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Solution-Focused Therapy Changes Neurophysiological Activation in Collegiate Athletes: An Intervention Study

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Solution-Focused Therapy Changes Neurophysiological Activation

in Collegiate Athletes: An Intervention Study

by

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Does Solution-Focused Therapy Change Neurophysiological Activation in Collegiate Athletes: An Intervention Study

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Abstract

Neurophysiological research has begun to uncover how therapy produces change in the brain. To examine this phenomenon, many studies have controlled for specific symptoms to identify where therapy has the greatest effect (Linden, 2006). In athletic performance, anxiety represents a significant struggle for college athletes (Mabweazara, Leach, & Andrews, 2017). The present study intended to examine the impact of brief therapy on brain activation and competition anxiety in college athletes. A sample of collegiate athletes (*n* = 17) participated in a pre-post intervention study. Pre- and post-intervention measures included electroencephalogram (EEG), galvanic skin response (GSR), self-report anxiety measures (SAS-2, GAD-7), and self-ratings of performance. Each athlete completed 5 sessions of Solution-Focused Therapy to address symptoms of competition anxiety. Significant decreases in self-reported competition anxiety were found post-intervention. Significant increases in self-ratings of performance were also found post-intervention. Significant changes in EEG brainwave activity were also found, particularly in the dorsolateral prefrontal cortex and temporal lobes which paralleled those found in previous studies on depression and anxiety (Grimm et al., 2008; Paquette et al., 2003). GSR readings were not found to be significantly different from pre- to post-intervention. The impact of therapy can be measured via client experience and brainwave activity. Limitations and future directions are discussed. Therapeutic outcomes appear to be just as present in the hardware of neurobiology as have been found in the software of self-report.

Keywords: Solution-focused therapy, EEG, competitive anxiety, college athletes

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Introduction

Defining Competition Anxiety

Collegiate athletes work incredibly hard to perfect the art of their performance; endless hours spent in the gym, on the field, or on the court, preparing for the challenge of competition. Many athletes have the support of coaches, trainers, and/or psychologists in the effort to improve their competitive edge. Predominantly, supports focus on nutrition (Gomes et al., 2013), life skills (Hardcastle, Tye, Glassey, & Hagger, 2015), pre-competition warm-up techniques (Herda, Cramer, Ryan, McHugh, & Stout, 2008), or exercise strategies (Rønnestad, Hansen, Hollan, & Ellefsen, 2015). Although such interventions play an important role in improving athletic performance, the greatest barrier to optimal performance for many athletes is competition anxiety (Mabweazara, Leach, & Andrews, 2017; Woodman, & Hardy, 2003).

Competition anxiety is defined as a multidimensional experience of somatic (pounding heart, sweat, shaking) and cognitive (worry, fear, focus) symptoms that can either impede or facilitate performance (Smith, Smoll, Cumming, & Grossbard, 2006). Notably, the somatic features of competition anxiety tend to be the strongest predictors of performance (Mabweazara, et al., 2017). This definition marks an important step in athletic performance research, as much of the previous work in this arena has focused singularly on one of those dimensions. Taylor (1987) sought to determine the relationship of physiological and cognitive anxiety on athletic performance using collegiate athletes (*n* = 81) from various sports teams (track, golf, skiing, basketball, tennis, and cross country). The participants were evaluated for anxiety via self-report questionnaires during six separate competitions. Taylor found that both physiological and cognitive symptoms of anxiety strongly correlated with performance across all sports, with low anxiety correlating with better performance. The sum of trait/state and cognitive/somatic anxiety may not necessarily predict performance, as was pointed out by Jones, Hanton, and Swain (1994). Their study indicated that interpretation of one's symptoms as positive or negative may be the greatest determinant of performance outcomes.

Although anxiety may impact an athlete's ability to perform; some athletes appear to excel under high pressure while others are overwhelmed. Turner and Raglin (1996) examined the "Inverted-U" theory of performance and anxiety in athletes, which posits that optimal performance occurs when anxious arousal meets the difficulty of the task. For example, athletes whose anxiety prevents them from maintaining focus would be considered on the far right of the Inverted-U, where arousal exceeds the difficulty of the task. Alternatively, the athlete who is overly relaxed may not be fully engaged in the task. Each athlete may therefore have a specific range of anxiety that facilitates greater performance.

Neurological Underpinnings of Competition Anxiety

Research efforts to understand anxiety and the brain have predominantly used symptom provocation techniques, as mentioned earlier. Anxiety has been found to affect specific brain regions such as increased activation in the anterior cingulate cortex, visual cortex, thalamus, amygdala, and insula (Likhtik, Stujenske, Topiwala, Harris, & Gordon, 2014; Straube, Mentzel, & Miltner, 2007). Straube and colleagues found a positive correlation between activation in these areas and activity in the right prefrontal cortex with scores on self-report measures of anxiety among adults with arachnophobia while observing images of spiders.

When a threat was detected, anxious arousal was found to inhibit spatial working memory ability (Shackman et al, 2006). Shackman and colleagues found that, among a sample of 55 undergraduate students, the threat of shock (symptom provocation) was sufficient to selectively disrupt performance on a visuospatial working memory task (recognizing patterns of letters). Such an effect would dramatically affect athletic performance, as many sports require high levels of visuospatial ability (Lum, Enns, & Pratt, 2002).

This phenomenon of threat activation in these areas appears to be true with athletes as well, as research has indicated that guided reflection (e.g., listening to a script that induces anxiety) is sufficient to provoke symptoms and activate physiological arousal of anxiety in athletes (Cumming, Olphin, & Law, 2007). Cumming et al. measured the heart rate and self-reported anxiety of 40 collegiate athletes as they listened to one of four guided reflections (relaxation, "psyching up," competition anxiety, and coping). This included one baseline phase where resting heart rate was measured. The results indicated increased heart rate and self-reported anxiety following the competition anxiety reflection compared to baseline. During the coping reflection, heart rate was increased compared to baseline and self-reported anxiety decreased. These findings indicate that collegiate athletes' experience of anxiety may be manipulated in the lab via scripted reflections.

Although many have examined the mystery of anxiety and its relationship to performance, a review of the literature by Burton and Naylor (1997) highlighted some of the issues with the research thus far. One of the primary concerns was that the construct of competitive anxiety was often examined through *either* cognitive or physiological lenses. Additionally, most symptoms were measured by quantity or intensity. Burton and Naylor pointed out this may not fully capture an athlete's experience (i.e., few symptoms but high intensity may look different than many symptoms at low intensity), which may confound self-report anxiety measures. Additionally, research with healthy collegiate athletes (those without concussions and traumatic brain injuries) investigating the neurobiological level of anxiety has not been conducted. Much of the literature cited in this review used self-report measures to examine cognitive and or physiological symptoms, research using neuroimaging technology as a measure of anxiety has yet to be published (see Nakata, Yoshie, Miura, & Kudo, 2010).

This represents a gap in the literature on competition anxiety and performance, as neuroimaging is used to research other forms of stress (Finn, Ramsey, & Earleywine, 2000; Weinstein, 1995). For example, Paquette et al (2003) found specific patterns of neurological activation in patients with arachnophobia while viewing images of spiders. Similarly, Grimm et al. (2008) found that emotional images activated specific brain regions in patients with Major Depressive Disorder. As researchers have begun to explore symptom-related activation (symptom provocation), the effects of treatment may be better understood.

Clinical Treatment of Competition Anxiety

Psychotherapists employ a vast array of techniques for the treatment of competition anxiety. These techniques can be sorted into two basic categories: emotion-focused coping, which addresses the emotional reaction to stress, and problem-focused coping, which addresses the triggers that lead to the emotional reaction (Lazarus & Folkman, 1984). Emotion-focused coping interventions have predominantly been studied in the form of cognitive-behavioral therapy (Maynard, Smith, & Warwick-Evans, 1995), visuo-motor behavioral rehearsal (Lohr & Scogin, 1998), pre-competition imagery (Beauchamp, Bray, & Albinson, 2002), and motivational self-talk strategies (Hatzigeorgiadis, Zourbanos, Mpoumpaki, & Theodorakis, 2009). Notably, emotion-focused and problem-focused strategies are included in Solution-Focused techniques (Bell, Skinner, & Fisher, 2009).

Maynard et al. (1995) found that cognitive-behavioral therapy was effective at decreasing self-report trait anxiety (using the Competitive State Anxiety Inventory-2, or CSAI-2) amongst semiprofessional female soccer players. Lohr and Scogin (1998) studied the effects of visuo-motor behavioral rehearsal which included repetitive practice of visualization of movement on performance and trait anxiety in male and female collegiate athletes across seven different sports. The intervention effectively decreased self-report state anxiety (as measured by the Sports Competitive Anxiety Test) and a negative correlation between anxiety levels and performance occurred. Hatzigeorgiadis et al. (2009) employed a motivational self-talk intervention with male tennis players (n = 72) and used a pre-post design to measure changes in self-confidence and self-report anxiety. The intervention effectively improved self-confidence scores and decreased trait anxiety scores (as measured by the CSAI-2).

Cognitive-behavioral interventions specifically, such as imagery and centering, are recognized under the category of mental skills training (Rogerson & Hrycaiko, 2002). Mental skills training techniques have been found to be particularly effective in elite (collegiate and professional) athletes. Maynard et al. (1995) found that mental skills training decreased trait (CSAI-2) anxiety symptoms among semi-professional male soccer players. Maynard, et al. compared players with debilitating cognitive trait anxiety (DCA) to those with debilitating somatic anxiety (DSA) to determine symptom-specific effects of the intervention. Participants completed self-report anxiety measures at the beginning, middle, and end of the season while participating in weekly mental skills training. A significant decrease in cognitive anxiety for the DCA group and a significant decrease in somatic anxiety in both DSA and DCA groups over time were found. Similarly, Bell, Skinner, and Fisher (2009) found Solution-Focused Therapy was effective in addressing the competition anxiety that affects motor movements (known as yips) in professional golfers. Four professional male golfers, each of whom suffered from yips while putting participated. Post-intervention measures indicated that each golfer showed large reductions in the frequency of yips, which lasted for 14 weeks. Therefore, Solution-Focused Therapy appears to warrant further examination in helping athletes address barriers to performance.

Therapy and the Human Brain

Although advances have dramatically improved the practice of psychotherapy and client outcomes, researchers continue to puzzle over how therapy evokes change (Kazdin, 2007). Many efforts to solve this mystery, such as those fronted by Duncan, Miller, and Hubble (2004), have meticulously examined therapeutic outcome via self-report measures from the client. The use of such measures provided critical insights regarding the client's experience, which appears to improve dramatically with the use of evidence-based practices (see Schedler, 2012; Butler, Chapman, Forman, & Beck, 2006). However, much is unknown about the neurological underpinnings of such change. In other words, we recognize differences in the "software" of human experience, yet changes in the "hardware" are less clear.

A review by Linden (2006) examined the application of neuroimaging technology for measuring therapy outcomes. Studies, such as Paquette et al. (2003), provided invaluable knowledge regarding changes in brain activity associated with treatment outcomes. Linden (2006) emphasized one of the greatest strengths of such research: symptom provocation. For example, Paquette et al. (2003) conducted brain imaging on adults with spider phobias before and after treatment. In their study, participants were presented with video of live spiders while being measured using fMRI. Changes in self-reported anxiety were found from pre- to post-intervention, as well as changes in brain activity in the dorsolateral prefrontal cortex. The induction of symptoms in a controlled lab environment provided the unique opportunity to measure outcome in vivo.

The Present Study

This study intended to answer the following questions: What areas in the brain change activation levels following a therapeutic intervention as measured by EEG, and how do these changes relate to specific (Sports Anxiety Scale-2) competitive anxiety, general (GAD-7) anxiety, and self-ratings of performance. The independent variables included measurements pre- and post-intervention and the dependent variables included scores on self-report measures as along with neurophysiological measurements, including EEG (10 channels, microvolt) and GSR (two channels;microsiemens).

Hypotheses included: (a) Based on the findings from Yamanaka and Yamamoto (2010) and Paquette et al. (2003), it was anticipated that prefrontal regions would demonstrate different mean power levels from pre- to post-intervention, (b) GSR levels would be lower at post intervention, (c) Self-reported trait anxiety (GAD-7) would decrease from pre- to post-intervention, (d) Self-reported state anxiety (SAS-2) would decrease from pre- to post-intervention, and (e) Self-reported ratings of performance would increase from pre- to post-intervention.

Chapter 2

Method

Participants

Student athletes in track and field, tennis, volleyball, soccer, baseball, and football were invited to participate in the study during the 2016 fall or 2017 spring semester. All participants were full-time, traditional students at a private university. An initial sample of 19 participants were included in the study, one was removed due to invalid EEG readings, the other following a TBI sustained between pre and post recording times. The participants (n = 17; age range 18-21, M_{age} = 19.31, SD = .23) included 7 females, 10 males, 2 of Latino/a heritage, 1 of African American or Black heritage, and 14 of White not Latino/a heritage. Participants who volunteered represented the following sports: three soccer, two baseball, seven track and field, three football, one tennis, and one volleyball. The study was approved by the university Institutional Review Board (IRB).

Materials

The pre-intervention measures included an informed consent, demographic questionnaire, two self-report anxiety measures (General Anxiety Disorder Scale and Sports Anxiety Scale 2), and neurophysiological measures (EEG and GSR). The demographic questionnaire included items such as age, gender, ethnicity, and sport. The post-intervention measures were the same as pre-intervention, except for the consent and demographic questionnaire.

Anxiety measures. The self-report anxiety measures include the General Anxiety Disorder Scale, (GAD-7; Spitzer, Kroenke, Williams, & Löwe, 2006), the Sports Anxiety Scale 2, (SAS-2; Smith et al., 2006), and a five-item rating scale of performance. The GAD-7 is a brief, 7-item measure of general anxiety on which participants indicate daily frequency of anxious symptoms over 2 weeks (i.e. not being able to stop worrying, restlessness, etc.). The GAD-7 has good test-retest reliability (interclass correlation = .89), and construct validity for symptoms of worry and concentration disruption ($r = .74$, $p < .001$). The GAD-7 correlated with Beck Anxiety Inventory ($r = 0.72$, Steer & Beck, 1997) and the anxiety substance of the Symptom Checklist-90, ($r = 0.74$, $p < .05$, Spitzer et al., 2006). The SAS-2 is a brief, 15-item measure of cognitive and physiological anxiety symptoms related to one's sport (i.e., I worry that I will let others down). The SAS-2 has strong reliability, particularly within a college athlete sample (correlations ranging from .89 to .93 for all symptom subscales, (Smith et al., 2006). The SAS-2 also has good predictive validity for state and trait anxiety ($r = .64$, $p < .001$). A 5-item rating scale was used as a descriptive measure of the athletes' perceived performance, team support, and coach support. Each item asked participants to rate themselves on a scale from 1-10, with 1 being *lowest or worst* and 10 *being highest or best*. For example, the first item asks participants "On a scale of 1-10, how might you rank yourself compared to other athletes in your sport at your level (i.e. Division III)?"

Intervention. Solution-Focused Therapy (SFT) was used as the intervention for competition anxiety (De Shazer, & Dolan, 2012). SFT incorporates elements of emotion-focused coping and problem-focused coping in an efficient manner that has been found to be effective with athletes (Bell et al., 2009; Bell, Skinner, & Halbrook, 2011; Hoigaard, &

Johansen, 2004). Additionally, SFT is relatively easy to train young clinicians to use effectively, and therefore a small team could be assembled to provide the intervention to participants. A brief training was developed for this study. All masters level therapists involved were trained using the same format. See Appendix A. Master's level therapist were supervised by a licensed psychologist.

Stimulus. The stimulus was displayed on a computer screen using SuperLab Pro software (Version 5.05, Cedrus Corporation, San Pedro CA). This included in sequence: (a) An initial screen with instructions for the participant to prepare for the measurement, (b) a rest screen (image of the beach) that was timed to 180 seconds (Rest), (c) a "competition anxiety" reflection that was timed to 180 seconds (Competition anxiety stimulus; Cumming et al., 2007), (d) a prompt to "use whatever mental skills you might use in trying to improve your performance," (e) a coping reflection that was timed to 180 seconds (Coping stimulus, Cumming et al., 2007), and (f) another viewing of the initial rest screen for 180 seconds (Rest 2).

The reflections for the stimuli phases (competition anxiety and coping) were adapted from Cumming et al. (2007), who found that the competition anxiety and coping reflections had significant effects on athlete anxiety and arousal levels. These included a scrolling video of the text moving from the bottom of the screen to the top, along with an audio recording of the text which was played on the computer speakers at approximately 60 decibels. The inclusion of these stimuli was used for symptom provocation of competition anxiety.

Physiological Equipment. All physiological measurements was gathered in the neurocognitive lab of the graduate department at a private university. The equipment included: Electrophysiological Encephalography (EEG) and Galvanic Skin Response (GSR/EDA

Electrodermal Activity). The data were acquired using the Biopac Data acquisition system (http://www.biopac.com/data-acquisition-analysis-system-mp150-system). The system was set with a high pass of .5 hertz and a low pass of 35 hertz with a sample rate of 1000/sec and acquisition length at 3,600 and 2,000 gain.

A 24-channel electrode cap was applied to each participant during the recordings. Two gold ear clips were used for reference grounds. Silver GSR electrodes were attached to the second and third finger of the left hand. Electrode gel is pre-applied on the adhesive of the GSR electrodes. Electrode gel was applied to the scalp with a blunt syringe on the following channel electrodes: FP1, FP2, F3, F4, F7, F8, T3, T4, T5, and T6. These channel locations were chosen based on the literature cited for regional activation associated with anxiety in the brain (Gusnard, Akbudak, Shulman, & Raichle, 2001; Paquette et al, 2003; Straube, et al., 2007). For example, FP1 and FP2 are placed in the medial prefrontal cortex, while T3 T4 are at the frontal temporal lobes.

Acqknowledge (Version 4.42, Biopac Systems, Goleta CA) loaded on a Mac computer, was used to follow and record the physiological measures. The researcher was seated behind the participant with direct sight of the second computer screen on which the visual stimulus is presented to the participant. During the measurement, the researcher completed an event record form to note when each sequence occurred as well as any auditory or visual interruptions.

Procedure

Permission from the coaches was obtained to invite college athletes to participate in the study. The athletes were recruited via advertisements (fliers) in the men’s and women’s locker rooms, with signed permission of the university’s athletic director, as well as through undergraduate general psychology courses. The students were contacted via email by one of the doctoral student research assistants and provided with information about the study. After athletes made contact, an initial session was scheduled for pre-intervention measurement.

Measurement structure. The student athlete spent a total of 45-60 minutes in the lab for each measurement period (pre- and post-intervention). This began at the first session by completing an informed consent and a demographic questionnaire. The participant was introduced to the application of the physiological electrodes using a script that describe the process of the data collection period. After signing informed consent, research assistants began the process of applying the EEG cap and GSR patches. The participant was measured from inium to nasium in centimeters to specific cap size and proper placement of electrode pads for the FP1 and FP2 channels. Next, the forehead, earlobes, and ring and index fingers were prepared for electrode placement. Gold ear clips were attached to the left and right earlobes for reference. A Velcro harness was strapped around the participant's upper torso. The EEG cap was placed on the participant's head, followed by the connection straps which secure the cap to the harness. Each electrode was filled with conductive gel using a dull syringe from Biopac. GSR electrode patches were placed on the pad of left middle and ring fingers, just below the first knuckle from the fingertip, the leads clipped on and connected to the Biopac system, followed by the gold ear clips and EEG cap cable. Connections were tested and irregularities were addressed before moving forward with the stimulus phases.

The stimulus was presented on a computer screen using Superlab software (Version 5.05, Cedrus Corporation, San Pedro CA). The athlete was seated in a comfortable chair facing the computer screen, approximately 250cm from the screen. This measurement session provided data points of mean power of the 10 EEG channels (milivoltes) and GSR microsiemens (sweat) from the skin.

Intervention structure. The student athlete attended five hour-long sessions with an SFT trained student therapist. Goals were to address performance concerns through (a) exploring and adapting thoughts and feelings related to performance (emotion-focused) and (b) instruction of pragmatic ways to alter anxious activation (problem-focused). Each Masters-level student therapist engaged in a 2-hour SFT training meeting with the supervising clinical psychologist before beginning treatment with the participant. The initial meeting with the participant was a brief intake session, where the student therapist gathered information about barriers to the athletic performance (e.g., negative thoughts, worry about evaluation from coach, etc.). The student therapists were supervised by a licensed psychologist, and kept confidential records for their own use on TherapyNotes.com, a HIPAA compliant documentation service. Information from sessions was only discussed with the psychologist for supervision purposes. The week following the final session, the student athlete returned for a post session for repeated physiological and self-report measures. All of these sessions were completed over a six to seven-week period of time. Following the second measurement session, the participants were debriefed and provided with further support (referral to university counseling) if needed.

Control of Confounding Variables

Multiple variables represented potential confounds in this study. Variability in EEG mean power and GSR levels was controlled by conducting all measurements at the same time of day (between 8:00am and 10:00am) and on the same days of the week. All physiological measurements included an additional hand-recorded document to note any anomalies (i.e., loud sounds from outside of the testing room) during testing. The effects of intervention and expectation bias were minimized by separating the lab technicians and the therapists into two different teams and instructing them not to discuss participant involvement in the study.

Chapter 3

Results

The research question explored if athletes demonstrate changes in neurophysiological activity after receiving a course of Solution-Focused Therapy. This was measured via mean power (EEG) and microsiemens (GSR). Given these questions, a mixed MANOVA for pre- and post-measures was used to interpret the data.

A 2X10X4 Repeated Measures MANOVA was used to analyze effects among time of measurement (pre- versus post-), channels (FP1, FP2, F3, F4, F7, F8, T3, T4, T5, T6), and phases (rest, competition anxiety stimulus, coping stimulus, post-rest). Initial results indicated a main effect for channels, F (9, 15.75) = 8.44, $p = .015$, $\eta^2 = .938$ (see Table 1). FP1 and FP2 were significantly higher in mean power than the other eight channels. No main effects were found for time of measurement or phases.

A 2X4 repeated measures MANOVA was conducted with GSR microsiemens to examine differences among time and phase, and no main effects or interactions were found.

Repeated measures *t*-tests were conducted on the self-report measures (SAS-2, GAD-7, performance rating items) to compare levels of anxiety over time. Significant differences were found on total scores for the SAS-2, with participants reporting decreased anxiety post-intervention, $M = 22.44$, $SD = 5.29$, compared to pre-intervention, $M = 28.13$, $SD = 7.30$; $t(15) = 3.13$, $p = .007$, $d = .89$. The SAS-2 indices of somatic, cognitive, and concentration disruption were also analyzed to examine changes within competition anxiety. A significant decrease in

Table 1

Mean Power (Channels x Phases)

Channel	Mean	Std. Deviation
FP1Rest1	.00316	.00218
FP1Video1	.00330	.00213
FP1Video2	.00358	.00238
FP1Rest2	.00378	.00258
FP2Rest1	.00309	.00213
FP2Video1	.00319	.00191
FP2Video2	.00342	.00224
FP2Rest2	.00373	.00245
F3Rest1	.000749	.00037
F3Video1	.000958	.00084
F3Video2	.00122	.00162
F3Rest2	.00086	.00059
F4Rest1	.00067	.00036
F4Video1	.00114	.00097
F4Video2	.00136	.001513
F4Rest2	.00090	.000544
F7Rest1	.00045	.000601
F7Video1	.000795	.001084
F7Video2	.00144	.002369
F7Rest2	.000854	.001436
F8Rest1	.00078	.00165
F8Video1	.00068	.000961
F8Video2	.00117	.002373
F8Rest2	.000574	.000382
T3Rest1	.00038	.000286
T3Video1	.00079	.001006
T3Video2	.00118	.002424
T3Rest2	.00049	.000400
T4Rest1	.00039	.000312
T4Video1	.00074	.001009
T4Video2	.00122	.002422
T4Rest2	.000533	.000387
T5Rest1	.000319	.000205
T5Video1	.000761	.0010095
T5Video2	.001341	.0024413
T5Rest2	.000479	.000466
T6Rest1	.000387	.00043
T6Video1	.000596	.00097
T6Video2	.001122	.00245
T6Rest2	.000468	.00038

scores was found for somatic, $t(15) = 3.13$, $p = .007$, $d = .73$, from pre- to post- intervention; however, no significant differences were found for the cognitive or concentration disruption indices (see Table 2). Notably, the scores at pre-intervention were similar to the sample of collegiate athletes measured in the validity study by Smith et al. (2006; see Table 2).

Table 2

Comparison of SAS-2 Index Scores to Smith et al. (2006)

SAS-2 Index Scores (Pre- Vs. Post-Intervention)			SAS-2 Scores from Smith et al (2006)	
Index	*M*	*SD*	*M*	*SD*
Somatic (Pre-)	9.25[a]	4.18	9.78	3.61
Somatic (Post-)	6.8[a]	2.19		
Worry (Pre-)	11.18	3.48	12.12	3.85
Worry (Post-)	9.18	2.58		
Conc. Disruption (Pre-)	7.68	2.38	6.93	2.37
Conc. Disruption (Post-)	6.43	1.71		
Total (Pre-)	28.13[b]	7.30	28.83	8.05
Total (Post-)	22.44[b]	5.29		

[a] $p = .007$ [b] $p = .007$

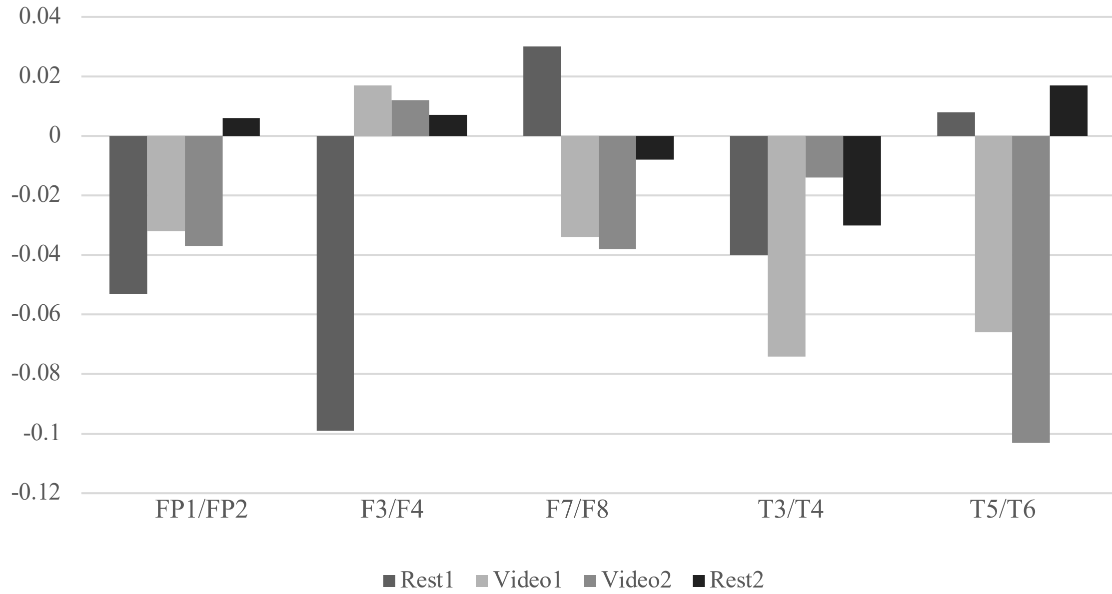
GAD-7 scores were positively skewed, indicating a low prevalence of generalized anxiety in the student-athletes. GAD-7 scores were not significantly different when comparing pre ($M = 5.56$, $SD = 4.48$) to post intervention ($M = 3.87$, $SD = 4.19$).

Repeated measures *t*-tests were conducted on each item from the performance rating scale, and significant differences were found for Items 2 and 3. For Item 2 ("On a scale of 1-10, how might your coach rank you compared to the other athletes on your team who compete in your event?") participants rated themselves higher at post intervention, $M = 7.57$, $SD = 1.69$, compared to pre intervention, $M = 6.57$, $SD = 1.28$; $t(15) = -3.02$, $p = .01$, $d = .67$. For Item 3 ("On a scale of 1-10, how supported do you feel as a member of your athletic team?") athletes rated higher at post-intervention, $M = 7.36$, $SD = 1.73$, compared to pre intervention, $M = 6.43$, $SD = 1.55$; $t(15) = -2.74$, $p = .017$, $d = .57$.

Adjouadi, Cabrerizo, Yaylali, & Jayakar, (2004) recommend an alternative method for examining EEG mean power data using an asymmetry ratio, thereby calculating the ratio of mean power of the right to left hemispheres in each brain region. A negative ratio indicates greater mean power for the left hemispheric channel, while a positive indicates greater mean power for the right. The equation was applied to the data to calculate the asymmetry ratio for each channel pairing (i.e., F3 and F4) of left and right hemispheres for each time (pre- and post-) and phase (rest, competitive anxiety stimulus, coping stimulus, post-rest). A MANOVA was conducted on the asymmetry ratio for each EEG channel pair. A significant interaction was found for channels and phases, F (77, 4.53), $p = .046$, $\eta^2 = 1.61$ (see Figure 1).

A subsequent paired samples t-test was conducted, indicating significant differences in asymmetry ratios in each phase for each channel pair. The right dorsolateral prefrontal cortex (F4) produced greater mean power than the left (F3) during the Competition Anxiety stimulus, Coping stimulus, and Rest 2, while the left produced greater mean power for the Rest 1 phase (see Table 1).

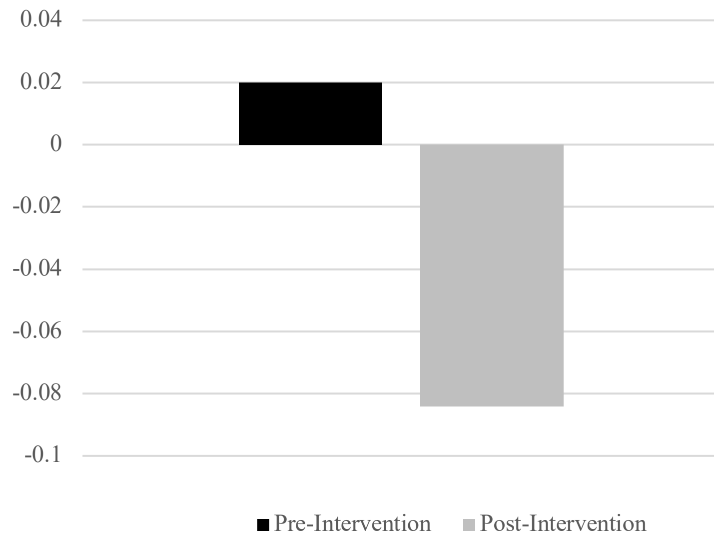
A paired samples t-test was conducted to further examine asymmetry mean power changes from pre- to post- intervention. A significant difference was found in the medial



Note: Positive scores indicate right hemispheric dominance, negative scores indicate left

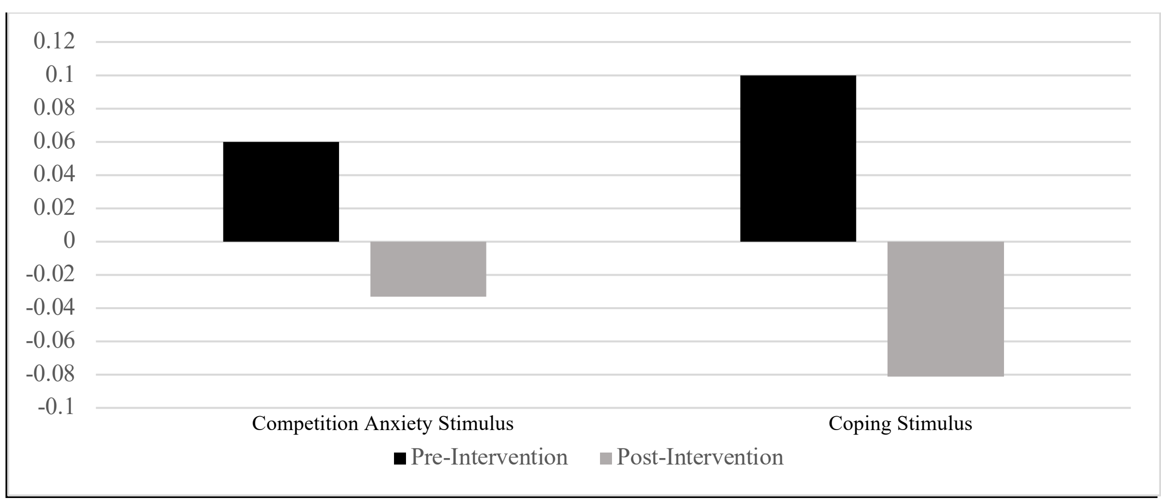
Figure 1. Asymmetry MANOVA Interaction Channels x Phases.

prefrontal cortex (FP1, FP2) during the competition anxiety stimulus, with the right showing increased mean power compared to the left post intervention, $t(15) = 2.37$, $p = .035$, $d = .70$ (see Figure 2). Mean power in the dorsolateral prefrontal cortex (F3, F4) was also significantly higher at post intervention, $t(15) = 2.17$, $p = .049$, $d = 0.97$, with the left increasing in mean power during the competition anxiety stimulus as well as during the coping stimulus (see Figure 3).



Note: Positive scores indicate right hemispheric dominance, negative scores indicate left

Figure 2. Changes in Mean Power Pre- to Post-Intervention in Fp1 and Fp2.



Note: Positive scores indicate right hemispheric dominance, negative scores indicate left

Figure 3. Changes in Mean Power fPre- to Post-Intervention in F3 and F4.

Chapter 4

Discussion

Self-Report Data

Solution-focused therapy decreases competition anxiety in student-athletes. This finding supports the conclusions of previous studies on SFT, where the intervention decreased self-reported symptoms (Bell et al., 2009; Hatzigeorgiadis et al., 2009, Maynard et al, 1995). The impact of the intervention is most evident in the athletes' report of anxiety symptoms, feeling supported by the team, and perceptions of coach evaluation. Congruent with my hypothesis, self-reported anxiety for competition (SAS-2) decreased significantly following five sessions of SFT. However, self-reported trait anxiety (GAD-7) was not significantly affected by the intervention. These results may be explained by the nature of SFT, which sought to specifically address problems related to barriers of optimal athletic performance. SFT was not designed to address underlying roots for participant symptoms (e.g., trauma); rather, the therapeutic goal is to provide brief coping techniques for symptom reduction as it directly related to the specific sport.

Differences in self-rated performance items were found following five sessions of SFT. Items that were significantly affected were those pertaining to the coach ("How might your coach rate you…") and the team ("How might your teammates rate you…"), with both ratings increasing significantly post-intervention. Interestingly, the other items did not appear to change from pre- to post-intervention (e.g., "How would you rate yourself…", "How supported do you feel by your team…," etc.). These results indicate that SFT may have the most impact on the athletes' beliefs about how others view their performance. Specific objectives in SFT were designed to address maladaptive thoughts (e.g., "my coach doesn't think I can perform") and improve visualization and focus (e.g. "I am in control of myself"). Based on changes in self-reported anxiety, SFT was found to be an effective treatment modality for this sample.

Neurophysiological Measures

The initial finding that the medial prefrontal channels (FP1 and FP2) were significantly higher than the other channels was not surprising, as these regions tend to have a higher metabolic rate than other brain regions (see Gusnard et al., 2001). Yet, the function of high prefrontal activation in college athletes may warrant further exploration in future research.

The asymmetry approach revealed significant differences in mean power among the phases of the stimulus, most notably in the prefrontal cortex. Specifically, left dorsal prefrontal cortex demonstrated greater mean power post-intervention than the right during the stimulus phases. The dorsal prefrontal cortex has been associated with introspective functions, such as self-reflection and internalization, whereas the medial prefrontal cortex has been associated with outward thought or externalization (Gusnard, et al., 2001). Additionally, Grimm et al. (2008) explored the relationship of asymmetry in brain activity in the medial prefrontal cortex by conducting fMRIs on 20 adult patients with Major Depressive Disorder (MDD) and 30 controls. The results from that study indicated that patients with MDD exhibited significantly less activity in the left dorsal prefrontal cortex than the right compared to controls, indicating that left dorsal prefrontal hypo-activation is related to negative emotionality. Furthermore, Grimm et al. concluded that hyperactivity in the right dorsal prefrontal cortex was related to increased attention control. Paquette et al. (2003) also found decreased activation of the right dorsal prefrontal cortex in patients with spider phobias during symptom provocation after therapeutic intervention. These findings suggest that the participants in this study demonstrated a shift from negative emotionality (i.e. worry, maladaptive thought) to greater attention control. This indicates that SFT may have provided the athletes with skills for effectively coping with the negative thoughts and emotions that were induced by that stimulus.

Differences in the asymmetry ratios were also found in the temporal lobes, with the left producing greater mean power during stimulus phases and the right producing greater mean power during rest phases. This finding may be related to SFT's focus on imagery and self-talk strategies. However, given that the left temporal lobe plays a critical role in the speech pathway (Scott, Blank, Rosen, & Wise, 2000), these findings may be the result of playing audio recorded scripts during the stimulus phases, whereas the rest phases were silent.

The GSR data were not significantly different from pre- to post-intervention. This may be due to the sensitivity of GSR equipment, as levels of activation can vary significantly from moment to moment and thereby mask the overall (average) change over time. Alternatively, the GSR may more accurately measure other types of anxiety (i.e. high severity or clinical) compared to competition anxiety.

Limitations

Limitations of this study may restrict the generalizability of these findings. Primarily, a control group was not included in the study. As part of the agreement with the athletic director of the university, all participants had to be provided with therapy services to minimize distraction for the student athletes who would be completing EEG only with no intervention (e.g. time away from study). This limited the degree of effect that could be attributed to the intervention.

Additionally, the small sample size prevented further analysis by participant variables (gender, age, ethnicity, sport). This also limited the generalizability of these findings, although the effect size was medium to large in each of the significant findings.

Conclusions

This study provides the first examination of therapy-induced neuropsychological changes in college athletes. Therapeutic change, through the use of Solution-focused techniques, evoked differences in brain activity and reduced symptoms of competition anxiety. Furthermore, improvements in the self-reported perceptions of the team and coach may indicate how certain beliefs (i.e. locus of control) are changed in the brain. The findings contribute to the mounting evidence for psychotherapy's biological mechanism of change. Differences in activation in the dorsolateral prefrontal cortex may provide greater insight regarding the efficacy of other treatment modalities, particularly long-term therapy. My findings also have clinical utility for college athletic programs. The use of brief therapy models, such as SFT, may change the way the athlete's brain responds to the heat of competition.

Future Directions

Future studies may want to focus on replication of these methods to examine the generalizability of the results. The inclusion of a control group would be particularly useful in identifying the effects specific to the intervention. A larger sample size would also provide greater insight regarding the variance seen between participants.

This research provides evidence for actual changes in brainwave activity after engaging in psychotherapy. Intervention studies can continue to promote access and decrease the stigma for mental health services, particularly for this population. Student-athletes have demonstrated resistance to seeking treatment for several reasons, including skepticism regarding the efficacy of treatment (Anderson, Hodge, Lavallee, & Martin, 2004). Psychological research must continue to broaden and include neurophysiological measures to provide “hard science” data to help explain the impact of psychotherapy.

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Appendix A

Curriculum Vitae

KYLER T. SHUMWAY

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1518 Pima Trail Unit B, Harker Heights, TX 76548
KylerShumway.com

EDUCATION

George Fox University
Doctoral Candidate (PsyD), Graduate Department of Clinical Psychology
August 2014 — April 2019

- Defended dissertation on the effects of psychotherapy for competition anxiety on brain activation.
- Relevant coursework included: Integrated Care Psychology, Neuropsychological Assessment, Consultation, Psychopharmacology, Supervision.
- Internship at Baylor Scott & White Healthcare in Temple, Texas

M.A. Clinical Psychology
August 2014 — April 2016

- Passed SFE qualifying exam to enter doctoral program.
- Relevant coursework included: Ethics, Cognitive Assessment, Personality Assessment, Cognitive Behavioral Therapy, Interpersonal and Psychodynamic Therapy, Multicultural Diversity.

Duke University
B.A. Psychology, Certificate in Human Development
August 2010 — May 2014

- Full-ride scholarship, 4-year Varsity Track and Field athlete.
- Graduation with Distinction with a 3.64 GPA, thesis on Social Exchange Rules.
- Relevant coursework included: Advanced Abnormal Psychology, Human Development, Aging and Adulthood, Cognitive Psychology, Psychopathology and Psychotherapy.

RESEARCH

Shumway, K. T., Peterson, M., Foster, L. (2018). High Stakes: Training your team for suicidality and psychosis risk management. Presented at the annual meeting of the Collaborative Family Healthcare Association, Rochester, NY.

Shumway, K. T., Wendler, D., Robison, M. (2018). Sleep, Stress, Social Connectedness, and Program Satisfaction in Graduate School. Presented at the annual meeting of the American Psychological Association, San Francisco, CA.

Peterson, M., **Shumway, K. T.**, Drake, G, Paxton, J. (2018). Exploratory Leadership Factors in a Graduate Clinical Psychology Program. Presented at the annual meeting of the American Psychological Association, San Francisco, CA.

Shumway, K.T. (submitted for publication). Does Therapy Change Brainwave Activity in Collegiate Athletes: An Intervention Study. *Clinical Psychology: Science and Practice.*

Spromberg, C. **Shumway, K. T.,** Andrews, G., Robison, M. (2017). Differences in Social Function Among Children Diagnosed with Disorders of the Corpus Callosum. A poster presented at the annual meeting of the National Academy of Neuroscience.

Shumway, K. T., Dix, R. (2017). Resilience-based intervention for integrated medical care teams. A poster presented at the annual meeting of the Collaborative Family Healthcare Association.

Shumway, K. T., Hamilton, E. Harris, H. & Gathercoal, K. (2017). Class-wide socioemotional education in rural schools: An intervention study. A poster presented at the annual meeting of the American Psychological Association, Washington, DC.

Andrews, G., **Shumway, K. T.,** Robison, M., & Spromberg, C. (2017). ADHD and Controls: Adolescents and Executive Functioning Performance Tasks. A poster presented at the annual meeting of the American Psychological Association, Washington, DC.

Shumway, K. T., Robison, M., Wendler, D. (2017). Sleep, Stress, Social Connectedness, and Cohort Satisfaction in Graduate School. Presented to the George Fox University GDCP Student Council and Faculty Board for APA Self-Study 2017.

Shumway, K. T., Foster, L., & Wendler D. (2016). Suicidality, Psychopathology, and Emergency Department Use for Crisis in Rural Communities. BHCCT Training 2016 Orientation.

Leary, M. K., **Shumway, K. T.** (2014). Developmental Factors that Relate to Social Exchange Rules. *Distinction thesis not submitted.*

CURRENT CLINICAL PLACEMENT

Behavioral Health Consultant, Resident Intern
Baylor Scott & White Healthcare, Temple TX

June 2018 – current
Setting: Integrated Care Hospital
APA Accredited Internship

- *Supervisors* –David Blackburn, PhD; Jessica Crespo, PsyD; Louis Gamino, PhD
- *Intervention*– Individual, couples, and family outpatient therapy, individual and family inpatient therapy for medical patients, individual and group therapy for inpatient psychiatry patients, case management
- *Assessment* - Pre-bariatric surgery evaluations, heart transplant evaluations, kidney transplant evaluations, suicide and psychosis risk assessments, full team consultation with the transplant staff, palliative care, case management

PREVIOUS CLINICAL EXPERIENCE

Behavioral Health Consultant, Team Coordinator
Behavioral Health Crisis Consultation Team, YCMH

January 2016 – May 2018
Setting: Willamette Valley and Providence Newberg ED, ICU, and Medical Surgery Units

- *Supervisors* - Mary Peterson, PhD, Joel Gregor, PsyD, Luann Foster, PsyD, and William Buhrow, PsyD.
- *BHC Duties* - Risk assessment (psychosis, suicidality, and homicidality), case management, and consultation with patient, family, medical staff, law enforcement, and inpatient care coordinators.
- *Team Coordinator Duties* – Training new staff to conduct risk assessment and provide consultation, addressing systemic concerns, consultation with supervisory psychologist team.

Practicum Therapist
Health and Counseling Center, George Fox University

August 2017– May 2018
Setting: University Counseling Center

- *Supervisor* - William Buhrow, PsyD.
- *Duties* - Individual therapy, outreach, and assessment for undergraduate students at a private university.

Assistant Practicum Director
Rural Counseling and Psychological Services
August 2017– May 2018
Setting: School Based Behavioral Health

- *Supervisor* - Elizabeth Hamilton, PhD.
- *Duties* – Director of rural behavioral health practice, providing supervision to students, assessment (IEP) review, and systems coordination for two school districts in Yamhill County.

Behavioral Health Consultant, Practicum Therapist
Willamette Family Medical Center
July 2016– July 2017
Setting: Co-located Primary Care and Community Mental Health

- *Supervisor* - Ross Bartlett, PsyD.
- *BHC Duties* – Case consultation, patient warm handoffs, brief assessment and treatment.
- *Therapist Duties* - Long-term therapy (6-20+ sessions), assessment, coordinated care, and billing.

Integrated Assessment
Behavioral Health Center
July 2016– January 2017
Setting: Community Mental Health Center

- *Supervisor* - Joel Gregor, PsyD.
- *Duties* – Assessment administration, report writing, and providing feedback to clients in CMH setting.

Practicum Therapist
School Based Behavioral Health, St. Paul Middle / High School
August 2015 – June 2016
Setting: Public School District

- *Supervisor* - Elizabeth Hamilton, PhD.
- *Duties* - IEP assessment, individual therapy, group therapy, and school staff consultation.

Pre-Practicum Therapist
George Fox University, Graduate Dept. of Clinical Psychology
January 2015 – May 2015
Setting: University

- *Supervisor* - Glena Andrews, PhD.
- *Duties* – Individual psychotherapy, case management, and electronic record keeping.

PUBLICATIONS IN PRINT

Shumway, K.T. (2018). *The Friendship Formula: How to Say Goodbye to Loneliness and Find Deeper Connection.* Self-published. *Amazon.com.*

McMinn, M., **Shumway, K. T.**, Rabie, A., & Rose, A. (2016). Use of Technology in Psychological Practice. *Elsevier Science.*

Shumway, K.T., Andrews, G. (2016). GDCP Neuropsychology Lab Manual. *George Fox University PsyD Resources.*

Shumway, K.T. (2016). Surviving the Cogpocalypse: A Student Manual for Learning Cognitive Assessment. *George Fox University PsyD Resources.*

ONLINE PUBLICATIONS

Shumway, K.T. (2018). Help Your Child Shake Back-to-School Jitters. *Scrubbing.in.*

Shumway, K.T. (2018). The Socioemotional Benefits of Health-Focused Summer Camp. *Scrubbing.in.*

Shumway, K.T. (2018). 4 Things Your Supervisee Wants to Hear from You. *CFHA.*

Shumway, K. T. (2017). Communicating with Medical Staff as a BHC. *Time2Track.*

Shumway, K. T. (2016). When Your Client is Suicidal: 5 Things You Should Know. *Time2Track.*

Shumway, K. T. (2016). Political Therapy: How to Talk About Politics with Clients. *Time2Track.*

Shumway, K. T. (2015). KylerShumway.com: A Public Outreach and Awareness Website.

Shumway, K. T. (2016). WritingForTherapists.org.

Shumway, K. T. (2016). Developing a Better Reputation in Grad School. *Time2Track.*

Shumway, K. T. (2016). Your Guide to Organizing Your Life as a Grad Student in Behavioral Health. *Time2Track.*

Shumway, K. T. (2015). How to Start Your Own Student Interest Group. *Time2Track.*

Shumway, K. T. (2015) Improve Your Sleep Hygiene. *Time2Track.*

LEADERSHIP

Baylor Scott & White Diversity Committee, BSWH Mental Health Clinic
July 2018 – Present

Team Coordinator, Behavioral Health Crisis Consultation Team
August 2016 – May 2018

Program Admissions Committee Student Advisor, George Fox University
August 2017 – May 2018

Student Council Vice President, George Fox University
March 2016 – May 2017

Admissions Committee, George Fox University
August 2016 – May 2017

Student Council Member-at-Large, George Fox University
August 2015 – May 2017

Student Interest Group (SIG) Coordinator, George Fox University
August 2015 – May 2017

GDCP SIG Program Creator, George Fox University
August 2015

Neuropsychology Lab Coordinator, George Fox University
Jan 2015 – July 2018

Professional Development SIG Founder, George Fox University
April 2015 – July 2018

Health Psychology SIG, Member, George Fox University
April 2015 – July 2018

Gender and Sexuality Diversity Committee, Member, George Fox University

January 2015 – July 2018

Multicultural Diversity Committee, Member, George Fox University
January 2015 – July 2018

Student House Representative, Duke University
2010 - 2011

PUBLIC SPEAKING

Keynote Speaker, "Neurodiversity and Making Friends Across the Spectrum"
Southern Maine Autism Conference
Scheduled March 2019
Keynote Speaker, "The Modern Bully: What Autistic Kids and Families Need to Know"
Southern Maine Autism Conference
Scheduled March 2019
Keynote Speaker, "Hurt People Hurt People: How to Help Survivors and Enactors of Bullying"
Matthew Reardon National Autism Conference
Scheduled February 2019
News Health Provider Interview, "The Health Benefits of Pets"
NBC Channel 6 - KCEN Central Texas News
February 2019
Workshop Speaker, "Weight Loss & Wellness: From How to Now"
Westfield Clinic, BSWH
February 2019
Workshop Speaker, "Motivation and Overcoming Health Barriers"
Temple Community Clinic
January 2019
Interviewee, "SEO and Writing for the Web"
APA Monitor
December 2018
Paid Webinar Speaker, "Writing for the Web as a Mental Health Professional"
American Psychological Association
December 2018
News Health Provider Interview, "Healthy Ways to Address Family Conflict"
NBC Channel 6 - KCEN Central Texas News
December 2018

News Health Provider Interview, "Gratitude and Thanksgiving"
NBC Channel 6 - KCEN Central Texas News
November 2018
News Health Provider Interview, "Mindfulness and Your Health"
NBC Channel 6 - KCEN Central Texas News
November 2018
Main Speaker, "High Stakes: Training Your Team for Suicide and Psychosis Risk Assessment"
Collaborative Family Healthcare Association
October 2018
Paid Speaker, "Stories from our Neurodiverse Friendship"
Love and Autism National Conference
October 2018
Live Television Expert, "Back-to-School and Bullying"
KXXV - Central Texas News
September 2018
Paid Webinar Speaker, "Supercharging Your Online Presence"
American Psychological Association
July 2018
Guest Speaker, "How Therapy Can Reduce Athletic Performance Anxiety"
Athletic Department, George Fox University
April 2018
Paid Speaker, "You Belong"
Love and Autism National Conference
October 2017
Guest Speaker, "Is it ADHD: Differential Diagnosis for Physicians"
WFMC Provider Didactic
April 2017
Guest Lecturer, "Acceptance and Commitment Therapy and Health"
Health Week, GFU Physical Therapy Department
March 2017
Guest Lecturer, "Christianity and Mormonism"
Graduate Dept. of Clinical Psychology, GFU
January 2017
Guest Lecturer, "Depression and Self-Care"
Mothers of Preschoolers, Salem, Oregon
January 2016

AFFILIATIONS

Collaborative Family Healthcare Association (CFHA)
American Psychological Association
APA Division 38 Association for Health Psychology
Psi Chi, George Fox University GDCP Chapter
American Psychological Association of Graduate Students

RELATED WORK EXPERIENCE

Graduate Assistant, Neurophysiology Lab
George Fox University, Dr. Glena Andrews
2015 - 2018
Graduate Assistant, Cognitive Assessment Course
George Fox University, Dr. Celeste Flachsbart-Jones
Fall Term 2017
Teaching Assistant, Child and Adolescent Assessment Course
George Fox University, Dr. Elizabeth Hamilton
Summer Term 2017
Teaching Assistant, Relational Psychodynamic Theory Course
George Fox University, Dr. Nancy Thurston
Spring Term 2017
Teaching Assistant, Cognitive Assessment Course
George Fox University, Dr. Celeste Flachsbart
Fall Term 2016
Teaching Assistant, Child and Adolescent Assessment Course
George Fox University, Dr. Elizabeth Hamilton
Summer Term 2016
Research Assistant, Social Psychology Research Lab
Dr. Mark Leary, Duke University
August 2013 — May 2014
Emergency Responder, Peer 4 You
Student Outreach Program, Duke University
August 2012 — May 2014
Activity Coordinator/Facilitator
Hillcrest Convalescent Center, Durham NC
January 2013 — May 2014

OTHER WORK EXPERIENCE

SEO Content Director
MarketingForTherapists.org
November 2015 – Present

Director of SEO Marketing services for MarketingForTherapists.org. Use of SEO content writing, backlinking, and web design to improve websites for mental health professionals from all over the world. Training and coordination for a writing team of graduate students.

Content Author
CFHA - IntegratedCareNews.com
October 2017 – Present

Assistant Track and Field Coach
George Fox University Track and Field
August 2014 — May 2015

Volunteer Strength and Conditioning Coach
Prairie High School, Cottonwood Idaho
June 2012 — August 2014

AWARDS

- National Register of Health Service Psychologists – Student Scholar Grant Recipient
- Student Presentation Award, American Psychological Association 2017 Convention
- George Fox University GDCP Student Commendation 2017
- Duke University Dean's List, 2013 and 2014
- 3x All-ACC Academic Champion
- Duke University Varsity Letter
- Duke Track and Field Team Leadership Award, 2014
- Eagle Scout Award, Boy Scouts of America

ASSESSMENT AND POPULATION SCREENERS

Previously Administered and/or Completed Competency
16 Personality Factors Questionnaire (16PF)

Adaptive Behavior Assessment System, Second Edition (ABAS-II)

Beck Anxiety Inventory (BAI)

Beck Depression Inventory (BDI)
Behavior Assessment System for Children, Third Edition (BASC-3)
Booklet Categories Test (BCT)
Boston Naming Test (BNT)
Brief Visuospatial Memory Test (BVMT)
California Verbal Learning Test (CVLT)
Collaborative Assessment and Management of Suicidality (CAMS)
Colombia Suicide Risk Assessment
Connors Adult ADHD Rating Scales-Observer and Self Report
Connors Continuous Performance Test-2
Delis-Kaplan Executive Function System (D-KEFS)
Developmental Neuropsychological Assessment (NEPSY)
Family Adaptability and Cohesion Evaluation Scales, IV (FACES IV)
Generalized Anxiety Disorder, Seventh Addition (GAD-7)
Grooved Pegboard Test (GPT)
Millon Adolescent Clinical Inventory (MACI)
Millon Clinical Multiaxial Inventory-III (MCMI-III)
Miller Forensic Assessment of Symptoms Test (M-FAST)
Mini-Mental State Examination, 2nd Edition (MMSE-II)
Minnesota Multiphasic Personality Inventory-II (MMPI-II)
Minnesota Multiphasic Personality Inventory-II, Restructured Format (MMPI-II-RF)
Montreal Cognitive Assessment (MoCA)
Outcome Rating Scale (ORS)
Patient Health Questionnaire (PHQ-9)
Personality Assessment Inventory (PAI)
Repeatable Battery for the Assessment of Neuropsychological Status (RBANDS)
Rey-Osterrieth Complex Figure (Rey-O)
Session Rating Scale (SRS)
Stanford Integrated Psychosocial Assessment for Transplantation (SIPAT)
Stroop Color and Word Test
Tactual Performance Test (TPT)
Test of Memory Malingering (TOMM)
Wechsler Adult Intelligence Scale, Fourth Edition (WAIS-IV)

Wechsler Individual Achievement Test, Third Edition (WIAT-III)

Wechsler Intelligence Scale for Children, Fourth Edition (WISC-IV)

Wechsler Memory Scale (WMS)

Wide Range Assessment of Memory and Learning, Second Edition (WRAML-II)

Wide Range Achievement Test, Fourth Edition (WRAT-IV)

Wide Range Intelligence Test (WRIT)

Wisconsin Card Sorting Test (WCST)

Woodcock-Johnson Tests of Cognitive Ability

Woodcock-Johnson Tests of Achievement

REFERENCES

Louis Gamino, PhD
Baylor Scott & White Health
254-493-2779
Internship director, clinical supervisor for outpatient psychotherapy and inpatient group therapy

Jessica Crespo, PsyD
Baylor Scott & White Health
305-890-2076
Supervising psychologist for outpatient psychotherapy and assessment, including kidney transplant and pre-bariatric evaluations

David Blackburn, PhD.
Baylor Scott & White Health
254-724-2585
Supervising psychologist for inpatient health psychology consultation/liaison, including heart and liver transplant evaluations

Glena Andrews, PhD.
George Fox University GDCP
503-554-2386
Dissertation chair, Director of Clinical Training, mentor

Ross Bartlett, PsyD.
Willamette Family Medical Center
503-396-6144
Supervising psychologist from co-located health psychology practicum

Elizabeth Hamilton, PhD.
School-Based Behavioral Health
503-550-8852
Supervising psychologist of SBBH practicum and assistant directorship

Mary Peterson, PhD.

George Fox University GDCP

503-442-3237

Department chair, supervising psychologist for Crisis Consultation assessment, mentor