe trauma, and the therapy has been proven to be beneficial to these patients outside of PTSD. To put this into a real life situation, an example of this could look like the a patient who had been bitten by a dog, then creating new information internally about a dog she had been approached by. The new information about an old event would look like, "this particular dog in this moment is safe and friendly even though I was bitten by an unfriendly dog 3 months ago..." Trauma within the brain can look different for every person, and can affect almost every region. Patients who have experienced multiple amounts of trauma tend to have a smaller limbic system (where emotions are stored and processed) and a larger reptilian complex (where instincts are stored, like flight or flight.) The processes within this study have shown increases and decreases of regions of the brain after the use of EMDR,

which ultimately change sectors of the brain that are most affected by trauma. The process behind EMDR has shown over and over to let patients of trauma reflect functional connectivity afterwards, which, in turn, can lead patients to a life without their symptoms, a life of higher quality.

A large component of EMDR is the Bilateral Stimulation (BLS) feature. Bilateral Stimulation is the process in which the patient receives some sort of alternating stimulation, which could be audio (alternating tones through headphones), visual (looking at one picture then another), or tactile (feeling vibrations on one side of the body to the other.) One study looked into the importance of BLS, comparing-- no stimulation, alternating stimulation and steady stimulation. The study used auditory BLS, and described in the conclusion:

> In the present study we have investigated the effect of auditory stimulation as used in EMDR while processing stimuli of negative emotional valence. We observed a parametric effect with bilateral alternating auditory stimulation leading to the greatest increase in activation of the amygdala and the greatest decrease in activation of dorsolateral prefrontal brain areas compared to simultaneous auditory stimulation and no stimulation at all. These results in healthy control subjects may encourage investigations in patients in order for the brain to be able to physically change and adapt to Eye Movement Desentization Reprocessing whether exposure therapies with concomitant bilateral stimulation indeed engage a neurobiologically grounded mechanism that may be beneficial to force open dissociation as one of the primary defence strategies often interfering with therapy in PTSD. (Herkt 6)

The study implicitly articulates that the bilateral stimulation aspect of EMDR kept the participants from dissociating during the session. This is meaningful because often treatment of PTSD is so slow, as the person starts to share their story they dissociate (detach from the body) and never have the chance to integrate therapy physiologically. Some type of stimulation has been proven to benefit the patient, and when the type of stimulation is alternating, the patient will feel more significant relief of symptoms. The specific increase in activation of the amygdala and the dorsolateral prefrontal cortex represent the calmness that is being developed during the process, and reassociation of negative memories when undergoing the process of EMDR. The act of bilateral stimulation allows for this activation to take place, and without bilateral stimulation, this activation would be significantly decreased. To the public, this proves that the brain has activity and movements all throughout brain are present during EMDR, and are a key element to the operation.This is also shown in an increase of activity of the amygdala part of your brain, and

a decrease of activity in the dorsolateral prefrontal cortex, shown directly below in the study's results:

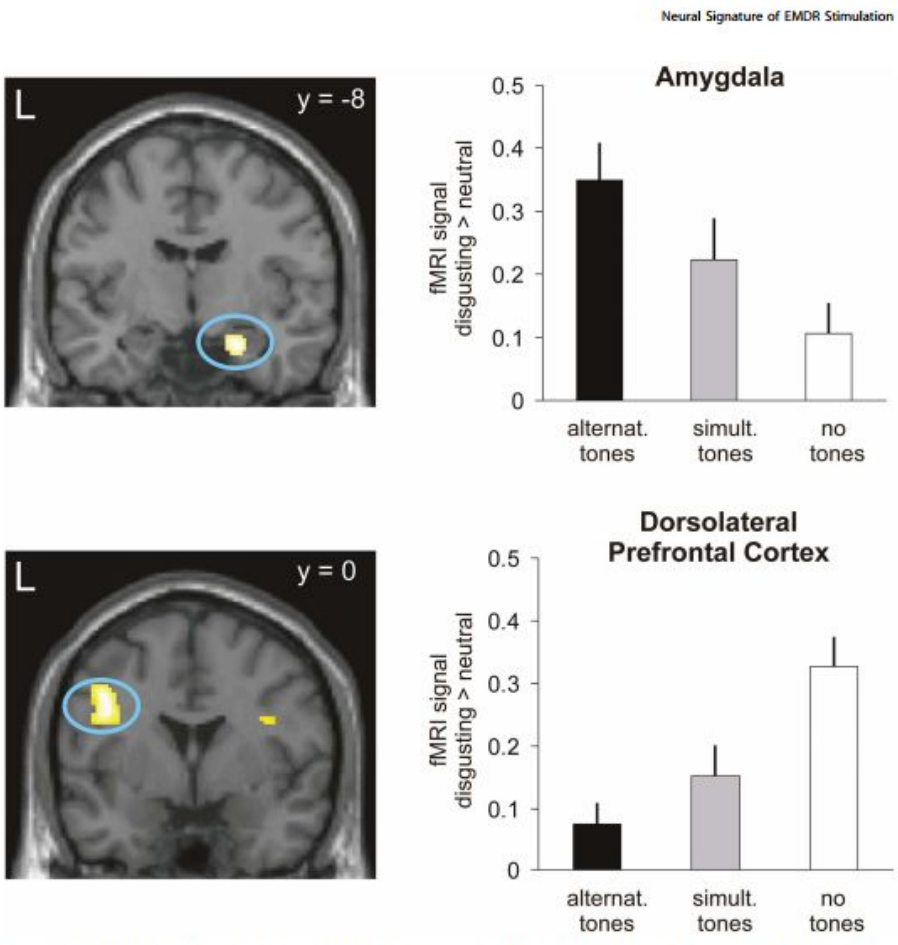


Figure 2. fMRI results: interaction of emotional picture presentation with type of auditory stimulation. Results of the interaction analysis of condition (visual disgusting vs. neutral stimulation) and auditory stimulation (alternating/simultaneous/no tones). Upper part – increased amygdala activation under alternating tones. Lower part – decreased dorsolateral prefrontal activation under alternating tones Plots show the mean signal of all significant voxels in the respective region and standard errors. For demonstration purposes, brain activations are shown at $p<0.005$ uncorrected.

The figure above shows a direct change in higher functioning of the amygdala (where memories are stored,) and lower functioning of the dorsolateral prefrontal cortex (where the the working memory is found,) after the use of alternating stimulation. When the patient in undergoing or has undergone EMDR, the main activation is found within the these two areas, the amygdala and dorsolateral prefrontal cortex. These two areas are the main regions that stores one's memories, and create/store emotions. It can be seen that these two areas would be the most affected after the use of EMDR, allowing the patient to bring the memory up, recognize their

feelings around that memory, and create and restore new emotions surrounding that memory. The activation, shown above, would entail that during the process the new creation of more positive emotions is taking place.

Section C: EMDR within Collaborative Based Therapies, and How it Compares to Other Therapies

The development of Eye Movement Desentization and Reprocessing is amongst a group of therapies known as "collaborative therapies," in which embodied practices have been recently arising from. Collaborative Therapies refer to a group of remedies that focus on the client's abilities to solve their individual problems, and has a baseline intention to loosen the grasp of externalized problems. EMDR identified within this group as it focuses on the client's own power to solve the issue. In turn, Collaborative Therapies alleviates the physical response of a trigger, and aligns the logic of knowing that you're safe with the body's ability to feel physically safe as well. One author looks into the benefits of these therapies, and more importantly the potential therapeutic contributions of studies in neurobiology, neurocardiology, and neurogastroenterology. The study looked into their role in effectively assisting patients who are struggling with intense and problematic emotional disorders, using a specific case of a woman with anxiety disorder. Marie-Nathalie Beaudoin of the Journal of Systematic Therapies looks into the neurological developments and discoveries of collaborative therapies, affirming,

Second, as discussed earlier, awareness of the different physiological aspects of experience provides clients with different ways to enter preferred selves. Clients can choose

to connect with preferred brain states from different angles, whether with their thoughts, meaning-making, perspectives, memories, experiences of oneself, posture, breath, heart, or gut. Third, connecting to a preferred self and bringing mindful attention to major visceral centers of the body allows clients to intensify desired experiences so they better fill experiential "space." This process simultaneously disconnects clients from the ruminating process of problems and attenuates activation of negative experiences in the brain's prefrontal cortex while also enhancing activation of the insula, associated with interoception and perspective (Farb et al., 2015). The ability to intensify embodied preferred states increases the likelihood of matching or superseding intense problematic emotions. (Beudoin 8)

Collaborative therapies are an innovative way at approaching intense negative emotions and patients of trauma, and allows the patient to solely rely on themselves while recognizing their own strength in being able to untangle their issues. This group of therapies relies on the entire body to mobilize itself in a way that is beneficial in helping the patient solve their own issues. The "prefered self" that the author mentions is a position in which the patient is allowing themselves to enter into a more calm area in terms of their negative and traumatic memories, thus allowing them to live a life of ease and harmony even with their traumatic memories still present. More research and experimenting are still needed to examine the potential efficiency around the neuroscience of collaborative therapies. Evidently, preliminary attempts at integrating embodied experiences (collaborative therapies) in clinical practices continue to reveal interesting results which can provide clients with many possible entries into their preferred brain states.

Outside of EMDR, Cognitive Based Therapy, or CBT is another widely used psychotherapy for people who have experienced trauma. There have been multiple studies that compare EMDR to CBT to see which therapy has the better outcomes. These results could inform patients which therapy could be of better use to them. A study from the Psychology Medicine, *Comparing the Efficacy of EMDR and Trauma-Focused Cognitive-Behavioral Therapy in the Treatment of PTSD: a Meta-Analytic Study,* examined both psychotherapies and compared one to the other with results, declaring:

> The superiority of one treatment over the other could not be demonstrated. Trauma focused CBT and EMDR tend to be equally efficacious. Differences between the two forms of treatment are probably not of clinical significance. While the data indicate that moderator variables influence treatment efficacy, we argue that because of the small number of original studies, little benefit is to be gained from a closer examination of these variables. Further research is needed within the framework of randomized controlled trials. (Seidler and Wagner 1)

Both therapies seem to offer a relief of symptoms for patients, and have been proven effective for a plethora of types of trauma. Depending on the patient, both CBT and EMDR focus on letting the patient solve their own issues, and allows them to come to a peaceful sense of self. Both therapies are great options for patients of trauma, and will allow for patients to come to terms with their experiences. With the current research available one therapy has not been proven to be generally better than the other, and both have their own advantages and disadvantages. It has been suggested that future research look deeper into the subject, but with the current examinations demonstrated, both therapies tend to be equally efficacious.

Section D: EMDR Benefits Outside of PTSD

While Eye Movement Desentization and Reprocessing has been known to best benefit adults, EMDR has also been known to help even children with trauma, and reshape their brains to aid them in coping with their symptoms. In a study done by *European Child Adolescent Psychiatry*, scientists looked into the general eight-step protocol of EMDR, and tested to see if this protocol could be adjusted for patients aged 6 to 16:

> EMDR was applicable after certain modifications adjusted to the age and developmental level of the child. The average treatment effect size was largest on re-experiencing, and smallest on hyperarousal scale. The age of the child yielded no significant effects on the dependent variables in the study. *Conclusions* A child-adjusted protocol for EMDR is suggested after being applied in a RCT for PTSD among traumatized and psychosocially exposed children. (Ahmad and a Sundelin-Wahlsten 1)

EMDR is primarily used on adults who have suffered symptoms of severe trauma but can actually avail to children after the protocols have been changed to fit the child of age, and of specific trauma type. Obviously, adults are not the only ones who have experienced trauma in their lives, and this then comes to show that children who have experienced trauma can be of benefit from EMDR has a therapy. While the eight step protocol is designed for those who are older, the protocol can be arranged in a way to fit the child's age and situation. To expose children to EMDR may be an intelligent maneuver as they will then have the knowledge of EMDR and have the option of this therapy to carry with them throughout their lives. This further

proves the vast amounts of assets that EMDR has demonstrated to be helpful for patients of trauma.

Outside of Post Traumatic Stress Disorder, EMDR has helped those who have suffered from other mental conditions, such as those who have suffered from eating disorders (and have a long term standing negative body image), depression, Obsessive Compulsive Disorder (OCD,) and psychosis. While there has been little research on EMDR and its effects on disorders such as those mentioned above, scientists are hopeful from the research that has been done, and beginning to produce studies to test if benefits can be produced for patients outside of PTSD: "There is also a single case experimental design with replications in the UK, the Sheffield EMDR and Pressions Investigation (SEID), which aims to ascertain whether clients respond to EMDR not only with an improvement in depressive symptoms but also in social functioning." Moreover, this exemplifies that while EMDR has been thought of to prove just symptoms, EMDR can actually help those who may need assistance in civil situations. This additionally perpetuates the idea that EMDR is beneficial to those outside of PTSD, and can assist those of many different types of disorders. The study was further described as the experimenters are helpful to publish their findings, and find substantial positive results for those suffering from depression.

Along with proven benefits to depressive symptoms, EMDR has been shown to help those with diagnosed eating disorders, and improve overall body image in the long run. Unfortunately, there is little published information pertaining to the specifics of the assistances that EMDR as a therapy provides to patients of eating disorders, however Dr. Andrea Bloomgarden and Rachel M Calogero looked into a randomized experimental design:

> A randomized, experimental design compared 43 women receiving standard residential eating disorders treatment (SRT) to 43 women receiving SRT and EMDR therapy (SRT+EMDR) on measures of negative body image and other clinical outcomes. SRT+EMDR reported less distress about negative body image memories and lower body dissatisfaction at posttreatment, 3-month, and 12-month follow-up, compared to SRT...The empirical evidence reported here suggests that EMDR may be used to treat specific aspects of negative body image in conjunction with SRT, but further research is necessary. (Bloomgarden and Calogero 1)

Through this study, patients who were entered into the hospital with eating disorders were treated with EMDR, and their overall negative body image memories (or NBIMs) were tested to prove the efficacy of using this therapy in addition to Standard Residential Treatment (SRT). As established above, generally, patients who received SRT in addition to EMDR had reduced amounts of distress about the earliest and worst negative body image memories compared to solely SRT.

The anatomy of individuals suffering from Obsessive Compulsive Disorder has been found to have similarities to those suffering from trauma or a specific traumatic event. Cromer et al. (2006) found that 54 percent of individuals who suffer from OCD had experienced at least one traumatic event within their lifetimes. Like depression, there is little research that has been done using EMDR on patients with OCD, but one case stands out, where Psychologist Robin Logie states,

> Böhm and Voderholzer (2010) described three case studies using both EMDR and Exposure Response Prevention Therapy (ERP) in the treatment of OCD. Marr (2012)

> described how OCD was successfully treated with EMDR in four cases where CBT had previously been unsuccessful. The first Randomized Controlled Trial (RCT) in this area indicated that EMDR is more effective than medication in the treatment of OCD (Nazari et al., 2011). (Logie 516)

This explicitly states positive results in that EMDR has shown specifically to be more effective on patients of OCD than medications, aligning the pathway for more research to be done in this area and showing a stronger outcome of a therapy to Obsessive Compulsive Disorder. This also shows that EMDR would be a better option for those who may be juggling medication to treat their OCD over EMDR.

Further, it has been questioned in this field whether or not EMDR could be a potential therapy to treat psychosis. While many believe psychosis is not connected to trauma, it is actually known that between 50 and 98 percent of adults with a severe mental illness such as psychosis had at least one traumatising experience (Logie 516) which has led scientists to acknowledge that trauma-focused treatments may be an important addition to the treatment of psychosis. Previous studies that have looked into the matter have concluded,

> ...EMDR is effective and safe in the treatment of PTSD in clients with a psychotic disorder. Treatment of PTSD with EMDR had a positive effect on auditory verbal hallucinations, delusions, anxiety symptoms, depression symptoms, and self-esteem. EMDR was utilised with this group of patients without adapting the treatment protocol or delaying treatment by preceding it with stabilising interventions. (Logie 517)

Recognizing that there have been studies that show a positive extension to the treatment of psychosis, there is no doubt that there is still a need for more research to be done on the

treatment of psychosis using EMDR, as well as the treatment of other disorders. This was consistent with previous predictions of the outcomes, and has opened up the door for the use of EMDR on those who have suffered from psychosis, and the symptoms that follow.

Ultimately, trauma within the brain comes in many different forms, and is one of the most complex issues neuroscientists have been faced with today. However, the arising discoveries around EMDR and analysis of the information has shown insight of a hopeful future for neuroscientists looking into trauma, as well as a hopeful future for patients of trauma. While EMDR has been proven beneficial for mostly those with PTSD, this article illustrates the positive results of the use of EMDR in and outside of PTSD. Naturally, EMDR can physically reshape the brain that has undergone an extreme traumatic event to allow the patient to live a life of higher quality.

Part IV: Conclusion

The findings of EMDR can guide further research for neuroscientists, which may support the healing of those with mental illness. Since EMDR has shown to physically reshape the brain, there are exciting possibilities for the use of Bilateral Stimulation and Collaborative Therapies. Collaborative based therapies are contemporary, and their findings continue to provide helpful information for the treatment of multiple disorders. This highlights a pathway for scientists to continue research on not only EMDR but also other integrative therapies.

Comparatively speaking, EMDR proves to be more beneficial in both the long and short term over medication alone. By medicating patients of trauma, this never actually allows the patient to come to terms with their traumatic experiences, and sometimes can even create a larger

problem, such as addiction. According to the Center for Disease Control (CDC), "...Prescription drug abuse kills more people than car accidents every year. The Centers for Disease Control and Prevention (CDC) classified it as an epidemic and the World Health Organization (WHO) reported it threatened the achievements of modern medicine. Prescription drug abuse is a global problem, and the U.S. is the world's biggest addict." (Elkins 1) Touching on addiction, most patients who have shown depressive symptoms are almost immediately given medication by their doctor, which can turn into a dangerous situation. In addition, when patients are medicated, their nervous system becomes suppressed, which does not allow for a new, positive link to a traumatic event within their brains to be reprocessed, and allow the patient to better administer their symptoms. When looking at treating trauma, scientists should be looking at how to treat trauma internally, not at the external symptom level. Furthermore, medicating patients who have depressive symptoms due to PTSD or a traumatic event blocks and disables the patients from having the feeling of being able to help themselves, or reach out to any other kind of help, but makes the patient feel as though they rely on this medication to help them, and leads into a lifelong feeling of hopelessness and demand of the drug.

To begin to implement the use of EMDR and other collaborative based therapies, as a society, we must first create a new definition of trauma. While EMDR is best used on those with PTSD, those with an array of different issues should use EMDR, and look into the enhancements it can bring forth, as studies have shown EMDR to be able to assist in many other areas than just PTSD. Trauma comes in many different forms, and could be any sort of different experience depending on the person. Trauma does not have to be of the most extreme platform, but can also come as a casualty in a smaller experience to some, and it is important to make the process of

EMDR as an option to patients, and those who have symptoms. Moreover, trauma has been proven to be a physical aspect within the brain, and through these processes, is exhibited as much more than external. If a new definition is implemented into our society, doctors could begin to focus less on simply prescribing medications to their therapists, and possibly refer their patients, who they feel would best benefit to EMDR. Once a new definition of trauma and how trauma should be dealt with in our society is carried out, patients could begin to feel more inclined to get help, outside of medicating, and come to better terms with the stigma around trauma and mental disorders. The new research that is being published over time can also allow for neuroscientists and therapists to better diagnose patients, consequently leading to less medications needing to be prescribed, less overdoses or addiction, and better outcomes.

With an open mind, looking at a complex and intricate piece of art can become a smoother process when you step back to analyze it and break it up into smaller pieces. Then, come back together with those portions to build up that piece of art, and reconsider what is in front of you to draw new conclusions. After looking at all of the pieces the neuroscience has offered, there is one general thing the neuroscience behind EMDR can teach the general public. It has exposed that there is a lot to know about trauma within the brain where trauma starts internally, and should not be treated solely by its external symptoms, or what is seen on the outside of a person who has experienced trauma. Likewise, trauma can been seen as something that deeply affects even the physiology of the brain. Thus, processes to help those who are looking for help need to start at the physical effect of trauma. Seeing as trauma is so common within the population, it is important to begin to look at how we can better treat those who have experienced trauma, and EMDR is a useful start.

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