

# Positive Cognition and Timing of Self-Administered App for Test-Taking Anxiety

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Received: August 6, 2018

Accepted: December 1, 2018

Online Published: February 25, 2019

doi:10.5539/ijps.v11n1p36

URL: <https://doi.org/10.5539/ijps.v11n1p36>

## Abstract

A self-administered application was designed to reduce anxiety using a modified Eye Movement Desensitization Reprocessing (EMDR) model. The purpose of this study was to calibrate the EMDR web application for timing and desired self-belief to reduce test taking anxiety prior to an academic exam. Five classrooms of 9<sup>th</sup> grade students from a convenience sample (N=132) were randomly assigned to different timing groups of EMDR exposure (30 seconds, 1 minute, 2 minutes, and 5 minutes). One minute was identified as the ideal time for exposure. "I got this" was selected from 5 choices (*I'm good enough; I'm smart enough; I can do this; I got this; and I'm ok*) and a self-reported other as the desired self-belief phrase before an examination as well as in daily life. This information was used to test the application for efficacy before an algebra examination in the next phase of research and can be applied both in a group classroom setting and individually.

**Keywords:** brief intervention, classroom, EMDR, test anxiety

## 1. Introduction

### 1.1 Test Anxiety and Goals of the Study

It is estimated that 25-40% of the general student population of the United States suffers from test taking anxiety (Zeidner, 2007). Test-taking anxiety is a common occurrence for many students, with symptoms including, but not limited, to increased worry, heart rate, and blood pressure, hyper vigilance, and debilitating somatic symptoms that are emotional, behavioral, cognitive, and physical in nature (Bradley et al., 2010; Ortner & Caspers, 2011). A certain amount of anxiety is found to be helpful to manage time, increase acuity, and improve performance (Mandler and Cowan, 1958). However, severe test-taking anxiety may be debilitating, thereby negatively affecting performance, even if the student prepares or studies (Riva, Grassi, Villani, Gaggioli, & Preziosa, 2007; Walsh, 1968; Walsh, Engbretson, & O'Brien, 1968).

Test anxiety research has shown cognitive, physiological, behavioral, and other consequences in high school youth (Neil, 2009; Zeidner, 2007). Examples include choosing to pursue higher levels of education, ability to advocate for self-needs, and selection of career paths. According to nationally recognized Common Core curricula and standards, adopted by most states and U.S. Territories, all students in traditional educational environments are required to show how they have met the English Language Arts and Mathematics Standards. For example, the principles of linear algebra in public education should be covered and mastered in the 8<sup>th</sup> grade (Common Core State Standards Initiative, 2015). Mastery has somewhat changed through Common Core Curricula. Now, there are fewer focus areas that are more intensely taught, and group learning is emphasized; however, mastery is still evaluated through an examination or performance demonstration of acquired mathematics and language arts skills. Teaching students to regulate anxiety before these potentially stressful evaluations will allow the students to then use these methods to cope in other stressful situations. If the teaching and testing are done in a classroom setting, the teacher in this setting often will be associated with how that student's anxiety is handled to improve or alleviate symptoms of distress.

This two-phase study was approved by the University of California, Davis Institutional Review Board (Study ID: 588997-1) to test an electronic self-administered Eye Movement Desensitization Reprocessing (EMDR) web application designed to reduce test-taking anxiety in a classroom setting. This paper addresses Phase I of research for the purpose of laying the foundation for how to implement this newly developed tool in a high school setting. A randomized approach was used to assess timing in multiple classrooms. The specific aims seek to 1. Identify the optimal length of exposure time to the intervention that is needed to reduce test-taking anxiety in students, 2. Determine the optimal positive self-cognition statement or short statement students desire before an academic exam, and 3. Test feasibility and implement an electronic EMDR protocol at the same time to all students in a classroom setting. The results of these findings were used to conduct the next study, a randomized experiment prior to an algebra exam to compare two different methods to evaluate changes in anxiety level and desired cognition.

### 1.2 Adaptive Information Processing: A Model to Visualize a Classroom Intervention

F. Shapiro's successful treatment, Eye Movement Desensitization Reprocessing (EMDR), is based on the model Adaptive Information Processing (AIP), which theorizes that early memories and exposures contribute to current behaviors, thoughts, sensations, and experiences. Reprocessing these connections affects future outcomes (Rubin et al., 2001; Shapiro, 1995, 1999, 2002, 2010).

EMDR Therapy is a multi-modal psychotherapeutic treatment intervention that includes a standardized set of questions and assessments collected to measure change in relationship to a distressing mental picture or memory. It is distinguished from other EMDR protocols because it is guided by a therapist or facilitator and requires strict fidelity to the standardized protocol that includes the following required stages or components (See Table 1).

Table 1. EMDR Therapy Stages

History
Preparation
Assessment:
Memory and Distress as measured by Subjective Units of Disturbance Scale (SUDS)
Identification of Negative Cognition
Identification of Positive Cognition and evaluation as measured by Validity of Cognition Scale (VoC)
Identification of feelings
Somatic or body sensation identification
Desensitization:
Bilateral Stimulation
Installation
Body Scan
Closure
Re-evaluation

Note: Adapted from *Eye Movement Desensitization and Reprocessing: Basic Principles, Protocols, and Procedures*, p. 46, by F. Shapiro, 1995, New York: Guilford Press.

All components should be addressed for fidelity to the proper EMDR Therapy protocol. Many people erroneously think that EMDR is only the fourth phase of the therapy, the desensitization or bilateral stimulation; however, a proper work-up starting with the client's history is crucial to the protocol and its efficacy. A thorough history of the client, their strengths and resources, and the presenting problems should be established before proceeding with the remaining phases. During the preparation phase, resources are built to lay the foundation for working with the traumatic or distressing material. Identification of a safe place, wherein the individual describes a real or imagined physical or mental image in which there is no distress, is ideal, but it is not always possible with clients who have complex trauma. This image may take time to establish. When it is safe enough for the client to proceed, the assessment phase begins. Then, as the individual tells the therapist what image or memory is distressing to them, baseline levels are evaluated for distress as well as self-beliefs, feelings, and

somatics. Thoughts that go with the memories are assessed through identification of negative cognition or where the individual thinks of the negative self-beliefs. These thoughts are generally in short schemas, or *I am* statements, in response to the stressor. Examples include: *I am powerless; I am not good enough; it is my fault; and I am bad*. The positive cognition is then assessed for what the client would like to believe about themselves such as *I am okay* or *I am good enough*. The Validity of Cognition Scale (VoC), a Likert scale from 1-7, where 1 means they do not believe it and 7 means they fully believe it, is used to assess how much they believe that statement to be true now. Identification of feelings and emotions that go with the distressing memory, such as sadness, anger, humiliation, fear, or anxiety, separates thoughts from feelings and allows for a range of emotions to be experienced. The Subjective Units of Disturbance Scale (SUDS) is the tool for the individual to then rank how distressing the memory they choose to process is on a scale of 0-10, where 0 indicates there is no distress and 10 means that it causes the highest level of distress (Wolpe, 1969, Shapiro, 1995, 1999, 2002, 2010, 2012). The somatic identification follows.

After all of this preceding work, Bilateral Stimulation (BLS) ensues, where signals to both sides of the brain are alternately sent back and forth repeatedly. This desensitization is primarily through eye movements, but may also utilize tactile tapping, buzzing, or movement on both sides of the body, as well as audio mechanisms like music or tones played alternately in the left, then right, ear. The therapist may change the speed of the stimulation, intensity, or sound as needed. In EMDR Therapy with a clinician, guided interventions are offered by the therapist at appropriate times to help the material be reprocessed. In the simplest form, Installation of the positive beliefs and outcomes of the reprocessed materials occur when SUDS is reduced to a 0, VoC is increased to a 7. A body scan assesses whether the individual experiences somatic sensations in the body as a result of the same stressor. Closure is necessary both for clients who have reportedly completely decreased their distress and increased their positive beliefs as well as those who have incomplete sessions. If clients end the session in the middle of desensitization, the therapist will consolidate gains and assure that client is appropriately resourced. It is also important to educate clients as to what to expect between sessions and to be aware of continued processing (Shapiro, 1999, 2002, 2010). Re-evaluation happens generally at the next session when the previous session is reviewed. The therapist re-assesses the measurements of distress, beliefs, emotions, and body sensations.

### *1.3 EMDR Therapy and Youth*

EMDR Therapy has been seen as a brief intervention due to the few sessions needed to make a difference. This validated modality has been shown to be efficacious in children with Post-Traumatic Stress Disorder (PTSD) (Johnson, 1998; Rodenburg, Benjamin, de Roos, Meijer, & Stams, 2009; Shapiro, 1995), but is less well-examined in youth with anticipatory anxiety. EMDR Therapy has been used to decrease anxiety across adult and adolescent populations; however, little is known regarding the effects of EMDR in high school youth for test taking or performance anxiety (Barker & Barker, 2007). Tinker and Wilson first published modifications to child EMDR protocols to accommodate for age, movement, developmental stage, and timing (Tinker & Wilson, 1999). Self-administered EMDR in a group setting has been done since 1998 through an Integrated Group Treatment Protocol (IGTP). It has been shown to be effective as a treatment for trauma in response to critical incidences in short treatment sessions (Jarero & Artigas, 2012). IGTP has been shown to be effective for children and adults, where they are doing self-EMDR individually in a group setting (Jarero & Artigas, 2014). Ribchester, Yule, and Duncan (2010) found an increase in attention children who had been in traffic accidents after EMDR Therapy was administered. Lendl and Foster's EMDR Performance Enhancement Protocol was developed to visualize focus, motivation, and the future template, and has shown efficacy, particularly in athletics (Luber, 2009). Maxfield and Melnyk found that single session exposure to EMDR was effective in addressing test taking anxiety (Maxfield and Melnyk, 2000). Questions remain as to whether or not similar improvements can be expected for large groups of students with test-taking anxiety doing EMDR at the same time in shorter lengths of exposure.

The above synopsis of EMDR protocols lays the foundation for the modeling of this study. The variables of interest include: the specific stages of Desired Positive Cognition, the Subjective Units of Disturbance Scale (recall, SUDS), and exposure to the Bilateral Stimulation, as discussed below.

### *1.4 Desired Positive Cognition*

A crucial phase of EMDR Therapy is the installation of positive cognition or positive self-belief as measured by the VoC scale. This step evaluates distress and prepares the client to process potentially distressing material. The electronic intervention developed for this study seeks to do a brief installation before a test. Thus, understanding what students want to believe about themselves is important. Positive self-belief and anxiety have been studied as predictors of performance (Bandura & Locke, 2003), yet the actual desired cognition is difficult to ascertain between self-confidence, esteem, efficacy, and perceived ability (Arguelles, 2007). Self-belief was

shown to both be an important protector against perceived threats, emotional and physical, such as an exam (Greenberg et al., 1992), and positively correlate with performance (Judge & Bono, 2001).

Many self-reported measures have been created to assess anxiety, including Positive and Negative Affect Scale (PANAS) (Watson, 1988), Children's Depression Inventory (Kovacs, 1985), Revised Children's Manifest Anxiety Scale (RCMAS) (Reynolds and Richmond, 1988), Rosenberg Self-Esteem Scale (Rosenberg, 1965), State Trait Anxiety Inventory for Children (STAIC) (Spielberger, 1973), Test Anxiety Questionnaire for High School Students (TAQ) (Mandler & Cowen, 1958), and Suinn Test Anxiety Behavior Scale (STABS) (Suinn, 1969); however, they take too long to take in a classroom setting before an exam (Shapiro, 1999). Brief ways of assessing anxiety may be easier to implement by a teacher and may be able to be administered in an electronic format.

### *1.5 Timing and Attunement*

Modifying the EMDR approach for a classroom setting that relies on technology requires research regarding self-EMDR and positive outcomes. Typically in EMDR, individuals are exposed to bilateral stimulation (BLS) at varying tempos and times, both for self-EMDR and facilitated EMDR (Shapiro, 1995, 1999, 2002, 2010, 2012). Although subjects are being exposed to BLS, they are actually concentrating on the pictures, thoughts, feelings, and body sensations that are happening as they are stimulated.

Participants are not required to concentrate on the stimulant for recognition, as attention span requires. "Stickiness" measures the length of time people stay on a particular website, but it is not of interest. Spreadable media, information that is designed to be shared in participatory electronic culture, may be more important (Jenkins, 2013). Understanding how long a student can attune to a seemingly boring site in a shared setting with the goal of a positive outcome is important.

### *1.6 Alternative Treatments for Anxiety*

One intervention does not fit all students. Traditional talk therapy modalities, EMDR Therapy, Heart Math (Arguelles, 2007), relaxation dynamics, deep breathing, and other resources or interventions exist to address student anxiety (Johnson, 1998); however, some students may prefer electronic methods. The goal of the present research is to evaluate an iPad or tablet-based intervention for anxiety. The following section addresses the methods used to approach the first phase of this larger research.

## **2. Methods**

A web-based self-administered EMDR application was developed to address individual test-taking anxiety. Feasibility had not yet been established for use in a group classroom setting, like a high school classroom. Efficacy in reducing test taking anxiety had not yet been determined, either. Reliability and validity of the new tool are beyond the scope of this pilot study; however, the instruments used for the measurements, VOC and SUDS, have been validated through former EMDR Therapy protocols above (Shapiro, 1999) and historically (Kim, Bae, & Park, 2008).

### *2.1 Differentiation of EMDR Practices*

This study used a variation of the approved and validated EMDR Therapy protocol to see if positive results may still be found in a self-administered electronic format without a therapist to guide the participants through the process. During phase two, the Preparation, resourcing is imperative before proceeding. This assures that the client is ready to process distressing material. For the purposes of this study, three elements of this resourcing are targeted for a brief intervention: exposure to one set of bilateral stimulation, identification of the desired positive cognition or positive self-beliefs, and installation of the positive phrase. The truncated format is necessary because the intended use is briefly and immediately before an anticipatory stressor. A Body Scan is a part of the protocol, but it is not tracked in the same way that it would be with a therapist. The EMDR Therapy model requires an understanding of the thoughts that are associated with distressing memories for individual participants. Negative cognitions are assessed first, where participants self-identify statements while they visualize the distressing elements of the experience. The positive cognition is immediately assessed afterward to see what the participants would like to think about themselves when they visualize the distressing situation. Positive cognition is measured using the Validity of Cognition (VoC) Scale and assesses how much a person presently believes the positive thought that they would like to hold about themselves (Shapiro, 1999, 2002). The VoC uses a Likert scale which rates the level of belief in the positive statements, with 1 meaning they do not believe it at all and 7 meaning they are in complete agreement with the self-belief.

The documentation of Self-EMDR practices and procedures (Shapiro, 2012) has opened a field of inquiry regarding how to communicate the differences between EMDR Therapy, Self-EMDR practices, and efficacy of

brief self-EMDR interventions. There are also opportunities to explore how to deliver self-EMDR procedures without a therapist present to guide EMDR Therapy. Self-EMDR procedures, without a therapist, lack fidelity to the validated EMDR Therapy eight-stage model described above. The electronic web application that was developed for this study differs from the original EMDR Therapy's 8 stages but does have more structure than Self-EMDR alone. The electronic version eliminates the individual self-identifying element of finding a safe place, as students participate as a group in a classroom setting. Additionally, negative cognitions and feelings are not elicited, as the intervention is meant to be administered very briefly in the minutes before an examination. Future research would be needed to determine validity and reliability of the electronic self-EMDR tool as compared to the validated EMDR Therapy. Scales are still assessed through self-administered pre/post-test questionnaires to see if anxiety, as measured by SUDS, is decreased, and positive cognition, as measured by VoC, is increased.

### *2.2 Purpose of Research*

Phase 1 identified the appropriate length of time to expose students to the intervention and the desired positive cognition that students would like to believe about themselves. Observing whether it was feasible to have a whole class access the website at the same time and complete the intervention at the same time was also included. Phase 2 tested feasibility in a classroom setting and whether the intervention decreased test-taking anxiety, but is not discussed in this paper.

### *2.3 Approach*

The design was cross-sectional, utilizing surveys and feedback questionnaires. The first purpose of this stage of the research was to understand how long students were able to attune to a bouncing ball on an electronic device. The second purpose was to learn what positive cognition ("I am" statement like "I can do it") that students wanted to believe about themselves before taking an examination. Lastly, it tested the feasibility of administering the protocol in a classroom setting. Participants included a convenience sample of 9<sup>th</sup> grade students (N=132) at a San Francisco Bay Area High School. Participants were identified by the principal and teachers as being sufficiently able to read English and follow directions. Those who were absent on the day of the study were excluded from the study.

## **3. Procedures**

### *3.1 Recruitment Methods*

The Principal Investigator (PI) requested permission of the principal of the school to use the school as a study site. Once the principal approved the protocol, scheduling of the classes to be studied were handled by the vice-principal. English classes were chosen by the vice principal because they were sequential; consistent to placement level; and minimized the number of teachers required to conduct the study. He identified a day on which English teachers did not have a required curriculum to conduct both the study assent by students and the administration of the protocol. One teacher permitted three of her classes to be studied, while a substitute teacher had two classes available for a total of five classes studied in a single day of study administration. Each class was given an information sheet to students as a guide while the PI described the study and invited participation in the study. Participation served as the student assent. Written parental consent was waived by the IRB as a result of prior approval by the administration and presence of the teacher during the protocol which served as additional protection. Students were informed that an incentive of a \$25 iTunes gift card would be offered at the completion of the study.

### *3.2 Randomization*

Students were randomly distributed into one of four groups: 30 seconds, 1 minute, 2 minutes, and 5 minutes (Figure 1). To assure that equal numbers of students were distributed in each group, cards with corresponding group times (30 seconds, 1 minute, 2 minutes, 5 minutes), were grouped for a total of four cards per set. Students randomly chose a card representing one of those times. When the first set of cards was distributed, the next set of cards was randomly given out by drawing one-by-one until all students had a card with a corresponding time. Enough sets of four were created so that all students would be close to evenly distributed at the end of each class.

30 Second-set 1	1 minute- set 1	2 minute- set 1	5 minute- set 1
30 Second- set 2	1 minute- set 2	2 minute- set 2	5 minute- set 2
30 Second- set 3	1 minute- set 3	2 minute- set 3	5 minute- set 3
30 Second- set 4	1 minute- set 4	2 minute- set 4	5 minute- set 4
30 Second- set 5	1 minute- set 5	2 minute- set 5	5 minute- set 5
30 Second- set 6	1 minute- set 6	2 minute- set 6	5 minute- set 6
30 Second- set 7	1 minute- set 7	2 minute- set 7	5 minute- set 7

Figure 1. Time 4-Card Sets for Randomized Distribution

### 3.3 Data Collection

The protocol took about 25 minutes in total. When the class arrived, teachers reminded students that the study was going to occur that day and introduced the principal investigator (PI). The PI reviewed the informed consent sheet, described the study protocol, and answered student questions before requesting assent of the students. Teachers made arrangements for students who did not want to participate; however, all students in all of the classes chose to participate. Pre-randomized cards for group assignments were offered to students until the number of people in each timing group was nearly the same. Students were handed an electronic device, a netbook or an iPad™, and were instructed to sign in to the device and find the website. They then were oriented to the surveys and procedures. The kind of device varied depending on what was available at the time the students had class. Three morning groups had netbooks and the two remaining classes had iPads™.

Students took approximately 90 seconds in total to answer the first questionnaire. The questionnaire included questions regarding the positive cognition they would like to believe about themselves daily and before an academic examination. Students were then directed to the page where the bouncing ball was located and were told to enter their time from their cards in units of seconds. Those in the 5-minute group were instructed to go first. While they were still following the bouncing ball, the 2-minute, 1-minute, and then 30-second groups respectively were told to start watching the ball. This meant that they all ended at the same time. Students were then asked to fill out the feedback form which included questions about their attention to the bouncing ball and thoughts about the application.

The length of time they were exposed to the bouncing ball was recorded on their questionnaire before submission. After both questionnaires were completed, they were thanked for their participation and entered into a drawing for a \$25 iTunes™ gift card.

### 3.4 Data Management

Data was recorded by students on paper and pencil forms with colors to identify the questionnaires before the test compared to those after the test. Study numbers were assigned to the questionnaires for collection purposes, but they were not linked back to the students who filled them out in any way. Numbers included the class period from which the students came, timing group, and number of students in the class. Data entry was done by the researcher into an Excel spreadsheet manually and checked again to assure proper entry. Codes were given to each question and ordered in pre/post format with color codes from the paper copies also given to the data columns for consistency. Data cleaning followed, assuring that students answered both the pre-test and the post-test and reviewing that all questions were answered based on the existing scales. If students wrote something different than the given scale or that filled in the blank but did not answer the question, their data was eliminated.

### 3.5 Data Analysis

Descriptive statistics, number of students, and frequency distribution comparison charts were reviewed to determine what students wanted to believe about themselves before a test as well as what they wanted to believe about themselves everyday. These methods were also used to identify what length of time students said was “just right.” “Too long,” “just right,” and “too short” were addressed as categorical data compared to timing groups of “30 seconds,” “one minute,” “two minutes,” and “five minutes”.

## 4. Results

### 4.1 Observing Logistics in the Classroom

The feasibility of utilizing electronic devices for an entire class was observed and tracked on the data collection day. Study administration went smoothly with few exceptions. Students in the first class each received netbooks. Not all students were familiar with the netbooks and had to be shown how to log onto the machines with their

unique student credentials. Once everyone was able to access the internet, the next challenge was ensuring that students entered the website exactly as it was written on the board. It was required that the “www” be entered in front of the website, which posed a challenge to some students. In subsequent classes, further emphases on these instructions were given to students to facilitate expedience of finding the intervention page. When instructed to put the amount of time from their randomized card in the timing box on the screen in seconds rather than minutes -- for example, 5 minutes=300 seconds -- a few students had problems understanding how to enter the value in seconds. The teacher wrote the values in seconds on the board. Students seemed to be able to follow directions in filling out the pre-intervention questionnaire easily. Color differences facilitated the distinction in the questionnaires. Students were instructed to start the 5-minute group first, without incident. The subsequent 2-minute, 1-minute, and 30-second groups all started their bouncing balls in smooth succession. Students easily transitioned to the second questionnaire.

#### 4.2 Time of Attunement

Both analyses of the percentage distributions of the timing show that one minute is the appropriate length of time to expose students to the bouncing ball. Five minutes trended too long, and 30 seconds, too short. Although two minutes was perceived as just right for many students, the one-minute time exposure demonstrated preferred outcomes.

#### 4.3 Positive Cognition

The comparison of daily cognition to the cognition preferred before a test was somewhat surprising. Due to time constraints, students were given preselected statements from which to choose what they wanted to believe about themselves both before a test and daily: *I'm good enough*; *I'm smart enough*; *I can do this*; *I got this*; and *I'm ok*. Students wanted to believe *I got this* both for test taking as well as daily. However, before a test, more students wanted to believe that they were smart enough, and *I can do it* ranked second for daily cognition and a close third before a test. One additional finding that supports the high level of students with test-taking anxiety was confirmed in this study. Of the 132 respondents, only 11 said that they never experienced test-taking anxiety; 92% reported some level of test-anxiety ranging from rarely to always.

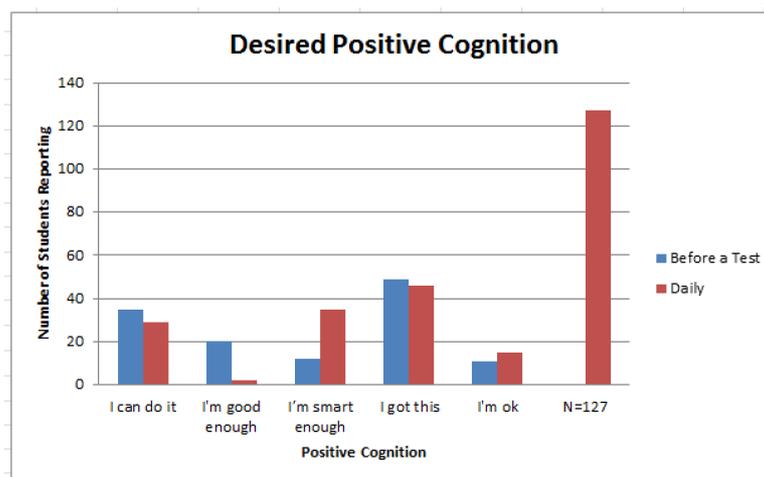


Figure 2. Desired Positive Cognition

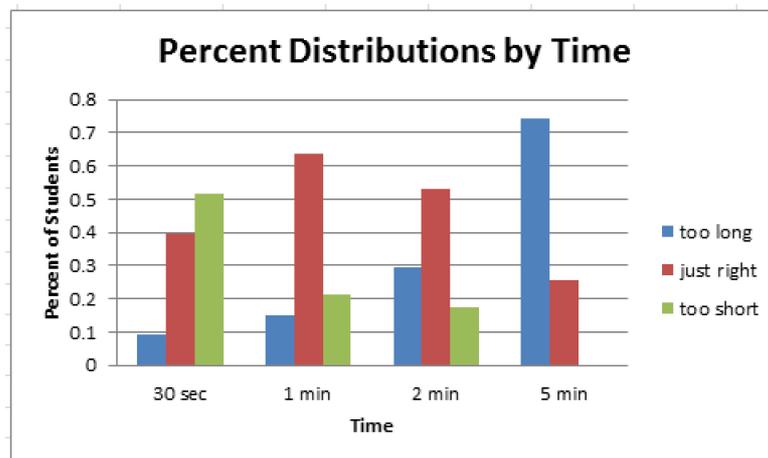


Figure 3. Percent Distributions by Time

## 5. Discussion

The purpose of this study was to determine the feasibility of implementing an electronic intervention in a classroom setting on individual devices but administered simultaneously in a group. Additionally, it sought to determine 1) the length of time students could attune to a bouncing ball on the screen and 2) what students want to believe about themselves before an academic examination.

### 5.1 Feasibility Findings

After observing five classes complete the study, it was determined that it was possible to have an entire class complete an individual electronic intervention at the same time with little interruption to class time. Students may spend more than half of their waking hours in a classroom setting; thus, schools play a vital role in the development and support of students (Dinkmeyer, Carlson, & Koval, 1975; Johnson, 1998). As schools continue to move to electronic learning platforms, there may be greater opportunity to utilize this technology in order to enhance student performance. Improved test-taking performance, emotional regulation, anxiety reduction, and/or exposure to interventions to improve self-efficacy may contribute to overall improved health outcomes (Boehm & Kubzansky, 2012).

Games and the gamification of wellness activities are finding themselves in the classroom more often as research has shown that they actually teach students how to be successful by dealing with failure (McGonigal, 2011). The more familiar students and teachers are with the technology, the easier it becomes to lead students through an intervention (Heid, 2008). For teachers, this is crucial, as valuable class time is spent on increased academic responsibilities to implement in a finite amount of time. New emphasis on whole integration has made its way to the classroom across the county through U.S. accepted Common Core teaching standards. These Common Core group learning strategies may provide an avenue to support efforts through electronic media to solidify gains and support emotional integration that will prepare students for the 21<sup>st</sup> century workplace (Greenhow, Robelia, & Hughes, 2009; Jerald, 2009).

### 5.2 Attunement and Positive Cognition Findings

The web application was preliminarily tested for both the student-identified ideal length of exposure time to the bouncing ball and the positive cognition that should be shown on the screen. The majority of students identified that one minute was the optimal time without being too short or too long. Although two minutes was a close alternative, one minute was chosen because it would cause less interruption to a classroom period. This finding is important because it has implications for educational practice teachers, students, and the classroom. For teachers, one minute of time is not too intrusive a length to expose students to an intervention.

This study builds on integrated group therapy protocol (IGTP) research and self-EMDR protocols by testing another method of delivering the EMDR protocols electronically. Although previous research had established efficacy of IGTP to be administered by facilitators and para professionals (Jarero, 2013), this study shows that it may also be administered with an electronic device as the facilitator. This expands the knowledge in the field by considering alternative forms of experiencing the potential benefits of EMDR when a therapist or trained

facilitator is unavailable to treat manageable anxiety. This is consistent with existing research that individual EMDR treatment may be self-administered in a group setting, particularly for children or youth (Ignacio Jarero & Artigas, 2014; Shapiro, 2012; Tinker & Wilson, 1999).

A strong VoC is a desired outcome of a successful EMDR completed session, installing that positive thought at the end of the session (Shapiro, 1999, 2002). This study attempted to identify what that cognition to install should be, both for an exam as well as daily. For both scenarios, students chose *I got this*; however, this study did not ask the students how they defined each statement. Ostensibly, efforts to support the emotional wellbeing of young people should prioritize positive self-belief and a broad view of self-efficacy in addition to academic preparation (Bandura & Locke, 2003). Collective positive beliefs have not been effectively studied; therefore, information about collective self-efficacy is lacking (Tsang, Hui, & Law, 2012). The findings above indicate that a shared self-belief of *I got this* may be a unifying statement to be assessed both individually as well as collectively.

### 5.3 Limitations

Several limitations exist in this phase of the research. The study was confounded by the availability of the electronic devices for the classes. The first three classes only had netbooks available to them while the last two classes of the day only had iPads, making it difficult to standardize the protocol by device. The students came from two different teachers as well.

Students may have felt peer pressure to participate or did not want to have to do the alternative assignment and participated anyway. Additional influencers like the possibility of winning a gift card or that the teacher was present in the classroom may have contributed to the participation.

The web application is significantly different from the EMDR Therapy model in that the web application is only using a truncated version of the resourcing component of the preparation phase in less than five minutes; however, a full session is not feasible in a classroom setting. Additionally, there is no therapist to guide the protocol. Alternatively, a shortened self-EMDR protocol with one long set of relatively slow bilateral stimulation is used. There is only one tempo offered on the application, where in other bilateral stimulation instances, the speed of the stimulus may increase or decrease depending on the needs of the individual.

Students were not able to choose from a comprehensive list of positive self-belief statements, rather a short list and another option was offered to minimize the disruption of class time. The selection of desired daily cognition or pre-test cognition may actually be something other than the choices that were given, even though the other option was not selected by many students. Additionally, students did not define what *I got this* meant to them. Rather, it was assumed that this urban slang was commonly agreed upon to mean *I have this handled or under control* (Trezvant, 2006).

### 5.4 Implications

For students, two times the length of a standard 30-second EMDR Bilateral Stimulation set is preferred for this self-administered method (Shapiro, 2012). This information could spur future research in increasing length of exposure for electronic self-EMDR techniques and contributes to the literature for attunement to bilateral stimulation by identifying one minute of exposure to pilot test in advance of an academic examination. This finding may not be generalizable to all students. This school had enough netbooks and iPads™ for entire classrooms; however, some schools may not be able to afford such resources, making familiarity with technology or even its use more challenging in a classroom setting. For students and entrepreneurs, this information could be vital to develop gamification strategies to support student performance electronically. It is not advisable to have one large screen at the front of the room and all students watch the bouncing ball for one minute because the intervention relies on pre-test and post-test questionnaires to identify SUDS and VoC, important measures to assess individual change. These changes could be linked by classroom to track classroom progress, currently possible with the app but not a part of this phase of research.

#### 5.4.1 Implications for Educational Practice and Policy

Findings related to desired positive self-belief have interdisciplinary implications for health and educational institutions and parents. First, the language that we use to support youth may need to include *I got this* in performance preparation. Schools, counselors, teachers, medical providers, and parents may need to strategize a spectrum of activities and opportunities to help students believe *I got this*. Second, academic curricula, including higher education curricula, could be enhanced through Common Core standards to include self-efficacy, and policy recommendations for youth should support increasing self-efficacy. These efforts must be researched to evaluate effectiveness.

### 5.5 Future Research

More research is needed to understand the desired cognition of students before a test, especially in allowing students to define what the positive cognition statements mean to them. Further research is also needed to test whether the intervention decreases test-taking anxiety and whether students improve their confidence by the belief that they *got this*. A strategy for how to implement the resourcing and installation of the cognition on an electronic device is also needed as it may be more beneficial to have the positive belief static on the screen of a particular size, a flash on the screen of a particular length, or alternative version of exposing students to *I got this* as a way to increase VoC from pre- to post-test. It may be of interest to see if the intervention also works to improve performance, not just reduce anxiety or increase positive self-belief. The above protocols should be repeated with participants at different ages and in response to different stressors.

As the application is adopted with other types of stress or anxiety in self-EMDR it will be necessary to test timing in other age groups, especially those who are not technology natives, meaning populations who have been exposed to technology all of their lives.

Adult parallels to academic tests are evident in everyday life, from job interviews, performance evaluations, medical experiences, or stress-inducing events related to one's specific career choice such as emergency response personnel or teachers entering a challenging environment. Early coping skills may be used before known anxiety-producing events to improve the experiences (Bandura & Locke, 2003). Reviewing the literature in self-EMDR (Shapiro, 2012), EMDR-IGTP (Ignacio Jarero & Artigas, 2014) and EMDR-PRECI (Ignacio Jarero, Artigas, & Luber, 2011) may indicate that a combination of protocols could be evaluated using this electronic format and should be further studied.

The next step in this research trajectory tests the efficacy of the intervention in another school with this information to see whether the intervention is effective in reducing test anxiety and increasing positive self-cognition. Phase II tests whether it is feasible to administer the protocol and examination in a standard 47-minute classroom period by observing the teacher in the classroom as the intervention protocol is being administered.

### 5.6 Conclusion

This study tested the feasibility of a classroom intervention and calibrated an electronic self-EMDR web application. Students were easily able to complete the individual intervention simultaneously in a classroom setting with little incident. Students were also able to give their feedback regarding the intervention, including how long they were able to attune to the bouncing ball and what they wanted to believe about themselves before an academic test. It was important to do the early stages, preparatory to research, when planning to test the efficacy of an intervention with variables that need to be identified for consistency. This should be based on what subjects identify, to avoid the influence of researcher bias. Additionally, this phase of understanding feasibility is necessary to map the logistics and time to get to the intervention in addition to the length of time exposed. Because the results showed that it was feasible to utilize the electronic intervention individually (on a student's own device) but as a group in Phase I without a test, the next phase of research will be able to build on the feasibility of implementation with the addition of an academic test. The ease of implementation in the classroom is also important to understand, as more mixed media and electronics are integrated into classroom learning platforms.

The statistical analysis for this phase of research was descriptive in nature. The emphasis of the study stressed the logistics in a classroom setting and feedback about the experience from students. In comparing the timing groups, the one-minute group seemed to be the group that students chose as "just right" with 30-seconds trending as too short and 5 minutes trending as too long. This finding is important in understanding if the intervention may help relieve anxiety in such a short amount of time. Moreover, if it is not sufficient time to see significant results in improving anxiety, then the question remains whether students will be able to tolerate watching the ball a little longer for optimal results.

Results showed that most youth want to believe, "I got this" before an exam as well as daily, preferring confidence over ability. Student support teams, from parents to teachers, coaches, and providers, may focus on improving youth self-belief. This information will now be used for future research to test the intervention before an academic examination in a classroom setting. More research is needed to test the electronic application to see if it is feasible to implement in a classroom setting before a test, and whether it is effective in decreasing test-taking anxiety while increasing self-efficacy.

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