

## NEUROSCIENCE-INFORMED COUNSELING

# The Eyes and Emotion Regulation: Helpful Tips for Counselors

Deanna Chrones<sup>1</sup>, Gina C. Martin<sup>2</sup>, and Eric Beeson<sup>3</sup>

<sup>1</sup> RELEASE™ Therapy Training Institute, Janesville, Wisconsin, United States


<sup>2</sup> Department of Counselor Education, University of Wisconsin–Whitewater


<sup>3</sup> The Family Institute at Northwestern University, Center for Applied Psychological and Family Studies, Northwestern University


*Emotion suppression is considered a maladaptive form of emotion regulation and is transdiagnostic of numerous mental disorders, including depressive, anxious, and trauma disorders. Existing eye-movement-based interventions, such as eye movement desensitization and reprocessing, use eye movements to access subconscious content and reduce the intensity of associated affect. This article presents information on the neuroanatomy of the eyes, including that the retinas are entirely made of brain tissue. The article then examines the literature on the eyes and their relationship to the nervous system, emotion regulation, emotion suppression, psychopathology, assessment, diagnosis, and treatment planning, and it explores interventions that use eye movements and contraindications of their use. It also provides resulting helpful tips about all these subjects for counselors to incorporate into their daily practice, and it indicates where further research is needed.*

The eyes have long been associated with the brain as a way to communicate between the external world and internal working consciousness of the mind (Carvalho et al., 2015). In fact, the retinas are entirely made up of brain tissue, which further substantiates the eye as integral to understanding the full potential of the brain and nervous system (Berry et al., 2008; Wolf et al., 2021; Zelinsky, 2010). It is important for counselors to have useful, current infor-

---

Deanna Chrones  <https://orcid.org/0000-0003-0451-8053>

Gina C. Martin  <https://orcid.org/0000-0002-7372-5307>

Eric Beeson  <https://orcid.org/0000-0001-6859-5790>

We have no known conflict of interest to disclose.

Correspondence concerning this article should be addressed to Deanna Chrones, RELEASE™ Therapy Training Institute, 3323 Newcastle Drive, Janesville, WI 53546. Email: [deanna@chronescounseling.com](mailto:deanna@chronescounseling.com)

mation about the eyes and their relationship to the nervous system, emotion regulation (ER), emotion suppression (ES), psychopathology, assessment, diagnosis, and treatment planning, as well as information on interventions that use eye movements and contraindications of their use. This article presents that information, as well as tips on how to incorporate such learnings into counselors' daily practice with clients.

### PHYSIOLOGICAL PROCESSES RELATED TO THE EYE

Age-old sayings indicate that the eye is the window into the soul, or a glimpse into the brain. This is anatomically true, as the retinas themselves are entirely made of brain tissue (Berry et al., 2008; Wolf et al., 2021; Zelinsky, 2010). The eyes and optic nerves are pressed out of the brain in the first 3 months of human gestation, and the eyes later reestablish connection to the brain via the optic nerves, which are also made of brain tissue (Berry et al., 2008). Research demonstrating the relationship between the eye, eye movements, and physiological processes such as breathing and heart rate, via the brain, dates back several decades (Aserinsky & Kleitman, 1953; Hustmyer & Burdick, 1965). The eye impacts physiological processes through visual means (Chrobok et al., 2017; Küller et al., 2009; McCormick & Bal, 1997; Sherman & Guillery, 2002) and in non-vision-related ways (Gronfier, 2013; Ma & Morrison, 2020; Ospri et al., 2017; Varadarajan & Huberman, 2018).

When most people think of the eyes, they think strictly of central eyesight. There are two additional types of routes light takes after entering the eye, between the retina and numerous parts of the brain: (1) routes that are visual, but not part of central eyesight, and (2) routes that are nonvisual. Specifically, the former are *peripheral-vision pathways*, which, among other things, allow for orientation of the body (Zelinsky, 2010), and the latter are *nonvisual pathways*, which include pathways between retina and limbic system (Csáki et al., 2015; Köves et al., 2016; Vereczki et al., 2006; Zelinsky, 2010).

It is helpful to understand basic information about natural eye movements to have context on how the eye is related to the brain and nervous system in both visual and nonvisual ways. There are four different types of eye movements that occur naturally: *saccadic*, *smooth-pursuit*, *vergence*, and *vestibulo-ocular* eye movements (Purves et al., 2018). Saccadic eye movements are sudden changes in gaze that can be voluntary or involuntary. Smooth-pursuit eye movements are slower, voluntary movements that strictly allow the eyes to follow a moving object. Vergence eye movements allow the eyes to change focus based on changes in distance of the object observed. Vestibulo-ocular eye movements account for changes in the position of the head (Purves et al., 2018).

## THE EYE AND THE AUTONOMIC NERVOUS SYSTEM

Vision makes up a large part of the brain's activity; approximately 30% of the brain is used for vision (Ben-Ari & Mondada, 2018). Eye movements are the result of orchestrated work involving nearly every part of the brain (Shaikh & Zee, 2018; Shishido et al., 2019). All visual functions of the eye occur through the optic nerve (Zelinsky, 2010), and vision is connected to the autonomic nervous system (ANS), by way of the brain, through the optic nerve (Chrobok et al., 2017; Küller et al., 2009). Research shows a strong link between accommodation (the vergence eye movements of focusing and unfocusing the eyes) and the sympathetic and parasympathetic actions of the ANS (Chen et al., 2003; Dukhayer et al., 2020). In fact, subjects with increased sympathetic muscle tone show faster constriction of the pupil—and faster focusing—than subjects with balanced ANS or increased parasympathetic muscle tone (Dukhayer et al., 2020). It is important to note eye focusing is something that occurs in times of stress, whether the danger is real or imagined. A fast way to manage ANS arousal using vision is through unfocusing the eyes until the field of vision is widened rather than restricted and narrow (Huberman, 2021). This is because difficult situations cause the muscles and mechanics of the eyes to change, the visual field to tighten, and focus to fixate at one depth (Huberman, 2021). During an interview, Huberman noted this triggers the sympathetic nervous system and prepares the body to take action, which may not always be an actual requirement of the situation. Unfocusing the eyes overrides this sympathetic nervous system response and is a useful way to calm the sympathetic nervous system (Wapner, 2020). This is a direct way to overcome the “tunnel vision” that occurs as a common symptom of trauma, panic, and other diagnoses. Therefore, counselors can lead their clients in the simple exercise of relaxing the eyes, unfocusing vision, and widening the field of vision to relax the ANS. This can take the form of an eye exercise that can be taught as a guided meditation but takes just a few seconds to do in clients' daily lives. The counselor invites clients to stare at one spot at the midpoint of their field of vision, unfocus their vision, blink as needed, notice they can see things in the periphery of their field of vision without moving their eyes, and finally, pay attention to how their body and nervous system relax as they see things in the periphery without moving their eyes. The guided meditation the counselor uses to teach the eye exercise is soothing to clients' nervous system, as is the actual eye exercise itself. The exercise can be done by clients anywhere, at almost any time, usually without others noticing.

The eye is also connected to the ANS in nonvisual ways (Berson et al., 2002; Gronfier, 2013; Hattar et al., 2006; Ospri et al., 2017; Varadarajan & Huberman, 2018). For example, light from the eye reaches and activates

the suprachiasmatic nucleus (SCN) in the hypothalamus through a channel unrelated to the formation of images (D. C. Fernandez et al., 2018; Gronfier, 2013; Ma & Morrison, 2020; Ospri et al., 2017; Varadarajan & Huberman, 2018). This is also true for sightless people (Ospri et al., 2017). The SCN is the body's master clock that regulates circadian rhythms, melatonin production, arousal, and other neuroendocrine functions; it also impacts mood disorders (D. C. Fernandez et al., 2018; Gronfier, 2013; Ma & Morrison, 2020; Ospri et al., 2017).

Research shows the eyes can be used to help reset the SCN; increase the efficiency of dopamine use; manage pain tolerance; and improve mood, learning, recall, and metabolism (D. C. Fernandez et al., 2018; Huberman, 2021; Ospri et al., 2017). Research indicates people can achieve these things by getting about 10 minutes of sunlight as close to sunrise as possible, when blue light is most pronounced—not through a window or windshield—as long as it is done in a careful manner (e.g., looking away from the sun, stopping and using eye protection if discomfort is felt). These effects can be achieved even on cloudy days (Huberman, 2021). This is guidance that counselors can share with their clients. Thus, counselors can educate their clients about the ability to manage arousal by relaxing visual focus, as well as the ability to improve mood by getting natural sunlight as near to sunrise as possible, as long as they take the precautions listed previously. The successful use of either tactic can also contribute to case conceptualization, as well as treatment planning. A successful response to the unfocusing exercise shows a predisposition to overarousal as a symptom and to the effectiveness of parasympathetic-system stimulation as a treatment. A positive response to additional daytime light exposure further demonstrates known or suspected depressive symptoms and a way to treat such symptoms in those clients.

### EYE MOVEMENTS AND THEIR CONNECTION TO EMOTION REGULATION

ER can be defined as strategies that individuals use to manage their emotions; the strategies can occur before the emotion is elicited (antecedent focused) or after (response focused; Aldao, 2012; Gross, 1998, 2001; Weissman et al., 2019). Eye movements have been linked to the accessing of emotions and cognitions and to ER (de Jongh et al., 2013; Harezlak & Kasproski, 2018; Schubert et al., 2016; van den Hout et al., 2012). This connection between eye movements and ER issues is strong (Everaert et al., 2017; Ferri et al., 2016; Harricharan et al., 2019; Vandekerckhove & Wang, 2018), as is that between ER issues and psychopathology (K. C. Fernandez et al., 2016; Pastuszak-Draxler & Gierowski, 2017).

ES is the attempt to escape difficult or painful emotions by turning attention to something else or minimizing the expression or experience of those emotions (Chapman et al., 2013). Reappraisal is an approach that involves reconceptualizing the circumstances one faces (Goldin et al., 2008). Reappraisal is an example of an antecedent-focused ER strategy, in which individuals change the way they think about a situation before the emotion is elicited; ES is a response-focused ER strategy, in which individuals control their experience and behavioral expression of emotion after it is elicited (Gross, 1998, 2001; Lum et al., 2009; Weissman et al., 2019). Reappraisal has been shown to be mainly adaptive; ES has been shown to be mainly maladaptive (Aldao et al., 2010; Gross, 1998, 2001; Lum et al., 2009; McRae, 2016; Weissman et al., 2019).

Further, ER issues are transdiagnostic of numerous disorders (Aldao, 2012; Aldao et al., 2010; K. C. Fernandez et al., 2016; Kring & Sloan, 2010). And ES, specifically, has been implicated in depressive disorders (Aldao et al., 2010; Dryman & Heimberg, 2018), anxious disorders (Aldao et al., 2010; Blalock et al., 2016; Dryman & Heimberg, 2018), eating disorders (Aldao et al., 2010; Naumann et al., 2016), and trauma disorders (Weissman et al., 2019). More specifically, a relationship between suppressed anger and depression has long been reported (Firestone, 2017; Pastuszak-Draxler & Gierowski, 2017); that relationship was a foundational belief of Freud's (Firestone, 2017; McGinn & Sanderson, 2001).

Importantly, ER is also deeply connected to eye movements—using the horizontal eye movements of eye movement desensitization and reprocessing (EMDR) during recollection of trauma have been shown to lessen the vividness and affective quality connected to those memories (Barrowcliff et al., 2004; Cotter et al., 2017; Lee & Cuijpers, 2013; van den Hout et al., 2001). Neurobiologically, horizontal eye movements are partially responsible for mediating recall of traumatic memories, and they offer aid in ER, which, again, is highly beneficial when working through trauma (Harricharan et al., 2019). Horizontal eye movements lessen the activation of brain regions involved in the processing of vision and emotions, and increase activation of the dorsolateral prefrontal cortex (Thomaes et al., 2016). Specifically, there is evidence side-to-side eye movements suppress the amygdala (and fear) in both mice (Jung & Huberman, 2018; Macé et al., 2018) and humans (de Voogd et al., 2018). Even when the counselor is not formally trained in EMDR or other eye-movement interventions, such horizontal, or lateralized, eye movements can be proactively used in counseling sessions. Given all the evidence of the safety of eye movements in general, these lateralized eye movements can be used by counselors to suppress the amygdala and calm clients during panic attacks or other stressful times in session. Further, such eye movements can

be recommended to clients for use during similar circumstances outside of session. Both such uses of horizontal eye movements can inform case conceptualization and can also be added to the treatment plan.

## EYE MOVEMENTS AND THEIR CONNECTION TO PSYCHOPATHOLOGY

Eye-movement abnormalities have been connected to psychopathology (Carvalho et al., 2015; Levy et al., 2010; Shishido et al., 2019; Takahashi et al., 2021; Zammarchi & Conversano, 2021). Abnormal variations of the natural eye moments described earlier can indicate specific mental disorders. These include depression, bipolar disorder, autism spectrum disorder, and attention-deficit/hyperactivity disorder (ADHD). Insomnia disorder is also impacted by the eyes.

### The Eyes and Insomnia Disorder

Sleep occurs in two overall stages, REM (rapid eye movement) sleep and NREM (non-rapid eye movement; Le Bon, 2020; Walker, 2017). REMs are saccadic eye movements (Ioannides et al., 2004; Purves et al., 2018). Though several decades have passed since researchers uncovered the existence of REM sleep, there continue to be debates about how this type of sleep is useful (Le Bon, 2020; Walker, 2017). Research shows REM sleep has the purpose of accessing the unconscious, though this is still debated (Betta et al., 2015; Hori et al., 2008; Ogawa et al., 2002). There are known functions of REM sleep; they relate to the operation of memory, mood, appetite, immunity, sensory-motor systems, vision, and reproductive organs (Le Bon, 2020). All stages of sleep, including Stages 1 and 2 of NREM (or “light NREM”), Stages 3 and 4 of NREM (or “deep NREM”), and REM, are important to brain health—in different ways at different hours of the night. In general, NREM sleep allows the brain to delete neuronal connections it no longer needs, and REM sleep allows the brain to foster essential neuronal connections, reduce the impact of traumatic memories, and increase creative thinking (Walker, 2017). The initial half of the nighttime sleeping period is mostly made up of NREM sleep, and the second half is mostly made up of REM sleep, though both do occur but in different, shifting proportions throughout the night; because each type of sleep serves different functions for body and mind, counselors must emphasize to their clients the importance of getting a full night of sleep on a regular basis, to include both “halves” of the nighttime sleeping period fully (Walker, 2017).

Sleep hygiene is a pattern of actions that might affect the caliber of sleep, optimizing the type and amount of sleep (Jansson-Fröjmark et al., 2019). Adequate amounts of sleep at proper hours, along with proper sleep hygiene to ensure such sleep, decrease the risk of numerous health conditions,

including Alzheimer's disease, metabolic disorders, cardiovascular disease, and immunodeficiencies (Walker, 2017). Lessened sleep has also been linked to lower bone density and greater risk of osteoporosis (Ochs-Balcom et al., 2020). Major mental disorders, such as anxiety, depression, and suicidality, are also correlated with inadequate sleep (Walker, 2017).

This information underscores the critical nature of assessing for sleep issues in clients and addressing those issues as a primary goal of therapy. The National Institutes of Health (NIH, 2012) states that health professionals, such as counselors, should ask clients numerous questions about sleep to assess for sleep issues, including number of hours of sleep and number of awakenings, as well as duration of awakenings, amount of time it takes to fall asleep, how rested clients feel when they wake up, and how rested or sleepy they feel during the day. Counselors should refer clients to their physicians for further assessment if any issue is uncovered (NIH, 2012). The NIH (2012) offers a sample sleep diary clients can fill out and take to their physicians, perhaps thus initiating a sleep study. A link for this sleep diary can be generated through an online search of "NIH, 12 tips for better sleep" (Walker, 2017).

Counselors should advise clients who suffer from insomnia to follow good sleep hygiene. Good sleep hygiene practices include bypassing or limiting caffeine, alcohol, and nicotine; taking digital technology out of the bedroom; keeping the bedroom cool; setting an appropriate bedtime all seven nights of the week; retiring to bed when tired (with minimal dozing on the couch); not remaining in bed if insomnia strikes (instead doing something calming until sleepy again); not napping during the day (especially after 3 p.m.); not engaging in stressful thinking before bed; avoiding medications and herbal preparations that interrupt sleep; getting exercise (but not too close to bedtime); making sure the stomach is neither too full nor too empty at bedtime; creating a good sleep setting that is distraction free; getting at least 30 minutes of natural sunlight during the day; awakening with the sunlight of dawn if possible; and getting rid of visible clocks in the bedroom (Jansson-Fröjmark et al., 2019; NIH, 2012; Walker, 2017). The NIH (2012) also reports those who have difficulty falling asleep should get 1 hour of natural sunlight in the morning and should dim interior lights before going to bed. Much of this guidance counselors should offer clients with insomnia disorder, particularly that involving the blue light of the sun and the blue light of technology and household lights, further illustrates the interrelationship between the eyes, sleep, and sleep disorders. The assessment questions offered above can inform the case conceptualization. If they alone, or together in combination with a referral, lead to a diagnosis of insomnia disorder, the sleep hygiene tips can be added to the treatment plan.

## The Eyes and Depression

Much of the existing research on eye movements' relationship to other types of mental illnesses utilizes advanced eye-tracking equipment to determine when eye movements are abnormal (Carvalho et al., 2015; Shishido et al., 2019; Zammarchi & Conversano, 2021). Research shows eye movements can help diagnose major depressive disorder (MDD; Bennabi et al., 2013; Carvalho et al., 2015; Zammarchi & Conversano, 2021) and can differentiate MDD from bipolar disorder (Carvalho et al., 2015; Li et al., 2016). Though both unipolar and bipolar clients have slower prosaccades (eye movements that allow clients to move eyes toward an object) than people who are not depressed, people with bipolar disorder make more errors during antisaccades (eye movements that allow clients to move eyes away from an object) than people with unipolar depression (Carvalho et al., 2015). Research demonstrates people with MDD have shorter "scanpaths" when allowed to move their eyes freely, as well as slower, jerkier saccadic movements when engaging in smooth pursuit (eye movements following an object) than people who do not have MDD, and his difference becomes larger as people age. However, in general, eye-tracking research results have more variability when studying depression than when examining schizophrenia (Takahashi et al., 2021).

## The Eyes and Neurodevelopmental Disorders

People with schizophrenia and related disorders have abnormal smooth-pursuit and antisaccade eye movements (Holzman, 2000; Iacono et al., 1982; Levy et al., 2010; Shishido et al., 2019; Thampi et al., 2003; Thomas et al., 2021; Wolf et al., 2021). Regarding abnormal smooth-pursuit movements, the gaze of people with schizophrenia lags when attempting to follow a moving object, requiring a later, fast saccade to reach the destination (Carvalho et al., 2015). People with schizophrenia also make significantly more numbers of errors when attempting antisaccades than do people without schizophrenia (Thomas et al., 2021; Wolf et al., 2021). Further, research shows being sightless from birth or early in life defends against schizophrenia (Morgan et al., 2018; Silverstein et al., 2013).

Lastly, abnormal eye movements are also found in and used to diagnose other neurodevelopmental disorders, including autism and ADHD (Johnson et al., 2016; Shishido et al., 2019; Sweeney et al., 2004; Takahashi et al., 2021; Zammarchi & Conversano, 2021). In looking at a target using saccades, people with autism spectrum disorder do not move their eyes far enough, or they move them past the target. They also have trouble using antisaccade movements accurately, and they have issues with following a moving target (Johnson et al., 2016). People with ADHD take more time to complete prosaccades, have



a harder time doing antisaccades, and have more difficulty keeping their gaze steady than people who do not have ADHD (Munoz et al., 2003). However, in regard to neurodevelopmental disorders, eye-tracking tests, while useful for showing deficits in cognitive functioning, may not discern between autism and ADHD (Lev et al., 2022).

### **Eye-Movement Abnormalities and Mental Disorders: Causal or Correlational?**

The amount of research utilizing eye-tracking hardware and software to explore psychiatric conditions has grown in recent years (Shishido et al., 2019; Zammarchi & Conversano, 2021). Though this research shows the potential of such technologies, additional studies are needed to further understand their diagnostic capabilities and to assess the applications of such results in treatment settings (Wolf et al., 2021; Zammarchi & Conversano, 2021). Further, there is a significant need for further research to more deeply understand whether eye-movement abnormalities are causal or correlational to mental disorders. This initial synthesis of information indicates there is evidence a relationship between eye movements and mental health, but counselors need to more deeply understand that relationship and the directionality of the relationship.

However, though no formal training in the use of basic eye-movement assessment in the counseling process was found by the present authors, there is enough evidence of a relationship between eye-movement abnormalities and mental disorder that a few simple tests in this area can add to the comprehensiveness of counselors' assessment process. Counselors can perform a rudimentary initial eye assessment for mental disorders by asking clients to start by looking at them, then see how clients' eyes function upon instructions to move just the eyes toward an object (to test for prosaccades), away from an object (to test for antisaccades), or freely about the room (to test for scanpath results), again, always starting each such test by looking at the counselor. Then counselors can ask clients to follow just the counselor's hand with their eyes (to test for smooth pursuit eye movements). Counselors can apply the eye-movement information given previously in this article to see if it corroborates or contradicts other aspects of the assessment process. For example, if a client presents with depressive symptoms but has a family history of bipolar disorder, and that client appears to have slower prosaccades than clients not suspected to have depression or bipolar disorder, a test for errors made during antisaccades might help differentiate bipolar disorder from depression. Then consultation with or referral to an ophthalmologist can confirm any such potential eye-movement abnormality concretely. Formal diagnosis should not be made by counselors through eye-movement assessment alone, without further

counseling-assessment methods, nor should assessment results about eye-movement abnormalities be finalized without an ophthalmologist. However, the above example illustrates the crucial nature of such an eye assessment in counseling. This is because bipolar clients often initially present solely with depressive symptoms, receive antidepressant medications, and devolve as a result (Takahashi et al., 2021). With further understanding of the relationship between eye movements and psychopathology, counselors can more confidently implement eye-movement assessment into the assessment and diagnosis processes already used in the clinical setting. This furthered knowledge can also help with case conceptualization and treatment planning, as it provides a sense of assessment as well as emotional connection and regulation. Implementing eye-movement analysis into assessment, diagnosis, case conceptualization, and treatment planning can add an objective measure beyond self-report of symptoms and can give counselors deeper insight into the brain processes of the presenting client.

### EYE-MOVEMENT INTERVENTIONS

Though, as described previously, horizontal eye movements can be used informally by counselors to calm anxiety in and out of session, there are numerous eye-movement interventions in which counselors can be formally trained. Although more could exist, we will focus on five commonly cited interventions: EMDR, Brainspotting (BSP), accelerated resolution therapy (ART), rapid resolution therapy (RRT), and eye movement integration (EMI) therapy. It is important to note far more research exists for EMDR than for the other methodologies, and so, in the present article, more content is presented on EMDR than on the other treatments. Stickgold (2002) wrote that EMDR uses smooth-pursuit eye movements, not saccadic movements like those found in REM, as is often cited. Though four of the five listed interventions mimic REMs to one degree or another via repeated eye movements, all five therapies are actually based on smooth-pursuit eye movements—where counselors guide the movement of the eyes with their hand or an object—rather than saccadic eye movements, which are found in REM sleep and REM dreaming. A quick comparison of the main aspects of these five interventions is presented in Table 1. Information on training for each method is provided at the end of this article.

#### Eye Movement Desensitization and Reprocessing Therapy

In EMDR, developed by Francine Shapiro (Balkin et al., 2022), clinicians use bilateral stimulation through side-to-side eye movements (or, alternatively, tones in the ears or pulses or taps to alternating sides of the body) in order to

**Table 1** Comparison of Eye Movement Therapies

Therapy	Developer	Description	Type of eye movement	Empirical support	Limitations
Eye movement desensitization and reprocessing (EMDR)	Francine Shapiro	The use of bilateral stimulation through side-to-side eye movements (alternating tones in the ears or pulses or taps to alternating sides of the body can also be used) to theoretically help process traumatic memories and alleviate symptoms of posttraumatic stress disorder (PTSD), using an eight-step protocol; also has a somatic component (Shapiro & Brown, 2019).	Though often cited as using saccadic eye movements, uses guided—or smooth pursuit—eye movements (Stickgold, 2002).	Numerous studies have supported the use of EMDR to treat PTSD caused by a wide variety of traumas (Shapiro & Brown, 2019).	Not sufficient evidence on the efficacy for trauma to allow for robust endorsement by the American Psychological Association (2017). EMDR has evidence of success in treating PTSD and depression (Sepehry et al., 2021; Valiente-Gómez et al., 2017); however, success rates with PTSD vary, from about 73% for adult-onset trauma to 25% for childhood-onset trauma (van der Kolk, 2014). Limited evidence of efficacy.
Brainspotting psychotherapy	David Grand	Outgrowth of hypnotherapy and EMDR; clinician guides clients' eyes to different positions, while client thinks of traumatic event(s), until facial expression or blink reveals a spot linked to trauma or peace, giving the clinician information to use in session; also has a somatic component (Masson et al., 2017).	Guided, or smooth pursuit, eye movements; not saccadic.	Shapiro and Brown (2019) wrote, "Using the American Psychological Association's broader definition of what constitutes evidence-based practice [sic] it may be considered such a practice from the perspective of multiple, multisite, multipractitioner, and multivalent anecdotal reports of good outcome" (p. 150).	Limited evidence of efficacy.
Accelerated resolution therapy	Laney Rosenzweig	Similar to EMDR but described as more structured, more reliant on pre- and post-treatment assessments, and more centered around positive imagery and clients' physiological responses than EMDR (Kip et al., 2013).	Guided, or smooth pursuit, eye movements; not saccadic.	Though there are only three studies as of yet, it gives signs of efficacy (Waits et al., 2017).	Limited evidence of efficacy.
Rapid resolution therapy (RRT)	Jon Connelly	Centered around teaching clients to speak of trauma without inducing their physiological symptoms of PTSD or associated negative self-beliefs, while the client and clinician hand an object back and forth between them, as the client's eyes follow the object (Hames, 2010).	Guided, or smooth pursuit, eye movements; not saccadic.	Hames (2010) shared anecdotal evidence of the effectiveness of this treatment for veterans and other PTSD sufferers.	The authors of the present article could not find any studies on RRT.
Eye movement integration (EMI) therapy	Connirae Andreas and Steve Andreas	Uses numerous eye-movement patterns while thinking of traumatic events and explores visual aspects, body sensations, and emotions (Beaulieu, 2005).	States it is based on smooth pursuit eye movements; not saccadic (Beaulieu, 2005).	Beaulieu (2005) showed efficacy with adults; Struwig and van Breda (2012) showed efficacy with adolescents; and van der Spuy & van Breda (2019) found EMI might be effective with "young children in resource-constrained settings" (p. 157).	Limited evidence of efficacy.

process the experience of traumatic memories and relieve symptoms associated with trauma (Shapiro & Brown, 2019). These types of eye movements (or other stimuli) are guided by the clinician or by equipment. The EMDR protocol involves eight steps and includes a somatic component (Shapiro & Brown, 2019). EMDR has been shown to be effective in treating PTSD caused by a wide variety of traumas (Barrowcliff et al., 2004; Schubert et al., 2011; Shapiro & Brown, 2019; Thomaes et al., 2016; van der Kolk et al., 2007). EMDR eye movements, isolated from other forms of bilateral stimulation in EMDR, are themselves an effective method of treating trauma (Andrade et al., 1997; Barrowcliff et al., 2004; de Jongh et al., 2013; Lee & Cuijpers, 2013; Schubert et al., 2016; van den Hout et al., 2001, 2012). There is also evidence of the efficacy of EMDR for treating depressive and anxious disorders (Capezzani et al., 2014; Sepehry et al., 2021; Valiente-Gómez et al., 2017). However, while EMDR is an evidence-based practice, there is not sufficient evidence on the efficacy of EMDR for trauma to allow for robust endorsement by the American Psychological Association (APA, 2017). In fact, Cuijpers et al. (2020) stated there are no studies at all that are low-bias, showing EMDR works on any condition other than PTSD, and only four low-bias studies that show it works on PTSD. Other experts express similar concerns about the existing studies of EMDR, finding too much credence given to studies with too many errors of various kinds, leading to inconclusive results, even when just examining EMDR's use for the treatment of over-arousal-based mental disorders (i.e., PTSD and anxiety; Balkin et al., 2022). Long-term success rates (8 months after study conclusion) on the use of EMDR for PTSD can vary, even intra-study. One study found them to range from about 73% for clients who had endured trauma that occurred in adulthood to 25% for adult clients who had endured trauma that occurred in childhood (van der Kolk, 2014). Clearly, despite the large number of studies on EMDR, more research is needed on its use for the treatment of PTSD and other mental disorders.

### Brainspotting Therapy

BSP was created by David Grand as an outgrowth of EMDR and a treatment called *somatic experiencing* (Masson et al., 2017). In BSP, as in EMDR, the clinician guides the client through eye movements; in the case of BSP, the movements are more thorough, throughout the field of vision (Masson et al., 2017). The clinician directs the clients' eyes to different areas of focus, using side-to-side movements, while the client thinks of specific traumatic events, until the client's facial expression, blink of the eye, or something similar reveals a spot in the field of vision that is linked to the trauma, something Grand called *Brainspots*, as he believed them to be associated with the trauma. The clinician uses that information, and any other somatic associations that arise, as a contin-

ued focus until the distress is resolved (Masson et al., 2017). BSP is quite new, and relatively few clinicians are trained in it due to the difficulty in receiving training and the failure of insurance companies to cover the treatment. There is evidence of efficacy supporting the use of BSP for trauma (Shapiro & Brown, 2019), though the number of validation studies is limited.

### **Accelerated Resolution Therapy**

ART is another eye movement therapy that is similar to EMDR, yet has more structure. Unlike EMDR, ART places more emphasis on positive imagery and physiological responses to the memories and eye movements, as well as on pre- and post-tests for efficacy of the treatment (Kip et al., 2013). There is evidence of efficacy supporting the use of ART for trauma (Kip et al., 2013, 2019) and depression (Kip et al., 2013), though the number of validation studies is limited.

### **Rapid Resolution Therapy**

RRT is considered a neurolinguistic treatment that focuses on the client speaking of their physiological experiences of the trauma while passing an object back and forth between the client and clinician (Hames, 2010). The client is instructed to follow the object with their eyes, thus inducing the external focus of the object that is being passed back and forth. This is another way of stimulating the optic nerve and creating that connection to the brain. Hames (2010) shared anecdotal evidence of the effectiveness of this treatment for veterans and other PTSD sufferers. No formal studies were found by the present authors.

### **Eye Movement Integration**

EMI uses various patterns of eye movements while thinking of the traumatic event and explores visual and bodily aspects as they relate to emotion (Beaulieu, 2005). A few studies that have shown efficacy with adults (Beaulieu, 2005), efficacy with adolescents (Struwig & van Breda, 2012), and limited efficacy within resource-strained settings with young children (van der Spuy & van Breda, 2019).

## **PRACTICAL USES OF EYE MOVEMENTS IN COUNSELING**

Throughout this article, there have been many reasons given as to how the eyes and eye movements are important in counseling. Eye movements and practices can be guided by counselors in the counseling room in the following useful ways: having clients unfocus the eyes to calm the ANS; advising clients to get careful exposure to morning/daytime sunlight and to avoid artificial

blue light in the evenings to improve sleep; employing informal, lateralized eye movements to downregulate the amygdala and regulate heightened emotions; using basic, rudimentary eye-movement assessments, in consultation with ophthalmologists, to improve the assessment process; and using formal eye-movement interventions to achieve numerous therapeutic goals.

But how can counselors use these latter techniques, and what training is needed to use them in order to remain in compliance with counselors' codes of ethics? According to the American Counseling Association (ACA, 2014) Code of Ethics (Code A.4.a., Avoiding Harm; C.2.a., Boundaries of Competence; and C.2.b., New Specialty Areas of Practice), it is imperative to complete training and certification around these topics in order to implement them. This is done to gain a full understanding not only of how these treatments work but also of the contraindications of these treatments. The most well-known of eye-movement treatments, EMDR, can cause abreactions. Abreactions, defined as emotional dysregulation to the point of being harmful, are another potential side effect of doing some of this deep work of accessing the unconscious with the use of eye movements. While it can be helpful to bring up deep emotions while the client is with the counselor, some clients might find that to be harmful if they are not equipped with the proper coping skills to effectively navigate the deep emotion. This is why it is imperative the clinician is trained in how to respond to and equip clients with the proper mechanisms to navigate deep emotional release.

Training for EMDR can be expensive, as high as \$1,500 (Balkin et al., 2022). It is also time-consuming, taking one full workweek or two full weekends, followed by 10 hours of personal consultation with a more advanced EMDR clinician in the year following training. After this process of formal training, a clinician is considered EMDR trained, but not yet certified, which takes additional time and money. BSP also requires additional specific training. BSP trainings are made up of three phases. Each phase takes 3 days and costs several hundred dollars. There is also a certification fee (Gurda, 2015). The present authors could not find any scholarly material describing the costs or duration of trainings for ART, RRT, or EMI. However, there are organizations that provide such trainings, and relevant information can be found online.

Further, the ACA (2014) Code of Ethics, Code C.7.a., Scientific Basis for Treatment, states treatments must be based in scientific evidence. As asserted, evidence of the efficacy of EMDR exists but is not yet strong enough to allow for robust endorsement by the APA (2017). Also, contention about that efficacy abounds, even around its use for PTSD, and much more so for its transdiagnostic use. There is even less evidence of the efficacy of other interventions that utilize eye movements to date. Further, there is a gap in the understanding of how these treatments work, which calls Code C.7.a. into stark relief.

Still, information about the eyes and their relationship to the nervous system, ER, ES, psychopathology, assessment, diagnosis, treatment planning, interventions that utilize eye movements (both formal and informal), and contraindications of their use can enhance counselors' understanding and treatment of their clients. The aforementioned tips resulting from the information provided herein are meant to be succinct, and they are meant to be of benefit to counselors in their daily work. However, though eye movement therapies appear to be a promising avenue, there are significant gaps in the literature on such interventions and all topics covered in this article. Additional research is needed on all these subjects.

## REFERENCES

- Aldao, A. (2012). Emotion regulation strategies as transdiagnostic processes: A closer look at the invariance of their form and function. *Revista de Psicopatología y Psicología Clínica*, 17(3), 261–277.
- Aldao, A., Nolen-Hoeksema, S., & Schweizer, S. (2010). Emotion-regulation strategies across psychopathology: A meta-analytic review. *Clinical Psychology Review*, 30(2), 217–237. <https://doi.org/10.1016/j.cpr.2009.11.004>
- American Counseling Association. (2014). 2014 ACA code of ethics. <https://www.counseling.org/docs/default-source/default-document-library/2014-code-of-ethics-finaladdress.pdf>
- American Psychological Association. (2017). *Clinical practice guideline for the treatment of Posttraumatic Stress Disorder (PTSD) in adults*. <http://www.apa.org/about/offices/directorates/guidelines/ptsd.pdf>
- Andrade, J., Kavanagh, D., & Baddeley, A. (1997). Eye-movements and visual imagery: A working memory approach to the treatment of post-traumatic stress disorder. *British Journal of Clinical Psychology*, 36(2), 209–223. <https://doi.org/10.1111/j.2044-8260.1997.tb01408.x>
- Aserinsky, E., & Kleitman, N. (1953). Regularly occurring periods of eye motility, and concomitant phenomena, during sleep. *Science*, 118(3062), 273–274.
- Balkin, R. S., Lenz, A. S., Russo, G. M., Powell, B. W., & Gregory, H. M. (2022). Effectiveness of EMDR for decreasing symptoms of over-arousal: A meta-analysis. *Journal of Counseling and Development*, 100(2), 115–122. <https://doi.org/10.1002/jcad.12418>
- Barrowcliff, A. L., Gray, N. S., Freeman, T. C., & MacCulloch, M. J. (2004). Eye-movements reduce the vividness, emotional valence and electrodermal arousal associated with negative autobiographical memories. *Journal of Forensic Psychiatry and Psychology*, 15(2), 325–345. <https://doi.org/10.1080/14789940410001673042>
- Beaulieu, D. (2005). An introduction to Eye Movement Integration Therapy. *European Journal of Clinical Hypnosis*, 6(3), 2–11.
- Ben-Ari, M., & Mondada, F. (2018). Image processing. In M. Ben-Ari & F. Mondada (Eds.), *Elements of robotics* (pp. 185–201). Springer International Publishing. [https://doi.org/10.1007/978-3-319-62533-1\\_12](https://doi.org/10.1007/978-3-319-62533-1_12)
- Bennabi, D., Vandel, P., Papaxanthis, C., Pozzo, T., & Haffen, E. (2013). Psychomotor retardation in depression: A systematic review of diagnostic, pathophysiologic, and therapeutic implications. *BioMed Research International*, 2013, 1–18. <https://doi.org/10.1155/2013/158746>
- Berry, M., Ahmed, Z., Lorber, B., Douglas, M., & Logan, A. (2008). Regeneration of axons in the visual system. *Restorative Neurology and Neuroscience*, 26(2–3), 147–174.
- Berson, D. M., Dunn, F. A., & Takao, M. (2002). Phototransduction by retinal ganglion cells that set the circadian clock. *Science*, 295(5557), 1070–1073.
- Betta, M., Laurino, M., Gemignani, A., Landi, A., & Menicucci, D. (2015). A Classification method for eye movements direction during REM sleep trained on wake electro-oculographic recordings. *Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, 2015, 370–373. <https://doi.org/10.1109/EMBC.2015.7318376>
- Blalock, D., Kashdan, T., & Farmer, A. (2016). Trait and daily emotion regulation in social anxiety disorder. *Cognitive Therapy and Research*, 40(3), 416–425. <https://doi.org/10.1007/s10608-015-9739-8>
- Capezzani, L., Ostacoli, L., Cavallo, M., Carletto, S., Fernandez, I., Solomon, R. M., Pagani, M., & Cantelmi, T. (2014). EMDR et TCC chez des patients atteints de cancer: Étude comparative de leurs effets sur l'ESPT, l'anxiété et la dépression. *Journal of EMDR Practice and Research*, 8(4), 119E–129E. <https://doi.org/10.1891/1933-3196.8.4.E119>
- Carvalho, N., Laurent, E., Noiret, N., Chopard, G., Haffen, E., Bennabi, D., & Vandel, P. (2015). Eye movement in unipolar and bipolar depression: A systematic review of the literature. *Frontiers in Psychology*, 6(1809), 1–19. <https://doi.org/10.3389/fpsyg.2015.01809>
- Chapman, B. P., Fiscella, K., Kawachi, I., Duberstein, P., & Muennig, P. (2013). Emotion suppression and mortality risk over a 12-year follow-up. *Journal of Psychosomatic Research*, 75(4), 381–385. <https://doi.org/10.1016/j.jpsychores.2013.07.014>
- Chen, J. C., Schmid, K. L., & Brown, B. (2003). The autonomic control of accommodation and implications for human myopia development: A review. *Ophthalmic and Physiological Optics*, 23(5), 401–422. <https://doi.org/10.1046/j.1475-1313.2003.00135.x>



- Chrobok, L., Palus-Chramiec, K., Chrzanowska, A., Kepczynski, M., & Lewandowski, M. H. (2017). Multiple excitatory actions of orexins upon thalamo-cortical neurons in dorsal lateral geniculate nucleus—Implications for vision modulation by arousal. *Scientific Reports*, 7(1), Article 7713. <https://doi.org/10.1038/s41598-017-08202-8>
- Cotter, P., Meysner, L., & Lee, C. W. (2017). Participant experiences of Eye Movement Desensitisation and Reprocessing vs. Cognitive Behavioural Therapy for grief: Similarities and differences. *European Journal of Psychotraumatology*, 8(6, Suppl.), Article 1375838. <https://doi.org/10.1080/20008198.2017.1375838>
- Csáki, Á., Vigh, B., Boldogkői, Z., Vereczki, V., Szél, Á., & Köves, K. (2015). Is a neuronal chain between the pineal body and the retina in rats and hamsters? Transneuronal tracing studies. *Neuroscience Letters*, 588, 1–6. <https://doi.org/10.1016/j.neulet.2014.12.043>
- Cuijpers, P., van Veen, S. C., Sijbrandij, M., Yoder, W., & Cristea, I. A. (2020). Eye movement desensitization and reprocessing for mental health problems: A systematic review and meta-analysis. *Cognitive Behaviour Therapy*, 49(3), 165–180. <https://doi.org/10.1080/16506073.2019.1703801>
- de Jongh, A., Ernst, R., Marques, L., & Hornsvelt, H. (2013). The impact of eye movements and tones on disturbing memories involving PTSD and other mental disorders. *Journal of Behavior Therapy and Experimental Psychiatry*, 44(4), 477–483. <https://doi.org/10.1016/j.jbtep.2013.07.002>
- de Voogd, L. D., Kanen, J. W., Neville, D. A., Roelofs, K., Fernández, G., & Hermans, E. J. (2018). Eye-movement intervention enhances extinction via amygdala deactivation. *Journal of Neuroscience*, 38(40), 8694–8706. <https://doi.org/10.1523/JNEUROSCI.0703-18.2018>
- Dryman, M. T., & Heimberg, R. G. (2018). Emotion regulation in social anxiety and depression: A systematic review of expressive suppression and cognitive reappraisal. *Clinical Psychology Review*, 65, 17–42. <https://doi.org/10.1016/j.cpr.2018.07.004>
- Dukhayer, S., Bushuieva, N. M., & Slobodanyk, S. B. (2020). Pupil response to accommodation and convergence in healthy children and adolescents of various age groups and autonomic nervous system tone. *Oftalmologicheskii Zhurnal*, 85(2), 36–44. <https://doi.org/10.31288/oftalmolz202023644>
- Everaert, J., Grahek, I., Duyck, W., Buelens, J., Van den Bergh, N., & Koster, E. H. W. (2017). Mapping the interplay among cognitive biases, emotion regulation, and depressive symptoms. *Cognition and Emotion*, 31(4), 726–735. <https://doi.org/10.1080/02699931.2016.1144561>
- Fernandez, D. C., Fogerson, P. M., Ospri, L. L., Thomsen, M. B., Layne, R. M., Severin, D., Zhan, J., Singer, J. H., Kirkwood, A., Zhao, H., Berson, D. M., & Hattar, S. (2018). Light affects mood and learning through distinct retina-brain pathways. *Cell*, 175(1), 71–84. <https://doi.org/10.1016/j.cell.2018.08.004>
- Fernandez, K. C., Jazaieri, H., & Gross, J. J. (2016). Emotion regulation: A transdiagnostic perspective on a new RDoC domain. *Cognitive Therapy and Research*, 40(3), 426–440. <https://doi.org/10.1007/s10608-016-9772-2>
- Ferri, J., Schmidt, J., Hajcak, G., & Canli, T. (2016). Emotion regulation and amygdala-precuneus connectivity: Focusing on attentional deployment. *Cognitive, Affective and Behavioral Neuroscience*, 16(6), 991–1002. <https://doi.org/10.3758/s13415-016-0447-y>
- Firestone, L. (2017, October 9). The role of anger in depression. *Psychology Today*. <https://www.psychologytoday.com/blog/compassion-matters/2017/10/the-role-anger-in-depression>
- Goldin, P. R., McRae, K., Ramel, W., & Gross, J. J. (2008). The neural bases of emotion regulation: Reappraisal and suppression of negative emotion. *Biological Psychiatry*, 63(6), 577–586. <https://doi.org/10.1016/j.biopsych.2007.05.031>
- Gronfier, C. (2013, Spring). The good blue and chronobiology: Light and non-visual functions. *Points de Vue: International Review of Ophthalmic Optics*, 19–22. [https://www.essilorpro.com/content/dam/essilor-pro/product-resources/crizal/The\\_Good\\_Blue\\_andChronobiology.pdf](https://www.essilorpro.com/content/dam/essilor-pro/product-resources/crizal/The_Good_Blue_andChronobiology.pdf)
- Gross, J. J. (1998). Antecedent- and response-focused emotion regulation: Divergent consequences for experience, expression, and physiology. *Journal of Personality and Social Psychology*, 74(1), 224–237. <https://doi.org/10.1037/0022-3514.74.1.224>
- Gross, J. J. (2001). Emotion regulation in adulthood: Timing is everything. *Current Directions in Psychological Science*, 10(6), 214–219. <https://doi.org/10.1111/1467-8721.00152>
- Gurda, K. (2015). Emerging trauma therapies: Critical analysis and discussion of three novel approaches. *Journal of Aggression, Maltreatment and Trauma*, 24, 773–793. <https://doi.org/10.1080/10926771.2015.1062445>

- Hames, J. M. (2010). Rapid resolution therapy. *Soldiers*. [https://www.army.mil/article/44335/rapid\\_resolution\\_therapy](https://www.army.mil/article/44335/rapid_resolution_therapy)
- Harezlak, K., & Kasproski, P. (2018, April 1). Application of eye tracking in medicine: A survey, research issues and challenges. *Computerized Medical Imaging and Graphics*, 65(2018), 176–190. <https://doi.org/10.1016/j.compmedimag.2017.04.006>
- Harricharan, S., McKinnon, M. C., Tursich, M., Densmore, M., Frewen, P., Théberge, J., van der Kolk, B., & Lanius, R. A. (2019). Overlapping frontoparietal networks in response to oculomotion and traumatic autobiographical memory retrieval: Implications for eye movement desensitization and reprocessing. *European Journal of Psychotraumatology*, 10(1), Article 1586265. <https://doi.org/10.1080/20008198.2019.1586265>
- Hattar, S., Kumar, M., Park, A., Tong, P., Tung, J., Yau, K., & Berson, D. M. (2006). Central projections of melanopsin-expressing retinal ganglion cells in the mouse. *Journal of Comparative Neurology*, 497(3), 326–349. <https://doi.org/10.1002/cne.20970>
- Holzman, P. S. (2000). Eye movements and the search for the essence of schizophrenia. *Brain Research Reviews*, 31(2–3), 350–356. <https://www.sciencedirect.com/science/article/abs/pii/S016501739900051X>
- Hori, T., Ogawa, K., Abe, T., & Nittono, H. (2008). Brain potentials related to rapid eye movements and dreaming during REM sleep: A short review of psychophysiological correlates. *Sleep and Biological Rhythms*, 6(3), 128–138. <https://doi.org/10.1111/j.1479-8425.2008.00358.x>
- Huberman, A. (2021, June 14). *The science of vision, eye health and seeing better*. Huberman Lab Podcast 24 [Video]. YouTube. <https://www.youtube.com/watch?v=ObtW353d5i0>
- Hustmyer, F. E., Jr., & Burdick, J. A. (1965). Consistency and test-retest reliability of spontaneous autonomic nervous system activity and eye movements. *Perceptual and Motor Skills*, 20(3, Suppl.), 1225–1228.
- Iacono, W. G., Pelouquin, L. J., Lumry, A. E., Valentine, R. H., & Tuason, V. B. (1982). Eye tracking in patients with unipolar and bipolar affective disorders in remission. *Journal of Abnormal Psychology*, 91(1), 35–44. <https://doi.org/10.1037/0021-843X.91.1.35>
- Ioannides, A. A., Corsi-Cabrera, M., Fenwick, P. B. C., del Rio Portilla, Y., Laskaris, N. A., Khurshudyan, A., Theofilou, D., Shibata, T., Uchida, S., Nakabayashi, T., & Kostopoulos, G. K. (2004). MEG tomography of human cortex and brainstem activity in waking and REM sleep saccades. *Cerebral Cortex*, 14(1), 56–72. <https://doi.org/10.1093/cercor/bhg091>
- Jansson-Fröjmark, M., Evander, J., & Alfnsson, S. (2019). Are sleep hygiene practices related to the incidence, persistence and remission of insomnia? Findings from a prospective community study. *Journal of Behavioral Medicine*, 42(1), 128–138. <https://doi.org/10.1007/s10865-018-9949-0>
- Johnson, B., Lum, J., Rinehart, N., & Fielding, J. (2016). Ocular motor disturbances in autism spectrum disorders: Systematic review and comprehensive meta-analysis. *Neuroscience and Biobehavioral Reviews*, 69, 260–279. <https://doi.org/10.1016/j.neubiorev.2016.08.007>
- Jung, H., & Huberman, A. D. (2018). An unbiased view of neural networks: More than meets the eye. *Neuron*, 100(5), 1019–1021. <https://doi.org/10.1016/j.neuron.2018.11.038>
- Kip, K. E., Berumen, J., Zeidan, A. R., Hernandez, D. F., & Finnegan, A. P. (2019). The emergence of accelerated resolution therapy for treatment of post-traumatic stress disorder: A review and new subgroup analyses. *Counselling and Psychotherapy Research*, 19(2), 117–129. <https://doi.org/10.1002/capr.12210>
- Kip, K. E., Sullivan, K. L., Lengacher, C. A., Rosenzweig, L., Hernandez, D. F., Kadel, R., Kozel, F. A., Shuman, A., Girling, S. A., Hardwick, M. J., & Diamond, D. M. (2013). Brief treatment of co-occurring post-traumatic stress and depressive symptoms by use of Accelerated Resolution Therapy. *Frontiers in Psychiatry*, 4, Article 11. <https://doi.org/10.3389/fpsy.2013.00011>
- Köves, K., Ágnes, C., & Vereczki, V. (2016). Recent research on the centrifugal visual system in mammalian species. *Anatomy and Physiology*, 6(3). <https://doi.org/10.4172/2161-0940.1000216>
- Kring, A. M., & Sloan, D. M. (2010). *Emotion regulation and psychopathology: A transdiagnostic approach to etiology and treatment*. Guilford Press.
- Küller, R., Mikellides, B., & Janssens, J. (2009). Color, arousal, and performance—A comparison of three experiments. *Color Research and Application*, 34(2), 141–152. <https://doi.org/10.1002/col.20476>
- Le Bon, O. (2020). Relationships between REM and NREM in the NREM-REM sleep cycle: A review on competing concepts. *Sleep Medicine*, 70, 6–16. <https://doi.org/10.1016/j.sleep.2020.02.004>

- Lee, C. W., & Cuijpers, P. (2013). A meta-analysis of the contribution of eye movements in processing emotional memories. *Journal of Behavior Therapy and Experimental Psychiatry*, 44(2), 231–239. <https://doi.org/10.1016/j.jbtep.2012.11.001>
- Lev, A., Braw, Y., Elbaum, T., Wagner, M., & Rassovsky, Y. (2022). Eye tracking during a continuous performance test: Utility for assessing ADHD patients. *Journal of Attention Disorders*, 26(2), 245–255. <https://doi.org/10.1177/1087054720972786>
- Levy, D. L., Sereno, A. B., Gooding, D. C., & O'Driscoll, G. A. (2010). Eye tracking dysfunction in schizophrenia: Characterization and pathophysiology. *Current Topics in Behavioral Neurosciences*, 4, 311–347.
- Li, Y., Yangyang, Y., Xia, M., Zhang, T., Wang, J., Liu, X., He, Y., & Wang, J. (2016). Eye movement indices in the study of depressive disorder. *Shanghai Archives of Psychiatry*, 28(6), 326–334. <https://doi.org/10.11919/j.issn.1002-0829.216078>
- Lum, H. C., Sims, V. K., Feldman, M., Afek, A., Smith-Jentsch, K. A., & Lagattuta, N. C. (2009). Emotion regulation training and scene understanding are related to eye movements during a computer based interactive simulation. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, 53(18), 1210–1214. <https://doi.org/10.1037/e5785220121010>
- Ma, M. A., & Morrison, E. H. (2020). Neuroanatomy, nucleus suprachiasmatic. In *StatPearls*. StatPearls Publishing. <http://www.ncbi.nlm.nih.gov/books/NBK546664/>
- Macé, É., Montaldo, G., Trenholm, S., Cowan, C., Brignall, A., Urban, A., & Roska, B. (2018). Whole-brain functional ultrasound imaging reveals brain modules for visuomotor integration. *Neuron*, 100(5), 1241–1251. <https://doi.org/10.1016/j.neuron.2018.11.031>
- Masson, J., Bernoussi, A., & Moukouta, C. S. (2017). Brainspotting therapy: About a Bataclan victim. *Global Journal of Health Science*, 9(7), 103–107. <https://doi.org/10.5539/gjhs.v9n7p103>
- McCormick, D. A., & Bal, T. (1997). Sleep and arousal: Thalamocortical mechanisms. *Annual Review of Neuroscience*, 20(1), 185. <https://doi.org/10.1146/annurev.neuro.20.1.185>
- McGinn, L. K., & Sanderson, W. C. (2001). What allows cognitive behavioral therapy to be brief: Overview, efficacy, and crucial factors facilitating brief treatment. *Clinical Psychology*, 8(1), 23–37. <https://doi.org/10.1093/clipsy.8.1.23>
- McRae, K. (2016). Cognitive emotion regulation: A review of theory and scientific findings. *Current Opinion in Behavioral Sciences*, 10, 119–124. <https://doi.org/10.1016/j.cobeha.2016.06.004>
- Morgan, V. A., Clark, M., Crewe, J., Valuri, G., Mackey, D. A., Badcock, J. C., & Jablensky, A. (2018). Congenital blindness is protective for schizophrenia and other psychotic illness. A whole-population study. *Schizophrenia Research*, 202, 414–416. <https://doi.org/10.1016/j.schres.2018.06.061>
- Munoz, D. P., Armstrong, I. T., Hampton, K. A., & Moore, K. D. (2003). Altered control of visual fixation and saccadic eye movements in attention-deficit hyperactivity disorder. *Journal of Neurophysiology*, 90(1), 503–514. <https://doi.org/10.1152/jn.00192.2003>
- National Institutes of Health. (2012, Summer). Are you sleep-deprived? Learn more about healthy sleep. *NIH MedlinePlus*. [https://magazine.medlineplus.gov/pdf/MLP\\_Summer2012web.pdf](https://magazine.medlineplus.gov/pdf/MLP_Summer2012web.pdf)
- Naumann, E., Tuschen-Caffier, B., Voderholzer, U., & Svaldi, J. (2016). Spontaneous emotion regulation in anorexia and bulimia nervosa. *Cognitive Therapy and Research*, 40(3), 304–313. <https://doi.org/10.1007/s10608-015-9723-3>
- Ochs-Balcom, H. M., Hovey, K. M., Andrews, C., Cauley, J. A., Hale, L., Li, W., Bea, J. W., Sarto, G. E., Stefanick, M. L., Stone, K. L., Watts, N. B., Zaslavsky, O., & Wactawski-Wende, J. (2020). Short sleep is associated with low bone mineral density and osteoporosis in the Women's Health Initiative. *Journal of Bone and Mineral Research: The Official Journal of the American Society for Bone and Mineral Research*, 35(2), 261–268. <https://doi.org/10.1002/jbmr.3879>
- Ogawa, K., Nittono, H., & Hori, T. (2002). Brain potentials associated with the onset and offset of rapid eye movement (REM) during REM sleep. *Psychiatry and Clinical Neurosciences*, 56(3), 259–260. <https://doi.org/10.1046/j.1440-1819.2002.01005.x>
- Osprey, L., Prusky, G., & Hattar, S. (2017). Mood, the circadian system, and melanopsin retinal ganglion cells. *Annual Review of Neuroscience*, 40(1), 539–556. <https://doi.org/10.1146/annurev-neuro-072116-031324>
- Pastuszak-Draxler, A., & Gierowski, J. K. (2017). Changes in acceptance and suppression of negative and positive emotions in patients with depressive disorders: A longitudinal study. *Archives of Psychiatry and Psychotherapy*, 19(4), 13–21. <https://doi.org/10.12740/APP/80161>

- Purves, D., Augustine, G. J., Fitzpatrick, D., Hall, W. C., LaMantia, A. S., Mooney, R. D., Platt, M. L., & White, L. E. (Eds.). (2018). *Neuroscience* (6<sup>th</sup> ed.). Sinauer Associates.
- Schubert, S. J., Lee, C. W., & Drummond, P. D. (2011). The efficacy and psychophysiological correlates of dual-attention tasks in eye movement desensitization and reprocessing (EMDR). *Journal of Anxiety Disorders*, 25(1), 1–11. <https://doi.org/10.1016/j.janxdis.2010.06.024>
- Schubert, S. J., Lee, C. W., & Drummond, P. D. (2016). Eye movements matter, but why? Psychophysiological correlates of EMDR therapy to treat trauma in Timor-Leste. *Journal of EMDR Practice and Research*, 10(2), 70–81. <https://doi.org/10.1891/1933-3196.10.2.70>
- Sepehry, A. A., Lam, K., Sheppard, M., Guirguis-Younger, M., & Maglio, A.-S. (2021). EMDR for depression: A meta-analysis and systematic review. *Journal of EMDR Practice and Research*, 15(1), 2–17. <https://doi.org/10.1891/EMDR-D-20-00038>
- Shaikh, A. G., & Zee, D. S. (2018). Eye movement research in the twenty-first century—A window to the brain, mind, and more. *The Cerebellum*, 17(3), 252–258. <https://doi.org/10.1007/s12311-017-0910-5>
- Shapiro, R., & Brown, L. S. (2019). Eye movement desensitization and reprocessing therapy and related treatments for trauma: An innovative, integrative trauma treatment. *Practice Innovations*, 4(3), 139–155. <https://doi.org/10.1037/pri0000092>
- Sherman, S. M., & Guillery, R. W. (2002). The role of the thalamus in the flow of information to the cortex. *Philosophical Transactions: Biological Sciences*, 357(1428), 1695–1708. <https://doi.org/10.1098/rstb.2002.1161>
- Shishido, E., Ogawa, S., Miyata, S., Yamamoto, M., Inada, T., & Ozaki, N. (2019). Application of eye trackers for understanding mental disorders: Cases for schizophrenia and autism spectrum disorder. *Neuropsychopharmacology Reports*, 39(2), 72–77. <https://doi.org/10.1002/npr2.12046>
- Silverstein, S., Wang, Y., & Keane, B. P. (2013). Cognitive and neuroplasticity mechanisms by which congenital or early blindness may confer a protective effect against schizophrenia. *Frontiers in Psychology*, 3, Article 624. <https://doi.org/10.3389/fpsyg.2012.00624>
- Stickgold, R. (2002). EMDR: A putative neurobiological mechanism of action. *Journal of Clinical Psychology*, 58(1), 61–75. <https://doi.org/10.1002/jclp.1129>
- Struwig, E., & van Breda, A. D. (2012). An exploratory study on the use of eye movement integration therapy in overcoming childhood trauma. *Families in Society: The Journal of Contemporary Social Services*, 93(1), 29–37. <https://doi.org/10.1606/1044-3894.4184>
- Sweeney, J. A., Takarae, Y., Macmillan, C., Luna, B., & Minshew, N. J. (2004). Eye movements in neurodevelopmental disorders. *Current Opinion in Neurology*, 17(1), 37–42. <https://doi.org/10.1097/01.wco.0000113936.12823.ad>
- Takahashi, J., Hirano, Y., Miura, K., Morita, K., Fujimoto, M., Yamamori, H., Yasuda, Y., Kudo, N., Shishido, E., Okazaki, K., Shiino, T., Nakao, T., Kasai, K., Hashimoto, R., & Onitsuka, T. (2021). Eye movement abnormalities in major depressive disorder. *Frontiers in Psychiatry*, 12, Article 673443. <https://www.frontiersin.org/article/10.3389/fpsyg.2021.673443>
- Thampi, A., Campell, C., Clarke, M., Barrett, S., & King, D. J. (2003). Eye movements and neurocognitive function in treatment resistant schizophrenia: A pilot study. *Irish Journal of Psychological Medicine*, 20(1), 6–10. <https://doi.org/10.1017/S0790966700007448>
- Thomaes, K., Engelhard, I. M., Sijbrandij, M., Cath, D. C., & den Heuvel, O. A. V. (2016). Degrading traumatic memories with eye movements: A pilot functional MRI study in PTSD. *European Journal of Psychotraumatology*, 7(1), Article 31371. <https://doi.org/10.3402/ejpt.v7.31371>
- Thomas, E. H. X., Steffens, M., Harms, C., Rossell, S. L., Gurvich, C., & Ettinger, U. (2021). Schizotypy, neuroticism, and saccadic eye movements: New data and meta-analysis. *Psychophysiology*, 58(1). <https://doi.org/10.1111/psyp.13706>
- Valiente-Gómez, A., Moreno-Alcázar, A., Treen, D., Cedrón, C., Colom, F., Pérez, V., & Amann, B. L. (2017). EMDR beyond PTSD: A systematic literature review. *Frontiers in Psychology*, 8, Article 1668. <https://doi.org/10.3389/fpsyg.2017.01668>
- Vandekerckhove, M., & Wang, Y. (2018). Emotion, emotion regulation and sleep: An intimate relationship. *AIMS Neuroscience*, 1(1), 1–22. <https://doi.org/10.3934/Neuroscience.2018.1.1>
- van den Hout, M., Muris, P., Salemink, E., & Kindt, M. (2001). Autobiographical memories become less vivid and emotional after eye movements. *British Journal of Clinical Psychology*, 40(2), 121–121.

- van den Hout, M. A., Rijkeboer, M. M., Engelhard, I. M., Klugkist, I., Hornsveld, H., Toffolo, M. J. B., & Cath, D. C. (2012). Tones inferior to eye movements in the EMDR treatment of PTSD. *Behaviour Research and Therapy*, 50(5), 275–279. <https://doi.org/10.1016/j.brat.2012.02.001>
- van der Kolk, B. (2014). *The body keeps the score*. Penguin Books.
- van der Kolk, B. A., Spinazzola, J., Blaustein, M. E., Hopper, J. W., Hopper, E. K., Korn, D. L., & Simpson, W. B. (2007). A randomized clinical trial of eye movement desensitization and reprocessing (EMDR), fluoxetine, and pill placebo in the treatment of posttraumatic stress disorder: Treatment effects and long-term maintenance. *Journal of Clinical Psychiatry*, 68(1), 37–46. <https://doi.org/10.4088/jcp.v68n0105>
- van der Spuy, C., & van Breda, A. D. (2019). An exploratory study on the use of Eye Movement Integration therapy for treating trauma in early childhood in South Africa. *Child Care in Practice*, 25(2), 157–174. <https://doi.org/10.1080/13575279.2018.1441126>
- Varadarajan, S. G., & Huberman, A. D. (2018). Assembly and repair of eye-to-brain connections. *Current Opinion in Neurobiology*, 53, 198–209. <https://doi.org/10.1016/j.conb.2018.10.001>
- Vereczki, V., Köves, K., Csáki, A., Hoffman, G. E., & Fiskum, G. (2006). Distribution of hypothalamic, hippocampal and other limbic peptidergic neuronal cell bodies giving rise to retinopetal fibers: Anterograde and retrograde tracing and neuropeptide immunohistochemical studies. *Neuroscience*, 140, 1089–1100. <https://doi.org/10.1016/j.neuroscience.2006.02.081>
- Waits, W., Marumoto, M., & Weaver, J. (2017). Accelerated resolution therapy (ART): A review and research to date. *Current Psychiatry Reports*, 19(3), Article 18. <https://doi.org/10.1007/s11920-017-0765-y>
- Walker, M. (2017). *Why we sleep: Unlocking the power of sleep and dreams*. Scribner.
- Wapner, J. (2020, November 16). Vision and breathing may be the secrets to surviving 2020. *Scientific American*. <https://www.scientificamerican.com/article/vision-and-breathing-may-be-the-secrets-to-surviving-2020/>
- Weissman, D. G., Bitran, D., Miller, A. B., Schaefer, J. D., Sheridan, M. A., & McLaughlin, K. A. (2019). Difficulties with emotion regulation as a transdiagnostic mechanism linking child maltreatment with the emergence of psychopathology. *Development and Psychopathology*, 31(3), 899–915. <https://doi.org/10.1017/S0954579419000348>
- Wolf, A., Ueda, K., & Hirano, Y. (2021). Recent updates of eye movement abnormalities in patients with schizophrenia: A scoping review. *Psychiatry and Clinical Neurosciences*, 75(3), 82–100. <https://doi.org/10.1111/pcn.13188>
- Zammarchi, G., & Conversano, C. (2021). Application of eye tracking technology in medicine: A bibliometric analysis. *Vision*, 5(4), Article 56. <https://doi.org/10.3390/vision5040056>
- Zelinsky, D. (2010). Brain injury rehabilitation: Cortical and subcortical interfacing via retinal pathways. *Physical Medicine and Rehabilitation*, 2(9), 852–857. <https://doi.org/10.1016/j.pmrj.2010.06.012>

Copyright of Journal of Mental Health Counseling is the property of American Mental Health Counselors Association and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.