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## The Impact of Eye-Movement Desensitization and Reprocessing on Self-Reported Test Anxiety in College Students

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The Impact of Eye-Movement Desensitization and Reprocessing on Self-Reported Test Anxiety  
in College Students

A dissertation submitted in partial fulfillment  
of the requirements for the degree of  
Doctor of Philosophy in Counselor Education and Supervision

by

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## **Abstract**

Test Anxiety (TA) has become a major concern for college students. Experiencing mental concern about test-taking perpetuated by physiological hyperarousal directly affects students' ability to be successful in college. Eye Movement Desensitization and Reprocessing (EMDR) is a multi-faceted therapeutic approach that aims to process dysfunctional negative cognitions which originate with negative past experiences to an adaptive state. Developed by Francine Shapiro in 1989, the Adaptive Information Processing (AIP) model undergirds the 30-second, therapist-initiated, bi-lateral eye-movements. These movements identify and reprocess emotionally disturbing experiences, linked to an individual's emotional expression, by deliberately triggering a connected trauma network. This dissertation examined the impact of eye-movement desensitization and reprocessing on self-reported test anxiety in the college student population. A single case research design (SCRD) was used to examine whether eye-movement desensitization and reprocessing impacts college students' self-reported scores on the Test Anxiety Inventory (TAI-T) and its subscales of worry (TAI-W) and emotionality (TAI-E) (Spielberger, 1980).

*Keywords: eye-movement desensitization and reprocessing, EMDR, test anxiety, college, students, TAI*

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## **Chapter I: Introduction**

### **The Impact of Eye Movement Desensitization and Reprocessing (EMDR) on Self-Reported Test Anxiety in College Students**

Attending college can be a stressful time for students. Students are challenged to manage academic pressure, social integration, financial responsibility, work, and identifying career prospects. As a result, many students experience the first onset of stress-related symptoms. Recent studies cited that 48.6% of college students with diagnosed mental health disorders suffer the onset of symptoms while in college. Further, 28% of students who are receiving psychological services on campus meet diagnostic criteria for a variety of psychiatric disorders such as depression and anxiety (American Psychological Association, 2013; Alschuler et al., 2009; Caruth, 2016; Eisenberg et al., 2016; Pedrelli et al., 2015).

Students who suffer from mental illness, who are first year or first generation, transfer students, or those who are poor academic performers (e.g., poor high school or cumulative GPA) are considered by institutions to be at-risk students. At-risk students are those most likely to drop-out or withdraw. Lockard et al., (2019) reported that up to 64% of students who withdraw from college do so as a consequence of mental health concerns. In fact, of first-time freshmen who enroll in a college or university, 40% will leave after their first semester with at least 20% of those classified as first-generation college students.

In response to the complex needs and high attrition rates of at-risk students, institutions began to allocate fiscal resources to departments and campus initiatives that assist students in being academically successful. One student service that appears to be effective in intervening with at-risk students is college counseling centers (CCCs) (Bishop, 2016; Caruth, 2016; Eisenberg et al., 2016). College counseling centers serve an essential role in the mission of

learning institutions and are an invaluable resource for the success of today's college students. Not only do they promote social integration and emotional health of students, but CCCs contribute to students' positive academic functioning by providing psychological support services (Backels et al., 2001; Bishop, 2016; Choi et al., 2010; Gerdes et al., 1994; Lee et al., 2009; Lockard et al., 2019; Schwitzer et al., 2018; Scofield et al., 2017). In support of this, data indicate that college counseling services impact students' academic performance (Lee et al., 2009; Schwitzer et al., 2018), mitigate (mental) performance impediments (Backels et al., 2001; Choi et al., 2010; Lockard et al., 2019) and assist in navigating adjustment difficulties (Bishop, 2016; Gerdes et al., 1994; Scofield et al., 2017).

### **Statement of the problem**

For college students, academic load, course difficulty, faculty expectations, exposure to new or different subject material and lack of internal coping mechanisms can support an atmosphere of stress and anxiety (Caruth, 2016; Culler & Holahan, 1980; Pedrelli et al., 2015). Connectedly, institutions have identified that the number of students with anxiety-related symptomology or disorders is growing ("American Psychological Association," 2013; Mistler et al., 2012). Twenty to twenty five percent of college students are estimated to be highly anxious, making anxiety the most prevalent mental health issue reported in the United States (US) ("American Psychological Association," 2013; Caruth, 2016; Huntley et al., 2019; Pedrelli et al., 2015).

In an effort to achieve academic success, students lacking a predisposition to anxious behavior may find themselves experiencing the first onset of anxiety-related symptoms without proper support. This is especially evident in the area of test-taking. Since the 1950s, scholars observed that anxiety during test-taking seemed to impact students' ability to be successful in



college courses and achieve desired outcomes such as graduating (Mandler and Sarason, 1952; 1953). Colloquially, this common experience has been termed “test anxiety.”

According to Huntley et al., (2019) test anxiety (TA) is a prevalent issue among college students that contributes to the number of reported anxiety-related concerns and can impact all aspects of the learning process (Enright et al., 2000). TA is defined as the phenomenological, affective, and behavioral responses that coexist with negative cognitive processing about the potential consequences of poor performance on examinations (Mandler & Sarason, 1952; 1953; O’ Donnell, 2017; Sarason, 1961; 1971; Sarason & Mandler, 1952; Sarason & Minard, 1962; Spielberger, 1980; Spielberger et al., 1983)

Further expanding the definition, there are two components of TA that adversely affect students’ functioning during testing situations. The first component, worry, is defined as negative expectation, self-deprecating cognitive concern (e.g., I will never pass, I am stupid, I might fail), and fear about one’s performance on tests. These cognitive processes have apparent consequences that interfere with effective cognitive functioning during test taking (Kaplan et al., 1979; Morris & Fulmer, 1976; Osterhouse, 1969; Richardson et al., 1977; Spielberger, 1972).

The second component of TA, emotionality, is operationalized as a reaction of emotional distress that invokes a state of physiological hyperarousal, or excessive autonomic arousal, that does not involve cognitive worry, and interferes with performance during test-taking (Morris & Fulmer, 1976; Osterhouse, 1969; Richardson et al., 1977; Spielberger, 1972). The resulting poor performance on tests can lead to failed courses, lower grade point averages (GPAs), higher drop-out rates, and the need for students to repeat years of study (Huntley et al, 2019; O’ Donnell, 2017).

Scholars recognized that if students' mental health issues were not identified, and adequate treatment provided, the continuous and adverse effects of experiences of TA may persist in this population long-term. However, early identification and efficacious mental health interventions by CCCs can ensure student success and create the opportunity for students to persist and, subsequently, graduate (Lockard et al., 2019; Pedrelli et al, 2015).

### **Significance of the study**

According to Huntley et al., (2019) the most well-established therapeutic interventions for TA have been found in behavioral approaches. The foci of behavioral approaches involve a) identifying negative automatic thoughts and potential cognitive distortions, b) the creation of rational or logical disputations, and c) a replacement of negative cognitive processes with adaptive ones (Corey, 2017; Huntley et al, 2019; Shapiro, 2018) While cognitive (CT) and cognitive behavioral therapy (CBT) have been supported as methods which effectively reduce the worry component of TA, these interventions fail to address the second component of TA, emotionality.

As differentiated from cognitive approaches, EMDR not only aims to reduce negative cognitive components of past experiences, but it also aims to systematically reduce physiological hyperarousal (Shapiro, 2018). Due the multimodal nature of the intervention, EMDR therapy can be effective and reduce costs while maintaining quality care as clients can experience improvements in relatively short time periods (Shapiro, 2018; Wilson et al., 2018). According to Shapiro (2018) the 8-phase EMDR protocol for current anxiety can be comprised of one 90-minute session, unless otherwise recommended by the EMDR-trained therapist.

If EMDR impacts the two components of TA, worry and emotionality, the intervention has the potential to establish itself as a holistic treatment approach for TA in the college student

population (Brady, 2018; Huntley et al, 2019; Gosselin & Matthews, 1995; Pedrelli et al, 2015). Holistic, time-sensitive interventions are important qualities to consider in the context of time-limited, academic success-oriented colleges and universities. EMDR is suitable for the brief nature of therapy in college counseling centers and may support high anxious and at-risk college students in being academically successful by impacting the worry and emotionality components of TA (Backels et al., 2001; Lockard et al., 2019).

As the need for mental health services in the college student population rises, so does the need for time sensitive interventions. Demonstrating a functional connection between EDMR and the components of TA will begin to establish literature for this time-sensitive, multimodal treatment.

### **Statement of Purpose**

EMDR is a structured comprehensive therapeutic procedure aimed at diminishing experienced, distressing emotions, related to past disturbing and traumatic events (Shapiro, 2018). EMDR simultaneously restructures negative cognitions, and aims to relieve accompanying emotional charged expressions (physiological hyperarousal) (Shapiro, 2018; Shapiro & Laliotis, 2011). Shapiro (2018) stated that studies have shown “rapid reduction of fear and symptomatology” in working with persons with phobias, panic disorder “and other anxiety disorders” (p. 11). Substantiated as an evidenced-based therapy for Post-Traumatic Stress Disorder (PTSD), EMDR may impact TA by targeting negative past, distressing experiences, connected by underlying negative cognitions about test taking (Korn & Leeds, 2002; Shapiro, 2018). However, there is limited evidence of EMDR’s impact on TA in the college-student population.

Another gap in the literature on EMDR is the lack of standardized procedures (Wilson et al., 2018). Using normative outcome measures such as the Test Anxiety Inventory (TAI) (Spielberger, 1980) and standardizing EMDR's procedures in accordance with Shapiro's (2018) scripted, 8-phase, current protocol for current anxiety may be the beginning of substantiating the intervention for TA and other anxiety-related disorders in the college student population. It is the purpose of this study to begin to fill these gaps in literature. The following research question will guide the study: What is the impact of Eye-Movement Desensitization and Reprocessing (EMDR) on college students' self-reported scores on the test anxiety inventory (TAI-T) and its subscales "worry" (TAI-W) and "emotionality" (TAI-E)?

### **Theoretical and conceptual framework**

This study will utilize the conceptual framework of the Adaptive Information Processing (AIP) model, developed by Francine Shapiro in 1987 (Shapiro, 2018). AIP asserts that information, gathered through experiences, are organized by emotional expression and neurobiological components (Shapiro, 2018). Shapiro (2018) speculates that past experiences, with associated cognitive content, are organized by emotional charge, and are linked to other, similar memory experiences. AIP assumes that neurological memory networks are only connected with other networks that have comparable affective valence (Shapiro & Lalotitis, 2011). Wherefore, AIP regards behavioral pathologies as having "derived from earlier life experiences" that continue throughout an individual's life (Shapiro, 2018, p. 15).

This model is useful in conceptualizing test anxiety as having derived from insufficiently processed information stored at the time of a past disturbing experience(s). Shapiro (2018) states, "The continued influence of...early experiences are due in large part to the present-day stimuli eliciting the negative affect and beliefs embodied in these memories" (p.16). Therefore, the

emotionality and worry incidents that occur when a student is exposed to testing situations are linked-to and derived-from non-assimilated memories of earlier disturbing experiences (Shapiro, 2018).

Not a novel theoretical framework from which to view TA, AIP's assertion that past, disturbing experiences contribute to students' present dysfunction, falls in-line with existing conceptual models of TA. Interference models of TA conceptualize the components of worry and emotionality as factors that disrupt memory recall of prior learning during the testing situation (Hembree, 1988; Mandler & Sarason, 1952; 1953; Morris & Liebert, 1970; Spielberger, 1980). AIP enhances the Interference Model's perspective by suggesting that worry and emotionality, which disrupt memory recall during test taking, are linked to past disturbing experiences and are a product of maladaptively stored neurobiological components.

### **Assumptions and Limitations**

The proposed study maintains several assumptions. A primary assumption of the study is its anchorage in the Adaptive Information Processing (AIP) model. According to Shapiro (2018), AIP attempts to provide a complex neurophysiological explanation of how past, disturbing experiences are stored in the brain and body. A critique since the development of AIP, the model does not use empirically validated terms to explain and describe psychological phenomena pertaining to information processing (Perkins & Rouanzoin, 2002).

For clarification, the Adaptive Information Processing (AIP) model maintains a principal belief that: recall, desensitization and reprocessing of traumatic memories depends on an underlying, emotionally charged experience, which occurred by an individual in the past, linked by an accompanying negative cognition in the present (Calcott & Berkman, 2014; Luber, 2015; Maxfield, 1999; Shapiro, 2018; Shapiro & Laliotis, 2011; Shapiro & Maxfield, 2002).

The electrical charge (i.e., affective valence) of the underlying negative cognition is stated to be linked to a specific bioelectric valence that is referred to by Shapiro (2018) as synaptic potential. This synaptic potential can have a high or low emotional expression which underlies maladaptive or adaptive behaviors in the present (Shapiro, 1996; 1999; 2018; Shapiro & Lalotis, 2011). Shapiro's (1999) use of terminology for improperly stored, past disturbing experiences are not precise terms used in the field of neurobiology (Dryfoos & Quinn, 2006; Engelhard et al., 2010; 2011; Lazarus, 1991). For this reason, some scholars and neurobiologists believe that the model's use of terms detracts from the clarity and applicability of the AIP model (Horowitz, 2011; Shapiro, 1996). In an article defending her theoretical assertions of AIP and in support of further inquiry, Shapiro (1996) stated that greater methodological rigor and higher clinical standards are needed to propagate the efficacy of EMDR. Maxfield (1999) agreed and stated, "...memory recall and its related physiological connections are currently unknown," wherefore the impact of EMDR on different syndromes and pathologies must be explored (p.25).

The second assumption of the proposed study is that EMDR can impact the two components of test anxiety. While literature suggests that the underlying characteristics of test anxiety (i.e., physiological hyperarousal and cognitive concern) can be decreased with EMDR, the intervention has not been empirically validated for use with TA. EMDR has only been substantiated as evidenced-based for use with post-traumatic stress disorder (PTSD), (Luber, 2015). The relationship between key characteristics of TA have not been causally related to the behavioral characteristics that EMDR provides restitution for.

Another limitation of the study is that, due to the complexity of the intervention, there are several exclusions to participation. One exclusion provides that potential participants that score

>30 on the Dissociative Experiences Scale (DES) (Bernstein, 1986) will not be eligible to participate in the study. Shapiro (2018) states that there is a high prevalence of undiagnosed dissociative disorders in clinical populations, such as at-risk students. According to Shapiro (2018), individuals with dissociative disorders are not good candidates for EMDR as the intervention relies on an individual's ability to communicate present distressing experiences and recall, with clarity, past disturbing memories. When an individual presents with dissociative symptoms and EMDR is used as an intervention, there can be a high cost to the client, therapist, and the therapeutic alliance in failing to consider the impact the disorder and treatment modality have on the client's psyche (Shapiro, 2018). Shapiro (2018) states, "If the index of suspicion for the presence of a dissociative disorder is low after screening, the therapist may proceed with the EMDR protocol, including predictive steps..." (p. 499). In an effort to compensate for this limitation of EMDR, this proposed study will screen participants using the Dissociative Experiences Scale (DES) (Bernstein, 1986), and will consider those with cumulative scores of <30 fit for participation in the study. Students who score  $\geq 30$  on the DES (Bernstein, 1986) will be excluded from participation for their psychological safety (Shapiro, 2018).

Further, the single case research design inherently limits the study. The study will be conducted at a small, rural, mid-western university in the United States and will include three student-participants. The small number of participants, sampled from the same location per the design of the study, will diminish the generalizability of the study's results. Additionally, social desirability is a possibility with survey measures (i.e., use of the Test Anxiety Inventory) (Spielberger, 1980).

Another notable limitation of this study is the vast amount of related literature. An exhaustive literature review beginning in 1950 to the present would include consumption of over

8,700 resources on EMDR and 120,301 resources on TA. As a result, the researcher chose to narrow the literature review on EMDR by single-case research design, and on TA by college student population. The literature review was then further narrowed to include only peer-reviewed scholarship with online availability.

### **Summary**

Anxiety is the most commonly reported mental health issue on college and university campuses in the US (American Psychological Association, 2013). The increasing severity of mental health issues in the college student population is a concern for success-oriented institutions as a large proportion of today's students fall into at-risk categories. Students are encumbered by the onset of stress-related symptoms that are marked by negative cognitions and emotional charged expressions (physiological hyperarousal). Not surprisingly there has been "an increase in demand for counseling and specialized services" on campuses nation-wide (Pedrelli et al, 2015, p. 2). In lieu of supporting students' academic success, institutions direly need to develop resources that provide access to time-sensitive, quality mental health services.

EMDR is a progressive and integrated therapeutic intervention. Validated through studies for use with individuals who experience post-traumatic stress, EMDR has gained interest for use with other mental health issues that are characterized by hyperarousal and cognitive worry. The proposed study aims to use EMDR as a holistic intervention for test anxiety with college students at a small, regional mid-western university. By following a strict procedural outline and straightforward analysis of visual data, an exploration of the impact of EMDR on TA can begin.

### **Definitions of Terms:**

For clarification, pertinent terms have been defined.

The following terms are:



*Adaptive Information Processing (AIP)*: an information processing model to explain the mechanisms of Eye-Movement Desensitization and Reprocessing (EDMR), that is based on observed treatment effects. This information processing model is used to understand and conceptualize fear-based psychopathology (Shapiro, 2018; Shapiro & Laliotis, 2011).

*Affect*: in AIP, affect is understood to stimulate cognitive content that has an equivalent “affective valence” (i.e., negative feelings result in negative thoughts). Memory networks, with their associated cognitive content, are neurobiologically organized by affect (Shapiro, 2018; Shapiro & Laliotis, 2011).

*Affective Valence*: the hypothesized “electrical charge,” experienced physiologically by a reactive person, expressed in affect (i.e., emotional disposition) (Shapiro, 2018). (Ex. strong affective valence is linked to the maladaptively stored memories which are expressed by heightened physiological states with accompanying reactive emotional responses) (Shapiro, 2018; Shapiro & Laliotis, 2011).

*Dissociation*: is a psychological defense-mechanism that allows a person to compartmentalize perceptions, memories and experiences, and to detach themselves from the full psychological impact. As traumatic experiences are recalled by an individual, dissociation may delay processing in a manner that impedes clinical treatment (Van IJzendoorn & Schuengel, 1996).

*Dissociative Experiences Scale (DES)*: a self-report measure, consisting of 28 items, that assess for the “percentage of time” that an individual experiences dissociative symptoms (Bernstein & Putnam, 1986; Van IJzendoorn & Schuengel, 1996).

*Dissociative Disorders*: a classification of a subgroup of mental disorders that are characterized by disruption(s) in typically integrated functions of the consciousness, memory, identity,

and perception of the environment (Van IJzendoorn & Schuengel, 1996; “Diagnostic and Statistical Manual...” 2013).

*Emotionality* – a reaction of emotional distress that invokes a state of physiological hyperarousal, or excessive autonomic arousal, that does not involve cognitive worry which interferes with performance during test-taking (Morris & Fulmer, 1976; Osterhouse, 1969; Richardson et al., 1977; Spielberger, 1972).

*Eye-Movement Desensitization and Reprocessing (EMDR)*: a complex multi-component process-model and set of principles, procedures and protocols that facilitate the accessing and processing of traumatic memories. This form of psychotherapy aims to diminish the intensity of perceptual, cognitive, emotional and physiological reactions to distressing memories. The components of EMDR include exposure, distraction, desensitization, cognitive restructuring, relaxation and self-efficacy elements (Shapiro, 2018).

*Information Processing System*: an inherent “information processing system” that is physiologically geared, neurobiologically balanced, to process information to a state of mental health within the (human) body, mind and emotions. Information received by the processing system is typically processed to an adaptive state, where neurobiological connections are made, emotional distress is relieved, and experiences are used constructively. Behavior follows an adaptive and functional pattern (Shapiro, 2018; Shapiro & Laliotis, 2011).

*Pathology*: affect or behavioral dysfunction that results when there is an unbalancing of the information processing system by trauma or stress; whereas the information acquired at the time of the traumatic event is not processed. Information is maintained neurologically

in a distressing, excitatory, state-specific form and remains in this disturbing state with its sensory content Shapiro & Laliotis, 2011; Shapiro, 2018).

*State-of-consciousness*: a proposed explanation of core characteristics of dissociative disorders such as amnesia and other neurological and behavioral disturbances that arise due to trauma events in an individual's life (Van IJzendoorn & Schuengel, 1996). Van IJzendoorn & Schuengel (1996) add that disruptions across an individual's state of consciousness impede their perception of the "integration of self," are said to occur because of induced physiologically induced trauma responses (p. 376).

*Test anxiety (TA)*: is characterized by physiological and behavioral responses that accompany concern about possible failure on tests (Huntley et al, 2019; Spielberger, 1980). Other possible and related characterizations of this condition are fear of failure, self-denigrating thoughts, intrusion of thoughts accompanied by physical manifestations of emotional distress (Mandler & Sarason, 1952; 1953; Morris & Liebert, 1970; Spielberger, 1980).

*Worry* – negative expectation, self-deprecating cognitive concern (e.g., "I will never pass" "I am stupid" "I might fail") and fear about one's performance on tests. These cognitive processes have apparent consequences that interfere with effective cognitive functioning during test taking (Kaplan et al., 1979; Morris & Fulmer, 1976; Osterhouse, 1969; Richardson et al., 1977; Spielberger, 1980).

## **Chapter II: Literature Review**

The literature review will provide an introduction to Eye-Movement Desensitization and Reprocessing (EMDR) and the Adaptive Information Processing (AIP) model. The therapeutic procedures of EMDR are outlined to provide insight for the reader into literature that have used single case research designs (SCRD) to explore the impact of EMDR on various pathologies. Special consideration is given to those studies that have explored EMDR's impact on test anxiety (TA) which is followed by a thorough review of TA research completed with the college student population. TA literature concludes with a brief mention of present work. Finally, closing thoughts are provided, as well as the research questions which will guide future work.

### **EMDR: Background, Theory and Procedure**

Empirically supported to treat traumatic memory-experiences, EMDR was developed by Francine Shapiro to treat the symptoms of anxiety (Shapiro, 2018). While taking a walk in 1987, Shapiro noticed that distressing thoughts, about past negative experiences, seemed to disappear when she rapidly shifted her eyes from side to side (Shapiro, 2018). In 1987, Shapiro conducted a case study and a controlled study, with a total sample of 22 individuals using the eye-movement technique. All the participants had various trauma experiences, and who, on average, had received 6 years of unsuccessful treatment (Shapiro, 2018). Shapiro's experiment showed a significant reduction in participants' subjective units of distress (SUDs) (Wolpe, 1990). For reference, a SUDs (Wolpe, 1990) score is a participant's self-report score of present, experienced distress on Likert scale, ranging from 0 = None to 10 = the worst possible. By 1989, Shapiro developed the procedural protocol used to treat participants from the case study and titled it "Eye Movement Desensitization" (EMD) (Shapiro, 2018).

As Shapiro (2018) continued to develop the procedure of her counseling intervention, EMD sparked controversy in scientific communities. Nonetheless, Shapiro (2018) continued to experiment with EMD during her stay as a Research Fellow at the Mental Health Institute in Palo Alto California (Engelhard et al., 2010; 2011; Shapiro, 1996). Since its development in 1987, EMD evolved to Eye-Movement Desensitization and Reprocessing (EMDR) and has become recognized as an evidenced-based treatment for trauma (Shapiro, 2018, p. 1). Shapiro (2018) stated that the treatment model of EMDR continues to support positive treatment outcomes in participants with a wide range of pathologies.

EMDR is an integrated, structured therapeutic procedure that adheres to the Adaptive Information Processing (AIP) model of psychotherapy (Shapiro, 2018). In EMDR, the therapist assists the individual in focusing on stored memories that are causing emotional and cognitive reactions in the present. The therapist identifies past experiences contributing to the present disturbance and identifies what is needed for future interactions with similar emotional and cognitive responses from the individual (Shapiro, 2012; 2018). Stated alternatively, EMDR is believed to facilitate the reprocessing of past memories via eye-movements, which restructure connected negative cognitions, and reduce or remove present emotional (i.e., physiological hyperarousal) responses to present stimuli (Shapiro, 2018; Shapiro & Laliotis, 2011).

### **Adaptive Information Processing (AIP) Model**

The components of EMDR are theoretically grounded in the Adaptive Information Processing (AIP) model (Shapiro, 2018). AIP asserts that information, gathered through experiences, are stored in the brain and organized by emotional charge and neurobiological components (e.g., cognitions) (Shapiro, 2018). Memory networks are organized by cognitive content and affective (emotional) expressions, which are linked to similar memory networks

(Maxfield, 1999; Shapiro, 2018). In this way, positive and negative experiences remain stored in the brain and body, with the original emotions, physical sensations, and beliefs - of moments in time - fundamentally unchanged (Shapiro, 2018; Shapiro & Lailotis, 2011).

According to the AIP model, negative, physiologically stored experiences are due to the brain's inability to process memories via its inherent information processing system (Shapiro et al., 2011). For clarification, Shapiro (2018) defines the information processing system as an inherent processing system that is physiologically geared, and neurobiologically balanced, to process information to a state of (mental) health within the (human) body, mind, and emotions (Shapiro, 2018). Information received by the processing system are typically processed to an adaptive state - where neurobiological connections are made, emotional distress is relieved, and experiences are used constructively (Shapiro, 2018). Observed behaviors, therefore, follow a similar pattern to experiences which have been stored in the brain (Shapiro, 2018; Shapiro & Lailotis, 2011). However, when negative incidents occur, the information processing system is unable to process the experience and an individual is subject to the accompanying emotional distress and negative self-beliefs that are similar, or related to other memories (Shapiro, 2018). From an AIP perspective, the presence of test anxious symptoms suggests that an individual has been exposed to negative situations resulting in insufficiently processed information. The insufficiently processed information from an earlier experience is exhibited in the present as worry and emotionality in response to test taking. (Shapiro, 2018).

## **Procedure**

EMDR is a complex multi-component process-model and set of principles, procedures and protocols that facilitate the accessing and processing of distressing memories. Undergirded by the AIP model, EMDR aims to diminish the intensity of perceptual, cognitive, emotional, and

physiological reactions to distressing memories, experienced in the present (Engelhard et al., 2011; Shapiro, 2018). The components of EMDR include exposure, distraction, desensitization, cognitive restructuring, relaxation, and self-efficacy elements (Shapiro, 2018). Wherefore, the 8-phases of the processing phase include: (1) history taking, (2) preparation, (3) baseline assessment, (4) eye movement desensitization, (5) installation, (6) body scan, (7) closure and (8) reevaluation (Shapiro, 2018). The Phase treatment protocol is described below.

### ***History Taking***

In the first phase of treatment, clinician and client will discuss previously experienced incidents, which can include any experience that the client reports as impactful. The clinician and client will appear to be engaging in a form of talk-therapy as they discuss a history of experiences related to the recent self-report of experienced distress. The clinician and client will develop an outline of the past, associated experiences that arise through discussion. Association will be determined by the client's recollection and subsequent identification of emotive expressions and parts of their body that elicit a physiological response, tension, or tightness, when memories are cognitively "held-in-mind" (Shapiro, 2018) This will naturally lead into the next step of preparation for baseline and reprocessing.

### ***Preparation***

Shapiro (2018) outlines the second phase of treatment – preparation - to include discussion of the recent experience of distress and hyperarousal. The client will choose, either the first or worst experience, as they re-experience it, now, in the present. Then, the client will choose a negative cognition that appears to express the dysfunctional self-belief that they "notice" in recalling the past distressing experience. Along with the historical outline of

experiences, Shapiro (2018) states, “The clinician then determines the specific targets (memories) that need to be addressed” (p. 66) for reprocessing.

### ***Baseline assessment***

Next, the participant will recall the affect, body sensations and negative cognitions that are related to the target experience and asked to rate their present experienced distress on the subjective units of distress (SUDs) scale (Wolpe, 1990). Clients will then choose a positive cognition – typically one that combats or counteracts their experienced negative cognition – and rate its believability on the Validity of Cognition (VoC) scale (Gosselin & Matthews, 1995; Shapiro, 2018).

### ***Eye-movement desensitization***

The third phase of the procedure is typically where the majority of therapeutic time is spent. In the desensitization phase, the client will hold -in- mind the image of the first or worst distressing experience, the negative cognition, body sensations and affect while simultaneously moving their eyes back and forth following the therapist’s fingers (Shapiro, 2018). This phase will focus on the client’s negative affect; the target of the desensitization being the present associations, as reflected in the SUDs (Shapiro, 2018, Wolpe, 1990). The clinician will complete approximately 20-60 traverses of back-and-forth eye movements, which will last about 30 seconds each. Following each set, the clinician will ask the participant “what” (i.e., memory, affect, cognition, etc.) emerged during the eye movements, or if (only) previously reported information is experienced. If (only) previously experienced material emerges more than once, the clinician will return to take inventory of SUDs (Shapiro, 2018; Wolpe, 1990). During the desensitization phase the therapist will repeat the sets of bilateral stimulation (eye movements),



until the client's reported SUD reaches 0 or 1, or is "ecologically appropriate" (Shapiro, 2018, p. 68).

### ***Installation***

The focus of this phase is on accentuating and strengthening a participant's choice positive cognition; in lieu of the negative cognition identified in the preparation and baseline phases. The client will be asked to hold "the most appropriate" positive cognition in mind, along with the target experience. Then, the therapist will begin bi-lateral eye movements, checking on the VoC scale periodically, until the participant reports a VoC of 7 (Shapiro, 2018).

### ***Body scan***

This step of the procedure is meant as a "quality control" phase whereas the clinician will check the client's reduction of hyperarousal by asking them to mindfully scan their body. Mindful scanning occurs by the client closing their eyes and noticing if there is any tension or tightness in the body; if so, sets of bilateral eye movements will be completed in order to eliminate these (Shapiro & Maxfield, 2002). The body scan can be repeated as many times as is necessary until the client reports no experiences of tension/tightness (Shapiro, 2018).

### ***Closure***

In this final phase, the client will prepare to leave the session. During closure, the clinician will debrief the client by offering resources for continued therapeutic participation, emergency response needs, and general coping mechanisms. The clinician will remind the participant that there is a possibility that disturbing thoughts, emotions, body sensations and images may reemerge following the completed reprocessing (Shapiro, 2018). If the participant experiences any reemerging of past-events and is not an imminent harm to themselves or others, they will be instructed to externalize (i.e., create psychological distance) their experience via

writing it down on a log or journal (Shapiro, 2018). Lastly, the client will be debriefed pertaining to EMDR procedures, protocols, functions and related material which may assist them in appropriately returning to homeostasis during their time away from sessions.

### ***Reevaluation***

The final stage of the standard protocol is generally implemented at the beginning of subsequent reprocessing sessions. Reevaluation is a time when the participant and therapist consider memories which surfaced during the reprocessing or body scan phase and were not fully reprocessed due to session time constraints (Shapiro, 2018).

### **EMDR in the Literature**

EMDR has been established as an evidence-based mode of psychotherapy for PTSD (Shapiro, 2018; Shapiro et al., 2011), It has also been well explored in experimental literature for a wide range of clinical issues, with a wide range of methodological approaches (Johnson, 1996; Shapiro, 2018). Experimental studies have explored the effects of EMDR with depression (Gauhar et al., 2016; Wood et al., 2018), Complex-PTSD (Rowe, 2019), chronic pain (Von Baeyer, 2020), mood disorders (Shapiro, 2018), domestic violence (Vuong, 2018), obsessive-compulsive disorder (Nazari et a., 2011), phobias (Doering et al., 2013) and other anxiety related disorders (Shapiro, 2018).

The most recent review of EMDR literature, narrowed by experimental design, mental health problems and randomized control trials, were completed by Maxfield, (1999), Cuijpers et al., (2020) and Valinete-Gomez et al., (2017). Ergo, to avoid redundancy, this review will focus on peer-reviewed: (a) experimental works on EMDR published since 1999, with a SCRDR focus; (b) an exhaustive review of works utilizing EMDR as an intervention for TA; and (c) and a review of pertinent TA theory and research from the 1950s to present day.

## **EMDR and Single-Case Designs**

In 2002, De Jongh et al., completed a study that is often cited in EMDR literature (Shapiro, 2018) for successful demonstration of the existence of a functional relation between intervention and the symptoms of phobia. Following a multiple-baseline, across participants design, De Jongh et al., (2002) reported that of 3 of 4 participants displayed a reduction in SUDs (Wolpe, 1990) ratings and in the believability of negative, recurring cognitions related to dental treatment. De Jongh et al., (2002) states, “At six weeks follow-up, the treatment gains were maintained. In addition, the behavior tests demonstrated considerable progress. After treatment, none of the four patients fulfilled the diagnostic criteria of dental phobia...” (p. 1499).

There are many methodological strengths of De Jongh et al.’s, (2002) study, including the provisions for maturation, instrumentation, stability, attrition bias and inconsistent effects. However, while the participants were debriefed about the methodology’s lengthy baseline phases (1-year prior to the intervention) to control for attrition bias, the possibility of the Hawthorne Effect having contributed to the results cannot be understated.

Grey (2011) piloted a multiple baseline, single case (n=1) design to consider the impact of “concentrated” EMDR administration on comorbid major depressive disorder (MDD), severe without psychotic features and panic disorder with agoraphobia. Grey (2011) outlined that the study would adhere to a strict EMDR protocol as recommended by Shapiro (2018), but that the intervention phase would “concentrate” sessions of EMDR to thrice weekly. The purpose of piloting concentrated EMDR session protocol, according to Grey (2011), was to explore a treatment schedule for EMDR that is comparable to those of Cognitive Behavioral Therapy (CBT) and exposure therapy.

Methodologically speaking, Grey (2011) published a well-designed, single case study (Ledford et al., 2018; Ray 2015). Controlling for most threats to internal validity, Grey (2011) conducted a diagnostic assessment to ensure conditions were met before implementation began. Notably, three assessments were taken at baseline, one in mid-treatment, one at post-treatment and two at a 1- and 3-month follow-up. Grey (2011) utilized the Beck Depression Inventory-II (BDI-II) (Beck, et al., 1996) and the Beck Anxiety Inventory (BAI) (Beck et al., 1988), two empirically valid and reliable measures, as the primary instruments. Grey (2011) supplemented these measures with the VoC (Gosselin & Matthews, 1995)) and SUD (Wolpe, 1990) scales and implemented a phase protocol that provided for seven assessments to be collected. Additionally, Grey (2011) supplemented measurement instruments with a qualitative assessment of the participant's function and status "conducted at all assessment points" (p. 17).

The resulting consequence of Grey's (2011) application of 12 EMDR reprocessing sessions within the time span of 1-month are encouraging. Not only did the participant's scores on the BAI and BDI-II decrease – indicating mild anxiety and minimal depression, but the participant reported changes in her functioning. Grey (2011) states, "...the participant reported marked improvements in her functioning. She returned to work and did not require any accommodation to her schedule or job duties. She noted that her energy level had increased, with a corresponding improvement in work performance" (p. 20).

Doering et al., (2013) reportedly included 31- participants, who met criteria (DSM-IV-TR) for dental phobia, in a multiple-baseline, across participants and behaviors design. All 31- participants received the EMDR standard protocol for phobia, as outlined by Shapiro (2018) as the intervention. The goal of combination designs is to assess a treatment modality for its ability

to impact and improve participants' symptomatology and improve desired behavioral actions (Ledford et al., 2018).

In the results section of the study, Doering et al., (2013) note a high attrition rate among participants in that only six participants completed the scheduled phase protocol, with the final follow-up at 12-months post-intervention. However, Doering et al., (2013) state that EMDR was associated with a significant reduction of dental anxiety and avoidance behavior in all 31-participants, as well as in the symptoms of PTSD.

Doering et al., (2013) demonstrated commitment to internal validity by: executing randomization of participant waitlist control and stability tiers, using supplemental assessments to support their primary instrument Dental Anxiety (DAS) and Fear Scales (DFS), the use of an interobserver, and adhering to a strict intervention protocol (Ledford et al., 2018; Ray, 2015). While the extents that Doering et al., (2013) took to ensure that internal validity was maintained, demonstrating experimental control beyond behavioral covariation in participants (n=6) was a challenge not met by this study (Ledford et al, 2018). Another limitation of the study's design was the potential for the Hawthorne Effect to have occurred in participants who were waitlisted. Doering et al., (2013) states, "all patients knew in advance that they would receive EMDR, either immediately or after a 4-wk waiting period, placebo effects depending on positive anticipation might have occurred..." (p. 592).

Proudlock (2015) published a study on EMDR, with a participant (n=1) who had been experiencing medically unexplained symptoms (MUS) of chronic pain in his abdomen. While Proudlock (2015) states that the study represents a single case design. The study does not, however, meet any standard of best practice as outlined by Ray (2015) and Ledford et al., (2018).

To explicate, a phase protocol was not implemented, no data were collected, or primary measures used - apart from the VoC (Shapiro, 1993) and SUDs (Wolpe, 1990) scales – which are, operationally speaking, standard and required EMDR procedure (Shapiro, 2018). Moreover, Proudlock (2015) administered multiple therapeutic interventions such as EMDR, Solution-Focused Therapy (SFT), and Cognitive Behavioral Therapy (CBT). The administration of even one additional modality causes entanglement effects to occur, especially when a previously applied intervention cannot be reversed (Ray, 2015). Ray (2015) states that administering multiple treatments, especially those that cannot be unlearned by the participant, represents an *inappropriate* SCR design [emphasis added]. The use of EMDR, SFT and CBT qualifies as multi-treatment interference, or alternatively, carryover effect. Carryover effect occurs when one intervention is applied during the first phase of treatment, and then another intervention is applied at a subsequent treatment (e.g., A-B-A-C). Whereas the impact of the second intervention lacks experimental control, as change in the participant cannot be attributed to either the first or second treatment (Ledford et al., 2018; Ray, 2015). Although Proudlock (2015) states that EMDR was effective in this SCD, for a participant (n=1) in reducing MUS, clear and unaccounted for methodological flaws challenge that assertion.

Mevisen et al., (2017) used a multiple baseline across participants design to explore EMDR for PTSD in (n=1) child and adolescent (n=1) with borderline personality disorder. Interestingly, Mevisen et al., (2017) noted that both participants (n=2) met criteria for PTSD with the Adapted ADIC-C PTSD Section, and both participants had been diagnosed with mild intellectual disabilities. Mevisen et al., (2017) indicated that the intervention of the EMDR was modified to participants' "mental age by following the Dutch standard EMDR protocol for

children and adolescents without intellectual disability (de Roos et al., 2008) with no more than a single minor adaptation (i.e., omitting the VoC in William's treatment)" (p. 40).

Following a non-concurrent, multiple baseline across participants design, with conditions being measured by the Adapted ADIC-C PTSD Section, Mevissen et al., (2017) reported that neither participant met criteria for PTSD, post-intervention, a result which was maintained at a 6-week follow-up. Major limitations in the study completed by Mevissen et al., (2017) are the sample size ( $n = 2$ ) and in-session modifications to the EMDR treatment protocol. Appropriately, although minimally indicated, Mevissen et al. (2017) states, "Another limitation is the lack of measurements concerning the treatment fidelity of EMDR therapy" (p.40). According to Shapiro (2018) one of the major flaws of experimental EMDR research, are those studies that do not strictly adhere to the outlined therapeutic protocols and researchers who improvise in-session during reprocessing.

Other methodological concerns in Mevissen et al.'s (2017) study include: the number ( $n=2$ ) and diversity of participants' (i.e., age, diagnoses, etc.), the reported results of the study, as well as the post-intervention assessment, which was taken six weeks post-treatment (Mevissen et al., 2017). Wherefore, criteria of strong, internal validity of SCRDs include (a) choosing either 1, or 3 participants for the internal validity of observational or demonstrable results, (b) identifying functionally independent and similar behaviors and participants and (c) reporting effective or ineffective results when a functional relation has not been established (Ledford et al., 2017; Ray, 2015),

Wood et al (2018) completed a time-series, repeated measures design that considered the feasibility of using EMDR for eight participants with clinically significant symptoms of the DSM-IV ("Diagnostic and statistical manual..." 1994) criteria for Major Depressive Disorder

(MDD). Of the eight participants, seven displayed clinically significant and statistically reliable improvement on the Hamilton Rating scale for Depression (Hamilton, 1960). Daily mood ratings, PH-Q9 scores (Kroenke et al., 2002), and a revised version of the Impact of Event Scale (Creamer et al., 2003) inventory were used to supplement the primary instrument, however some of the measures were stated to be highly variable both during baseline and intervention assessments. Wood et al., (2018) indicated that the participants in the study completed an average of 17.6 sessions of EMDR and preferred tapping to bi-lateral stimulation. Interestingly Wood et al., (2018) stated that results support EMDR as a feasible treatment for recurrent and/or long-term depression, and they recommended efficacy research to begin.

A major methodological flaw of the study was, rather than being randomized, Wood et al., (2018) used a predictive baseline which was determined by how quickly a therapist became available. Wherefore, the SCD cannot be wholly classified as an experimental design (Ledford et al., 2018; Wood et al., 2018). While Wood et al., (2018) noted the predictive baseline as a major limitation of the study, the decision was considered “clinically more appropriate” (p. 74).

Falls et al., (2018) four competitive golfers’ who reported to be experiencing “troubling prospective imagery related to their golf” participated in a single-subject, multiple-baseline, across participants design (p.173). The Competitive State Anxiety Inventory- 2R (Cox et al., 2003) was used to measure participants’ perception of physiological, affective and negative cognitive responses of anxiety, related to their expectations of success on self-evaluation (Falls et al., 2018).

A well-designed SCRCD according to best practices outlined by Ray (2015), Falls et al., (2018) utilized supplemental measures of the Beck Depression Inventory (Beck et al., 1996) and the Impact of Future Events (Cox et al., 2003) scale to provide insight and context to their



primary instrument (Ray, 2015); a range of between 9-32 (Ledford et al, 2018; Ray, 2015) days from baseline to stabilization and administration of 3 EMDR sessions; and follow-up assessment lasting between 18-55 days. Additionally, Falls et al., (2018) did not alter the EMDR protocol beyond recommendations of Shapiro (2018), and maintained a strong internal validity using continuous measurement, concurrently measured data, functionally independent and functionally similar participants and demonstrated experimental control by maintaining at least 3- participants (Ledford et al., 2018). Wherefore, Falls et al., (2018) state, “Following EMDR, scores across baseline and follow-up phases indicated that all participants experienced a reduction in the impact of prospective imagery...” (p. 175-176).

Nicosia et al., (2019) performed a multiple baseline (MB), single case design that explored an emotion-focused (EFT) modified EMDR intervention, on (n=1) participant. The participant was stated to have been experiencing PTSD symptoms, following the precipitating event of the World Trade Center tragedy of 2011. The phase protocol used two validated measures to assess the symptomatology over time, namely the Traumatic Symptom Inventory (TSI) (Briere, 1995) and the Personality Assessment Inventory (PAI) (Moey, 1991). Nicosia et al., (2019) indicated that eight baseline measurements were taken before introduction of the intervention, which meets recommended phase protocol standards for establishing pattern of behavior and stability of symptomatology (Ledford et al., 2018; Ray, 2015). Nicosia et al., (2019) reported that after a single session of the modified EMDR protocol, the participants’ scores on the two scales normalized.

However, the methodological flaw in this case is the threat to interval validity caused by multi treatment interference (Ledford et al., 2018). While it is not explicitly stated, the study appears to be a multiple baseline (MD) design of withdrawal/reversal. Nicosia et al. (2019) states

that the participant received EFT for the first seven sessions of the initial intervention phase, symptom assessment occurred throughout the phase, and then, received a singular session of EMDR, wherefore indicating a withdrawal/reversal design. Withdrawal/reversal designs are problematic in single case research, as the effect of the first intervention cannot be discerned from the effect of the second; this phenomena in methodological flaw is called carryover effect (Ray, 2015). Ray (2015) states, “A-B-A-B designs are considered inappropriate for interventions that promote learning or experiences that cannot be reversed” (p. 396).

### **EMDR and Test Anxiety**

Twenty years after the introduction of EMDR, it seemed clear to De et al., (2002) that EMDR had not been supported as an efficacious treatment for any specific phobia or anxiety disorder, except for PTSD. Preliminary use of EMDR for anxiety-related disorders had only included agoraphobia and arachnophobia (Shapiro, 2018). During this time, however, EMDR was stated to be less effective than exposure treatments, but more effective than no treatment (Luber, 2015) As such, Luber (2015) indicated that the underdeveloped empirical support for EMDR with anxiety -related disorders should be remedied.

According to Cuijpers et al., (2020) EMDR was supported as an efficacious treatment for TA. However, being that only four studies qualified for methodological review, Cuijpers et al., (2020) stated, “hardly any of the studies has low risk of bias, indicating the considerable uncertainty of these findings” (p. 175).

To exhaust literature on EMDR and TA, a systematic literature search was performed. Notably, Cuijpers et al., (2020) was correct in that the number of available sources is small. Two peer-reviewed articles (Enright et al., 2000; Stevens et al., 1999) and three dissertations (Hampel, 1997; Hernandez, 2015; Maxfield, 1999), were discovered electronically. Two dissertations were

unavailable and only the two peer-reviewed articles met inclusion criteria for this portion of the literature review. As such, Stevens et al., (1999) and Enright et al., (2000) are summarized below.

Stevens et al., (1999) ventured to study EMDR in the college student population using between subjects, factorial design. Namely, a 3 x 2 (Treatment x Testing) repeated- measures MANCOVA was employed to compare pre/posttest on the subjective units of distress (SUDs) (Wolpe, 1990) scale and on Test Anxiety Inventory (TAI) scores (Spielberger, 1980). Levels of independent variables (IV) included EMDR, Rational Emotive Therapy (RET) and information only. Of 350 undergraduate students who contacted the researcher for the study, 61- were identified as test-anxious according to the Debilitating Anxiety subscale of the Achievement Anxiety Test (DA-AAT) (Alpert et al., 1960) and randomly assigned to a treatment group. Only 28 of the 61 subjects completed the follow-up assessment of the TAI (Spielberger, 1980) but “Due to a misunderstanding, therapists neglected to administer the SUDs; hence, distress ratings at follow-up were not available for analysis” (p. 292).

Following analysis, Stevens et al., (1999) reported findings that encouraged use of RET over EMDR and information only for students who are test anxious. While EMDR seemed to lower participants’ subjective evaluation of anxiety symptomology, beyond those reported in the RET or information only groups, “RET lowered combined TAI scores more than EMDR and information only” (p. 293).

The results of Steven et al.’s (1999) study are restrained by multiple methodological errors. For example, Stevens et al., (1999) instituted more than a few assessments, including several self-developed, seemingly qualitative surveys, to “assess variables that could moderate the outcomes of treatment” (p. 289).

The primary measure used was the DA-AAT (Alpert et al., 1960), whereas other assessments listed included: self-developed background questionnaire (included items on a 7-point Likert scale related to age, SES, race, gender, perceived test preparedness, perceived impact of anxiety on grades, and the expectation that participation might impact TA, etc.); the Social Desirability Scale (SDS) (Crowne et al., 1960) that measures one's need to respond in culturally favorable ways; the Study Skills Questionnaire (SSQUES) (McCombs et al., (1980) to identify deficits in test preparedness; Betts Questionnaire Upon Mental Imagery (QMI)- short form (Sheehan, 1967) was chosen to measure vividness of imagery to act as a moderator of the visualization that occur for participants in standard EMDR protocol; Test Anxiety Inventory (TAI) (Spielberger, 1980); and a self-developed Post-Experimental Questionnaire, "...to assess extraneous variables," such as perceptions of the credibility of the therapist administering intervention and the helpfulness of the applied treatment (Stevens et al., 1999, p. 290). While the aim of Stevens et al., (1999) may have been to increase the reliability of the study's findings (Barnes et al., 2002), the numerous instruments employed seemed to distract from the fact that the only conclusive results occurred from use of the TAI (Spielberger, 1980).

A questionable choice by Stevens et al., (1999) was that both EMDR and RET standard protocols were abbreviated by the researchers, and implemented by therapists in one, 20-minute session as requested [emphasis added]. For explication, in the case of the standard, 8-phase protocol for EMDR, Stevens et al., (1999) reportedly used 3-phases; namely, phase 2: assessment, phase 3: desensitization and phase 4: installation. Stevens et al., (1999) reported that "blind" therapists were recruited from a local social-service agency, to administer EMDR and RET. Stevens et al., (1999) states that all therapists were licensed and "had practiced professionally for several years," the EMDR therapists had completed Level II training (i.e., had

completed supervised experience hours to practice EMDR independently), whereas those trained in RET had “received graduate and/or continuing education” (p. 291).

While not explicated, many of the threats to internal and external validity were mentioned in the discussion and conclusion sections of this study. The threats to internal/external validity in Stevens et al.’s (1999) study include: a high mortality rate (“slightly over 52% for RET), resentful demoralization due to abbreviated, non-standardized therapeutic protocols for the EMDR/RET participant groups, compensatory rivalry from the participants who received information only as compared to an intervention, unreliable and unvalidated self-measures, and inaccurate inferences from the derived data (Creswell et al., 2018).

Enright et al., (2000) completed an experimental pre/post-test treatment control, group design that used a repeated measures, analysis of variance (ANVOA) to explore between groups comparisons. Being that Enright et al., (2000) was measuring the effect of EMDR on 35 college students, from two different universities, the primary measure employed was the TAI (Spielberger, 1980).

Of the 30 participants that were retained, 18 comprised the treatment group and 17 comprised the delayed treatment group. Of those, 5- participants withdraw at post-testing, 2 participants from the treatment group and 3 from the delayed treatment group (Enright et al., 2000). Enright et al., (2000) maintained EMDR standard protocol, accounting for two, 1-hour sessions of intervention. Post-test measures were taken, both at the conclusion of the second EMDR treatment, and approximately at 1-month for the follow-up.

The findings of the study by Enright et al., (2000) were reported that while both groups scored equivalently at pretest, the treatment was the only significant on the TAI-T (Spielberger, 1980) mean scores at post testing, with no significant difference being found between posttest

and delayed test means on the TAI-T (Spielberger, 1980). Similar to results on the TAI-T (Spielberger, 1980), scores on the TAI-E (Spielberger, 1980) and TAI-W (Spielberger, 1980) showed a significant difference between pre-post scores for the treatment group. The same could not said for the delayed treatment group whereas scores on both subscales did not reach significance (Enright et al., 2000).

There are many strengths to Enright et al.'s (2000) study, and it should be noted that the study's design controlled for a various number of threats to internal validity. Namely, Enright et al., (2000) made provisions to maintain experimental control by: the random assignment of participants to groups, the large sample size, the delayed participant group receiving treatment, and the valid/reliable instrument in the TAI (Spielberger, 1980). While Enright et al., (2000) made provisions for most threats to internal validity, it is possible that the large sample size afforded opportunity for the participants to experience history and maturation (Creswell et al., 2018); especially given that participants who were waitlisted had to (minimally) wait until their predecessor had received two sessions of EMDR.

As was similar to the SCRD published on EMDR, the collective findings of Stevens et al., (1999) and Enright et al., (2000) are sporadic. From clear methodological flaws and improvised measurements (Stevens et al., 1999) to well-designed, uncomplicated standard procedures (Enright et al., 2000), the efficacy of EMDR for TA is far from being determined.

### **Test Anxiety: Theory and Research**

The following review of literature began as an exhaustive search using the University of Arkansas' online library database, provided via OneSearch. OneSearch provides access to records from different publishers and sources including but not limited to PsychINFO, MEDLINE and ERIC. The body of study on TA is expansive, to provide all pertinent scholarly

work on TA and in a time efficient manner, TA literature has been narrowed by date (beginning in 1950), topic, college student population and those resources that are peer-reviewed articles and available online.

The 1950s and 60s were categorized by explorative research into TA. Inquiries investigated the impact of anxiety during test-taking on student grades and grade point averages (GPAs). At this time, anxiety during test-taking was a phenomena, later to be coined test anxiety (TA) (Morris & Liebert, 1970), whose characteristics fluctuated with each scholar's conjecture about student personality traits, motivation, study skills, and intellectual achievement (Carlson & Ryan, 1969; Harmatz, 1968; Marso, 1969; Sarason, 1959; 1961; Stallings et al., 1969; Sutter & Reid, 1969).

Meanwhile, scholars developed several instruments to measure TA even though there wasn't consensus amongst researchers on the definitive characteristics or occurrence of the phenomenon. Throughout the 1960s alone, findings produced seven TA instruments normed on the college student population (Alpert & Haber, 1960; Carrier & Jewel, 1966; Osterhouse, 1969; Sarason & Mandler, 1952; Sarason & Ganzer, 1962; Sarason et al., 1968; Spielberger, 1960).

During the late 1960s and 1970s, TA research took yet another misguided step as scholars used experimental designs to explore differences between group means assigned by intervention on one or more TA measures (Ganzer, 1968; Guidry & Randolph, 1974; Johnson & Sechrest, 1968; McMahon, 1973; Munz & Smouse, 1968; Osterhouse, 1972; Raynor, 1970; Walsh et al., 1968; Weiner & Potpan, 1970).

The misguided nature of scholarly work continued in the 1970s and early 1980s as no singular operationalized definition of TA existed. During this time, scholars were explaining the impact of multiple independent variables on the dependent measures of TA, while also

attempting to use the findings to explain the phenomenon (Culler & Holahan, 1980; Deffenbacher et al., 1980; Rounds & Hendel, 1980; Thompson & Griebstein, 1980). Still, by the late 1970's and 1980's, little conclusive research was done to substantiate either a clearly defined construct of TA or an understanding of its occurrence or components.

Hembree (1988) authored a landmark study in TA research with the completion of a meta-analysis that included 562 studies. The pivotal findings of Hembree (1988) included support for an Interference Model of TA which supported emotionality (i.e., physiological hyperarousal) and worry (i.e., cognitive disruption to the task of test taking) as components of the phenomenon. Still, by 1990, Zeidner cited blatant dissonance amongst scholars about the construct.

Through the late 1980s and early 1990s, TA was being used to describe anxiety experienced both within and about the process of testing, as well as an explanation of an individual's subjective experience and subsequent testing outcomes (Green, 1990; Hembree, 1988; Smith et al., 1990; Zeidner, 1990) Additionally, some scholars were busy delineating the extent to which worry, and emotionality impacted student outcomes in specific courses (Green, 1990). Zeidner (1990) found that the worry component of TA was more closely related to academic performance than emotionality and the turn of the decade caused TA research to vacillate once again.

TA explorations in the 1990s were driven toward cognitive-attentional models and information-processing deficits (Zeidner, 1990). Deficit models of TA became another major contributor to the overall body of work on TA as they juxtaposed the Interference models of the 1980s (Hembree, 1988).



The most notable present work on TA includes a meta-analysis completed by Huntley et al., in 2019. Citing obvious methodological errors in the two pre-existing meta-analyses (Ergene, 2003; Hambree, 1988), Huntley et al., (2019) compiled four randomized controlled trials (n = 2,209) examining the efficacy of interventions for test anxious college students. While results of Huntley et al's, (2019) study supported cognitive behavioral approaches in reducing TA and improving academic performance, Huntley et al., (2019) advised to moderate any confidence in the results as previous methodological inquiry into TA was confounded by poor designs.

The following literature review aims to explicate TA literature by decade, from the 1950s to the present day. Notable themes and summative information are provided at the close of each decade review. Based on the provided literature and at conclusion, the Interference Model of TA is addressed as it, along with the AIP model of EMDR, guides the methodology of the present study.

### **Formative Theory and Research: 1950s and 1960s**

The most notable explorations into TA began in the 1950s and 1960s. During this time, most studies explored the relationships between students' anxiety about classroom performance, intellect and testing outcomes (Calvin et al., 1957; Daniels et al., 1978; Grace, 1957; Mandler & Sarason, 1952; 1953; Sarason, 1959; Sarason, 1960; Sinick, 1956). While some scholars were concerned with anxiety about classroom performance as a distinct experience during test-taking, many others considered it a general anxiety condition, more closely related to physiological performance anxiety (Calvin et al., 1957; Daniels et al., 1978; Grace 1957; Sinick, 1956).

An impetus of TA research, Mandler and Sarason's (1952; 1953) scholarship is often cited the foundational body of literature on TA. Mandler & Sarason (1953) considered that anxiety about classroom performance was a distinct experience that occurred during the process

of testing. Students' testing outcomes suggested that there was a subjective component to the experience of test-taking that hindered a positive outcome and was not related to test preparedness or learning ability (Mandler and Sarason, 1953; Sarason, 1960).

Mandler and Sarason (1953) modeled their inquiry of TA to examine participants' past experiences and subjective beliefs of failure on performance outcomes. Mandler & Sarason (1953) conceptualized that tests could be classified as a "psychological stress situation" (p. 336). Utilizing an experimental between groups, factorial design, 322 college students were screened by The Anxiety Questionnaire (Sarason & Mandler, 1952). Seventy two participants were included in the study and were apportioned to either a low or high TA group.

In the findings, Mandler and Sarason (1953) state that prior experience (i.e., exposure) of sample-tests significantly reduced both groups' variability and even improved testing scores of participants in the high TA group. Whereas subjective experience of failure was correlated with "significantly poorer performance in high-anxiety subjects, unless it is counteracted by a specific success report" (p. 340). Mandler and Sarason (1953) stated that subjective experiences of failure appeared to stem from participants' self-assumed estimates of performance. Consequently, low-anxiety participants reported high self-estimations of their performance, as compared to the high anxiety group. Mandler and Sarason (1953) recommendation for future inquiry included the exploration of subjective experiences of failure, its contribution to TA, and the impact on academic performance.

Grace (1957) explored 267 college student's personality factors with the MMPI (Hathaway & M'Kinley, 1940). Grace (1957) aimed to gain insight into whether independent-responsible students were less anxious than dependent- irresponsible students during test-taking and whether these factors could predict matriculation. In the findings, Grace (1957) stated that

independent-responsible students were less anxious than dependent-irresponsible students. Additionally, independent-responsible, female students were significantly less anxious than all groups. Similar to other scholarly work of the time, Grace (1957) didn't recognize anxiety during test-taking as a primary contributing factor to student testing outcomes. However, by completion of the study, Grace (1957) noted that high manifest anxiety did appear to impact "a whole range of behaviors" in students (p. 39).

Primarily concerned with the inquiry into whether anxiety during testing situations could be differentiated from general anxiety, Sarason (1959) hypothesized that TA measures would only correlate with general anxiety to a moderate extent. Using an adapted version of The Anxiety Questionnaire (Sarason & Mandler, 1952), a True/False TA scale (Sarason & Mandler, 1952) and Edwards' 29-item Social Desirability scale (Edwards, 1957), Sarason (1959) found that TA was negatively correlated with intelligence outcomes for both males and females in sample of 309 college students. However, Sarason (1959) found that there was a small correlation between TA and general anxiety which influenced their recommendations for future scholarship to include comparison studies of general anxiety to TA. The results of Sarason's (1959) inquiry were pivotal work in TA research and would distinguish specific anxiety from TA and open the path to future scholarship on the subject.

In replicating the work of Mandler & Sarason (1953) and to advance scholarship of TA, Grooms & Endler (1960) used the Test Anxiety Questionnaire (TAQ) (Mandler & Sarason, 1952) to gauge college students in three kinds of testing situations. Differentiation of testing situation was a formative step in advancing TA literature. Prior to Grooms & Endler (1960) anxiety in testing situations had been viewed as a unidimensional personality trait that occurred within an individual of which the effects of could be measured but not controlled.

Predicting that participants who scored high on the TAQ (Mandler & Sarason, 1952) would also exhibit lower aptitude on a test and have lower GPAs, Grooms & Endler (1960) administered the TAQ (Mandler & Sarason, 1952) to 116 male college students. Outcomes yielded data which supported anxiety as a modifier variable which impacts the testing situation. In the high anxious group, lower participant aptitude test outcomes predicted lower GPAs.

As the 1960's progressed, so did the foundational work of Sarason (1960; 1961; Sarason & Mindard, 1962). A critical work in TA literature were the explications Sarason (1960) made in exploring the construct of TA through anxiety scales that were available at that time. Through reviewing several different aspects of TA, Sarason (1960) found that anxiety was present and co-existed with stress responses, in task relevant and irrelevant behaviors, and in the outcome of aptitude tests. High anxious subjects were found to experience more self-deprecating cognitions as well as being more self-occupied than low anxious subjects. Due to the findings, Sarason (1960) recommended that future research on TA focus on the development of techniques for the extinction of anxiety responses.

Although Sarason (1961) recommended that literature on TA focus on extinction of anxiety responses during the process of test-taking, Sarason (1961) decided to explore the relationship between intellectual performance and TA self-report measures. Sarason (1961) investigated 738 Freshman and Sophomore college students enrolled in introductory psychology and sociology courses finding that high test anxious students differed in testing outcome than those who were low anxious. Low anxious students performed better than those who were high anxious.

Aiming to continue exploration into whether anxiety about testing situations is distinct from generalized and performance anxiety, Sarason & Minard (1962) explored the impact exam

instructions had on low/high anxious subjects' testing outcomes. The 3-factor analysis of data supported the hypothesis that low anxious students perform better than high anxious students. However, there was no significant difference of outcome scores between low and high anxious subjects when no stress inducing instructions were given, suggesting that ability may not be the basis for observed variation in scores (Sarason & Minard, 1962).

Being that high anxious students differed in testing outcome than those who were low anxious when stress inducing instructions were given, Sarason & Koenig (1965) aimed to explore self-descriptions as a subjective component of anxiety that occurs during testing situations. Sarason & Koenig (1965) stated that if anxiety were a measure of self-preoccupation, then TA would be related to an individual's self-descriptions but not necessarily to their description of others. Using a 2 x 2 x 2 analysis, Sarason & Koenig (1965) found that high anxious subjects tended to be more self-critical and self-debasing in their self-descriptions as compared to low anxious subjects. Due to the findings, Sarason & Koenig (1965) decisively stated that lower outcomes on tests reflected high degrees of self-preoccupation and lower self-esteem (p. 620).

The foundational work of Mandler & Sarason (1952; 1953) and Sarason et al., (1959; 1960; 1961; 1962; 1965) encouraged researchers thereafter to explore TA from differing theoretical perspectives. For those who conceptualize TA as performance anxiety, research has centered around understanding, describing, and explaining the context in which the anxiety occurs (Paul et al., 1964; Sarason & Minard, 1962). On the other hand, researchers who view TA as a syndrome are concerned with the components of anxiety; namely, the cognitive and physiological responses that it comprises (Denny et al., 1964; Korchin & Levine, 1957; Sarason, 1960; 1961; Sarason & Koenig, 1965).

In a study by Emery and Krumboltz (1967), fifty-four test anxious college freshmen were randomly assigned to one of three groups. The purpose of the study was to determine whether there were differences between the treatment and control groups. One group utilized desensitization with individualized anxiety hierarchies, the other treatment group utilized desensitization with a single standard hierarchy, while the final group was a no-treatment group. At the conclusion of the study, Emery and Krumboltz (1967) found that participants that received the desensitization treatment rated themselves as significantly less anxious than those who received no treatment, both before and during their final examinations. There were no significant differences found between groups in comparisons between treatments and final examination grades.

At conclusion of the study, Emery and Krumboltz (1967) wondered if participants' experience of performance anxiety (facilitating or debilitating) accounted for variance between groups. Citing a limitation of the study, Emery and Krumboltz (1967) stated that a post-test measure was not collected as students may report low test-anxious scores, indicating a lack of test-anxious characteristics due to the exam being completed.

A major methodological flaw in Emery and Krumboltz (1967) was that the measure of test-anxious characteristics was a researcher-developed protocol that does not maintain any internal reliability or validity ratings. Emery and Krumboltz (1967) states, "Most....took a test anxiety scale as part of a 3-hour psychological assessment during orientation week. This scale is a refinement of a scale previously constructed by Emery and contains 18 items known to discriminate..." (p. 205).

Ganzer (1968) completed a test-anxiety study involving seventy-two female undergraduate students enrolled in an introductory psychology course at the University of

Washington. The two-day experiment explored differences between groups of participants' pre-post – test scores on the Test Anxiety Scale (TAS) (Sarason & Ganzer, 1962).

On Day 1, Ganzer (1968) analyzed data using a 2 x 3 x 5 repeated-measures ANOVA to explore differences between two independent variables using high-, middle-, and low- TAS (Sarason & Ganzer, 1962) scores, divided by random assignment into either the observer (O) or no-observer group (NO). Whereas on Day 2, a 2 x 2 x 3 factorial ANOVA was used to analyze the data from three “...independent variables: high-, middle-, and low-TAS (Sarason & Ganzer, 1962) scores, O and NO conditions – Day 1, and O and NO conditions – Day 2” (p. 195). Each of the six groups had 12 participants representing each grouped variable. Ganzer (1968) reported Day 1 results included significant differences between high- and middle- test anxious groups with an observer present as compared to those participants in the low- test-anxious and no observer groups (p. 194). The results for Day 2 were not significant.

In a study by Johnson & Sechrest (1968) the Alpert-Haber Achievement Anxiety Test (Alpert & Haber, 1960) was administered to 60 college student-participants randomly assigned to one of three groups. The participants were divided into two treatment and one control groups, namely, 1) systematic desensitization counterconditioning, 2) progressive relaxation training, and 3) non-treatment groups. Johnson and Sechrest (1968) hypothesized that the desensitization by counterconditioning group would self-report less anxiety than participants who only received progressive relaxation training or no-treatment, and that progressive relaxation training would be more effective than no-treatment at reducing self-reported anxiety levels. Johnson and Sechrest (1968) stated that the hypotheses which were biased on account of the interventions being effectual could be considered a limitation of this study.

Using an ANOVA to compare between group means, Johnson and Sechrest, (1968) reported that there were no significant differences between groups on the outcome measure of the Alpert-Haber Achievement Anxiety Test (Alpert & Haber, 1960). However, the systematic desensitization group attained significantly higher final exam grades than the other two groups, which did not significantly differ from one another. At conclusion, Johnson et al., (1968) cited support of systematic desensitization counterconditioning as a treatment intervention for test anxious individuals.

By the late 60's, Munz and Smouse, (1968) and many others had come to understand test-taking anxiety as a bidimensional construct with either facilitating or debilitating effects on academic performance. Up until that time, investigators had viewed anxiety in testing situations as a unidimensional personality trait.

Munz and Smouse (1968), aimed to study how test anxious participants' experiences differed when question-items were sequenced from easy-to-hard (E-H), hard-to-easy (H-E) or random (R). Using the Alpert-Haber Achievement Anxiety Test (AAT) (Alpert & Haber, 1960), 120 male and female participants from the University of Oklahoma were divided into four sections of an introductory psychology course using the three different sequenced tests and one control group.

An analysis of variance was conducted for the total sample along with the simple main effects analysis. There were no significant differences between item-difficulty order effect on performance scores. There were significant main effects, however, between facilitators and performance on scores. Facilitators scoring significantly higher than debilitators and nonaffecteds. Additionally, facilitators scored significantly higher than the other three anxiety types, as measured by the AAT (Alpert & Haber, 1960) on the E-H form.



Munz and Smouse (1968) indicated that their findings suggest that the “standard test-construction practice of arranging test items in an order of increasing difficulty is not justified” to assist in the reduction of debilitating TA and facilitating performance (p. 372). Citing that the relationship between test anxious experience, performance and sequenced question-items are more complex than initially considered, Munz and Smouse (1968) suggested that theoretical support is needed to justify the use or manipulation of sequenced question-items, test-taking orientations, and test-taking situations in order to produce a facilitating effect on students’ testing outcomes.

Walsh et al., (1968) used the Alpert-Haber Achievement Anxiety Test (Alpert & Haber, 1960) to explore the relationship between sophomore college students’ class grades on tests and self-reported experiences of facilitating (helpful), debilitating (crippling), and facilitating less the debilitating, anxiety. Walsh et al., (1968) explored two separate samples of students, one with 103 participants (46- males, 57- females) and the second with 94 participants (42- males, 52 – females) who were enrolled in a college social science class.

Using an analysis of variance to compare between group means, Walsh et al., (1968) found no significant difference between the groups of females in section one and two, or between males in section one and two. However, Walsh et al., (1968) found significant differences between all three measures of anxiety and sex (males, females) on the testing outcomes. Additionally, Walsh et al., (1968) stated, “While no statistical tests were run, the females tended to do better than the males in both samples” (p. 574).

In discussion, Walsh et al., (1968) stated that they were curious as to the outcomes of the studies, wondering if extraneous variables were to blame for the outcomes. Walsh et al., (1968) stated, “It is also interesting to note that the reported anxiety may not always be an influencing

factor at any given testing session” (p. 574). Walsh et al., (1968) encouraged future researchers to consider controlling for sex of participants and environment, as both of these confounding variables may increase or decrease the relationship between anxiety and test-taking behavior.

To understand the relationship between TA and performance feedback, Harmatz (1968) observed 54-female undergraduate students enrolled in a psychology course at the University of Massachusetts performing in the role of a teacher with a figurative pupil. High test anxious (HA) and low test anxious (LA) participants were asked to instruct a pupil who was stated to be performing average (A), above average (AA) or below average (BA). Participants were informed to administer a shock level toward the pupil based on their performance. Harmatz (1968) hypothesized that LA participants would increase the shock level of pupils who were stated to be performing BA, as participants would perceive their performance to be correlated with their ability to teach.

Results on the Test Anxiety Scale (TAS) (Sarason & Ganzer, 1962) were analyzed using a 2 x 3 x 5 repeated measures design. Harmatz (1968) found that the LA participants increased the shock level toward the BA pupils, a moderate amount toward the A pupil and the least amount toward the AA pupil. Whereas the HA participants gave the most increase in shock level to the A pupil, the smallest amount of shock to the BA pupil and a slight increase in shock level to the AA pupil. Harmatz (1968) stated, “The results of this study support the conclusion that subjects differing in test anxiety will respond differently to reported levels of performance in another person. This lends support to the hypothesis that the perception of an acceptable performance varies with subjects’ test-anxiety level” (p. 626).

In a two-part study completed by Carlson and Ryan (1969), 234 (142 women, 92 men) university students were assessed for TA on knowledge recall and comprehension. Using

Bloom's taxonomy four evaluative instruments were developed and used to measure cognitive classifications such as knowledge, comprehension, application and analysis. Participants were randomly assigned to one of the four groups and all participants were administered the Test Anxiety (TA), General Anxiety (GA) and Need for Achievement (NA) sections of the Autobiographical Survey (Sarason, 1958) developed by Sarason in 1958. Following the assessments, all participants were measured on the specific assessment assigned to their group.

Carlson and Ryan (1969) reported that there was a negative correlation between TA scores and knowledge was significant ( $p < .05$ ). Relatedly, there appeared to be an intercorrelation between GA, TA, and NA which might suggest that the conditions are not independent affective states. Carlson and Ryan (1969) additionally found intercorrelations between TA and Knowledge, TA and Comprehension and GA. These results suggested that higher levels of TA have a debilitating effect on "lower" levels of cognitive functioning but not those participants with "higher" levels of cognitive functioning. Carlson and Ryan (1969) stated, "At any rate, it appears that the interfering responses generated were differentially developed by those of high and low anxiety and the type of question, which implies levels of cognitive functioning required to give an answer, played a crucial role in test performance" (p. 19).

Sutter and Reid (1969) aimed to understand personality characteristics and how they interact with conditions of the learning environment in computer assisted (CAI) instruction. One hundred undergraduate males assigned randomly among one control and two experimental groups took a problem-solving course at a computer. In one group, the participants took the course alone at a computer and the other took the course with a partner. The primary focus of Sutter et al., (1969) was to determine whether there was a correlation between personality traits

and the interpersonal-noninterpersonal nature of the learning environment. Personality traits were specific anxiety or TA, sociability and dominance.

Sarason's (1958) Test Anxiety (TA) scale was used to measure participants' anxiety in testing situations. Whereas performance was measured by a five-problem test specifically devised by Sutter and Reid (1969) and the University of Texas at Austin. Using a multiple linear regression analysis of variance, Sutter and Reid (1969) found that there were no significant differences with respect to the individual personality, attitude, or achievement test variables. When personality traits are not considered, the lack of involvement on account of the CAI does not significantly differ from participants in the alone vs. Partnered groups. However, when personality traits are considered, conditions, as well as attitude, do affect learning. Sutter and Reid (1969) stated that high TA was associated with negative attitudes toward the CAI in both experimental groups. Sutter & Reid (1969) stated, "A significant interaction (.025) was obtained between TA and achievement for both groups. Students high in TA achieved better when working with a partner" (p. 155). Sutter and Reid (1969) discussed that this effect could be due to the high TA participants' partner evoking task-relevant responses vs. Task-irrelevant responses.

In a study by Marso (1969), participants' TA scores were used to project student achievement. TA was inversely associated with student achievement as measured by final examination performance, but this factor did not account for a significant portion of the variance between the two groups (easy and hard examinations) of students. Marso (1969) found that students of lower ability were more likely to be affected by easy or hard examinations. Wherefore, "lower" ability students seemed to perform better with "easy" examinations than did "higher" ability students.

Stallings et al., (1969) were interested in exploring the impact that pass-fail (P-F) grading options would have on participants that were categorized as highly test anxious. According to Stallings et al., (1969), high TA is characterized by high “fear of failure,” whereas they hypothesized that high TA students would prefer a P-F option to non- P-F options. Seventy-six students enrolled in a P-F option at the University of Illinois-Urbana were administered the Test Anxiety Questionnaire (TAQ) (Mandler & Sarason, 1952) and a version of the grade utility scale constructed by McDaniel (. At conclusion of the study, P-F students did not record higher TA than non-P-F students. Additionally, Stallings et al., (1969) found that while there was no significant relationship between TA and grade option, students who performed well with the P-F option traditionally maintained heavier course loads and higher GPAs on average.

Cohen (1969) reported that there have been a few studies that note a small, significant relationship between high TA and the high frequency of dream recall (DRF). However, this study was primarily interested in exploring the variance reported in DRF studies. Relatedly, Cohen (1969) cites psychoanalytic theory as the underpinning philosophy of the study, noting a particular relationship between defense and anxiety. TA was used to denote a-condition-specific anxiety/defensiveness as compared to generalized anxiety/defensiveness.

### **Summary**

The 1950s and 60s were categorized by explorative research into TA, its impact on grade outcomes and differentiating student personality characteristics such as general performance anxiety from TA (Carlson & Ryan, 1969; Harmatz, 1968; Marso, 1969; Sarason, 1959; 1961; Stallings et al., 1969; Sutter & Reid, 1969).

While scholars took great care to consider many of the factors that could influence anxiety during the event of test taking, their attempts to provide explanations for large

proportions of variance confounded the studies results. Scholars considered general anxiety, skills, phobia, personality factors, learning and motivation (Grace (1957; Deffenbacher et al., 1980; Korchin & Levine, 1957; Sarason, 1959; 1961) with systematic desensitization dominating scholarly inquiry into effective treatment interventions (Emery & Krumboltz, 1967; Johnson & Sechrest, 1968). Another limiting factor for TA research was the independent development of numerous TA measures (Oetting, 1966; Sarason, 1960). Scholars chose to develop individual screening measures of TA as compared to operationalizing consistent language and agreed upon characteristics of TA. From the beginning of 1960 to the close of 1969, literature mentions seven TA instruments that were either developed (Alpert & Haber, 1960; Carrier & Jewel, 1966; Spielberger, 1980), modified (Osterhouse, 1969) or revised (Sarason & Mandler, 1952; Sarason & Ganzer, 1962; Sarason et al., 1968).

### **1970s**

In a study completed by Weiner and Potepan (1970), students' need for achievement and their anxiety about testing failure were explored with a correlational methodology. Weiner and Potepan (1970) operationalized students' need for achievement in opposition to anxiety about failure by intertwining achievement orientation, achievement responsibility and anxiety about testing. To explicate the terms, Weiner and Potepan (1970) defined TA as 'a tendency to respond in fear in achievement-related contexts by engaging in activities that are instrumental to avoiding the achievement task(s) (p. 144). Achievement orientation is outlined as the approach or avoidance of success or failure, whereas intellectual achievement responsibility refers to one's readiness to attribute success or failure to oneself rather than external sources (e.g., luck, task difficulty, etc).

One hundred and seven female and male college students were assessed by three instruments. The Test Anxiety Questionnaire (TAQ) (Mandler & Sarason, 1952) was used to gather self-reported experiences of situationally aroused anxiety. A self-report scale developed by Mehrabian (1968) was used to assess a student's approach or avoidance of a task as it was perceived to be easy or difficult. Lastly, Weiner and Potepan (1970) employed the Intellectual Achievement Responsibility scale developed by Crandall et al., (1962).

The findings by Weiner and Potepan (1970) indicated that males' success is associated with high achievement orientation, low TA, self-attribution for success in both effort and ability and a belief that failure is not caused by a lack of ability (p. 150). Surprising to Weiner and Potepan (1970) was that these results were not true for female participants. Weiner and Potepan (1970) also noted a significant decrease in students' 'approach motivation' as exam dates drew closer regardless of motivation orientation (approach or avoidance), wherefore researchers suggested that further inquiries are needed to delineate the group differences in outcome.

Using 69- men and 52- women in an introductory psychology course in two different studies, Raynor (1970) measured students' motives, using the Thematic Apperceptive of Achievement survey developed by McClelland et al., 1953. Raynor (1970) then measured students' experience of TA with Mandler and Sarason's (1952) Test Anxiety Questionnaire.

Raynor (1970) predicted that students who were high in achievement and low in TA would receive higher grades and attribute their scores to be indicative of (future) career success. Results of Raynor's (1970) studies indicated that students who scored high in achievement, citing their perception of future career success to be related to test performance, had higher outcome grades than those who saw the outcome grade as low in importance. Raynor (1970) stated, "These results suggest that the predictive efficiency of achievement-related motive scores

depends upon the moderator-variable effect of an individuals' future career orientation" (p. 31). In terms of TA research, Raynor (1970) believed that low or high TA students' exam scores will depend on the student's perception of the applicability of the course to their future career.

Marso (1970a) conducted two experiments to determine if a relationship existed between test item arrangement and student performance on power tests. Marso (1970a) considered that TA is a moderator variable that has a stated effect on the performance outcomes of students in the studies. Marso (1970) employed two forms of the Quick Word Test (QWT) (Borgatta & Corsini, 1960) and a TA scale developed by Carrier & Jewel (1966) to gauge students' subjective experience of TA pre-exam.

In the first study, Marso (1970a) found that TA significantly impacted students' outcomes on exams. Students with high degrees of reported TA performed less well on three different forms of exams whereas item arrangement formats did not impact students' performance. Marso (1970a) results for a second study were reportedly similar. The results of the second study indicate that the item difficulty formats did not influence students' performance on the final examinations but students with reported high degrees of TA perform less well on classroom examinations than those with low degrees of TA.

Morris and Liebert (1970) aimed to explore the relationship of TA to the posited components of 'worry' and 'emotionality.' Morris and Liebert (1970) believed that these two components were representative of Mandler and Sarason's (1952) Test Anxiety Questionnaire. Citing previous inquiries into TA, Morris and Liebert (1970) defined 'worry' as expressions of cognitive concern about one's performance such as thinking about negative consequences of failure or expressing doubts about one's ability to perform desirably. 'Emotionality' refers to the physiological and affective reactions to the stress of a testing situation. Citing previous studies,



Morris and Liebert (1970) aimed to explore the distinction between worry and emotionality and their impact on students' classroom examination outcomes.

In a correlational study, Morris and Liebert (1970) posited that a positive relationship would exist between physiological arousal, pulse rate, and emotionality; whereas pulse rate would not be related to 'worry;' and a negative relationship would exist between worry and test performance, but that neither emotionality nor worry would be correlated to performance outcomes on the exam.

In the study containing college students enrolled in an introductory psychology course, Morris and Liebert (1970) found that there was a significantly positive relationship between emotionality and pulse rate as well as between worry and pulse rate. However, worry and emotionality measured by pulse rate did not significantly differ from one another.

Additionally, there were significant negative correlations between worry and outcome grade, but no such relationship was found between emotionality and outcome grade. Morris and Liebert (1970) stated that this finding suggests that worry affects performance on intellectual tests, whereas emotionality has no such effect.

Based on their findings, Morris and Liebert (1970) recommended that future inquiries of TA make a distinction between autonomic indexes (pulse rate, etc) and students' perceptions of the testing situation. According to Morris and Liebert (1970) autonomic responses may be considered as separate components of anxiety, or whether they are a student's differential response to the testing environment.

In a study by Marso (1970b) students with high TA were used to explore whether more frequently graded examinations, with instructor feedback decreased students' experience of TA, wherefore increasing examination outcomes at final. Using 116 students enrolled in four

sections of an introductory educational psychology course, a four-factor ANOVA was performed with a measure of TA as developed by Carrier & Jewel (1966).

The results of the study indicated that tests and testing procedures do influence student achievement as measured by students' performance on final examinations. However, no significant outcome was found which suggested that students with reported high levels of TA benefitted from learning conditions with more frequently graded, feedback orientated conditions.

Raynor and Rubin (1971) aimed to explore the degree to which perception of future success impacts students' present experience of TA, motivation, and performance (outcome on an exam). In this study, TA was viewed as a moderator variable which impacts students' perceptions of success (future benefits gained from positive performance) on examination outcomes. At conclusion, Raynor and Rubin (1971) found that students with high future orientation, who reported low levels of TA, answered significantly more questions correctly than those who were low in future orientation and high in TA. High future-oriented students, however, did not differ significantly at outcome than those who were low future-oriented students. Raynor and Rubin (1971) cited that the researcher's previous study's results may have confounded this inquiry, resulting in outcomes that compare students' achievement motivation. Resulting from a desire to create a comprehensive measure of TA, Osterhouse (1969) developed a modified version of Alpert and Haber's Anxiety Test (Alpert & Haber, 1960) and Sarason's Test Anxiety Scale (Sarason & Mandler, 1952) to observe the two-factors of TA, emotionality and worry. Using 115 male college students enrolled in an introductory psychology course, Osipow & Kreinbring (1971) aimed to study the temporal stability of the Osterhouse test anxiety instrument to "observe the degree to which significant score fluctuations reflect situational variations in stresses and strains in academic work" (p. 152).

Osipow & Kreinbring (1971) defined emotionality as a factor that is largely physiological in nature, manifesting with physical symptoms and occurring during an examination situation. Whereas worry was defined as a cognitive component which manifests after the examination's end and in response to a students' considerations about their performance and its implications.

Findings in the Osipow & Kreinbring (1971) study indicate that while there were fluctuations in students' scores over the course of a term, such changes did not significantly impact the stability of the measure. An ANOVA was used to compare scores on the 1st occasion of emotionality/worry scores to the 2nd occasion of scores. Completing further ANOVAs with each set of scores over a 10-week period resulted in similar results. The outcome of Osipow & Kreinbring (1971) study suggested that the Osterhouse's (1969) test anxiety scale is likely to remain a stable measure of TA, at least at 10-weeks post-test.

As a result of the positive -psychology movement, a large body of research was developed on how humor could be used to alleviate tension and decrease defensiveness. Wherefore in the 1970s, there was a large influx of experimental studies exploring the effects of humor on psychological functioning.

Smith et al., (1971) aimed to explore high/low test anxious students' performance on exams when humor was used. Two hundred and fifteen college students (109-males, 106 females) enrolled in an undergraduate psychology course at Purdue University recorded scores on the Test Anxiety Scale (TAS) developed by Sarason and Ganzer (1968). Based on their scores on the TAS, students were grouped into low, moderate or high TA groups and administered one of four forms of a humorous and non-humorous test.

In the results, Smith et al., (1971) reported that the students who were reported to be high-test-anxious, in the non-humorous condition clearly demonstrated a lowered level of task

performance. Additionally, high-test-anxious students with humorous conditions not only performed better than high-test-anxious students in non-humorous conditions but their performance also equaled that of the low-test-anxious group. Smith et al., (1971) stated that an unexpected result of the study found that the moderate anxiety group did not differ significantly in performance than either the low/high-test anxious groups.

Smith et al., (1971) found that the effect of humor on test-anxiety for students is that it facilitates task orientated behaviors during test taking but only for high-test-anxious individuals.

Ray et al., (1971) explored acquisition and retention of scholastic material on low, medium, and high-test anxious students. One hundred and twelve male-students enrolled in an introductory psychology course at Vanderbilt University were divided into groups based on their scores on a modified version of the State Trait Anxiety Inventory (STAI) (Spielberger et al., 1983).

Using an ANOVA, Ray et al., (1971) performed a between-subjects design using TA, report, and test trials as variables. In the findings, Ray et al., (1971) reported that there was not a significant interaction between TA and report interaction. However, when controlling for original learning, TA was found to significantly affect performance, retention and generalization test outcomes.

Osterhouse (1972) compared the interventions of systematic desensitization (SD) and study skills training for reducing TA in students. Emotionality, as a component of TA, was treated with study skills training, whereas the cognitive component of TA was treated with SD. While all students received study skills training, only the SD group received additional treatment.

Osterhouse (1972) divided 53 highly test anxious students into groups based on the student's scores of emotionality and worry, as measured by the Inventory of Test Anxiety (Osterhouse, 1969). The Inventory of Test Anxiety (Osterhouse, 1969) was designed to measure autonomic arousal or physiological reactions to the stress of examination performance. The Inventory also aims to measure worry via 8-items that reflect concern about one's level of examination performance relative to other students.

Twenty high emotionality and 20- high worry subjects were secured for treatment, while 10- high emotionality and 10-worry subjects were assigned to a 'no-contact' control group. Using an ANOVA, Osterhouse (1972) computed treatment outcomes on each DV score, using pre-treatment scores as the covariate. The only significant finding in Osterhouse (1972) was the between groups comparisons of the SD and control groups ( $p < .05$ ). SD students reported significantly less anxiety during the final examination than did control students, therefore suggesting that SD offered more potential as a treatment method for TA compared to study skills training. While the only significant finding in Osterhouse (1972), another interesting outcome of the study suggested that high emotionality students scored slightly better than high worry students on the final exam. Osterhouse (1972) posited that this outcome may suggest that the TA component of 'worry' impacts students' outcomes on tests to a larger degree than emotionality.

In a study by Mitchell & Ng (1972), 30 students enrolled in their second year of the University of New South Wales were administered 7- measures to evaluate the efficacy of treatment procedures in reducing TA, improving academic performance and study habits. Mitchell & Ng (1972) used a general anxiety scale, two test-anxiety scales (Alpert & Haber 1980; Suinn, 1968), a study habits survey (Brown & Holtzman, 1956), the fear thermometer (Walk, 1956), and verbal and quantitative aptitude tests.

Mitchell & Ng (1972) found that while students reported reductions in TA, that this occurrence alone did not correlate with an improvement in academic performance. Additionally, the study attempted to increase the level of study-habit competence to explore its correlation with increased academic performance, to which Mitchell & Ng (1972) did not find a relationship. Mitchell & Ng (1972) suggested that while previous studies have distinguished between efficacy of treatment for TA, the findings in this study did not agree.

However, results indicated that the effects of TA on academic achievement are not unidimensional as the components of TA are also not unidimensional. In line with studies completed by Sarason (1971), Mitchell & Ng (1972) support the idea that TA is both a cognitive and physiological experience, occurring before, during and after testing situations. Mitchell & Ng (1972) stated, “In the cognitive cluster there are maladaptive and unrealistic self-perceptions, expectations, fears, attitudes, and academic behavior patterns. In the autonomic cluster there is a heightened physiological reactivity” (p. 496). Wherefore, Mitchell & Ng (1972) suggest that inadequate study skills and habits may develop independently from TA.

In their recommendations, Mitchell & Ng (1972) indicate that SD does show to decrease students’ experience of TA but does not simultaneously increase academic performance. Mitchell & Ng (1972) stated, “...if the goal established is only that of test-anxiety reduction the single-model conditioning procedure of desensitization is effective. However, if the goal of therapy is improved academic achievement, where poor study habits are known to exist, then...a multimodal approach is necessary” (p. 497).

McMillan & Osterhouse (1972) aimed to examine the effectiveness of Systematic Desensitization for reducing anxiety in highly TA students who differed in their level of generalized anxiety. As a general measure of anxiety, 100 university students who scored

low/high on the Manifest Anxiety Scale (Taylor, 1953), were divided into groups and administered the Inventory of Test Anxiety (Osterhouse, 1969).

A one-way ANOVA performed on post-treatment scores on the Inventory of TA yielded a non-significant result ( $F$  ratio of = 1.2) for group differences. “The one-way analysis of covariance for posttreatment examination scores, with pretreatment examination scores as a covariate, yielded a significant  $F$  ratio of 11.5 ( $df = 1/15$ ,  $p < .005$ ), indicating that low anxiety subjects received significantly higher examination scores following treatment than did high anxiety subjects. High anxiety subjects showed a slight decrease in examination performance” (p. 520).

McMillan & Osterhouse (1972) stated that the results of the study suggest that there is a level of generalized or “free-floating anxiety” present in students’ experiences, as measured by the Manifest Anxiety Scale (Taylor, 1953), which impacts academic performance for the highly-test-anxious student. McMillan & Osterhouse (1972) found that this level of anxiety is present even after the intervention of desensitization has been applied. TA research has uncovered ambiguous and contradictory data, such as while desensitization has been found to reduce TA, there has been little consistency of outcome in other studies, and students’ academic performance does not seem to be relationally connected to a decrease in TA.

In a study by Meichenbaum (1972), ‘worry’ and ‘emotionality’ were identified as the two components of TA. Worry was stated to be cognitive concern over performance and emotionality, the autonomic arousal aspect of anxiety. Meichenbaum (1972) aimed to explore the ‘worry’ component of TA in students who report to be highly test anxious. Citing several previously completed studies, Meichenbaum (1972) indicated that a major performance decrement of highly test anxious students is their ability to attend to task-relevant behaviors.

Irrelevant behaviors include negative self-deprecating thoughts, concern about testing outcomes and their impact on future endeavors. Meichenbaum (1972) stated since systematic desensitization can effectively reduce the emotionality component of TA, the negative ruminations are what keep the student from being able to adequately approach the testing situation.

Meichenbaum (1972) stated, “Treatment should be designed to directly control the worry component and the cognitive or attentional style of the high-test anxious person” (p. 370). Using 21 student volunteers (15-males and 6-females), a pre and post measure of TA was taken on the Test Anxiety Questionnaire (Alpert-Haber, 1960). Two performance measures also accompanied the Test Anxiety Questionnaire, specifically a digit symbol test (Brown, 1965) and Raven’s Matrices Test (Raven, 1956). Students were divided into one of three groups a) a desensitization group, b) cognitive modification group and a c) waitlist control group.

Data was analyzed using an ANOVA procedure indicating that the cognitive modification procedure was most effective at reducing subjective experiences of TA. The cognitive modification group also maintained these results at one-month follow-up and did not differ in outcomes more than the low-test anxious group following treatment. The SD group did differ significantly from the waitlist control group, making improvements in performance, with decreased experienced TA.

Meichenbaum (1972) suggested that group SD and cognitive modification procedures had a significant impact on students' experiences of TA and improved academic performance compared to the waitlist control group. Wherefore group administration of interventions such as SD and cognitive modification should be explored as effective and comparable to individual intervention when aiming to reduce TA and increase academic achievement.



Fisher (1973) explored students' motive to succeed in terms of one's academic self-concept and confidence in that concept. Fisher (1973) found that TA was inversely related to self-concept in students, which was defined as a motive to avoid failure. Fisher (1973) found that a student's academic self-concept is related to their preference for academic risk-taking and is proportional to course examination anxiety. In other words, Fisher (1973) found that test and "course" anxiety interact and impact a students' academic self-concept.

Frederiksen and Evans (1974) aimed to explore the process of students' ability to learn how to appropriately develop hypotheses for research inquires. Based on prior research by Klein et al., (1969), anxiety was determined to be a factor that confounds the learning process in students. Wherefore, Frederiksen and Evans (1974) explored to what extent that TA (due to the evaluative factor of test taking) would have on students' ability to perform the required tasks.

Frederiksen and Evans (1974) found that TA was not a significant indicator of performance in the academic. Frederiksen and Evans (1973) wondered if the insignificance of the relationship between formulating hypotheses and TA may make more tenable the idea that negative self-talk occurs in large quantities during evaluative situations.

Citing those previous studies that had modified the Alpert-Haber Achievement Anxiety Test (AAT) (Alpert and Haber, 1960, Huck and Jacko (1974) explored whether statistical outcomes were impacted by such modifications. An analysis of covariance revealed that modifying the AAT, produced intraform correlation between the Facilitative and Debilitative scales and a difference in internal consistency reliability estimates.

While the results of Huck and Jacko (1974) do not signify that slight alterations will always create a different score distribution in every instrument, they do however suggest that the internal reliability of the instrument be tested, and reported in said study if any alternations are made.

Previous studies on TA had been performed on populations of primarily Caucasian college students. Wherefore Bronzaft et al., (1974) aimed to determine if black students are high in TA regardless of cultural background.

Using 105 students from two colleges, Bronzaft et al., (1974) administered the Alpert-Haber Achievement Anxiety Test (AAT) (Alpert and Haber, 1960) as a pre/posttest measure. Bronzaft et al., (1974) chose the AAT due to the measure providing a score for facilitating (positive test taking attitudes) (AAT+) and debilitating (negative test taking attitudes) (AAT-), as Bronzaft et al., (1974) appeared to identify test taking attitudes as determined by an individuals' experience of performance anxiety.

Participants were additionally asked to indicate their fathers' occupations and education level, and whether their fathers' occupation fell into middle- or lower-class categories (as defined by white-collar or blue-collar jobs).

In the findings, Bronzaft et al., (1974) stated that there were no significant differences between AAT+ and AAT+ scores on middle- and lower-class students at Lehman College. A comparison of AAT- scores yielded a similar result, with no significant difference being found between scores. These results were the same for students at Lehman College as well as at the University of the West Indies. However, the mean AAT+ score and the means AAT- score for all students at Lehman College were compared to all the AAT+ and AAT- scores at The University of the West Indies finding that the students at the University of the West Indies had significantly higher facilitating TA ( $t = 2.94, p < .01$ ) and significantly lower debilitating TA ( $t = 8.84, p < .01$ ).

Much of TA literature to-date has been concerned with whether TA is a state of anxiety (A-State) or a personality trait (A-Trait) (Spielberger, 1980; Wittmaier, 1974). Until Wittmaier

(1974) no studies undertook the goal of delineating between the two. Wittmaier (1974) indicated that a positive place to begin developing literature on state or trait anxiety in the testing situation would be to observe the relationship between a measure of each.

Wittmaier (1974) used the Alpert-Haber Achievement Anxiety Test (AAT) (Alpert-Haber, 1960) to measure A-Trait (Facilitating, AAT+ and Debilitating, AAT- Anxiety scales) anxiety and the Mood Adjective Checklist (MACL) (Nowlis and Green, 1965) to measure A-State anxiety.

Nowlis and Green's (1965) MACL does not measure specific or generalized anxiety but rather, it records a way in which an individual is disposed to respond to the world and himself as a conception.

300 college students were administered both instruments as pre/posttest measures as Wittmaier (1974) then assessed relationships between A-Trait (AAT) (Alpert & Haber, 1960) and A-State (MACL) (Nowlis & Green, 1965) and performance. Wittmaier (1974) found that a relationship did exist between A-Trait anxiety and A-State anxiety, a relationship between debilitating (AAT-) (Alpert-Haber, 1960) anxiety and performance in high anxious students, and a relationship between emotional activation and performance.

The study investigated the effects of personality type on the effectiveness of various treatment procedures in reducing TA. Test anxious college students identified as extrovert or introvert by the Eysenck Personality Inventory randomly were assigned to insight, desensitization, flooding treatments, and control groups.

Horne (1974) used the TAS (Sarason and Ganzer, 1962) and the IPAT Self Analysis Form (R.B. Cattell, 1957) with 800 male and female students from a large midwestern university.

Analysis of variance assessed difference scores on pre- to post anxiety measures. These methods generally failed to reduce anxiety on most of the measures. The only significant change was on a

TA rating scale on which the introverts demonstrated greater TA reduction than did the extroverts.

In support of other studies completed on TA, Horne (1974) stated that the only differences found were between scores were on personality scale items, suggesting that the impact of intervention for TA depends on an individual's expression of test anxious behavior. In discussion, Horne (1974) indicated that the variables which account for change in TA have not been adequately defined.

Guidry and Randolph (1974) recognized that if an intervention was not developed to counteract students' experience of TA, poor performance on examinations may result in a need to repeat or withdraw from courses.

Guidry and Randolph (1974) explored covert reinforcement as a treatment for TA in the college student population using a placebo control and no-treatment groups for comparison. The Suinn Test Anxiety Behavior Scale (STABS) (Suinn, 1969), the Test Anxiety Questionnaire (TAQ) (Mandler and Cowan, 1958) and the State Trait Anxiety Inventory (STAI) (Spielberger et al, 1970) was administered to 144 student volunteers, 36 of the highest scoring, were inducted into the study as participants.

An analysis of variance on the pre-test of the STABS found that no significant differences were found between group means. However, analysis of posttest scores of the STABS revealed significant differences between the covert reinforcement and control groups ( $p < .01$ ) as well as at follow-up ( $p < .001$ ). There was a significant difference between covert reinforcement and placebo groups ( $p < .05$ ) at follow-up.

Guidry and Randolph (1974) didn't provide rationale for the use of three measures of TA other than a brief statement indicating a desire to account for both state and trait anxiety. For the

use of the STAI, the measure was abbreviated to include only 20-items that account for state anxiety. The STABS was stated to be used “to provide an additional measure of TA and to permit comparison with studies that have utilized this instrument” (p. 261).

Although there were very few, Daniels & Hewitt (1978) perceived that studies on classroom examination performance reported that students with less anxiety displayed better performance. Seeing an opportunity to simplify experimental methods and explore anxiety as an underlying cause of poor academic performance, Daniels & Hewitt (1978) conducted an analysis of variance, between groups design, on anxiety and test performance.

Sarason’s Test Anxiety Questionnaire (Sarason & Mandler, 1952) and Terman’s Concept Mastery Test (Terman, 1950) were used to examine college, male/female group scores across multiple baselines. In the results, Daniels & Hewitt (1978) found no significant difference in anxiety and performance when comparing between sex, intelligence or difficulty of test-question. There was a significant finding, however, that high anxiety translated to poorer performance on exams. Daniels & Hewitt (1978) stated:

Overall, there seemed to be an extremely strong relationship between anxiety and performance, and this seems to be the primary finding of interest in the study. Had course grades been assigned on the basis of the four tests given during the semester (without a final being given) ...(it) would have meant that 87% of the low anxious group would have received either an A or B grade; 50% would have received an A. Among high anxious students, none would have received an A and only 19% would receive a B (p.345).

Daniels & Hewitt (1978) noted a curiosity of whether low/high test-performance anxiety was related to an emotional reaction – a subjective experience - that occurred in response to the

action of test-taking. While a logical conjecture, it doesn't appear very different from the conjectures that Mandler & Sarason made in 1952 and 1953.

Four years later, Culler and Holahan (1980) stated, "Studies relating test anxiety to academic performance in college students have generally supported the finding that test anxiety is associated with a significant performance decrement reflected in students' grade point averages" (p. 16). Both suppositions – physiological emotional responses occur during student test-taking and TA impacts student GPAs – were suggested 25 years earlier (Culler & Holahan, 1980; Daniels et al., 1978). A problem all in its own, 25 years of TA research hadn't accomplished much.

### **1980s**

During the turn of the decade, explanations of TA were based on an interference model. Generally, while scholars didn't agree on much when it came to TA, they could agree that there was a subjective worry component which students consistently reported that interrupted or interfered with students' task-relevant (test relevant) behaviors. The interference model of TA assumes that in the testing situation anxiety is aroused and interferes with a student's ability to retrieve and use information that is otherwise well known. Culler and Holahan (1980) indicated that the interference model has critics which purport that the degree of interference during test taking may have to do with a students' level of study skill competence.

Culler and Holahan (1980) investigated the relationship between TA and performance in college students, the differences in study-related behaviors in high/low test anxious individuals and the relative differential effectiveness of study-related behaviors for both high/low test anxious groups. Culler and Holahan (1980) used an abbreviated version of the Test Anxiety Scale (TAS) (Sarason et al., 1968) as the screening measure to obtain 65 high test anxious and 31

low test anxious college student participants. The abbreviated version of the TAS (Sarason et al., 1968) was also used as the pre-posttest measure along with the 50-item Study Habits scale of the Survey of Study Habits and Attitudes (Brown and Holtzman, 1967). Additionally, participants completed a questionnaire designed to provide researchers with more information about “a number of other study related behaviors” (p. 17). Culler and Holahan (1980) reported that high test anxious students recorded lower GPAs and were found to have poorer study skills. However, high test anxious students saw an increase in academic performance when the quality of study skills and the amount of study time were adequate.

Thompson et al., (1980) designed a study to explore three treatment effects (anxiety management training, electromyogram, (EMG) Biofeedback, and stress-management training) on three variations of academic underachievement associated with anxiety. Confounded by poor methodological errors and due to a withdrawal of some participants for a myriad of reasons, Thompson et al., (1980) performed separate analyses of variance on the seven pretest indices of the 19 remaining participants.

Harris & Johnson (1980) explored covert modeling combined with study skills training, self-control desensitization combined with study skills training and study skills training alone as treatment options for TA. Harris & Johnson (1980) reported findings on 48 college student participants who met the inclusion criteria. Inclusion criteria were set that a student must: a) score >30 on the Debilitating Anxiety subscale of the Achievement Anxiety Test (Alpert & Haber, 1960), b) had a cumulative GPA under 3.5, and c) provided consent to their academic records as well as consent to participate in all eight treatment sessions and two assessment sessions.

Harris & Johson (1980) used the Suinn Test Anxiety Behavioral scale (STABS) (Suinn, 1969), The Achievement Anxiety Test (AAT) (Alpert-Haber, 1960), the Test Anxiety Scale (TAS) (Sarason, 1969) as pre/posttest measures. Two additional self-report measures, The Social Avoidance and Distress Scale (SADS) (Watson & Friend, 1969) and the Fear of Negative Evaluation Scale (FNES) (Watson & Friend, 1969) were administered as pre/posttest measures (Harris & Johson, 1980)

Harris & Johson (1980) found that an analysis of variance performed on participants' pre/posttest scores on the STABS indicated the largest decrease in TA for the individualized covert modeling group. These results were similar for the self-control desensitization and study skills groups. The waitlist control group increased slightly in TA scores from pre-to-posttest.

On the DA subscale of the AAT (Alpert-Haber, 1960) as well as on the TAS (Sarason, 1969), participants' outcomes were similar. At posttest, the analysis of variance showed the greatest decrease in Debilitating Anxiety scores for the covert modeling group and then the self-control desensitization group. An interesting finding by Harris & Johnson (1980), all treatment groups reported more facilitating anxiety (FA) on the AAT (Alpert-Haber, 1960) than the control group. There was an overall increase in pre-treatment to post-treatment scores. Supplemental measures of the SADS (Watson & Friend, 1969) and FNES (Watson & Friend, 1969) indicated that all groups were lower on both measures than waitlist control group. However, only pre-to-posttreatment scores on the SADS decreased substantially across all groups. Harris & Johnson's (1980) findings suggest that individualized covert modeling combined with study skills training is effective in reducing TA and increasing academic performance in highly test anxious individuals.



A major critique of Harris & Johnson's (1980) work is that, while supplemental instruments can support the primary instrument's outcomes, having too many instruments is problematic. The carryover effect on participants' outcomes in this case is highly likely. In their discussion, Harris & Johnson (1980) report with special consideration that covert modeling combined with study skills training effectively reduces TA in the college student population. Interestingly, Harris & Johnson (1980) also reported similar results for self-control desensitization "confirming previously published reports" (p. 192). Following the disclosure that self-control desensitization is also an effective intervention for TA, Harris & Johnson (1980) stated that while study skills prevented participants from decreasing in overall GPA from pre-to-posttest, study skills training alone was not enough to consistently decrease TA scores or increase GPAs.

Deffenbacher et al., (1980) aimed to study TA reduction but from the perspective that experienced anxiety during test-taking couldn't be narrowed to negative evaluation, cognitive concern or physiological hyperarousal. Deffenbacher et al., (1980) stated that "free floating anxiety" was not accounted for in models that purport test-anxious symptoms as being tailored to worry and emotionality.

Deffenbacher et al., (1980) used the AAT (Alpert-Haber, 1960) and the Worry-Emotionality scale (Liebert & Morris, 1967), the Digit Symbol Test (a subtest of the Wechsler Adult Intelligence Scale). Supplemental measures to assess for non-targeted anxieties were selected to identify the variety and intensity of situationally specific anxieties (measured by the Fear Inventory (Wolpe, 1969) and general trait anxiety (measured by the Trait Anxiety Inventory (Spielberger et al., 1970)).

Interestingly, Deffenbacher et al., (1980) reassigned the instruments in the study to gain qualitative and quantitative data in a manner in which the measures may not have been intended. For example, Deffenbacher et al., (1980) stated that the ATT (Alpert-Haber, 1960) was used to measure “how subjects felt about tests generally” and the Worry-Emotionality scale (Liebert & Morris, 1967) was named the “State test anxiety” that was geared to measure “affect under evaluative stress” (p. 233)). Deffenbacher et al., (1980) reported findings that support self-control desensitization as an intervention for TA reduction. Posttreatment findings revealed that non-targeted anxiety also decreased in the population at follow-up in the desensitization group on both measures.

While the premise of the study in exploring the variance between TA and generalized anxiety symptoms, Deffenbacher et al., (1980) may have done well to review literature previously completed on this topic. Whereas Deffenbacher et al., (1980) would have found that numerous scholars aimed to explain the variance of scores that differentiated test and general anxiety decades earlier. These findings supported the components of TA being worry (cognitive concern and fear of negative evaluation) and emotionality (physiological hyperarousal) about the testing situation.

In a landmark study in 1988, Hembree became a recognized scholar on account of Interference models of TA. Up until Hembree’s (1988) study, there was quite a schism of perspectives on TA, and ideologies of an Interference model were developing further. Hembree’s (1988) meta-analysis included 562 studies and aimed to present the nature, effects, and treatment of TA, especially given that they believed the construct of TA to lack a clearly defined description and characteristics. Due to the extensive nature of the meta-analysis, Hembree (1988)

generalized their findings as representative and generalizable to the population as conclusions (p. 72).

Principally, Hembree (1988) found that (a) TA and performance are significantly related; (b) relationships of worry (cognitive facets of) and emotionality (physiological facets of) are inversely related, whereas worry displayed a stronger relationship to TA with negative performance outcomes; (c) there are no significant differences between TA and the moderator of sex (male/female), but the relationship between students of average abilities (as compares to low or high) and TA was stronger; (d) there were no significant differences between TA and performance when tests were considered easy for students; (e) conditions that enhanced performance in college students' with high levels of TA included "low stress instructions, provision of memory support, minimal distractions, and background music;" (f) students with low levels of TA performed well when they had ego-involved instructions, scaffolded test-question arrangement and no music during tests.

### **1990s to Present Day**

Zeidner (1990) explored TA as a limitation to students' performance on aptitude tests. Based on literature Zeidner (1987a; 1987b) had completed, Zeidner (1990) considered that sex and socioeconomic status encouraged higher TA, wherefore, lowering students' aptitude test scores. Using 163 male and 198 female college students, Zeidner (1990) administered the Hebrew-Adapted version of the TAI/HB (Spielberger, 1980) and a scholastic aptitude test. A major reporting err of Zeidner's (1990), the aptitude test was not identified. Rather Zeidner (1990) provided a description of the instrument. Zeidner (1990) stated that aptitude test included five objective multiple-choice subtests: a) mathematical reasoning, b) general information, c) figural reasoning, d) analytic thinking and e) English comprehension (p. 152). Zeidner (1990)

stated, “Subtest scores were standardized to  $M = 100$  and  $SD = 20$  (relative norms for college candidates of the National Institute for Testing and Evaluation). Total test score was formed by linear composite of subtest scores, scaled to a  $M = 500$  and  $SD = 100$ ” (p. 152).

Zeidner (1990) used an analysis of covariance (ANCOVA) for the effects of TA, ethnicity and the impact on an aptitude test performance. Zeidner (1990) used a multivariate analysis of variance to explore sex differences on the two components of TA and the outcomes on an aptitude test. In the findings, Zeidner (1990) reported significant differences between males and females on the TAI/HB (Spielberger, 1980) with females scoring significantly higher than males on the subscale of emotionality. TA was not significantly impacted by ethnicity or socioeconomic class, and there were no significant differences on an aptitude test by sex or socioeconomic status (Zeidner, 1990). At conclusion, Zeidner (1990) stated that sex and socioeconomic status should not be considered as explanations for variance further.

Smith et al., (1990) compared three models of TA to determine which more accurately represented students' experiences of TA. Using 178 college students, cognitive-attentional (i.e., negative thoughts and individualized concern), cognitive-skills (i.e., study habits) and social learning models were considered (i.e., self-efficacy and goal-related motivation) were compared. Smith et al., (1990) found a significant difference between groups indicating that cognitive-attentional components of TA are more important than academic skills or social learning processes. At conclusion of their study, Smith et al., (1990) suggested that TA work focus on cognitive-attentional models and replace deficit formulations of TA. In their recommendations, Smith et al., (1990) stated that multimodal counseling interventions should be used to address and diminish TA moving forward.

Citing task-irrelevant justifications of poor academic performers in college, Parks-Hamm et al., (2010) examined the impact of students' intentions on combating distractions during test taking. Using 51- students from New York University, participants were randomly assigned to either a task-facilitating or temptation-inhibiting plan condition. Using a short form of the Test Anxiety Inventory (Spielberger, 1980), TA was measured at the beginning of the study, followed by a working memory intensive math exam during which, televised distractions appeared on the same computer screen (Parks-Hamm et al., 2010).

In their findings, Parks-Hamm et al., (2010) concluded that as TA increased, environments that maintained temptation-inhibiting factors seemed to benefit performance. Alternatively, Parks-Hamm et al., (2010) noted that high-test anxious students were more likely to demonstrate an impaired performance when in task-facilitating implementation intentions conditions. On this outcome, Parks-Hamm et al., (2010) noted these findings as “an ironic consequence of a plan labeled task facilitating” (p. 32). Further, Parks-Hamm et al., (2010) stated that students who experience TA can benefit more from forming intentional behaviors around ignoring distractions rather than increasing their effort on the ongoing test. Like much of the literature before it, Parks-Hamm et al.'s (2010) results encouraged future research to consider “the necessity of tailoring the content of plans to the individual...” as the outcomes “...showed a very different pattern of results.

As inquiries of TA have developed over a 70-year period, it seems that scholars are no closer to identifying the components or singular characteristic environment in which the condition occurs (Korchin & Levine, 1957; Huntley et al., 2019). Scholars who have immersed themselves in TA literature could presently agree that students have consistently reported experiences of negative cognitive processing that occurs during testing situations. However,

students' self-report scores of emotionality have differed in severity and expression, both of which have fluctuated depending on testing conditions and personal factors (Huntley et al., 2019). The differences and severity of expressed symptoms have confounded researchers for decades. It would seem that the worry component of TA can be effectively alleviated with cognitive therapeutic interventions, but that component of emotionality still persists and impacts students' testing outcomes (Wittmaier, 1974; Hembree, 1988; Huntley et al., 2019; Smith et al., 1990; Spielberger, 1980; Zeidner, 1990).

### **Conclusion**

College is a stressful time for students. Academic load, being exposed to differing cultures and belief systems, variations in living situations, employment, and familial issues can support an atmosphere of stress and anxiety (Pedrelli et al, 2015). Anxiety is the most prevalent mental health issue reported in the US college student population.

TA is an adverse psychophysiological issue that affects student mental health and can impede academic success. Poor performance on examinations can lead to significantly higher drop-out rates or the need for students to repeat years of study (Hembree, 1988; Huntley et al, 2018; Korchin & Levine, 1957; Sarason, 1961). Scholars, such as Pedrelli et al., (2015) recognized that if students' mental health issues were not identified and adequate treatment provided, the continuous and adverse effects of TA could persist in this population long-term. However, early identification and time-sensitive mental health interventions can ensure student success and create the opportunity for students to persist and graduate (Mitchell & Ng, 1972; Pedrelli et al, 2015; Sarason, 1971).

Educators and scholars have spent decades attempting to understand, describe, measure and mitigate TA. With little consensus on the topic, decades of research have only consistently

observed that the construct of TA has fluctuated. The one component of TA that scholars can consistently agree upon is cognitive worry. However, while many studies have supported emotionality as the second component of TA, its expression and severity are known to vacillate. The unpredictability of emotionality has led scholars to consider that this TA response is aroused by personally threatening conditions that only occur in testing situations. These individual and emotional responses interfere with the task of test-taking and lead to decrements in performance outcomes.

TA is believed to occur before, during and after test-taking whose evocation is not expected under neutral conditions (Mitchell & Ng, 1972; Sarason, 1971). Under the Interference Model of TA, there must be a stimulus in the present testing situation which elicits an emotional and cognitive response that disrupts memory recall and task-oriented behavior.

The AIP model, conjointly with the Interference Model of TA, may provide some context for college students' self-reported worry and emotionality. From the perspective of Interference Models of TA, worry and emotionality disrupt memory recall of prior learning, disallowing students to access necessary information during the course of test-taking. Likewise, the AIP model purports that memory recall is disrupted in the present if the stimulus of a negative or maladaptive cognition has been activated by a similar affective valence which is linked to a past, disturbing and traumatic experiences (Shapiro, 2018; Shapiro & Laliotis, 2011). Stated simply, the expression and severity of emotional responses to test-taking are linked by students' accompanying negative or maladaptive cognitions in the present situation.

EMDR is a multimodal, time-sensitive therapy known to reduce negative cognitive distortions and relieve accompanying physiological hyperarousal. Undergirded by the AIP

model, EMDR may provide institutions and CCCs with a time-sensitive, multimodal intervention that impacts the components of TA in the college student population.



## **Chapter III: Research Method and Procedure**

### **Methods**

Test Anxiety (TA) has become a major concern for students. Experiencing psychological interference during test-taking, perpetuated by physiological hyperarousal and negative cognitive concern, directly affects students' ability to be successful in college. Eye Movement Desensitization and Reprocessing (EMDR) is a comprehensive and multimodal therapeutic approach which aims to process dysfunctional negative cognitions that originate with negative past experiences to an adaptive state (Shapiro, 2018). Developed by Francine Shapiro in 1989, the Adaptive Information Processing (AIP) model undergirds the 30-second, therapist-initiated, bi-lateral eye-movements. These movements identify and reprocess emotionally disturbing experiences, linked to an individual's emotional expression or charge, by deliberately triggering the associated trauma network. The purpose of this study was to examine the impact of eye-movement desensitization and reprocessing (EMDR) on college students' self-reported TA. The researcher proposed the use of an A-B, single case research design (SCRD) to examine the impact of EMDR on college students' self-reported experiences of TA as measured by the Test Anxiety Inventory (TAI) (Spielberger, 1980). and its associated subscales which measure "worry" (TAI-W) and "emotionality" (TAI-E).

### **Research Question**

The following research question guided the study:

1. What is the impact of Eye-Movement Desensitization and Reprocessing (EMDR) on college students' self-reported scores on the test anxiety inventory (TAI-T) and its subscales of "worry" (TAI-W) and "emotionality" (TAI-E) (Spielberger, 1980)?

## **Research Design**

This study proposed the use of a non-experimental single case research design (SCRD). Simple time series A-B designs represent the most basic non-experimental approaches and are the least complex SCRCD that allow behavior change to be observed (Ledford & Gast, 2018). Being that TA is considered a syndrome, recording students' self-reported experiences of TA, at the same location, at multiple time intervals allowed for a 'baseline' of test anxious behavior to be observed, as measured by the TAI-T, TAI-E and TAI-W (Spielberger, 1980). Using a SCRCD allowed the researcher to collect repeated observations of the baseline condition until data were stable, and then introduced the intervention of EMDR (Creswell & Guetterman, 2019; Ledford & Gast, 2018). After application of EMDR, TA was again measured, using the same measurement procedures as in the baseline condition. Ledford & Gast (2018) stated that any changes in the target behavior appears to be a function of the intervention. While only correlational conclusions are possible from a simple time series design, straightforward measurements were necessary to begin developing the literary building blocks for future, rigorous SCRCDs to be accomplished (Creswell & Guetterman, 2019; Ledford & Gast, 2018).

The impact of EMDR on college students' self-reported scores on the TAI-T, TAI-W and TAI-E (Spielberger, 1980), was explored by examining a summative analysis of visual graphic data.

### **Participants**

Participants were recruited using flyers, posted around university placards, and within campus techno marketing devices or those who were referred by university community members. Moreover, targeted emails were sent to students to garner participants that were chosen from the potential individuals who met inclusion criteria.

After potential participants notified the researcher of their interest in the study - via the contact information listed on the marketing material – they were provided with an electronic statement of informed consent, asked to complete a “demographic information form,” and set-up an initial meeting to review and sign the informed consent, answer any questions they had, and complete the screening measures.

Out of the fifty-one students who responded with interest in the study, six responded requesting a meeting with the researcher to determine whether they met inclusion criteria with agreement to the terms of informed consent. Two of the six students did not meet inclusion criteria for participation as were referred to on and off campus mental health services as requested. One student who met inclusion criteria withdrew from participation prior to the first baseline data point being recorded due to changes in academic and career interests. This student was referred to on-campus mental health services as requested. One student withdrew from the study following application of the intervention of EMDR and did not respond to three attempts to provide referral resources and support thereafter. Two participants remained out of the initial pool of fifty-one interested students. Both students completed the baseline and intervention phases and the associated assessment, for a total of six and a half weeks of the study.

### ***Screening Criteria (Inclusion/Exclusion)***

It is imperative in any study that the welfare of potential participants and participants be a primary concern of the researcher during the entire process. Albeit, if the researcher can be involved in any preventative work to “do no harm,” ethical requirements are that they do so (American Counseling Association, 2014; Creswell et al., 2018; Ledford et al., 2018). Exclusion criteria for this study were extensive to avoid any possible harm to potential participants or

participants, as well as to limit confounding variables from impacting the study's results (Ledford et al., 2018; Shapiro, 2018).

Students who self-identified as persons who “experience test anxiety,” or were “anxious before taking tests” but did not meet inclusion criteria or were not chosen as study participants were offered a 90-minute session of the EMDR 8-Phase Current Anxiety Protocol, academic support services or counseling. Students who declined services were provided with on and off campus mental health resources and university academic success referrals.

EMDR requires that individuals shift states-of-consciousness, from recalling past experiences, to present awareness, to then transitioning to imagining future experiences. These shifts in states-of-consciousness require a degree of psycho-physiological functioning that may not be possible for persons that have experienced certain health conditions. Due to the multifaceted nature of EMDR, Shapiro (2018) suggested that participants be excluded from administration of EMDR if they self-reported to have experienced, or are currently experiencing, any of the following issues: vision problems, epilepsy, neurological impairment, psychosis, dissociative disorders, or major depression. Potential participants were excluded from participating if they self-reported to have prior suicide attempts, self-harming behaviors or were currently being assessed for diagnoses.

Lastly, participants were excluded if they score >30% on the Dissociative Experiences Scale (DES) (Bernstein, 1986), or below a score of 50 on the Test Anxiety Inventory (TAI) (Spielberger, 1980). Shapiro (2018) stated that a score >30 on the DES (Bernstein, 1986) may suggest that a potential participant maintained a dissociative disorder and should be excluded from treatment for their psychological safety. Shapiro (2018) recommended that if an individual scores >30 on the DES (Bernstein, 1986) a full psychological assessment should be completed to

determine the severity of dissociative symptoms. As a full psychological assessment was beyond the scope of this study, potential participants were excluded from administration of EMDR if they scored  $>30$  on the DES (Bernstein, 1986). Potential participants who were excluded on the basis of their score on the DES were not offered a 90-minute session of the EMDR 8-Phase Current Anxiety Protocol in accordance with Shapiro's (2018) recommendations. They were offered a referral to a local psychologist and community mental health agency who could administer appropriate psychological assessments to determine and identify the student's need for services. Additionally, students were offered case management and academic support services at the university.

Furthermore, potential participants who scored lower than a score of 50 on the TAI (Spielberger, 1980) were excluded. A score below the normalized T-scores (Mean = 50, SD = 10) in the college student population ( $n = 2,578$ ) indicates a lack of test-anxious characteristics (Spielberger, 1980; Szafranski, 2012). While a score below 50 indicates a lack of test anxious characteristics and participants will be excluded on the basis of a score lower than 50, normal outcomes for the TAI and its subscales differ slightly based on sex. For undergraduate males, normalized scores on the TAI-T ( $\mu = 38.48, \sigma = 12.43$ ), TAI-W ( $\mu = 13.61, \sigma = 4.98$ ), and TAI-E ( $\mu = 16.85, \sigma = 5.64$ ) are slightly lower than for females at TAI-T ( $\mu = 42.79, \sigma = 13.70$ ), TAI-W ( $\mu = 14.90, \sigma = 5.51$ ) and TAI-E ( $\mu = 18.94, \sigma = 6.31$ ) (Spielberger, 1980).

### **Practitioner Training**

EMDR was administered by the researcher/practitioner who is a Licensed Professional Counselor-Supervisor (LPC-S) in Oklahoma as well as an EMDR- trained therapist. The researcher/practitioner has worked in the university counseling clinic for eight years, displaying a commitment to mental health in higher education. While college students present with a wide

array of conditions, primarily the researcher/practitioner has developed skills in crisis intervention and in the treatment of anxiety, depression, and trauma.

In Oklahoma, holding a counseling license requires that an individual has completed a Master of Science (MS) and a minimum of 3,000 hours of supervised experience post-degree conferral to gain licensure. Status as a Licensed Professional Counselor (LPC) affords an individual the capacity to independently practice counseling without weekly oversight from a supervisor. With two years of independent practice as a LPC, an individual can gain the status of supervisor. Supervisory status provides that an individual can continue to independently provide counseling services as well as supervise counselors at all stages of development, prior to licensure. Supervisory status changes a counselor's identification from LPC to Licensed Professional Counselor-Supervisor (LPC-S).

“EMDR-trained” denotes a clinician who has completed two intensive EMDR training courses and 10-hours of subsequent supervision, provided by an EMDR Certified Counselor-Supervisor. Training and subsequent supervision ensure the fidelity of the applied intervention, as well as the ethical care of the clients who receive EMDR. EMDR-trained therapists have the option of continuing with supervised-experienced hours toward certification, if desired. However, there is no further training or supervision required of an EMDR-trained therapist to independently practice the modality.

### **Instrumentation**

Several data sources were utilized to add rich, insightful, and contextual information to the visual outcomes of the study's graphic results. This study utilized: (a) a demographic information form; (b) the Adverse Childhood Experiences (ACE) Questionnaire (Finkelhor et al., 2015); (c) the Dissociative Experiences Scale (DES) (Bernstein, 1986); (d) Test-Anxiety

Inventory (TAI) (Spielberger, 1980); (e) the Validity of Cognition (VoC) (Gosselin & Matthews, 1995; Shapiro, 1993) and the (f) Subjective Units of Distress (SUDs) scales (Wolpe, 1990).

## **Screening Instruments**

### ***Demographic Information Form***

The demographic information form was a document developed by the researcher/practitioner to gather contextual information about participants. The form assisted in non-intrusively inquiring about participants' medical or mental health issues that may have excluded them from participating in the study. The demographic information form also assisted the researcher/practitioner in describing participant outcomes during data analysis.

To assist in maintaining the privacy of the participants' information, the form only identified individuals via their university student identification number and a chosen pseudo name. The form was comprised of 32-check-box items and 3 fill-in-the-blank spaces that were sectioned by categories. The three categories were student information, personal information, and medical and mental health history.

### ***The Adverse Childhood Experiences (ACE) Questionnaire***

The Adverse Childhood Experiences (ACE) Questionnaire has become a popular self-report survey for researchers interested in gathering information about the long-term effects of childhood trauma (Finkelhor et al., 2015). While studies have used the ACE to predict negative mental and physical health issues, Finkelhor et al., (2015) stated that the questionnaire was not formulated by any systematic process to do so. The scale is made up of 10 items, 5 of which assess early experiences such as physical abuse, neglect, and sexual abuse. The other 5 items inquire about parental or family incapacities such as parental loss through divorce and death or

abandonment (Finkelhor et al., 2015). The ACE was used to gather information on participants' past trauma histories which assisted in explaining and describing the study's outcomes.

### ***Dissociative Experiences Scale (DES)***

The dissociative experiences scale (DES) (Bernstein, 1986) was originally developed to screen individuals for varying degrees of dissociation. Since the development of EMDR, the DES has gained traction for being used to gauge an individuals' likelihood of maintaining a dissociative disorder and is the most commonly used instrument for assessing such (Lyssenko et al., 2018; Van IJzendoorn & Schuengel, 1996; Shapiro, 2018).

Scale items of the DES have been developed using clinical- data, interviews, scales which measure memory loss, and professional consultation (Bernstein, 1986). On the 28-item survey, individuals were asked to indicate, on a continuum of the percentage of time, how often they experience identified dissociative symptomatology (Bernstein, 1986; Bernstein et al., 1986; Lyssenko et al., 2018; Van IJzendoorn & Schuengel., 1996). The DES developed its criterion of dissociative symptomatology from the Diagnostic and Statistical Manual of Mental Disorders (3<sup>rd</sup> edition) and aims to measure the frequency of disruptions and/or discontinuations of a normal pattern of memory, identity, emotion, perception, and behavior (Bernstein et al., 1986; "Diagnostic and statistical manual..." 1994).

Dissociative symptoms are of high clinical relevance as they are often linked with maladaptive functioning and diagnosable mental health disorders (Lyssenko et al., 2018; Van IJzendoorn & Schuengel, 1996). The experience of dissociative symptoms has been linked to transient stress-related trauma responses in individuals that have had various trauma events occur over the course of their lives. Individuals with dissociative symptoms report disruptions in processing, learning and memory (Lyssenko et al., (2018; Shapiro, 2018). The presence of these



symptoms would interfere with the applicability of EMDR in this study provided that a participant was not screened for dissociative symptoms by the DES (Bernstein, 1986; Shapiro, 2018).

While there has been some controversy over the DES, with scholars citing inconsistency in factor structure (Patihis & Lynn, 2017; Saggino et al., 2020), the DES has displayed good test-retest reliability (Lyssenko et al., 2018; Van IJzendoorn & Schuengel, 1996) with a correlation coefficient of  $r = .84$  in 26 normal subjects across 4-8 weeks (Bernstein & Putnam, 1986).

There are several studies that have supported the DES in maintaining high validity and reliability both in clinical and non-clinical populations (Lyssenko et al., 2018; Van IJzendoorn & Schuengel, 1996). The most notable being a meta-analysis conducted by IJzendoorn & Schuengel (1996) reported a DES internal consistency rating on Cronbach's alpha of 0.93 across 16 -studies. The most impressive outcome that IJzendoorn & Schuengel (1996) reported was that of the predictive validity of the DES when it comes to dissociative disorders as compared to personality disorders ( $d = 1.05$ ,  $r = 0.46$ ). Additionally, Lyssenko et al., (2018) stated that the DES maintains "a high convergent validity with alternative measures of dissociation ( $d = 1.82$ ,  $N = 5,916$ )" (p. 38).

According to Shapiro (2018), participants who scored  $>30$  on the DES should refrain from engaging in EMDR therapy until they have completed a structured diagnostic interview and attended to maladaptive neural network configurations. Individuals who scored  $>30$  on the DES are more likely to maintain a dissociative disorder and may have needed to allow time "for sufficient preparation and stabilization prior to trauma processing" (p. 96).

## **Baseline and Outcome Instrument**

### ***Test Anxiety Inventory (TAI)***

Spielberger (1980) asserted that there are two characteristics of TA that disrupt a student's ability to perform well on academic tests – worry and emotionality. “Worry” is a ruminative process where the student focuses on a negative cognition (e.g., I can't do this, I am too stupid, I am going to fail and never amount to anything in life), leading to an inability to concentrate on the immediate task of test-taking (Szafranski et al., 2012). The second component of TA that Spielberger (1980) outlined is, “emotionality.” Emotionality consists of physiological hyperarousal (e.g., muscle tension, increased heart rate, upset stomach, etc.) of which the symptoms are said to be “intrusive” and can deter a student's focus from an exam. Emotionality can exasperate a student's experienced worry, therefore leading them to have difficulty with memory-recall of previously studied material (Szafranski et al, 2012). Desiring to have an instrument that measured the two components of TA, Spielberger (1980) developed the Test-Anxiety Inventory (TAI-T) (Spielberger, 1980). The TAI-T is a self-report, 20-item Likert scale survey with two subscales that measure current, experienced worry (TAI-W) and emotionality (TAI-E) (Spielberger, 1980) and has strong, time-tested psychometric properties (Enright et al., 2000; Szafranski et al., 2012).

### ***Validity and reliability of the TAI***

Since its development by Spielberger (1980), the TAI-T has been supported as a valid and reliable instrument. Validity coefficients are said to be .82, with reliability for acute-time span (two- to four- week intervals) being ( $r = .80$ ) (Szafranski et al, 2012). Reliability testing of the TAI-T (Spielberger, 1980) indicated that the inventory has a good test-retest and half-split reliability rating. Using the Kruskal-Wallis and post-hoc comparison scores, internal consistency of the TAI-T (Spielberger, 1980) was supported, as the item-scale score correlations were significant in at least eight populations (Szafranski et al., 2012).

In a study conducted by Szafranski et al. (2012), the TAI-T (Spielberger, 1980) exhibited a continued, strong internal consistency with Cronbach alphas for males (.95) and females of (.95). Whereas when Spielberger (1980) normed the TAI-T on the college student population, Cronbach alpha levels were reported as .94 and .95 for males and females (Szafranski et al., 2012). On the TAI-W, Spielberger (1980) reported alphas of .88 and .90 for males and females whereas Szafranski et al (2012) discovered Cronbach alphas of .90 and .91 for current undergraduate males and females. According to Szafranski et al., (2012) the TAI-E, reported Cronbach alphas of .90 and .91 for males and females with Spielberger (1980), whereas Szafranski et al., (2012) found .92 and .91 for current undergraduate males and females (Szafranski et al., 2012, p. 671).

While the Cronbach alpha levels reported by Szafranski et al., (2012) appear to support the TAI-T and its subscales as valid and reliable, Szafranski et al., (2012) cited limitations in using the instrument with current studies. Szafranski et al, (2012) purports that the current demographic of the college student body has changed since Spielberger normed the assessment in 1980. Wherefore, Szafranski et al (2012) suggested that current, applicable, student norms be considered when reporting research outcomes which employed the TAI-T as an outcome measure.

This study proposed the use of the TAI-T (Spielberger, 1980) as a screening tool. Participants who scored less than 50 on the TAI-T (Spielberger, 1980) were excluded, as this score indicated a lack of test anxious characteristics. Additionally, the TAI-T (Spielberger, 1980) was used as the baseline and outcome measurement from which the components of TA, worry and emotionality, were observed.

## **Process Measures**

According to Ray (2015), it is important to consider supplemental measures to support the outcomes of a study's primary instrument, as well as to provide insight into participant expressions that may not be readily observed. The use of the Validity of Cognition (VoC) (Gosselin & Matthews, 1995) and the Subjective Units of Distress scales (SUDs) (Wolpe, 1990) provided outcome data with unique perspectives of the participants' experiences during the intervention phase. The VoC (Gosselin & Matthews, 1995)

### ***Subjective Units of Distress (SUDs) Scale***

The Subjective Units of Distress scale (SUDs) measures distress on a Likert scale ranging from (0 = None to 10 = the worst possible) (Hiebert & Fox, 1981; Shapiro, 2018; Wolpe, 1990). The SUD scale is used in EMDR to measure a participant's self-monitoring capacity to report the subjective experience of emotionality and worry (Hiebert & Fox, 1981; Shapiro, 2018).

### ***Validity of Cognition Scale (VoC)***

The Validity of Cognition (VoC) (Gosselin & Matthews, 1995) scale is a self-report Likert scale with a range of (one = completely untrue to seven = completely true) that aims to measure the subjective believability of the positive cognition identified by the participant during the reprocessing phase of desensitization in EMDR (Shapiro, 2018). During the reprocessing phase of EMDR, the participant is asked to report the degree to which they believe their identified positive cognition is held as completely untrue or completely true. In this way the VoC (Gosselin & Matthews, 1995) aims to quantify a participant's self-perception of a positive thought independently of any treatment intervention (Shapiro, 2018).

## **Procedure**

### **Site**

The study took place at a small, regional university in the mid-west United States. The university's origins date back to the early 1900's when it was known as a Cherokee female seminary college. At the time of the study, student demographics reflected the history of the institution as the population of approximately 7,500 students was comprised of non-traditional, female, undergraduate students. The university was also a Native-serving and military-friendly institution, making the student population diverse and in need of a high level of support to be academically successful.

The institution funded counseling services to provide individual and academic support to its diverse student population. The on-campus counseling clinic, housed under the office of student affairs, comprised of one administrator who is fully licensed to practice counseling in Oklahoma, one full-time senior clinical coordinator/therapist who is fully licensed to practice and supervise in Oklahoma and three additional, full-time mental health practitioners with varying certifications and degree holdings. Additionally, the counseling office served as an immersive learning facility for developing undergraduate and graduate student-counselors from the social work and psychology fields to complete requirements for their degree plans.

The mission of the counseling clinic was to provide students with short-term psychological and academic assistance. The clinic offered time-efficient mental health services such as but not limited to solution-focused and cognitive behavioral therapies, EMDR, crisis intervention, support groups, case management and referral services.

The DES (Bernstein, 1986) and TAI (Spielberger, 1980) assessments were administered in a designated room within the counseling clinic. The student room was used for the provision of informed consent, participant screenings, and baseline assessment phases. The administration of the intervention and study closing also occurred in a student room. The intervention room

included “comfortable” lighting, a couch and office furniture that created a relaxing environment. Maintaining a consistent student testing room location and adjacent office provided the participants with continuity throughout the research process and a space which exudes privacy and confidentiality (Creswell & Creswell., 2018; Ledford & Gast, 2018).

### **Informed Consent**

Individuals who contacted the researcher/practitioner expressing interest in the study were provided with the informed consent to review. Following continued interest after reviewing the informed consent, individuals were complete the demographic information form, the ACE (Finkelhor et al., 2015), and the screening measures. During this initial meeting, the researcher explained the research purpose, procedures, any benefits, or changes in individuals or organizations that might reasonably be expected, potential power differentials, timeline, informed consent, limits of confidentiality, and the target audience for dissemination of the research (“American Counseling Association...” 2014; Creswell & Creswell, 2018). Potential participants were asked to opt-in or opt-out of participating and receiving treatment via the signing of a consent form for participation in the research project. Moreover, potential participants were informed of their right to withdraw from participation in the study at any time, or for any reason, without consequence (Creswell & Creswell., 2018).

After the initial meeting, the researcher/practitioner contacted potential participants to explain their outcomes on the screening measures and whether their outcomes recommend them for inclusion or exclusion in the study. Lastly, the researcher individually scheduled the second meeting with each of the participants (Ray, 2015; Shapiro, 2018).

At the close of the phase protocol and data collection, each participant was offered a follow-up meeting and provided with further information on psychological support and academic

success services. All participants were encouraged to report any questions or ethical concerns to the Director of Counseling Services, university administration and/or to the Institutional Review Board's (IRB) Coordinator, in the Office of Compliance at the University of Arkansas, Fayetteville.

### **Baseline**

According to Ray (2015) establishing a stable baseline is paramount to the integrity of single case research designs (SCRD). Being that the proposed method of assessment is the TAI-T, (Spielberger, 1980) and a score below 50 may indicate a lack of test-anxious characteristics, baseline criterion was set at a minimum score of 50 (Spielberger, 1980). A consistent score of or above 50 on the TAI-T (Spielberger, 1980), at approximately five to eight time points established stability of test anxious characteristics in the participant (Ledford et al., 2018; Ray, 2015). Once stability of test anxious symptoms were achieved, the researcher introduced the intervention of EMDR. However, in the case of one participant, a consistent baseline of significant behavior would not be established, wherefore, due to time-limiting factors the researcher decided to continue with a less than desired stability of measure, noting the changes-made, as a limitation of the study in the results (Ray, 2015).

### **Phase Protocol**

In this study, the baseline assessment was scheduled in days. A baseline measurement was taken every Tuesday and Friday, where the minimal latency between the first baseline assessment and the administration of the intervention was three weeks. The same is true for the second phase of post-intervention assessment, which correlated with reliability coefficients for the TAI-T (Spielberger, 1980). While the TAI (Spielberger, 1980) maintains 'good' reliability coefficients ( $r = .80$ ) for acute time spans, when the measure is used to test-retest over a six-

month period, the reliability drops significantly, ( $r = .62$ ) (Szanfranki et al., 2012, p.668). This facet of the measure did not limit the TAI's (Spielberger, 1980) use in this proposed study, whereas the post-test procedure was accomplished no more than two-to four-weeks following the administration of the intervention of EMDR (Szafranski et al, 2012).

To implement the intervention, baseline criterion must be met by each participant. The following phase protocol, displayed in Table 1, was proposed:

**Table 1**

*A-B single case research design: phase protocol*

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Phase	Day	TU.1	FR.2	TU.3	FR.4	TU.5	FR.6	MON.7	TU.8	FR.9	TU.10	FR.11	TU.12	FRI.13
Phase A	A	A	A	A	A	A	A	B	B	B	B	B	B	B
Phase B	N	N	N	N	N	N	N	EM	N	N	N	N	N	N
Data Collect.	DES TA	TA	TA	TA	TA	TA	TA	VoC, SD	TA	TA	TA	TA	TA	TA, CD

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*Note.* TU = Tuesday; FR = Friday; MON = Monday; “#” = Number of TAI administration; DES = Dissociative Experiences Scale; TA = Test Anxiety Inventory; EM = EMDR; VoC = Validity Cognition Scale; SD = Subjective Units of Distress Scale, CD = closing



## **Intervention**

Operating on the theoretical foundation of the Adaptive Information Processing (AIP) model, EMDR is a systematic, 8-phase psychological intervention that uses a collection of techniques, with a primary focus on bi-lateral eye-movements, to desensitize and simultaneously re-structure past distressing and maladaptively stored memories (Shapiro, 2018; Shapiro et al., 2011).

Originally developed by Francine Shapiro in 1987, the present EMDR intervention utilizes 8-phases that coincide with the outcome goals of the Three-Pronged Protocol. The Three-Pronged Protocol of past, present, and future orients the application of EMDR toward congruence with AIP model.

## **Application of EMDR on Test Anxious Behavior**

The AIP model asserts that pathology experienced in present situations, especially maladaptive affective and physiological responses, are due to inadequately processed memories and responses which were encountered in the past (Chamberlin, 2019; Gerwing et al., 2015; Shapiro, 2018; Shapiro et al., 2011). Shapiro (2018) states, “earlier life experiences...set-in motion a continued pattern of affect, behavior, cognitions, and consequent identity structures” (p. 15). The AIP model employs the perspective that, across the clinical spectrum – from PTSD, phobias, panic disorders, depression, and dissociation – pathology has been configured by the impact of earlier experiences “that are held in the brain in state-specific form” (Shapiro, 2018, p. 16).

The technical components of EMDR allow an individual to access improperly stored memory, through the retrieval, targeting and re-structuring mechanism of eye-movements to a more adaptive resolution (Shapiro, 2018). Shapiro (2018) postulates that during the reprocessing

phase of EMDR, the technique of rapid, bi-lateral eye movements, simulates the brain's natural cataloging process that takes place during REM sleep. While Shapiro (2018) admits that she is unsure of the exact mechanism of change in EMDR, she states that "there appears to be a neurological balance in a distinct psychological system that allows information to be processed to an adaptive resolution. Theoretically speaking, adaptive resolution is that behavioral response that occurs when connections to appropriate associations are made and the experience is integrated into a positive emotional and cognitive schema" (p. 26).

Together, the Three-Pronged Protocol guides practical use of the AIP via EMDR mechanisms by focused participant therapeutic work on: (1) identifying and targeting past distressing memories and associated negative cognitions, (2) identifying and targeting present experiences that trigger affective and/or physiological disturbances, and (3) processing behaviors needed for adaptive functioning to identify templates for positive, future action (Shapiro et al., 2011; Shapiro, 2018).

Through the AIP model, the object of an academic test would be identified as the present trigger, ignited by a past memory to which present negative affective and physiological responses (i.e., emotionality) – as well as negative cognitions (i.e., worry) are engaged. The subsequent behaviors include test anxious responses, expressed by the individuality of the person experiencing them.

### **EMDR 8-Phase Current Anxiety Protocol**

The following phases outlined and described the sequential, standard 8-phase EMDR protocol as integrated with the symptom-based current anxiety protocol (Shapiro, 2018). The intervention of EMDR was administered during one, 90-minute session and is described below.

***Phase 1: History Taking***

During this initial phase, the therapist and participant discussed previously experienced incidents of TA as historical events leading themselves to the present behavioral dysfunction. The participant and therapist engaged in a form of talk-therapy as the participant discussed and described “a history” of experiences related to TA. Due to the symptom-based, current anxiety protocol, history taking (only) included up to 10 participant experiences (Shapiro, 2018).

***Phase 2: Preparation***

This phase of treatment – preparation –included discussion of the participant’s experienced TA. Then, the participant chose a negative cognition that appeared to express the state of self-experience correlated to their participation in test taking (Shapiro, 2018). The therapist then determined the specific target memory to be used as the focus of reprocessing as described by the participant as the first or worst experience related to TA (Shapiro, 2018).

***Phase 3: Baseline assessment***

Next, the participant identified the affect, body sensations and negative cognitions (as chosen from the preparation phase) that were related to the target TA experience. Participants also chose a positive cognition for-installation following reprocessing. The positive cognition was assessed via the VoC (Shapiro, 1993) and countered the experienced negative cognition (Shapiro, 2018). The participants rated these associations on the SUD (Wolpe, 1990) and VoC scales (Shapiro, 1993) respectively (Maxfield, 1999; Shapiro, 2018).

***Phase 4: Eye-movement desensitization***

This fourth phase of the procedure encompassed approximately 60 minutes of the 90-minute session. In the desensitization phase, the participant held -in- mind the image of their first or worst distressing TA experience, in addition to a negative cognition, the associated body

sensations and affect, while simultaneously moving their eyes back and forth following the therapist's fingers (Shapiro & Maxfield, 2002; Shapiro, 2018)

Reprocessing focused on the participant's negative affect, which was the target of the desensitization connected to negative test taking experiences, and in reflected in the SUDs (Shapiro & Maxfield, 2002; Shapiro, 1993; Shapiro, 2018). The therapist completed approximately 24-60 traverses of back-and-forth eye movements, lasting about 30 seconds each. Following each set, the therapist asked the participant "what" (i.e., memory, affect, cognition, etc.) emerged during the eye movements, or if (only) previously reported information was experienced. If, only, previously experienced material emerged-more than once, the therapist returned to take an inventory of SUDs (Shapiro, 2018). During the desensitization phase the therapist repeated the sets of bilateral stimulation (eye movements), until the participant's SUD (Wolpe, 1990) reached 0 or 1, or was "ecologically appropriate" (Shapiro, 2018, p. 68).

In alignment with the symptom-based current anxiety protocol, if dissimilar (i.e., those apart from anxiety experienced during test taking) experiences arose the therapist offered discussion of those experiences to occur in phase 8 and reprocessed during debriefing of the study.

### ***Phase 5: Installation***

The focus of this phase was on accentuating and strengthening a participant's choice positive cognition. The participant was asked to hold "the most appropriate" positive cognition in mind, along with the target, TA experience. "The most appropriate" positive cognition was determined by the participant and therapist as one that more accurately reflects a positive, yet rational self-statement, which may combat or compete with the participant's negative cognition

(Shapiro, 2018). Then the therapist began bi-lateral eye movements, checking on the VoC scale periodically, until the participant reported a VoC of 7 (Shapiro, 2018).

#### ***Phase 6: Body scan***

This step of the procedure was meant as a quality control phase whereas the therapist checked the participant's reduction of hyperarousal by asking them to mindfully scan their body. The body scan occurred by the participant closing their eyes and noticing if there is any emotional distress or tension in the body; if so, sets of bilateral eye movements were completed to eliminate these (Shapiro & Maxfield, 2002; Shapiro, 2018).

#### ***Phase 7: Closure***

In this phase, the participant prepared to leave the session. During closure, the therapist debriefed the participant by offering resources for continued therapeutic participation, emergency response needs, and general coping mechanisms. The therapist reminded the participant that there is a possibility that disturbing thoughts, emotions, body sensations and images may reemerge following the completed reprocessing (Shapiro, 2018). If the participant experienced any reemerging of past-events and was not an imminent harm to themselves or others, they were instructed to externalize (i.e., create psychological distance) their experience via writing it down on a log or journal (Shapiro, 2018, p. 70).

#### ***Phase 8: Reevaluation***

The final stage of the standard protocol is generally implemented at the beginning of subsequent reprocessing sessions. Reevaluation is a time when the participant and therapist consider memories which surfaced during the reprocessing phase and were not fully reprocessed due to session time constraints (Shapiro, 2018). Due to the nature of this study, reevaluation included discussion of non-test anxiety related memories (if any) that surfaced for the participant

during reprocessing, as well as the option to receive appropriate, continued reprocessing during debriefing, or a referral to local psychological services, as desired.

### **Data Analysis**

This study proposed a visual analysis of graphic data to determine whether: (a) the EMDR Protocol for Current Anxiety impacted scores of emotionality on the TAI-E (Spielberger, 1980) in three college students; (b) the EMDR Protocol for Current Anxiety impacted scores of worry on the TAI-W (Spielberger, 1980) in three college students, (c) the EMDR Protocol for Current Anxiety impacted total scores on the TAI-T (Spielberger, 1980) in three college students, and (d) whether these results suggested a correlational relationship between the intervention of EMDR and college students' baseline scores on the TAI-T (Spielberger, 1980).

In single case studies, visual analysis of graphic data is one of the eldest techniques in social science research (Kratochwill et al., 2015; Ledford & Gast, 2018; Long et al., 1995). Graphic data from participant baseline scores was systematically evaluated to determine whether characteristics of the data patterns suggest a demonstration of effect between the intervention of EMDR and participants' baseline scores on the TAI-T, TAI-W and TAI-E (Ledford & Gast., 2018; Spielberger, 1980).

A visual analysis of graphic data included systematic evaluation via determining the level, trend, variability, stability, immediacy of change, overlap, and consistency (Ledford & Gast, 2018) of participant scores on the TAI-T, TAI-W and TAI-E (Spielberger, 1980).

### ***Level***

The term level denotes a low, moderate, or high representation on an ordinate scale value given to the frequency of behavior that occurs (Ledford et al., 2018). In this study, level referred to the participant's mean scores on the TAI-T, TAI-E, and TAI-W (Spielberger, 1980).

### ***Trend***

The slope and direction of the data points, over time, is referred to as the “trend” of the graphic data (Ledford et al., 2018) Whether the data points are increasing, decreasing, or remaining the same can all be evaluated by observing the trend of data overtime. In this study, the trend of the participant’s scores on the TAI-T, TAI-E and TAI-W (Spielberger, 1980) was graphed.

### ***Variability and stability***

Ledford et al., (2018) states, “...variability can be summarized as the range of data values within a condition or as the percentage of data points falling within a given stability envelope” (p. 185). Stability is the predictability, or lack of fluctuations, in adjacent data points (i.e., do the data consistently and continuously move in a similar magnitude and direction). This portion of the systematic evaluation was accomplished by calculating differences between data points using the standard deviation and range in each phase.

### ***Immediacy of Change***

The evaluative factor, immediacy of change, refers to the degree that behavior change (noted by the variability) occurs following the application of the intervention (Ledford et al, 2018). For example, if a participant’s scores on the TAI-E and TAI-W (Spielberger, 1980) were stable but abruptly decrease following the intervention of EMDR, the variability between adjacent data points indicates the degree of the immediacy of change.

### ***Overlap & Consistency***

Overlap is an important evaluative tool in SCRD. Overlap refers to the reported values in one condition that exist in the same range of values in the second condition (Ledford et al, 2018). Observing equivalent values in both conditions is inversely related to the data that is taken at

implementation of the intervention. For example, imagine that a student's scores on the TAI-T (Spielberger, 1980) are identified as high (level) in the first baseline phase; treatment is administered and the student's scores decrease; during the second condition it is observed, at the withdrawal of the intervention, that the student's scores increase (*overlap*), appearing like scores in the first condition; these results lend credibility to the existence of a relationship and are therefore identified as overlap (Ledford et al., 2018). Consistency, therefore, is the extent to which data patterns in one condition (scores observed prior to the intervention) are similar to data patterns in other conditions (scores observed post-intervention) (Ledford & Gast, 2018, p. 194).

### **Tau-U**

In SCRD, the Tau-U can be used as a non-parametric measure of effect size (Gamst et al, 2008; Parker et al., 2011). Effect size in SCRD provides that there can be an estimation of the overall magnitude of behavior change that is statistically analyzed and falls between -1 and 1 (Brossart et al., 2018; Ledford & Gast, 2018; Parker et al., 2011; Ray, 2015). There is no agreed upon method or standard for effect size estimation in SCRD being that the validity of outcomes is somewhat dependent on whether the research is typical of the context which is being studied. Wherefore, the magnitude of behavior change in SCRD cannot be compared to normal data and must rely on comparisons of an individual's initial data point, such data points adjacent to each other and those across phases (Ledford & Gast, 2018; Lenz, 2013; Parker et al., 2011).

Historically, several methods were used to compare data within and across participants in SCRD. These approaches have included effect sizes models that compared data as a Percentage of Nonoverlapping Data (PND), Percentage of Data Exceeding the Median (PEM) and a Percentage of All Nonoverlapping Data (PAND) across phases (Lenz, 2013). More recently



approaches such as the Tau-U, are beginning to establish themselves as the preferred method of researchers for effect size comparison (Brossart et al., 2018; Parker et al., 2011).

Tau-U is a non-parametric correlation coefficient between  $-1$  and  $1$ , that does not require a normal score distribution to rank outcomes. Tau-U ranks the number of concordant or discordant pairs in the intervention phase based on the number of data points in the baseline phase, beginning with the first data point (Parker et al., 2011). Tau-U rank correlation is stated to be a robust measure of non-overlap (based on data in the baseline phase) and can account for scores that are considered outliers to the stability of baseline behavior in the intervention phase (Brossart et al., 2018; Parker et al., 2011). Accounting for outliers and baseline behavior contrasts with prior effect size comparisons (i.e., PND, PEM and PAND) that traditionally observe similar scores within or across phases without considering trends (Brossart et al., 2018; Lenz, 2013; Parker et al., 2011). According to Lenz (2013) to quantify the differences between two means, the values of .50, .50-.69, .70-.89 and .90 and greater can be interpreted as not effective, small, medium, and large (Scruggs & Mastropieri, 1998).

## Chapter IV: Results

The researcher implemented a single-case research design (SCRD) to examine the impact of Eye-movement Desensitization and Reprocessing (EMDR) on college students' self-reported scores on the Test Anxiety Inventory (TAI-T) and its subscales of worry (TAI-W) and emotionality (TAI-E) (Spielberger, 1980). For the TAI-T, TAI-W and TAI-E (Spielberger, 1980). Lower numbers on the TAI-T, TAI-W and TAI-E (Spielberger, 1980) indicate less current, overall TA, less worry and less emotionality when participants consider testing situations. The TAI-T and its subscales of worry, TAI-W and emotionality TAI-E (Spielberger, 1980) were used to track changes between the baseline and intervention phases.

Scripted within EMDR as process measures (Shapiro, 2018), the Validity of Cognition scale (VoC) (Gosselin & Matthews, 1995) and the Subjective Units of Distress (SUD) scale (Wolpe, 1990) were used to assess participants' experiences during the 90-minute EMDR session. The VoC (Gosselin & Matthews, 1995) measured the subjective believability of the positive cognition identified by the participant during the reprocessing phase of desensitization. The SUD scale (Wolpe, 1990) measured participants' subjective experience of emotionality and worry relative to past distressing or disturbing memories linked to TA. The VoC (Gosselin & Matthews, 1995) and SUD (Wolpe, 1990) scales will provide contextual information to participants' TAI-T, TAI-W and TAI-E (Spielberger, 1980) scores in the intervention phase.

In the following sections, I present the results from the study using the visual graphic analysis of data for the TAI-T, TAI-W, and the TAI-E (Spielberger, 1980). The data is presented for each individual participant in tables and graphs. The tables will display the following: level (mean), trend, variability, immediacy of change, and overlap (Tau-U). The Tau-U score provides an effect size for each participant. The graphs will display each observation for every participant

across the phases. In each section I will discuss the comparison of data from phase A to phase B.

### **Participant One: Phillip**

Phillip's baseline (phase A) lasted three weeks with a total of 7 data points and his intervention (phase B) lasted three weeks with a total of six data points. In total, Phillip participated in the study for six and a half weeks and had a total of 13 data points. Table 2, Table 3 and Table 4 provides the following data for Phillip's outcomes on the TAI-T, TAI-W, and TAI-E (Spielberger, 1980): level (mean), trend, variability (standard deviation and range), immediacy of change, and Tau-U (effect size).

**Table 2***Phillip's Visual Analysis of Data: TAI-T*

Metric	Phase	Result
Level (Mean)	A	53.71
	B	31.33
Trend	A	Stable
	B	Steep deceleration
Variability (SD, Range)	A	2.21; 7
	B	7.17; 20
Immediacy of Change	A to B	Rapid, abrupt change
Consistency of Data	A to B	Inconsistent
Tau-U	A to B	-1

**Table 3***Phillips Visual Analysis of Data: TAI-W*

Metric	Phase	Result
Level (Mean)	A	24.14
	B	12.833
Trend	A	Accelerating
	B	Steep deceleration
Variability (SD, Range)	A	2.91; 7
	B	4.07; 11
Immediacy of Change	A to B	Rapid, abrupt change
Consistency of Data	A to B	Inconsistent
Tau-U	A to B	-0.98

**Table 4***Phillips Visual Analysis of Data: TAI-E*


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Metric Phase Result		
Level (Mean)	A	19.28
	B	12
Trend	A	Gradual deceleration
	B	Steep deceleration
Variability (SD, Range)	A	1.38; 4
	B	2.36; 7
Immediacy of Change	A to B	Delayed change
Consistency of Data	A to B	Inconsistent
Tau-U	A to B	-1

---

## Level

The level of scores across the baseline for the TAI-T in Phillip's case was 53.71, which indicated a clinically significant level of test anxious behavior across the data points. On the TAI-W, Phillip's level was recorded as 24.14 which placed his scores in the 95<sup>th</sup> percentile for college undergraduates (Spielberger, 1980). On the TAI-E, Phillip's level ( $\mu = 19.28$ ) placed his scores in the 70<sup>th</sup> percentile.

The level of scores across the intervention phase for the TAI-T was 31.33, which indicated a lack of test anxious characteristics across the data points. On the TAI-W, Phillip's level was recorded at 12.83 which placed his scores in the 51<sup>st</sup> percentile (Spielberger, 1980). For the TAI-E, Phillip's level was recorded at 12 which places his scores at the 25<sup>th</sup> percentile for undergraduate college students (Spielberger, 1980). In the baseline phase, Phillip's level indicated a clinically significant amount of test anxious behavior. Based on his level change from baseline to intervention, it appears that Phillip's level decreased below significance, indicating a low amount of test anxious behavior

## Trend

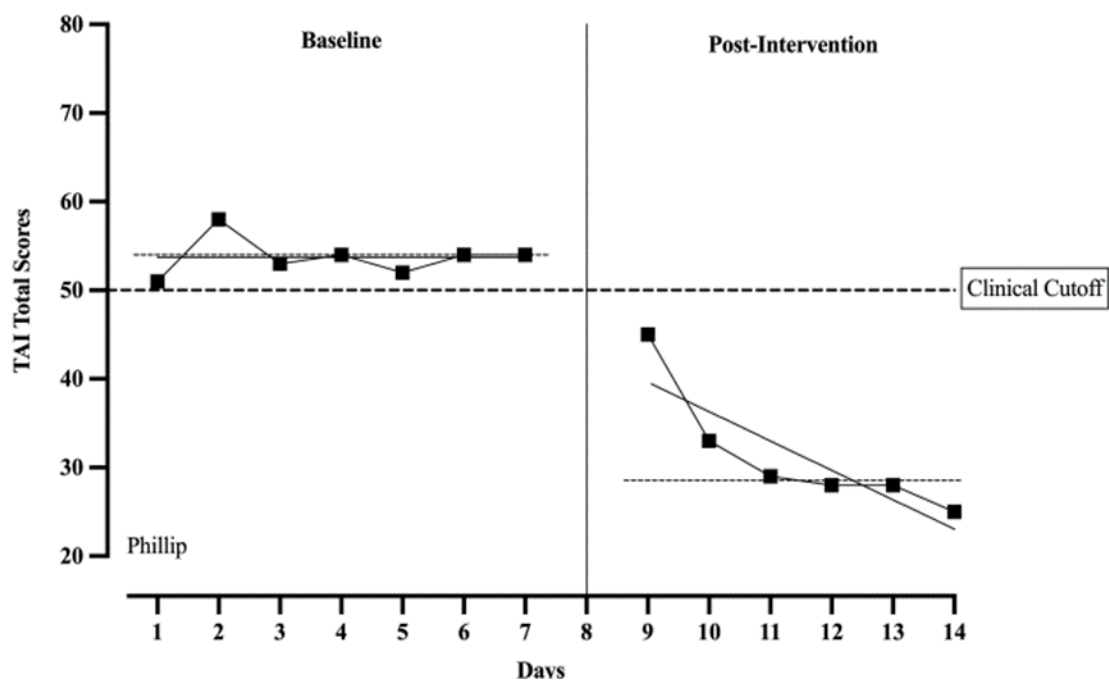
**TAI-T.** In baseline phase, Phillip's scores displayed a steep acceleration in TAI-T scores from point one to two, followed by a steep deceleration from point two to three, and subsequent zero-celerating and stable data trend from points three to seven. This data trend is therapeutic to test anxious characteristics measured by the TAI-T in that there was acquisition of the target behavior (i.e., decreased reported test anxiety) between points three and seven.

In the intervention phase, Phillip's scores on the TAI-T displayed a therapeutic steep deceleration from points nine to twelve, followed by a zero-celerating trend from points twelve to thirteen and a deceleration score from points thirteen to fourteen. Figure 1 provides Phillip's

TAI-T outcomes in visual graphics. The trend of therapeutic deceleration of data from the baseline to intervention phases suggests that EMDR positively impacted Phillip's test anxious behavior.

**Figure 1**

*Phillip's Visual Graphed Outcomes: TAI-T*



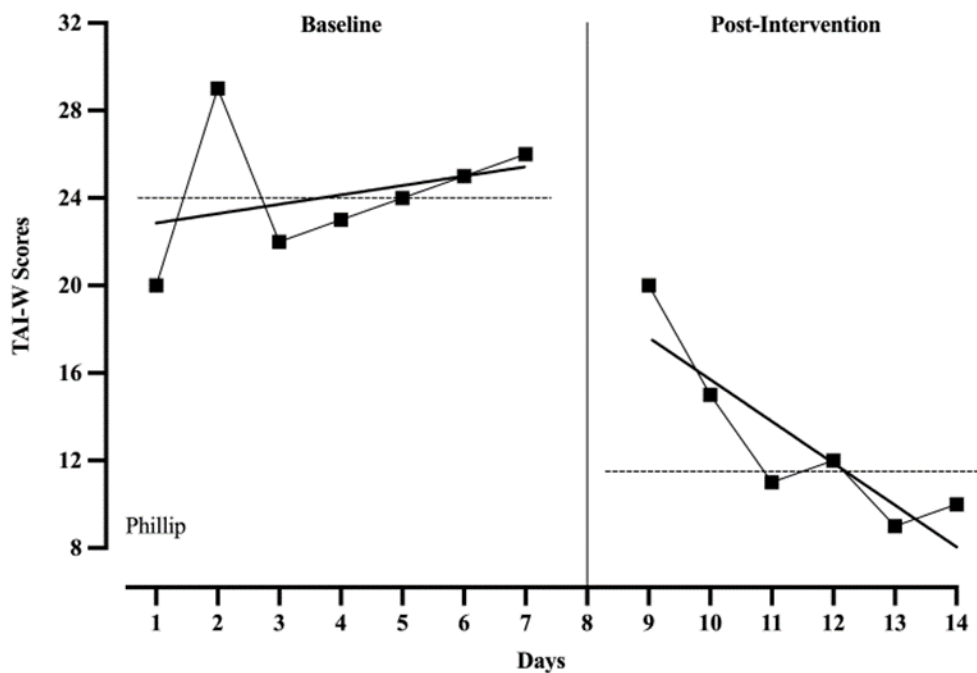
*Note.* Brown et al. 2023



**TAI-W.** On the TAI-W, Phillip's scores displayed a steep acceleration from baseline measurement one to two, with a steep deceleration from measurement two to three, followed by a gradual acceleration in worry characteristics from measurement three to seven. On the TAI-W, Phillip's scores displayed a steep decelerating trend from points nine to eleven, followed by an acceleration between points eleven to twelve. From points twelve to thirteen there was a gradual deceleration with an acceleration between points thirteen and fourteen. Figure 2 provides Phillip's TAI-W outcomes in visual graphics. The therapeutic steep deceleration trend of data from the baseline to intervention phases suggests that EMDR positively impacted Phillip's test anxious behavior.

**Figure 2**

*Phillip's Visual Graphed Outcomes: TAI-W*

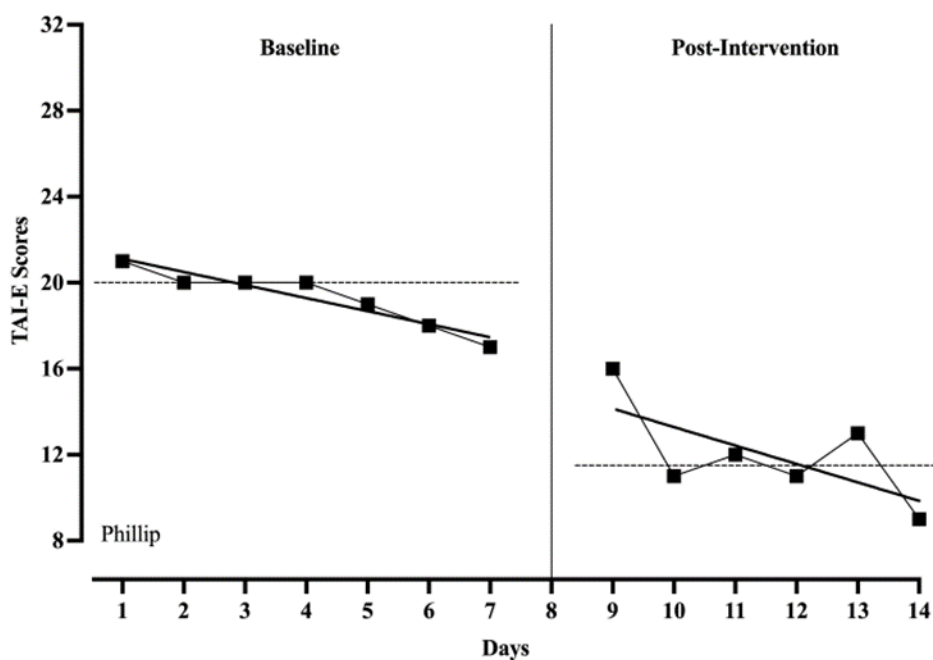


*Note.* Brown et al. 2023

**TAI-E.** Phillip's scores on the TAI-E in the baseline phase displayed a gradual decrease in scores from point one to two, a zero-celerating trend from points two to four and a decelerating trend from points four to seven. On the TAI-E scores displayed a steep deceleration from points nine to ten, an acceleration between points ten to eleven, followed by a deceleration between points eleven to twelve. The scores accelerated from points twelve to thirteen, followed by a steep deceleration from point thirteen to fourteen. Figure 3 provides Phillip's TAI-E outcomes in visual graphics.

**Figure 3**

*Phillip's Visual Graphed Outcomes: TAI-E*



*Note.* Brown et al. 2023

### **Variability (Standard Deviation and Range)**

Variability is the fluctuation from one data point to another and is the opposite of stability. When data do not demonstrate stability, they are described as highly variable or somewhat variable with or without numerical quantification (Ledford & Gast, 2018). However, when described by numerical quantification, the range of data values and the amount of data that falls within a phase are reported using the standard deviation and range within a phase (Ledford & Gast, 2018). Data are described as stable, or variable based on the predicted pattern of test anxious behavior in the baseline condition.

In the baseline phase, Phillip's scores displayed stability of test anxious characteristics on the TAI-T with a level of 53.71,  $\sigma = 2.21$  and a range of 7. The stability of test anxious characteristics was also observed on the subscale of worry and emotionality. Phillip's scores on the TAI-W had a range of 7 and  $\sigma = 2.91$ . The subscale of emotionality displayed a range of 4 and  $\sigma = 1.38$ .

In the intervention phase, Phillip's scores dropped below significance ( $\geq 50$ ) on the TAI-T. The scores were observed as highly variable with a level of 31.33, a range of 20 and  $\sigma = 7.17$ . Similarly, Phillip's scores on the TAI-W and TAI-E were observed to be highly variable with a level of 24.14, range of 11,  $\sigma = 4.07$  and level of 12, a range of 7, and  $\sigma = 2.36$  respectively. The stability of data in the baseline phase that demonstrated a decreasing and highly variable pattern in the intervention phase suggests that EMDR did impact Phillip's test anxious behavior.

### **Immediacy of Change**

Immediacy of change reflects the degree to which behavior change occurs across conditions and is determined by the change in level that occurs immediately following the introduction of the intervention (Ledford & Gast, 2018). Changes in behavior that occur after the

introduction of a new condition are indicative of an immediately effective intervention and are described as “immediate” or “powerful” (Ledford & Gast, 2018, p. 191). An immediate change in behavior from one phase to the next appears to be an effect of the intervention. In this case, an immediate change in test anxious behavior following the application of EMDR would indicate that it does impact the components of worry and emotionality.

Visual analysis of Phillip’s scores on the TAI-T (Spielberger, 1980) from baseline to intervention displayed an immediate change in data of 9 points and a change in level from baseline 53.71 to intervention 31.33 phases. This immediate change is supported by Phillip’s outcomes on the TAI-W. Visual analysis of data on the TAI-W displayed an immediate decrease in data by 6 points. The immediate change in behavior is supported by the change in level from 24.14 to 12.83. The immediate change of test anxious behavior in Phillip’s case can be inferred to the intervention.

Phillip’s scores on the TAI-E did not display an immediate change of behavior from baseline to intervention phase, as the change in data decreased by 1 point. However, the change in level from baseline of 19.28 to intervention of 12 suggests that there was a delayed change in test anxious behavior as measured by the TAI-E.

### **Consistency & Overlap (Tau-U)**

On the TAI-T, there is no overlap of data that occurs between phase A ( $\mu = 53.71$ ) and phase B ( $\mu = 31.33$ ). No overlap was observed on the TAI-W in the baseline ( $\mu = 24.14$ ) and intervention phases ( $\mu = 12.83$ ). A similar relationship was observed on the TAI-E in the baseline ( $\mu = 19.28$ ) to the intervention phase ( $\mu = 12$ ). With the differences that were observed between phase A and phase B, data are inconsistent and indicate an absence of overlap. These factors indicate that there was behavior change observed across conditions that suggests that there was a

demonstration of effect on TA (as measured by the TAI-T, TAI-W, and TAI-E), via the intervention of EMDR.

**Tau-U.** The Tau-U is a non-parametric measure of effect size that ranks the number of concordant and discordant pairs beginning with the first data point in the baseline phase (Brossart et al., 2018; Parker et al., 2011). The comparison of adjacent data points accounts for trends in the baseline condition. Wherefore, across phase comparisons of outcomes are more likely to demonstrate adequate power for a short data series. Without consideration of whether a baseline trend is present could provide that the magnitude of behavior change is overestimated by an effect size outcome (Brossart et al., 2018; Parker et al., 2011). Lenz (2013) identifies that the values of .50, .50-.69, .70-.89 and .90 and greater can be interpreted as not effective, small, medium, and large (Scruggs & Mastropieri, 1998). Phillips's Tau-U (effect size) for the TAI-T, TAI-W and TAI-E are displayed in Table 5. There was no presence of a baseline trend for the TAI-T, TAI-W, and TAI-E whereas there was no need to correct for baseline. The Tau-U for the TAI-T returned a large effect size (-1), whereas comparisons on the TAI-W returned a large effect size (0.98) and a large effect size on the TAI-E (-1).

**Table 5***Phillip's Effect Size Outcomes: Tau-U*

Measure Tau-U Outcomes and P Values									
	TAU	TAU <sub>b</sub>	VARs	SD	SD <sub>tau</sub>	Z	P Values	CI 85%	CI 90%
TAI-T	0.1905	0.2051	44.33	6.65	0.3171	0.6008	0.5480	-0.266< >0.647	-0.331< >0.712
TAI-W	0.5238	0.5328	44.33	6.65	0.3171	1.6521	0.0985	0.067< >0.980	0.002< >1
TAI-E	-0.8571	-0.9231	44.33	6.65	0.3171	-2.7034	0.0069	-1< >-0.401	-1< >-0.336

**Conclusion**

Phillip had a decrease in level from baseline from to intervention that was supported by an inconsistent data trend across phases. The significant differences in outcomes were furthered with the absence of overlap in data from one condition to the next and the effect sizes on the TAI-T, TAI-W and TAI-E of large (i.e., very effective) (Lenz, 2013).

Ledford and Gast (2018) stated that confidence in behavior change, and the presence of a functional relation are inversely related to the proportion of overlapping data across conditions. Wherefore, the visual graphic analysis of data indicates that there is an immediate, abrupt change in behavior that suggests a demonstration of (intervention) effect on the target behavior of TA as measured by the TAI-T, TAI-W, and the TAI-E.

**Participant Two: Josh**

Josh participated in the three weeks of phase A (baseline) with a total of 7 data points, and three weeks of phase B (intervention) with a total of six data points. Josh was in the study for six and half weeks and had a total of 13 data points. Tables 6, 7 and 8 provide the following data for Josh's outcomes on the TAI-T, TAI-W, and TAI-E (Spielberger, 2018): level (mean), trend, variability (standard deviation and range), immediacy of effect, and Tau-U (effect size).

**Table 6***Josh's Visual Analysis of Data: TAI-T*

Metric	Phase	Result
Level (Mean)	A	44.14
	B	38.33
Trend	A	Steep deceleration, therapeutic Gradual deceleration
	B	
Variability (SD, Range)	A	7.33; 19
	B	4.27; 7
Immediacy of Change	A to B	No change
Consistency of Data	A to B	Consistent, overlap
Tau-U	A to B	0 (corrected baseline)



**Table 7***Josh's Visual Analysis of Data: TAI-W*

Metric	Phase	Result
Level (Mean)	A	17.28
	B	15
Trend	A	Steep deceleration, therapeutic Gradual deceleration
	B	
Variability (SD, Range)	A	2.36; 6
	B	2.60; 8
Immediacy of Change	A to B	No change
Consistency of Data	A to B	Consistent, some overlap
Tau-U	A to B	-0.0952 (corrected baseline)

**Table 8***Josh's Visual Analysis of Data: TAI-E*

Metric	Phase	Result
Level (Mean)	A	18.14
	B	16.33
Trend	A	Steep deceleration, therapeutic Gradual deceleration
	B	
Variability (SD, Range)	A	3.57; 9
	B	1.86; 5
Immediacy of Change	A to B	No change
Consistency of Data	A to B	Consistent, some overlap
Tau-U	A to B	0.1190 (Corrected baseline)

## Level

The level of scores across the baseline for the TAI-T in Josh's case was 44.14, which indicated a lack of test anxious behavior across the data points according to Spielberger (1980). On the TAI-W, Josh's level was recorded as 17.28 which placed his scores in the 80<sup>th</sup> percentile for college student undergraduates (Spielberger, 1980). On the TAI-E, Josh's level was recorded as 18.14 which placed his scores in the 65<sup>th</sup> percentile (Spielberger, 1980).

The level of scores across the intervention phase for the TAI-T was 38.33, which indicated a lack of test anxious characteristics across the data points. On the TAI-W, Josh's level was recorded at 15 which placed his scores in the 70<sup>th</sup> percentile for undergraduate college students according to Spielberger (1980). For the TAI-E, Josh's level was recorded at 16.336 which places his scores at the 52<sup>nd</sup> percentile. (Spielberger, 1980). Based on his level change from baseline to intervention, it appears that Josh's level of test anxious behavior fell below clinical significance prior to the application of the intervention. The low amount of test anxious behavior observed in Josh's outcomes from baseline to intervention in the absence of the intervention suggests that the decrease in behavior may have been due to extraneous factors rather than EMDR.

## Trend

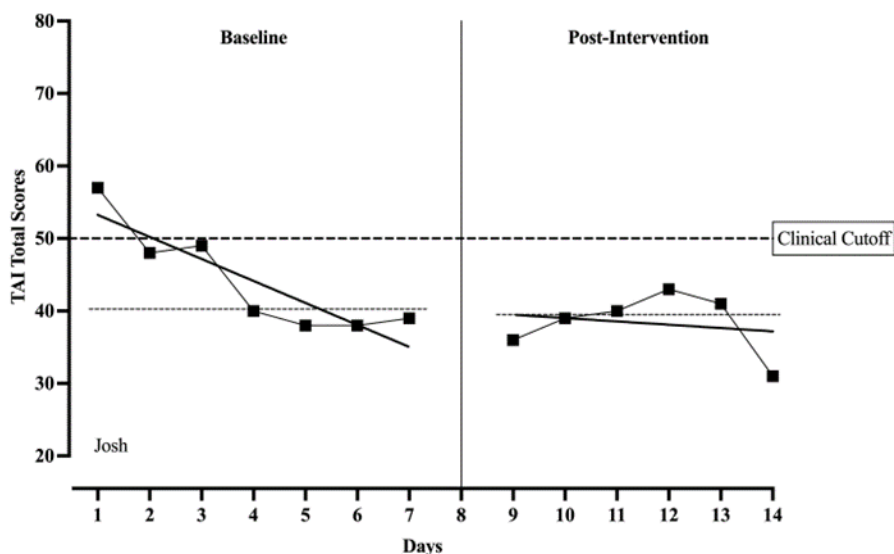
**TAI-T.** In the baseline phase, Josh's scores on the TAI-T displayed a therapeutic, steep deceleration. At point one, Josh's score on the TAI-T indicated that clinically significant test-anxious characteristics were present ( $\geq 50$ ). From point one to point two there was a therapeutic, steep deceleration followed by a gradual acceleration from point two to three, with a steep deceleration from point three through five, and an acceleration of scores between points six and seven. Stability of data points in Josh's case occurred between points four to seven ( $\mu = 38.75$ ).

The data trend is therapeutic being that the mean ( $\mu=44.14$ ) of all data in the baseline phase was below a score of 50 ( $\geq 50$  is clinically significant), indicating a decrease in test anxious characteristics before the intervention was applied.

In the intervention phase Josh's scores on the TAI-T displayed a therapeutic deceleration from before the intervention (point seven) to after (point nine). Scores thereafter gradually accelerated from points nine to twelve, followed by a gradual deceleration from point twelve to thirteen and a steep, and then a therapeutic deceleration from point thirteen to fourteen. The trend of therapeutic deceleration in the baseline through the intervention phases suggests that EMDR had no impact on Josh's test anxious behavior. Figure 4 displays Josh's visual graphed outcomes on the TAI-T for the baseline and intervention phases.

#### Figure 4

*Josh's Visual Graphed Outcomes: TAI-T*



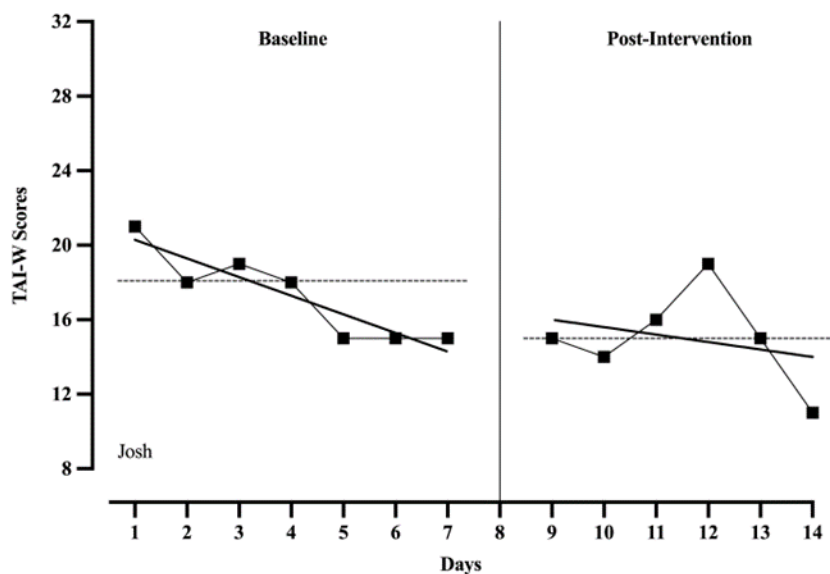
*Note.* Brown et al. 2023

**TAI-W.** On the TAI-W (Spielberger, 1980), Josh's scores displayed a therapeutic, steep deceleration trend in data from points one to two. From point to three, the scores accelerated followed by a steep deceleration from point three to five and a subsequent zero-celerating trend from point five to seven.

In the intervention phase, Josh's scores on the TAI-W had a zero-celerating trend from points seven to nine, followed by a gradual deceleration between points nine and ten. From points ten to twelve, a steep acceleration of worry is observed followed by a therapeutic step deceleration from point twelve to point fourteen. Figure 5 displays Josh's visual graphed outcomes on the TAI-W for the baseline and intervention phases. The trend of therapeutic, step deceleration in the baseline phase to zero celeration, steep acceleration and step deceleration in the intervention phase suggests that EMDR did not impact Josh's test anxious behavior on this measure.

**Figure 5**

*Josh's Visual Graphed Outcomes: TAI-W*

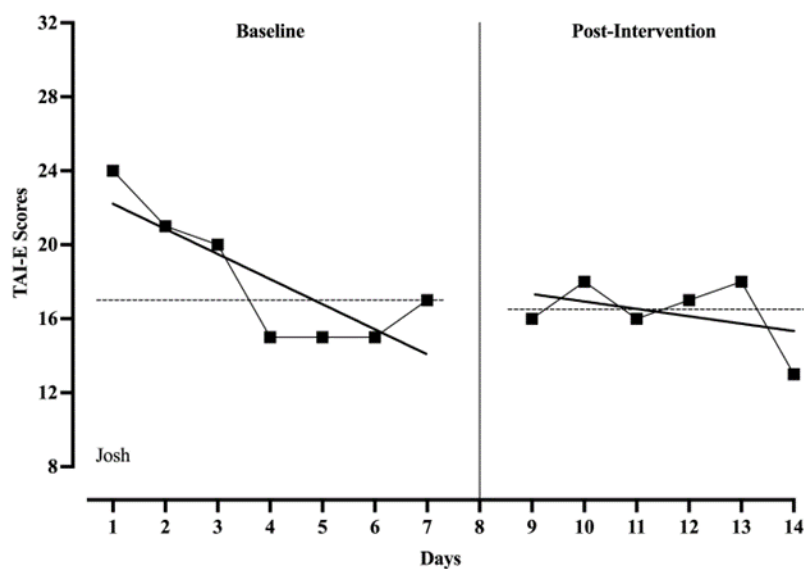


*Note.* Brown et al. 2023

**TAI-E.** In the baseline phase, Josh's outcomes on the TAI-E, indicate a therapeutic, steep deceleration. From points one through point four, there was a steep deceleration in data points, a stabilization of points from four to six, with a steep acceleration from point six to seven. In the intervention phase, Josh's outcomes display a zero-celerating trend from points seven to nine, an acceleration from point nine to ten, followed by a deceleration from point ten to eleven. From points eleven to thirteen there is a gradual acceleration, followed by a therapeutic deceleration from points thirteen to fourteen. The trend of therapeutic, steep deceleration to a zero-celeration, acceleration and gradual deceleration from baseline to intervention phases suggests that EMDR did not impact Josh's test anxious behavior. Figure 6 displays Josh's visual graphed outcomes on the TAI-E for the baseline and intervention phases.

**Figure 6**

*Josh's Visual Graphed Outcomes: TAI-E*



*Note.* Brown et al. 2023

### ***Variability (Standard Deviation and Range)***

In the baseline phase, Josh's scores displayed a lack of test anxious characteristics on the TAI-T with level of 44.14,  $\sigma = 7.33$  and a range of 19. These observations contrast with Spielberger's (1980) clinically significant score on the TAI-T being 50. The highly variable observation of test anxious characteristics was also observed on the subscale of worry and emotionality. Josh's scores on the TAI-W displayed a level of 17.28, range of 6 and  $\sigma = 2.36$ . The subscale of emotionality displayed a level of 19.28, a range of 9 and  $\sigma = 3.57$ .

In the intervention phase, Josh's scores continued below significance (50) on the TAI-T. The scores were observed as highly variable with a level of 38.33, a range of 7 and  $\sigma = 4.27$ . Similarly, Josh's scores on the TAI-W displayed a level of 15, a range of 8 and  $\sigma = 2.60$ . On the TAI-E were observed to be highly variable with a level of 18.14, range of 9 and a  $\sigma = 3.579$ . The high variability of data that occurred across all 14 points of the baseline and intervention phases suggest that the variability of outcomes is likely to persist in the absence of the intervention. Therefore, the highly variable outcomes in Josh's case are likely the result of extraneous factors and not a function of the impact of EMDR.

### **Immediacy of Change**

Visual analyzation of Josh's scores on the TAI-T from baseline A to intervention B phases displayed a change in data from points seven and nine of 3 points. There was a delayed change in data from point 7 to point 14 of 8 points. The delayed change in data was supported by the change in level from baseline ( $\mu=44.14$ ) to intervention ( $\mu= 38.33$ ) phases.

On the TAI-W, Josh's outcomes from baseline A to intervention B phases displayed no change in data points seven to nine. There was a delay in change, however, that occurred from

point 7 to 14 of 4 points. The delayed change in outcomes was supported by the change in level being 17.28 in the baseline and 15 in the intervention phases.

Data on the TAI-E from baseline A to intervention B phases displayed a change in data from points seven to nine of 1 point. There was a delayed change observed from points 7 to 14 of 4 points. The delayed change in outcomes was supported by the change in level from baseline ( $\mu=18.14$ ) to intervention ( $\mu= 16.33$ ). The outcomes on the TAI-T, TAI-W and TAI-E suggest that while there was a delayed change in behavior over time, these outcomes did not occur immediately following the application of the intervention of EMDR. Further, the highly variable outcomes of preceding data points suggest that change in Josh's test anxious behavior was not due to the intervention.

### **Consistency & Overlap (Tau-U)**

Overlap was observed on the TAI-W in the baseline to intervention phases. A similar relationship was observed on the TAI-E from the baseline to intervention phases. With the differences that were observed between phase A and phase B, data are consistent and indicate the presence of overlap. Additionally, the magnitude of change from phase A to phase B observed indicated that the outcomes were not significant on the TAI-T (Tau-U =0), TAI-W (Tau-U = -0.0952) and the TAI-E (Tau-U = 0.1190). These factors suggest that no behavior change was observed across conditions and the intervention did not impact Josh's outcomes on the TAI-T, TAI-W or the TAI-E.

**Tau-U.** Josh's Tau-U (effect size) for the TAI-T, TAI-W and TAI-E are displayed in Table 9. The presence of a baseline trend for the TAI-T, TAI-W and TAI-E prompted the researcher to correct for baseline trend, resulting in a Tau-U of (0), (-0.0952) and (0.1190) respectively. The presence of a baseline trend in Josh's case on the TAI-T, TAI-W and TAI-E



indicates that there was an instability of data trend, and the null of a stable baseline was rejected in all three cases. The outcomes on all three scales were not significant. These outcomes suggest that there was no effect of the intervention on Josh's test anxious behavior.

**Table 9**

*Josh's Effect Size Outcomes: Tau-U*

Measure Tau-U Outcomes and P Values									
	TAU	TAU <sub>b</sub>	VARs	SD	SD <sub>tau</sub>	Z	P Value	CI 85%	CI 90%
TAI-T	0	0	196	14	0.33	0	1	-0.480 <> 0.480	-0.548 <> 0.548
TAI-W	-4	-0.0952	196	14	0.33	-0.2757	0.7751	-0.575 <> 0.385	-0.644 <> 0.453
TAI-E	0.1190	0.1205	196	14	0.33	0.3571	0.7210	-0.361 <> 0.599	-0.4295 <> 0.667

### Conclusion

Josh had a therapeutic, decelerating trend in outcomes beginning in the baseline phase, until stability of data points occurred between points four through eleven. Additionally, there was a contra-therapeutic acceleration of data points, followed by a therapeutic deceleration at the end of the intervention phase. The therapeutic deceleration prior to the introduction of the intervention caused Josh's TAI-T scores to drop below clinical significance ( $\leq 50$ ).

Across phases effect sizes on all three scales were not statistically significant, resulting in no behavior change occurring as a result of the intervention. This finding was further supported

by the amount of overlap that was observed across the phases as measured by the TAI-T and its subscales, TAI-W and TAI-E.

The purpose of this dissertation was to explore the impact of EMDR on college students' self-reported TA. The research question was: What is the impact of Eye-Movement Desensitization and Reprocessing (EMDR) on college students' self-reported scores on the test anxiety inventory (TAI-T) and its subscales of "worry" (TAI-W) and "emotionality" (TAI-E) (Spielberger, 1980)? After completing the visual analysis of data (level, trend, variability, immediacy of change, consistency, overlap and effect size) for two participants, the results are inconclusive. While one student's outcomes displayed a demonstration of effect, the other student's outcomes did not. For a functional relation to be supported, the researcher must observe at least three demonstrations of effect (Ledford & Gast, 2018).

### **Summary**

To assess the research question, a visual analysis of data was completed on individual participants across the baseline and intervention phases. The researcher examined the level (mean), trend, variability (standard deviation and range), immediacy of change, consistency, overlap and effect size (Tau-U) to assess the impact of the intervention of EMDR on college students' self-reported TA as measured by the Test Anxiety Inventory (TAI-T) and its subscales of worry (TAI-W) and emotionality (TAI-E) (Spielberger, 1980). This section will discuss the summary of findings for individual participants.

## Chapter V: Discussion

This dissertation investigated the impact of EMDR on college students' self-reported scores on the TAI-T and its subscales, "worry" TAI-W and "emotionality" TAI-E (Spielberger, 1980). This dissertation utilized an A-B single-case research design (SCRD) to assess the impact of the intervention. Both participants progressed through the baseline and intervention phases following stabilization of the target behavior through review of scores on the TAI-T (Spielberger, 1980). While one participant's outcomes demonstrated behavior change on the TAI-T and its subscales, TAI-W and TAI-E (Spielberger, 1980), the other did not. The results of the study provide contributions to literature on EMDR and TA that are inconclusive. This section will discuss the summary of findings for individual participants. Lastly, it will cover the implications of the findings, the limitations of the study and suggestions for future research.

### Phillip

Visual graphic analysis of data in Phillip's case indicates that there is an immediate, abrupt change in behavior that suggests a demonstration of effect on the target behavior of TA. Literature may provide an explanation for this finding. Firstly, Phillip's outcomes on the TAI-W ( $\mu = 24.14$ ) with a large effect size (0.98) suggests that this component of TA underwent clinically significant outcomes in the baseline phase and may have been addressed by aspects of EMDR that provided cognitive restitution.

The steep acceleration of TAI-W (Spielberger, 1980) scores from point one to two indicated a variation of experienced worry that fell outside of the mean ( $\mu = 24$ ) by approximately than 3 standard deviations ( $\sigma = 2.91$ ) during the baseline phase. This occurrence contrasts with Phillip's scores on the TAI-E (Spielberger, 1980) which gradually decelerated from point one to two and from four to seven. Phillip's variation of scores and subsequent

gradual acceleration in worry characteristics coexisted with a gradual deceleration of emotionality characteristics in the baseline phase. While the contrast in subscales scores provided that the overall score of the TAI-T (Spielberger, 1980) remained stable, the data appear to suggest that the worry component of TA was more impactful on Phillip's experience of TA than was the component of emotionality.

Relatedly, some notable explorations of TA identify worry as the most significant component that impacts students' ability to remain task orientated during test taking. Worry is operationalized as negative expectation, self-deprecating cognitive concern (e.g., "I will never pass" "I am stupid" "I might fail") and fear about one's performance on tests (Kaplan et al., 1979; Morris & Fulmer, 1976; Osterhouse, 1969; Richardson et al., 1977; Spielberger, 1980). These cognitive processes have apparent consequences that can interfere with effective cognitive functioning during test taking.

Mandler and Sarason (1953) stated that students' subjective beliefs about failure during test-taking led to a psychological stress situation which aligned with Sarason and Koenig's (1965) findings that suggested that the most impactful treatments for TA include those that address the cognitive component. Mandler and Sarason (1953) considered that students' subjective experiences of failure appeared to stem from participants' self-assumed estimates of performance which are operationalized within the component of worry (Kaplan et al., 1979; Morris & Fulmer, 1976; Osterhouse, 1969; Richardson et al., 1977; Spielberger, 1980). These outcomes align with Phillip's stated negative cognition (i.e., negative underlying belief) discovered during Phase Two of EMDR of "I am stupid" "for not knowing the answers." and the underlying emotion stated as "frustrated with myself."

EMDR includes, at minimum, four cognitive components to address the worry characteristic of TA. Namely, these components of the intervention are categorized as exposure, distraction, desensitization and cognitive restructuring (Shapiro, 2018). During Phase Two of EMDR, Phillip discovered that the most disturbing memory related to TA was connected the negative underlying cognition of “I am stupid.” Phillip’s desired cognitive (replacement) belief was, “I am capable, and I am not stupid.” When asked during the reprocessing portion of the bilateral stimulation “what are you noticing now?” Phillip often recalled specific, non-physiological components of the particular experience that came to mind (e.g., “I think and think and think”, “I didn’t know where to go from there”, and “scrambled messages (thoughts).” This contrasted with less often recalling body sensations or memory-specific emotions related to past disturbing events. For example, according to Phillip, the worst part of the target memory experience that contributed to his experience of TA was “...looking at my score sheet and seeing how many (answers) I had to correct.” The stated experience contrasts with Josh’s “worst” memory experience related to TA which identified the component of emotionality more readily. Josh stated, “... I was just crying and crying... I felt afraid.”

While Phillip did experience aspects of emotionality as evidenced by outcomes across the TAI-E ( $\mu = 19.28$ ) and an effect size of  $-1$ , the worry component was notably more impactful to Phillip’s TA experience as evidenced by self-reported outcomes on the Validity of Cognition (VoC) (Gosselin & Matthews, 1995) and Subjective Units of Distress (SUD) (Wolpe, 1990) scales. Sarason & Koenig (1965) stated that if anxiety were a measure of self-preoccupation, then TA would be related to an individual’s self-descriptions but not necessarily to their description of others. Wherefore, Phillip’s stated VoC (Gosselin & Matthews, 1995) during Phase Two of EMDR supports Sarason and Koenig’s (1965) identification of the worry

component being connected to self-vs. others preoccupation. During Phase Two of EMDR, Phillip noted the believability of his identified cognitive (replacement) belief as a “1” on a 7-point Likert scale (one = completely false to seven = completely true). At the conclusion of Phase Five: Installation, Phillip reported that the words, “I am enough” fit better than the previous positive cognition of “I am capable, and I am not stupid” with an accompanying score of believability as “a 6 or 7” on the VoC (Gosselin & Matthews, 1995) scale. In contrast, Phillip’s self-reported SUDs (Wolpe, 1990) during Phase Two was “a 7 or 8” (0-no disturbance thought 10-highest disturbance). At the conclusion of Phase Four: Desensitization, Phillip’s self-reported SUDs (Wolpe, 1990) was “0 or 1.” The outcomes on the processing measures indicate the presence of residual worry related to the identified negative cognition as compares to the remission of physiological experiences as reflected in the VoC (Gosselin & Matthews, 1995) and SUDs (Wolpe, 1990).

Further, studies have cited that high-anxious subjects tended to be more self-critical and self-debasing in their self-descriptions as compared to low anxious subjects in addition to maintaining lower grade point averages than students who are less self-preoccupied (Falls et al., 2018; Grooms & Endler, 1960; Huntley et al., 2019; Sarason, 1960, 1961; Sarason & Koenig, 1965; Sarason & Minard, 1962; Zeidner, 1990). The results of the current study appear to support these findings. Phillip, a male, senior undergraduate student, self-reported a grade point average (GPA) that falls between 2.1 and 3.0. Whereas Josh, a male, senior undergraduate student, self-reported to have a GPA that falls between 3.1 and 4.0. Relatedly, Josh’s outcomes indicated no behavior change and a therapeutic, decelerating data trend that fell below clinical significance. Sarason and Koenig (1965) stated that lower outcomes on tests reflected high degrees of self-preoccupation and lower self-esteem (p. 620). As noted previously and throughout the

administration of EMDR, Phillip often vocalized cognitive-preoccupations and self-critical thoughts (e.g., “I am stupid” “I was missing so many, I didn’t feel intelligent”) whereas Josh vocalized physiological experiences of TA expressed with emotional terminology (e.g., “I am afraid” “I am overwhelmed” “I feel fear, hopelessness” “my brain feels clearer” “less buzzing”). In this way, contextual demographic information supports the supposition that the demonstration of effect in Phillip’s case occurred in relationship to the deceleration of the worry component of TA.

### **Josh**

Visual graphic analysis of data in Josh’s case indicated that there was no change in behavior across phases, with a large proportion of overlapping data. During the baseline phase, Josh reported outcomes which displayed a therapeutic deceleration of test anxious characteristics following his initial meeting with the researcher. The extraneous event(s) that led to a deceleration in TA symptomatology was unknown to researcher and participant alike. Three weeks into the baseline phase (correlated with point six on the protocol), Josh stated, “I haven’t been having much anxiety lately...I’m not really sure why.” When asked by the researcher about this experience, Josh stated that he “hasn’t really been feeling...anxious”. He stated that this awareness was a result of recording and reviewing his responses on the TAI (Spielberger, 1980) assessment “...the last several times.” Literature may support the outcomes in Josh’s case.

Firstly, the initial outcome on the TAI-T (Spielberger, 1980) indicated the presence of test anxious characteristics followed by the absence of clinically significant outcomes for the remainder of the study. In literature, when students’ outcomes have not reached significance, but self-reported TA symptomatology persists, scholars explored student GPA (achievement) and the presence of other anxiety –related stress conditions for explication (Carlson & Ryan, 1969;

Harmatz, 1968; Huntley et al, 2019; Marso, 1969; O' Donnell, 2017; Sarason, 1959, 1961; Stallings et al., 1969; Sutter & Reid, 1969). In Josh's case, both GPA and anxiety-related stress conditions are viable explanations for the findings.

Low-test anxious students tend to have higher GPAs than high-anxious students (Culler & Holahan, 1980; Daniels et al., 1978; Grooms & Endler, 1960; Harris & Johnson, 1980; Sarason & Minard, 1962; Stallings et al., 1969) These findings were supported in this study as the low-test anxious participant, Josh (TAI-T  $\mu = 44.14$ ) (Spielberger, 1980) reported a higher GPA (between 3.1 and 4.0) than the high-test anxious ( $\mu = 53.71$ ) participant, Phillip (between 2.1 and 3.0). Students who are low-test anxious tend to be better academic performers than high-test anxious students and display positive outcomes on measures of facilitative motivation, effective study skills habits and aptitude tests (Carlson & Ryan, 1969; Culler and Holahan, 1980; Harmatz, 1968; Marso, 1969; Sarason, 1959, 1961; Stallings et al., 1969; Sutter & Reid, 1969). Given his high achieving academic performance, Josh's therapeutic decelerating outcomes on the TAI-T and its subscales, TAI-W and TAI-E (Spielberger, 1980) may be the result of an anxiety-related stress response that is not related to TA (McMillan & Osterhouse, 1972; Sarason, 1960). McMillian & Osterhouse (1972) stated that free floating anxiety impacts the level of self-reported anxiety in students and does not include those experiences that are phobic, or performance related in nature. Operationalizing 'anxiety-related stress responses' could include an expansive amount of peer scholarship and is beyond the scope of this study. However, the significant outcome on Josh's Adverse Childhood Experiences (ACEs) Questionnaire (Finkelhor et al., 2015), ( $\geq 3$ ) may provide support for the presence of "free floating anxiety" that impacted the study's outcomes (Finkelhor et al., 2015; Spielberger, 1980) Finkelhor et al., (2015) stated that physiological and psychological distress as an adult is inversely related to significant



outcomes on the ACEs (Finkelhor et al., 2015). Contextually, Josh's statement three weeks into the study made a distinction between anxiety in testing situations and "...anxiety lately" as he was aware that the experienced symptoms were not translating into self-reported outcomes on the TAI (Spielberger, 1980).

Josh's experience of emotionality is described and supported with contextual information gathered during the intervention phase. As stated previously, Josh often described his current experience of TA with emotional descriptors, as was also the case when describing past, distressing and related experiences. For example, when describing one past distressing experience Josh stated, "I notice...shame and guilt" "...in my forehead (tension and/or tightness)." On another occasion Josh stated, "I felt inadequate...I'm not good enough" "I feel it in my upper (top of) head, in my eyes and forehead...." "It's sadness." Further, the SUDs (Wolpe, 1990) check of EMDR (Shapiro, 2018), required two additional sets of bilateral stimulation to assist Josh in reducing the self-reported experience of distress from a "6" in Phase Two (Shapiro, 2018) to "a 2-and-a-half" in Phase Four. This experience is contrasted with Phillip's SUDs (Wolpe, 1990) check that was reduced from a "7 or 8" in Phase Two, to a "0 or 1" in Phase Four, with the same amount of bi-lateral stimulation. Additionally, during Phase Six of EMDR, the Body Scan (Shapiro, 2018), Josh found the absence of "tension" "in....body" to be a notable improvement. Josh stated, "There's no tension" "a smidge (tightness) on the lower, front part of my head" "that's crazy (surprised facial affect)." When asked about his meaning by the researcher, Josh replied "the...EMDR thing" "It's crazy how it works."

Josh's outcomes on the TAI-E (Spielberger, 1980) provide additional support that he experienced anxiety-related stress responses unrelated to TA. Notably, the component of emotionality supported a high proportion of overlapping outcomes throughout the study, in

contrast to the worry component. Emotionality as a physiological response, is stated to occur both in anxiety-related stress conditions and TA (Deffenbacher et al., 1980). The distinction of emotionality experienced during an anxiety-related stress or testing condition can be made by examining the situation in which it occurs. The delineation between the two syndromes is when emotionality is experienced as a component of TA, it occurs “during test taking” (Morris & Fulmer, 1976; Osterhouse, 1969; Richardson et al., 1977; Spielberger, 1972). In Josh’s case, outcomes on the TAI-E displayed an experience of emotionality though the outcomes did not reach significance. Therefore, Josh’s experience of emotionality can be said to have occurred due to another anxiety-related stress condition.

Behavior change was not observed from baseline to intervention phases in Josh’s case. This finding coincides with the limited literature on the efficacy of EMDR with anxiety-related disorders (Luber, 2015; Shapiro, 2018). De et al (2002) stated that EMDR had not been supported as an efficacious treatment for any specific phobia or anxiety disorder other than PTSD. When EMDR has been used for anxiety-related disorders, multiple applications of the intervention have been used (Shapiro, 2018; Wood et al., 2018). Research suggests that one 90-minute application of EMDR would not have been sufficient to reduce the symptoms of an anxiety-related condition in Josh’s case.

### **Comparison of Level across Participants and Phases**

Comparison across participants and phases supported the outcomes as stated. Normalized scores for undergraduate males on the TAI are TAI-T ( $\mu = 38.48, \sigma = 12.43$ ), TAI-W ( $\mu = 13.61, \sigma = 4.98$ ), and TAI-E ( $\mu = 16.85, \sigma = 5.64$ ) (Spielberger, 1980). The level and variability of both participants across phases on the TAI-T demonstrate that Phillip’s level in the baseline phase reached clinical significance and decreased below the cutoff in the intervention

phase. Not only did Phillip's outcomes on the TAI-T in the intervention phase fall below the clinical cutoff, but the level also fell below the normalized outcomes for undergraduate males. These outcomes are contrasted by Josh's outcomes on the TAI-T, as the baseline phase displayed a higher-than-normal level, which subsequently decreased to a normal level outcome in the intervention phase. This trend in data occurred for both participants, across phases on the TAI-W and TAI-E as displayed in Table 10. The comparison between the levels across phases indicated that Phillip's scores were higher than Josh's in the baseline phase and subsequently decreased beyond Josh's level outcomes in the intervention phase. These outcomes suggest that in Phillip's case, the potential effectiveness of the intervention is observed. In Josh's case, outcomes suggest that he did maintain higher-than-normal outcomes on the TAI-T and its subscales, which decreased to a normal level in the intervention phase. These outcomes suggest that while outcomes were not of clinical significance, there may have been extraneous factors that supported a reduction in test anxious symptoms.

**Table 10***Means and Standard Deviations of Assessment Scores for Participants Across Phases*

Assessment	Metric	Phase	Phillip	Josh	
TAI-T	Level (Mean)	A	53.71	44.14	
		B	31.33	38.33	
	Standard Dev.	A	2.21	7.33	
		B	7.17	4.27	
	TAI-W	Level (Mean)	A	24.14	17.28
			B	12.83	15
Standard Dev.		A	2.91	2.36	
		B	4.07	2.60	
TAI-E		Level (Mean)	A	19.28	18.14
			B	12	16.33
	Standard Dev.	A	1.38	3.57	
		B	2.36	1.86	

### **Summary of Findings**

By connecting the Interference Model's perspective of TA to the Adaptive Information Processing (AIP) framework, this study aimed address the worry and emotionality components of TA as having derived from past disturbing and traumatic memories (Shapiro, 2018; Shapiro & Laliotis, 2011). The AIP model states that memories with similar affective valences are linked together by cognitive concern and accompanying physiological hyperarousal (Shapiro, 2018). Wherefore, current, experienced TA would be likely to be observed as it is operationalized: as a present experience of worry and emotionality (Shapiro, 2018; Spielberger, 1980) which are factors that EMDR provides restitution for. While one participant's outcomes demonstrated behavior change and an impact of the intervention on the worry and emotionality components of TA, another participant's outcomes did not. These outcomes are inconclusive as SCRD requires at least three demonstrations of effect to determine whether a functional relation is present between EMDR and the components of TA. In the scope of TA and EMDR literature, this study does not contribute outcomes which are of any clear distinction and therefore must be interpreted with caution. The implications of these findings are described in the next section, as well as the limitations of the study and suggestions for future research.

### **Implications for Practice and Future Research**

This study's findings have implications for the use of EMDR in the treatment of TA, as well as implications for future research. Research has been confounded by methodological errors and dissenting opinions about the components of TA and the situation in which it occurs. After over seventy years of investigation, the body of TA research remains unchanged due to the vacillating and inconclusive outcomes of past and present scholarship (Grooms & Endler (1960; Hembree, 1988; Parks-Hamm et al., 2010; Zeidner, 1990). TA literature is still examining

whether anxiety during test taking is classified as a psychological stress experience that occurs within an individual, or if it is an experience that occurs in response to specific situational factors (Culler and Holahan, 1980; Daniels et al., 1978; Green, 1990; Hembree 1988; Herzer & Hamm, 2014; Huntley et al., 2019; Mandler & Sarason, 1952, 1953; Sarason, 1959; Smith et al., 1990; Zeidner, 1990).

Past research on EMDR in the treatment of TA has demonstrated similar, inconclusive results (Parks-Hamm et al., 2010; Perkins & Rouanzoin, 2002). Although Cuijpers et al., (2020) stated that EMDR was supported as an efficacious treatment for TA through a process of methodological evaluation, only four studies qualified for inclusion in the review at that time. Cuijpers et al. (2020) stated that hardly any of the studies had low risk of bias, indicating considerable uncertainty of their findings.

The findings in this study align with past inconclusive outcomes of EMDR on TA (Herzer & Hamm, 2014; Huntley et al., 2019). Participants in this study reported experiences of negative cognitive processing and accompanying physiological hyperarousal which occur during test taking and impact their academic success. However, TA symptom severity varied for individual participants based on related or unrelated personal factors, as did the impact of the applied intervention.

For Phillip, the intervention of EMDR impacted self-reported experiences of TA. The impact of EMDR demonstrated the largest effect on the worry component in Phillip's case. For Josh, components of worry and emotionality were observable, but they were not impacted by the intervention and appeared to be the products of extraneous events. Wherefore, it could be stated that students with higher levels of worry, compared to students with higher levels of emotionality, may experience a significant decrease in TA behavior post intervention. Students

with higher levels of emotionality, or those with outcomes that fall below the clinical cutoff on the TAI-T may not experience a significant change of behavior post intervention.

Based on these findings, implications for practice include a) using EMDR in the treatment of TA for students who have a similar score structure to Phillip (i.e., outcomes identifying the worry component with a significant effect size) and b) applying EMDR to cases of TA with caution as the impact of the intervention varied for individual participants and there were not repeated demonstrations of effect. These implications for practice align with previous scholarship of SCRCD that used EMDR as an intervention. These studies were well-designed and controlled for most threats to internal validity and identified the presence of functional relations with at least three demonstrations of effect (De Jongh et al., 2002; Doering et al., 2013; Shapiro, 2018)

Future research that uses EMDR in the treatment of TA with a SCRCD should focus on maintaining at least 3 participants to provide comparison data that contributes to rich contextual information to explain and describe the study's outcomes (Ledford & Gast, 2018; Ray, 2015). Future work should set a goal of having at least 6 participants prior to the first baseline assessment. Acquiring at least 6 participants may account for threats to internal validity such as attrition bias and inconsistent effects (Ledford & Gast, 2018; Ray, 2015).

Lastly, EMDR did not impact Josh's self-reported experiences of TA. The intervention did not have any effect on his behavior as was demonstrated by the therapeutic, steep deceleration of data in the absence of EMDR from baseline to intervention phases. Based on the visual analyzation of data and contextual narrative during the application of the intervention, the researcher's duty to non-maleficence was maintained. These two differentiated and inconclusive

outcomes lead the researcher to conclude that use of EMDR in the treatment of TA should be considered case-by-case and done so with caution.

## **Limitations**

### **Single-case designs and analysis**

A major limitation of this study was the non-experimental A-B, simple time series design. Non-experimental designs of this type maintain low internal validity and weak confidence in outcomes (Ledford & Gast, 2018). As noted in the review of literature, EMDR and TA research has been confounded by poor methodological designs and the absence of operationalized definitions to describe within condition experiences. To simplify procedures and to develop straightforward measurements, the A-B design was utilized to limit confounding variables from impacting the study's outcomes. However, while behavior change did occur in Phillip's case and appears to be a function of EMDR, there was no direct intra-participant replication of these findings. Being that there was no replication of effect, there is no assurance that EMDR is responsible for the changes in Phillip's experience of TA.

Another limitation of the study was that one of the participant's outcomes fell below the clinical cutoff prior to the introduction of the intervention. In order to maintain non-maleficence, the researcher was required to proceed with the application of the intervention. The primary concern of the researcher was the ethical commitment to "do no harm" (American Counseling Association, 2014; Creswell et al., 2018; Ledford & Gast, 2018). In Josh's case, the baseline phase for this participant could have continued beyond the seven collected data points. This change may have seen the reemergence of clinically significant TA symptomatology that displayed scores  $\geq 50$  on the TAI-T (Spielberger, 1980). Had the researcher allowed for this change, outcomes in this case may have produced new, unexpected, or replicated findings that



could have increased the reliability of the study's outcomes (Brossart et al., 2018; Ledford & Gast, 2018). However, though Josh's outcomes fell below the clinical cutoff, stability of outcome was achieved on the dependent measure and treatment could not be withheld (Brossart et al., 2018' Ledford & Gast, 2018).

Another limitation of the study was the compromised internal validity due to attrition of a participant. Out of the fifty-one students who responded with interest in the study, six responded requesting a meeting with the researcher to determine whether they met inclusion criteria and to sign the statement of informed consent. Exclusion criteria for this study were extensive to avoid any possible harm to participants and to limit confounding variables from impacting the study's outcomes (Ledford et al., 2018; Shapiro, 2018). Wherefore, two of the six students did not meet inclusion criteria for participation as were referred to on and off campus mental health services, as requested. One student who met inclusion criteria withdrew from participation prior to the first baseline data point being recorded due to changes in academic and career interests. This student was referred to on-campus mental health services as requested. Three participants were maintained at this point in the study and were scheduled for phase protocol baseline assessments on a Tuesday/Friday basis. Near the fifth baseline data collection point, the researcher scheduled the 90-minute EMDR session with each of the three participants. Following the application of the intervention, one student withdrew from the study and did not respond to three attempts to provide referral resources and support thereafter. Two participants remained out of the initial pool of fifty-one interested students. Both students completed the baseline and intervention phases and the associated assessment, for a total of six and a half weeks of the study. According to Ray (2015), criteria of strong SCRDS include choosing at least three participants to maintain

internal validity and demonstrable results. Due to the attrition of the participant, the study's outcomes are considered to demonstrate inconsistent intervention effects.

### **Intervention**

A major limitation of the intervention of EMDR is the lack of empirical support for the theoretical model that undergirds the eight procedural phases (Engelhard et al., 2010; 2011; Perkins & Rouanzoin, 2002; Shapiro, 2018). The Adaptive Information Processing (AIP) model attempts to provide a complex neurophysiological explanation of how past, disturbing experiences are stored in the brain. The desensitization and reprocessing of current, experienced distress is stated to occur and depend on an underlying state-of-consciousness, experienced by an individual in the past, linked by an accompanying negative cognition and emotional charge in the present (Calcott & Berkman, 2014; Luber, 2015; Maxfield, 1999; Shapiro, 2018; Shapiro & Laliotis, 2011; Shapiro & Maxfield, 2002). The process of recalling past linked experiences is determined by observing current high or low affective expressions that are negative in nature (Shapiro, 1996, 1999, 2018; Shapiro & Laliotis, 2011). According to Dryfoos and Quinn (2006) and Lazarus (1991) the terminology that Shapiro (2018) used to describe neurobiological, memory processes are not precise or accurate terms in the field of neurobiology. For this reason, scholars believe that the model's use of terms detracts from the clarity and applicability of the theory (Horowitz, 2011; Shapiro, 1996). Even Shapiro (1996) stated that further investigation and greater methodological rigor are needed to propagate the efficacy of EMDR, as scholars have not appropriately examined the philosophical underpinnings of the intervention (Mevisen et al. 2017; Perkins & Rouanzoin, 2002). Due to the lack of empirical support for the AIP model (Shapiro, 2018), the outcomes of the study cannot be fully explained. Coincidentally, outcomes in this study cannot be explained or described further than visual graphic data has provided, or the

narrations made by participants during the intervention have described. A major limitation of EMDR is that it is impossible for the outcomes of any study to be extrapolated or stated to have occurred as a resolute intention of the intervention.

Finally, another limitation of the intervention was the presumption that the components of EMDR could impact the two components of TA. Based on the AIP model, literature suggested that the underlying characteristics of TA could be decreased, provided worry and emotionality are negative or distressing affective experiences that inhibit functioning in the present (on exams) (Engelhard et al., 2010; 2011; Shapiro, 2018). The limitation of EMDR in this case is that the relationship between key characteristics of TA have not been causally related to the behavioral characteristics that EMDR provides restitution for. Wherefore, the impact that EMDR has on TA is far from being determined.

### **Conclusion**

TA impacts college student mental health (Culler & Holahan, 1980; Pedrelli et al, 2015). College students may experience the first onset of anxiety-related stress symptoms while attempting to achieve academic success. This is especially evident in the area of test-taking. Students' self-reported experiences of worry and emotionality that occurs about or during testing has been termed "test anxiety" (Mandler & Sarason, 1952, 1953; O' Donnell, 2017; Sarason, 1961, 1971; Sarason & Mandler, 1952; Sarason & Minard, 1962; Spielberger, 1980; Spielberger et al., 1983)

Since the 1950s, scholars have been exploring treatments to alleviate the symptoms of TA to encourage student success. Although there is a vast amount of research on the topic of TA, the findings are often inconclusive due to methodological flaws, improvised measurements, and confounded outcomes (Parks-Hamm et al., 2010; Stevens et al., 1999; Enright et al., 2000).

The most well-established interventions for the worry component of TA are cognitive behavioral approaches (Corey, 2017; Huntley et al, 2019; Shapiro, 2018). However, the findings of scholarship on treatments that address the emotionality component of TA have vacillating outcomes (Emery & Krumholtz, 1967; Johson & Sechrest, 1968; Meichenbaum, 1972). Although there have been multiple multimodal treatments proposed, there is a lack of research on their impact on TA in the college student population. EMDR is a multimodal treatment that is evidenced-based in the treatment of PTSD (Shapiro, 2018). EDMR aims to reduce negative cognitive components of past experiences as well as systematically reduce emotional affective expression observed as physiological hyperarousal (Shapiro, 2018; Shapiro & Laliotis, 2011).

This dissertation utilized a SCRCD to examine the impact that EMDR had on the TA components of worry and emotionality. The current dissertation utilized an A-B simple time series design on two undergraduate college student participants over the course of six and half weeks. The results in one case demonstrated an impact of the intervention on the TAI-T, TAI-W and TAI-E (Spielberger, 2018). The other participant's outcomes did not demonstrate an impact of the intervention on the TAI-T or its subscales (Spielberger, 2018). This dissertation contributes to the body of TA scholarship and the use of multimodal treatments such as EMDR.

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## Appendices

### Appendix A: IRB Approval




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**To:** Renee Jeanine Wilson  
**From:** Douglas J Adams, Chair  
 IRB Expedited Review  
**Date:** 08/10/2023  
**Action:** **Expedited Approval**  
**Action Date:** 08/10/2023  
**Protocol #:** 2306475976  
**Study Title:** The Impact of Eye-Movement Desensitization and Reprocessing on Self-Reported Test Anxiety in College Students  
**Expiration Date:** 06/27/2024  
**Last Approval Date:**

The above-referenced protocol has been approved following expedited review by the IRB Committee that oversees research with human subjects.

If the research involves collaboration with another institution then the research cannot commence until the Committee receives written notification of approval from the collaborating institution's IRB.

It is the Principal Investigator's responsibility to obtain review and continued approval before the expiration date.

Protocols are approved for a maximum period of one year. You may not continue any research activity beyond the expiration date without Committee approval. Please submit continuation requests early enough to allow sufficient time for review. Failure to receive approval for continuation before the expiration date will result in the automatic suspension of the approval of this protocol. Information collected following suspension is unapproved research and cannot be reported or published as research data. If you do not wish continued approval, please notify the Committee of the study closure.

**Adverse Events:** Any serious or unexpected adverse event must be reported to the IRB Committee within 48 hours. All other adverse events should be reported within 10 working days.

**Amendments:** If you wish to change any aspect of this study, such as the procedures, the consent forms, study personnel, or number of participants, please submit an amendment to the IRB. All changes must be approved by the IRB Committee before they can be initiated.

You must maintain a research file for at least 3 years after completion of the study. This file should include all correspondence with the IRB Committee, original signed consent forms, and study data.

cc: Kristin K Higgins, Investigator

## Appendix B: Informed Consent

### Informed Consent

<p><b>Investigators:</b></p> <p>Renee Wilson, MS, LPC-S, Principal Investigator  <a href="mailto:rjvalcar@uark.edu">rjvalcar@uark.edu</a>  (918) 444-2042</p> <p>Kristin Higgins, Ph. D, Faculty Advisor  <a href="mailto:kkhiggi@uark.edu">kkhiggi@uark.edu</a>  (479) 575- 4758  University of Arkansas  The College of Education and Health Professions  Graduate Education Building,  Fayetteville, AR 72701</p>	<p><b>Compliance Contact Person:</b></p> <p>Ro Windwalker, CIP  IRB Coordinator  Research Integrity &amp; Compliance  <a href="mailto:irb@uark.edu">irb@uark.edu</a>  (479) 575 – 2208  105 MLKG Building  Fayetteville, AR 72701</p>
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**Description:** You are invited to participate in a research study on the impact of Eye-Movement Desensitization and Reprocessing (EMDR) on Test Anxiety (TA) in college students. The therapeutic intervention of EMDR will be offered by a Licensed Professional Counselor-Supervisor who is EMDR-trained. The purpose of this study is to gain a greater understanding of the impact EMDR has on college students self-reported experiences of TA as measured by the Test Anxiety Inventory (TAI-T) (Spielberger, 1980) and its subscales of Worry (TAI-W) and Emotionality (TAI-E) (Spielberger, 1980). The entire process of gathering your self-report experience of TA, with one 90-minute session of EMDR will be 6-weeks. The initial meeting will last approximately 60-minutes to complete the assessments as listed, with each subsequent meeting to complete the TAI lasting approximately 10-15 minutes.

To gather your self-report experience of TA, you will participate by following the schedule as listed:

- Week 1, Day 1 (Tuesday): Complete a demographic information form, the Adverse Childhood Experiences (ACE) Questionnaire (Finkelhor et al., 2015) and screening measures. Screening measures include: the Dissociative Experiences Scale (DES) (Bernstein, 1986) and the TAI (Spielberger, 1980) This meeting will last approximately 60- minutes.
- Week 1, Day 2 (Friday): TAI. This meeting will last approximately 10-15 minutes.
- Week 2, Day 3 (Tuesday): TAI. This meeting will last approximately 10-15 minutes.
- Week 2, Day 4 (Friday): TAI. This meeting will last approximately 10-15 minutes.
- Week 2, Day 5 (Tuesday): TAI. This meeting will last approximately 10-15 minutes.
- Week 3, Day 6 (Friday): TAI. This meeting will last approximately 10-15 minutes.

- Week 3, Day 7 (Monday): EMDR This meeting will last approximately 90 minutes.
- Week 4, Day 8 (Tuesday): TAI. This meeting will last approximately 10-15 minutes.
- Week 4, Day 9 (Friday): TAI. This meeting will last approximately 10-15 minutes.
- Week 5, Day 10 (Tuesday): TAI. This meeting will last approximately 10-15 minutes.
- Week 5, Day 11 (Friday): TAI. This meeting will last approximately 10-15 minutes.
- Week 6, Day 12 (Tuesday): TAI. This meeting will last approximately 10-15 minutes.
- Week 6, Day 13 (Friday): TAI, debriefing and closure. This meeting will last approximately 45 minutes.

What to expect for TA assessment: Each Tuesday and Friday, the TAI (Spielberger, 1980) will be administered at the university counseling clinic, in a student testing room which includes several desks, chairs, and computers. You will arrive at an agreed upon time and will be escorted to the testing room where you will use your log-on information to access the TAI assessment electronically. Once you have completed the assessment, you will be escorted from the testing room.

What to expect for EMDR intervention: The administration of EMDR will take approximately 90 minutes. During the administration of EMDR, the first half-hour of the meeting will include discussion with the therapist about your previous experiences of TA. From the perspective of the EMDR-trained therapist, this will include discussion and identification of any affect, body sensations and negative thoughts related to your past experiences of TA (i.e., history, preparation, and baseline assessment). The next hour of the intervention will include bilateral eye-movements (desensitization and reprocessing), discussion of a positive thought, followed with bi-lateral eye-movements (i.e., installation), a mindfulness activity (i.e., body scan), closure and de-briefing (i.e., re-evaluation). For reference, eye-movements entail the therapist utilizing two fingers, at a comfortable distance, traversing back-and-forth, bi-laterally across your view, for approximately 24-30 passes, lasting about 30 seconds each.

Risks and Benefits: EMDR therapy is a treatment approach that is widely validated by research for the treatment of post-traumatic stress disorder (PTSD). Research on other applications of EMDR is in progress. Distressing, unresolved memories may surface through the use of EMDR as an intervention for TA. While the intervention will be focused on exploring your past experiences of TA, some clients have experienced reactions during treatment that neither they nor the therapist could have anticipated. These reactions can include a high level of emotion, cognitive processing and/or physical sensations. Following the treatment session, the processing of incidents/material may continue, and other dreams, memories, flashbacks, feelings, etc., may surface to your awareness. To minimize risk to participants, at the end of the EMDR session, as well as at the end of the study, you will be asked to disclose any changes in your cognitive, emotional, or physical experiences in every-day occurrences and offered continued psychological support services. These support services will include the option of: discontinuing your participation in the study, continuing EMDR therapy post-study, beginning counseling services with university student-counseling services, medical and medication referral services and/or referral to off-campus, community counseling agencies.

Voluntary Participation: Your participation in the research study is completely voluntary. There is no form of payment for participating.

Confidentiality: All demographic information and process notes will be secured and protected by a minimum of two locked doors per the Oklahoma State Board of Behavioral Health standards. Participants will be assigned an identification number during the study to maintain anonymity of participants. Information collected will be kept confidential to the extent allowed by law and University policy. No identifying information will be used in any publications or reports resulting from this research.

Right to withdraw from participation: You are free to refuse any portion of participation in the study and to withdraw at any time, without incident or reason. Your decision to withdraw will bring no negative consequence from the researcher to you.

Questions or Concerns: If you have any questions about the research protocol, please contact the investigator or faculty advisor listed at the top of the consent document. The purpose of an Institutional Review Board (IRB) is to assure that appropriate steps are taken to protect the rights and welfare of humans participating as subjects in research. If you have any concerns about your participation in this research project, please contact the NSU IRB at (918) 449-6509 or [irb@nsuok.edu](mailto:irb@nsuok.edu), or the University of Arkansas IRB Coordinator listed at the top of the consent form.

Informed Consent: I, \_\_\_\_\_ have read the description, including the purpose of the study, the procedures to be used, the potential risks, the confidentiality, and the option to withdraw from the study at any time. The investigator has explained each of the items to me. The investigator answered all my questions regarding the study, and I understand what is involved. My signature on this Acknowledgement and Consent is free from pressure or influence from any person or entity and I agree to participate in this study and that I have received a copy of this agreement.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date



## Appendix C: Demographic Information Form

### Demographic Information Form

The Impact of Eye-Movement Desensitization and Reprocessing on Self-Reported Test Anxiety  
in College Students

<p><b>Investigators:</b></p> <p>Renee Wilson, MS, LPC-S, Principal Investigator <a href="mailto:rjvalcar@uark.edu">rjvalcar@uark.edu</a> (918) 444-2042</p> <p>Kristin Higgins, Ph. D, Faculty Advisor <a href="mailto:kkhiggi@uark.edu">kkhiggi@uark.edu</a> (479) 575- 4758 University of Arkansas The College of Education and Health Professions Graduate Education Building, Fayetteville, AR 72701</p>	<p><b>Compliance Contact Person:</b></p> <p>Ro Windwalker, CIP IRB Coordinator Research Integrity &amp; Compliance <a href="mailto:irb@uark.edu">irb@uark.edu</a> (479) 575 – 2208 105 MLKG Building Fayetteville, AR 72701</p>
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\_\_\_\_\_

Date                                      Participant ID number                                      Pseudo Name

**Check all those that apply:**

**Student information**

- I live in university housing.
- I am a commuter.
- I am a freshman or sophomore undergraduate student.
- I am a junior or senior undergraduate student.
- I am a graduate student.
- Part-time (< 12 credit hours for undergraduates, < 9 credit hours for graduate students)
- Full-time (12 or more credit hours for undergraduates, 9 or more credit hours for graduate students)
- My GPA is between 0.0 and 2.0.
- My GPA is between 2.1 and 3.0.

My GPA is between 3.1 and 4.0.

Intended or declared major of study is: \_\_\_\_\_

**Personal information**

I am between the ages of 18 and 24.

I am between the ages of 25 and 32.

I am between the ages of 33 and 40.

I am older than 40.

Single.

In a relationship.

Legally married.

Male.

Female.

Non-binary, non-gender conforming or trans.

Ethnicity or socio-cultural identification: \_\_\_\_\_

**Medical and Mental Health History**

The following information is related to your medical and mental health history. This section must be completed for you to be considered as a potential participant in the study. To protect your medical and mental health, you may be excluded from participation if you have been diagnosed, are currently being assessed or treated for certain medical conditions or psychological disorders. Please see the Informed Consent document for more information on these exclusions.

Check all those that you have **previously, or currently** apply to you.

I have vision issues that affect my eye movements OR cause frequent headaches.

Other vision or eye conditions/diagnoses.

Epilepsy.

Neurological condition.

Learning disability.

Delusions or hallucinations.

Dissociation.

Autism.

- Major Depressive Disorder (MDD).
- Suicidal or self -harming thoughts or behaviors.
- Hospitalization OR inpatient/outpatient treatment.
- Other mental health conditions/diagnoses.

If you checked any of boxes listed under the medical and mental health history, please explain, and describe below.

DO NOT MARK BELOW THIS LINE. FOR RESEARCHER TO COMPLETE.

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- Demographic Information form completed.
- Informed consent provided and signed.
- Basic protocol and generic session script provided.
- Dissociative Experiences Scale (DES) (Bernstein, 1986) completed. Score \_\_\_\_\_
- Test Anxiety Inventory (TAI) (Spielberger, 1980) completed. Score \_\_\_\_\_
- Resources and referral options provided.
- Participant meets inclusion criteria.
- Participant does not meet inclusion criteria.

## Appendix D: Basic Protocol

### Informational Handout

Description of Eye-Movement Desensitization and Reprocessing (EMDR): Since its development in 1987, EMD evolved to Eye-Movement Desensitization and Reprocessing (EMDR) and has become recognized as an evidenced-based treatment for trauma (Shapiro, 2018, p. 1). Shapiro (2018) stated that the treatment model of EMDR continues to support positive treatment outcomes in participants with a wide range of pathologies. Eye movement desensitization and reprocessing (EMDR) is an integrated, structured therapeutic procedure that adheres to the Adaptive Information Processing (AIP) model of psychotherapy (Shapiro, 2018). In EMDR, the therapist assists the individual in focusing on stored memories that are causing emotional and cognitive reactions in the present. The therapist identifies past experiences contributing to the present disturbance and identifies what is needed for future interactions with similar emotional and cognitive responses from the individual (Shapiro, 2012; 2018).

Theory of how EMDR works: EMDR is believed to work by stimulating information processing in the brain by eye-movements. These eye-movements may allow the brain to adaptively re-process past, disturbing experiences. When a distressing event occurs, it can get stored in the brain with the original picture, sound, thoughts, feelings, and body sensations of the moment. Eye-movements in EMDR seem to stimulate the brain in information processing, like what happens in REM sleep, allowing the brain to re-organize maladaptively stored information (Shapiro, 2018).

### Basic Procedural Steps & Generic 90-minute Session Script:

#### Phase One – History Taking and Session Planning:

During this phase the therapist will help you outline a maximum of 10 memories that are connected to your current experience of test anxiety (TA). The therapist will record your “presenting complaint” as TA, gather an example of the most recent experience of TA, as well as up to 10 memories in which you can recall having a similar affective, emotional, or cognitive experience.

#### Questions your therapist may ask during this phase:

- Can you tell me more about your experience of test anxiety?
- What recent experience have you had that represents this issue?
- As you focus on the recent experience of \_\_\_\_\_, notice the image that comes to mind, the negative thoughts you’re having about yourself, the emotions and sensations you’re experiencing right now, and let your mind float back to an earlier time when you have felt this way before and just notice what comes to mind. What do you notice? Is there anything else?
- How would you like to be able to handle testing situations in the future?

#### Phase Two - Preparation

In this phase you and the therapist will collaborate on the logistics of seating arrangements, room lighting, stop signal and review of coping strategies.

Questions your therapist may ask during this phase:

- Is this a comfortable seating arrangement?
- Do you prefer the lighting? If not, how might it be more comfortable for you?
- In the case that you would like to pause the bilateral eye-movements, how would you like to let me know that you feel this way? Would you like to use a non-verbal cue (e.g., 'waving' your hands, 'snapping' your fingers, etc.) or a stop word?
- When you're feeling negatively, what do you do that helps you feel better?

Phase Three – Assessment & Reprocessing

This portion of the session includes some talk-therapy and bi-lateral eye-movements.

Questions your therapist may ask during this phase:

- What picture represents the worst part of the testing situation as you think of it now?
- As you think of the experience, what is the worst part of it?
- What words go best with that picture that express your negative belief about yourself as you think of it now?
- What emotions do you feel now?
- What would you prefer to believe about yourself?
- On a scale of 0 to 10, where 0 is no disturbance or neutral and 10 is the highest disturbance you can imagine, how disturbing does the memory feel to you now?
- Where do you feel it in your body?

Phase Four – Desensitization

Phase four includes talk-therapy and is focused on bi-lateral eye movements.

Questions your therapist may ask during this phase:

- What are you noticing now?
- When you bring up the original memory, on a scale of 0 to 10, where 0 is no disturbance and 10 is the highest disturbance you can imagine, how disturbing does it feel to you now?
- Where do you feel it in your body?

Phase Five – Installation

This phase of EMDR focuses on connecting how you would like to respond in testing situations with your original memory or experience.

Questions your therapist may ask during this phase:

- Do the words (a positive coping response) still fit, or is there another positive statement that fits even better?
- On a scale of 1 to 7, how true do those words (a positive coping response) feel to you now?

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#### Phase Six: Body Scan

To complete processing, this phase checks for residual body sensations associated with the target memory. If there is any tension or tightness in your body that you notice, the therapist may do bi-lateral eye movements until the discomfort subsides.

#### Questions your therapist may ask during this phase:

- Do you feel any tension or tightness in your body?
- Where do you feel it?
- What do you notice now?

#### Phase Seven: Closure

This phase is to prepare you for the end of the processing phases and transition your focus to the present and future.

#### Questions your therapist may ask during this phase:

- How are you feeling?
- What positive statement can you make that expresses how you feel or what you have learned or gained?
- What feels like the most important thing you have learned about yourself or for yourself today?

#### Phase Eight: Reevaluation and Future Template

The purpose of this phase is to evaluate the progress on the target memory as well as to identify other target memories that may have surfaced as a result of the reprocessing and desensitization phases. You and your therapist will also create a future template of behavior in testing situations and use bi-lateral eye movements to install them.

#### Questions your therapist may ask during this phase:

- When you bring up the memory, what are you noticing now?
- Imagine yourself coping effectively with a similar situation in the future, what are you noticing?

#### References:

Shapiro, F. (2018). Eye movement desensitization and reprocessing: Basic principles, protocols, and procedures. 3rd edition. New York: Guilford Press.