A Single-Case Alternating Treatments Design Utilizing Quantitative Electroencephalography to Observe and Measure Mental State Trends During individual Participant Non-Nature-Based Small initiative Adventure Therapy Experiences

Patrick Lane Robert Mcmillion
plmcmil@gmail.com

Follow this and additional works at: https://huskiecommons.lib.niu.edu/allgraduate-thesesdissertations

Part of the Cognitive Behavioral Therapy Commons, Counseling Psychology Commons, and the Neurosciences Commons

Recommended Citation
Mcmillion, Patrick Lane Robert, "A Single-Case Alternating Treatments Design Utilizing Quantitative Electroencephalography to Observe and Measure Mental State Trends During individual Participant Non-Nature-Based Small initiative Adventure Therapy Experiences" (2023). Graduate Research Theses & Dissertations. 7163.
https://huskiecommons.lib.niu.edu/allgraduate-thesesdissertations/7163

This Dissertation/Thesis is brought to you for free and open access by the Graduate Research & Artistry at Huskie Commons. It has been accepted for inclusion in Graduate Research Theses & Dissertations by an authorized administrator of Huskie Commons. For more information, please contact jschumacher@niu.edu.
ABSTRACT

A SINGLE-CASE ALTERNATING TREATMENTS DESIGN UTILIZING QUANTITATIVE ELECTROENCEPHALOGRAPHY TO OBSERVE AND MEASURE MENTAL STATE TRENDS DURING INDIVIDUAL PARTICIPANT NON-NATURE-BASED SMALL INITIATIVE ADVENTURE THERAPY EXPERIENCES

Patrick L.R. McMillion, PhD
Department of Counseling and Higher Education
Northern Illinois University, 2023
Dr. Suzanne Degges-White, Director

This single-case alternating-treatments design research study observed and measured mental state trends during the counseling approach known as Adventure Therapy (AT) using quantitative electroencephalography (qEEG). Participants wore a qEEG headset while participating in a multi-stage AT experience. Two problems were addressed in this study. The first was the lack of research in AT utilizing other empirical measures beyond subjective report surveys and the outcomes of specific programs. The second was the lack of neuroscientific measurement of counseling approaches and interventions within the field of counseling in general. There is a need for empirical evidence supporting AT to address access barriers to AT services for clients. In addition, the field has called for more research utilizing neuroscientific measures. There were clear trends that all mental bands became more active during the AT experience. It was clear that the novelty of the experience yielded maintained mental arousal along with maintained focus and concentration of the task at hand and concrete skill practice yielded problem solving and integration of learning through processing. The method of real-time measurement and observation of mental state phenomena during a counseling approach also seemed to help with supporting or providing a deeper understanding of how a client may be processing their experience. With the calls from the AT field for future research to gain deeper
understanding of the processes of change using more methodologically sophisticated methods and from the counseling field at large to utilize more neuroscientific measure in research and to substantiate our work, this study helps to enter that gap and provide some new, helpful information, to work on shrinking it.
A SINGLE-CASE ALTERNATING TREATMENTS DESIGN UTILIZING QUANTITATIVE ELECTROENCEPHALOGRAPHY TO OBSERVE AND MEASURE MENTAL STATE TRENDS DURING INDIVIDUAL PARTICIPANT NON-NATURE-BASED SMALL INITIATIVE ADVENTURE THERAPY EXPERIENCES

BY

PATRICK L.R. MCMILLION
© 2023 Patrick L.R. McMillion

A DISSERTATION SUBMITTED TO THE GRADUATE SCHOOL IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE DOCTOR OF PHILOSOPHY

DEPARTMENT OF COUNSELING AND HIGHER EDUCATION

Doctoral Director:
Suzanne Degges-White
ACKNOWLEDGEMENTS

Thank you to my partner, Bridget, and my two young daughters, Ailish and Elenora, for supporting me so much! You bring light to me every day, keep me grounded, and catch me when I fall. I also can’t forget Joanie, my mother-in-law. She takes care of us all! Thank you sister Christine, Grandma Hongisto, and Grandma McMillion for always checking to see how I was doing in this process, but not caring if I had actually been productive.

Thank you to my committee: Dr. Degges-White, Dr. Johnson, and Dr. Zhu. Your expertise, wisdom, and mentorship were invaluable.

Thank you to the professors, staff, and peers from NIU past and present, who helped guide me on my path to become a professional counselor and counselor educator: Charlie Myers, Jane Rheineck, Toni Tollerud, Deb Pender, Scott Wickman, Toni Van Laarhoven, Melissa Fickling, Kimberly Hart, T.J. Schoonover, Ola Bamgbose, Suzy Wise, and Lucy Parker.

Thanks to Adventure Works and all the people I’ve worked with and been friends with through there and by there (way too many to list). Including all my amazing friends in TAPG and in the OBHC, especially: Lynette Spencer, Dr. Norton, Dr. Tucker, Kim Sackstedter, Tony Alvarez, Gary Stauffer, Kim Hinzy, Ryan Bromberek, Matt Hayes, Fred Borroel, and Alex White for showing me what Adventure Therapy could be.

Thank you to the staff and faculty at Westminster College in Utah for supporting me in the last legs of the journey to getting this thing completed.
DEDICATION

To Dad, for teaching me how to problem solve.

To Mom, for teaching me how to care
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIST OF TABLES</td>
<td>x</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>xi</td>
</tr>
<tr>
<td>LIST OF APPENDICES</td>
<td>xiii</td>
</tr>
<tr>
<td>CHAPTER 1: INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>Statement of Problem</td>
<td>2</td>
</tr>
<tr>
<td>Purpose of Study</td>
<td>2</td>
</tr>
<tr>
<td>Significance of Study</td>
<td>3</td>
</tr>
<tr>
<td>Research Questions and Hypotheses</td>
<td>3</td>
</tr>
<tr>
<td>Research Design</td>
<td>4</td>
</tr>
<tr>
<td>Definition of Terms</td>
<td>4</td>
</tr>
<tr>
<td>Adventure Therapy</td>
<td>4</td>
</tr>
<tr>
<td>Adventure Therapy Experience</td>
<td>4</td>
</tr>
<tr>
<td>Mental States</td>
<td>5</td>
</tr>
<tr>
<td>Phases</td>
<td>5</td>
</tr>
<tr>
<td>Power Bands</td>
<td>5</td>
</tr>
<tr>
<td>Quantitative Electroencephalography</td>
<td>5</td>
</tr>
<tr>
<td>Organization of the Dissertation</td>
<td>5</td>
</tr>
<tr>
<td>CHAPTER 2: REVIEW OF THE LITERATURE</td>
<td>7</td>
</tr>
<tr>
<td>Adventure Therapy</td>
<td>7</td>
</tr>
<tr>
<td>History</td>
<td>8</td>
</tr>
<tr>
<td>Fidelity in the Adventure Therapy Experience</td>
<td>9</td>
</tr>
<tr>
<td>Technical Skills</td>
<td>10</td>
</tr>
<tr>
<td>Facilitation and Processing</td>
<td>10</td>
</tr>
<tr>
<td>Organizational/Administrative Policies</td>
<td>11</td>
</tr>
<tr>
<td>Conceptual Knowledge</td>
<td>11</td>
</tr>
<tr>
<td>Therapeutic Alliance Building</td>
<td>11</td>
</tr>
<tr>
<td>Assessment</td>
<td>12</td>
</tr>
<tr>
<td>Interventions</td>
<td>12</td>
</tr>
<tr>
<td>Therapeutic Monitoring</td>
<td>12</td>
</tr>
<tr>
<td>Documentation</td>
<td>13</td>
</tr>
<tr>
<td>Professionalism</td>
<td>13</td>
</tr>
<tr>
<td>Socio-Cultural/Environmental Considerations</td>
<td>13</td>
</tr>
<tr>
<td>Foundations of an Adventure Therapy Experience</td>
<td>13</td>
</tr>
<tr>
<td>Instruction</td>
<td>13</td>
</tr>
<tr>
<td>Activity</td>
<td>14</td>
</tr>
<tr>
<td>Processing</td>
<td>14</td>
</tr>
<tr>
<td>Research and Theory Describing the AT Experience</td>
<td>14</td>
</tr>
<tr>
<td>Trunk and Foundation</td>
<td>18</td>
</tr>
<tr>
<td>Lowest Branches</td>
<td>18</td>
</tr>
<tr>
<td>Middle Branches</td>
<td>18</td>
</tr>
<tr>
<td>Upper Branches</td>
<td>19</td>
</tr>
<tr>
<td>The Sun, Relationships, and Culture</td>
<td>20</td>
</tr>
<tr>
<td>Summary of Adventure Therapy ..................................................</td>
<td>21</td>
</tr>
<tr>
<td>The Use of Neuroscientific Measures and Approaches in Counseling and Counseling Research ...........................................................</td>
<td>21</td>
</tr>
<tr>
<td>Quantitative Electroencephalography ............................................</td>
<td>22</td>
</tr>
<tr>
<td>Delta .......................................................................................</td>
<td>23</td>
</tr>
<tr>
<td>Theta .......................................................................................</td>
<td>23</td>
</tr>
<tr>
<td>Alpha ......................................................................................</td>
<td>23</td>
</tr>
<tr>
<td>Beta .........................................................................................</td>
<td>23</td>
</tr>
<tr>
<td>Gamma ....................................................................................</td>
<td>23</td>
</tr>
<tr>
<td>History and Standardization ..................................................</td>
<td>23</td>
</tr>
<tr>
<td>QEEG in Counseling and Counseling Research ................................</td>
<td>24</td>
</tr>
<tr>
<td>Bridging Adventure Therapy and Neuroscientific Measures ..........</td>
<td>25</td>
</tr>
<tr>
<td>Summary ..................................................................................</td>
<td>26</td>
</tr>
<tr>
<td>CHAPTER 3: METHODS .................................................................</td>
<td>27</td>
</tr>
<tr>
<td>Problem Statement .....................................................................</td>
<td>27</td>
</tr>
<tr>
<td>Restatement of Purpose ...........................................................</td>
<td>28</td>
</tr>
<tr>
<td>Research Questions and Hypotheses ...........................................</td>
<td>28</td>
</tr>
<tr>
<td>Single-Case Alternating-Treatments Research Design ..................</td>
<td>28</td>
</tr>
<tr>
<td>Participants and Recruitment ..................................................</td>
<td>29</td>
</tr>
<tr>
<td>Participant-1 ...........................................................................</td>
<td>29</td>
</tr>
<tr>
<td>Participant-2 ...........................................................................</td>
<td>29</td>
</tr>
<tr>
<td>Participant-3 ..........................................................................</td>
<td>30</td>
</tr>
<tr>
<td>Topic</td>
<td>Page</td>
</tr>
<tr>
<td>-----------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Participant-4</td>
<td>30</td>
</tr>
<tr>
<td>Facilitator Qualifications</td>
<td>30</td>
</tr>
<tr>
<td>Instrumentation and Data Collection</td>
<td>30</td>
</tr>
<tr>
<td>Demographics Questionnaire</td>
<td>30</td>
</tr>
<tr>
<td>Emotiv Epoc X and Emotiv Pro Software</td>
<td>31</td>
</tr>
<tr>
<td>Experience Integrity Questionnaire</td>
<td>32</td>
</tr>
<tr>
<td>Procedures</td>
<td>32</td>
</tr>
<tr>
<td>Adventure Therapy Experience</td>
<td>32</td>
</tr>
<tr>
<td>The Dump</td>
<td>33</td>
</tr>
<tr>
<td>Game of Life</td>
<td>33</td>
</tr>
<tr>
<td>Not Knots</td>
<td>33</td>
</tr>
<tr>
<td>Toothpick Possibilities</td>
<td>34</td>
</tr>
<tr>
<td>Turning Over a New Leaf</td>
<td>34</td>
</tr>
<tr>
<td>Experimental Process</td>
<td>34</td>
</tr>
<tr>
<td>Initial Resting State</td>
<td>34</td>
</tr>
<tr>
<td>AT Experience</td>
<td>35</td>
</tr>
<tr>
<td>Experience Integrity Questionnaire</td>
<td>35</td>
</tr>
<tr>
<td>Follow-up</td>
<td>35</td>
</tr>
<tr>
<td>Data Analysis</td>
<td>36</td>
</tr>
<tr>
<td>Visual Analysis</td>
<td>36</td>
</tr>
<tr>
<td>Level</td>
<td>37</td>
</tr>
<tr>
<td>Internal Validity Limitations</td>
<td>64</td>
</tr>
<tr>
<td>Criterion and Face Validity Limitations</td>
<td>64</td>
</tr>
<tr>
<td>Maturation and Carryover Effect Limitations</td>
<td>65</td>
</tr>
<tr>
<td>Construct Validity Limitations</td>
<td>65</td>
</tr>
<tr>
<td>External Validity Limitations</td>
<td>66</td>
</tr>
<tr>
<td>Future Research Considerations</td>
<td>67</td>
</tr>
<tr>
<td>Conclusion</td>
<td>68</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>69</td>
</tr>
<tr>
<td>APPENDICES</td>
<td>76</td>
</tr>
</tbody>
</table>
## LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Participant-1 Experience Integrity Questionnaires Results</td>
<td>43</td>
</tr>
<tr>
<td>2</td>
<td>Participant-2 Experience Integrity Questionnaires Results</td>
<td>47</td>
</tr>
<tr>
<td>3</td>
<td>Participant-3 Experience Integrity Questionnaires Results</td>
<td>51</td>
</tr>
<tr>
<td>4</td>
<td>Participant-4 Experience Integrity Questionnaires Results</td>
<td>55</td>
</tr>
</tbody>
</table>
### LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1</td>
<td>Components of a Representative Adventure Therapy Experience</td>
<td>17</td>
</tr>
<tr>
<td>Figure 2</td>
<td>Image Representing the Map of the International 10-20 System</td>
<td>24</td>
</tr>
<tr>
<td>Figure 3</td>
<td>Epoc X User Manual Diagrams of Headset and Electrode Placement</td>
<td>31</td>
</tr>
<tr>
<td>Figure 4</td>
<td>Participant-1 Band Power Comparisons Within Session</td>
<td>40</td>
</tr>
<tr>
<td>Figure 5</td>
<td>Participant-2 Band Power Comparisons Within Session</td>
<td>40</td>
</tr>
<tr>
<td>Figure 6</td>
<td>Participant-3 Band Power Comparisons Within Session</td>
<td>41</td>
</tr>
<tr>
<td>Figure 7</td>
<td>Participant-4 Band Power Comparisons Within Session</td>
<td>41</td>
</tr>
<tr>
<td>Figure 8</td>
<td>Participant-1 Theta Band Power Comparisons Within Sessions</td>
<td>44</td>
</tr>
<tr>
<td>Figure 9</td>
<td>Participant-1 Alpha Band Power Comparisons Within Sessions</td>
<td>45</td>
</tr>
<tr>
<td>Figure 10</td>
<td>Participant-1 Beta Band Power Comparisons Within Sessions</td>
<td>45</td>
</tr>
<tr>
<td>Figure 11</td>
<td>Participant-1 Gamma Band Power Comparisons Within Sessions</td>
<td>46</td>
</tr>
<tr>
<td>Figure 12</td>
<td>Participant-2 Theta Band Power Comparisons Within Sessions</td>
<td>48</td>
</tr>
<tr>
<td>Figure 13</td>
<td>Participant-2 Alpha Band Power Comparisons Within Sessions</td>
<td>49</td>
</tr>
<tr>
<td>Figure 14</td>
<td>Participant-2 Beta Band Power Comparisons Within Sessions</td>
<td>49</td>
</tr>
<tr>
<td>Figure 15</td>
<td>Participant-2 Gamma Band Power Comparisons Within Sessions</td>
<td>50</td>
</tr>
<tr>
<td>Figure 16</td>
<td>Participant-3 Theta Band Power Comparisons Within Sessions</td>
<td>52</td>
</tr>
<tr>
<td>Figure 17</td>
<td>Participant-3 Alpha Band Power Comparisons Within Sessions</td>
<td>53</td>
</tr>
<tr>
<td>Figure 18</td>
<td>Participant-3 Beta Band Power Comparisons Within Sessions</td>
<td>53</td>
</tr>
<tr>
<td>Figure 19</td>
<td>Participant-3 Gamma Band Power Comparisons Within Sessions</td>
<td>54</td>
</tr>
</tbody>
</table>
Figure 20 – Participant-4 Theta Band Power Comparisons Within Sessions...........................56
Figure 21 – Participant-4 Alpha Band Power Comparisons Within Sessions..........................57
Figure 22 – Participant-4 Beta Band Power Comparisons Within Sessions............................57
Figure 23 – Participant-4 Gamma Band Power Comparisons Within Sessions.....................58
LIST OF APPENDICES

<table>
<thead>
<tr>
<th>Appendix</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appendix A – DEMOGRAPHICS QUESTIONNAIRE</td>
<td>76</td>
</tr>
<tr>
<td>Appendix B – PARTICIPANT RECRUITMENT INVITATION</td>
<td>78</td>
</tr>
<tr>
<td>Appendix C – INFORMED CONSENT</td>
<td>80</td>
</tr>
<tr>
<td>Appendix D – EXPERIMENTAL PROTOCOL</td>
<td>83</td>
</tr>
<tr>
<td>Appendix E – EXPERIENCE INTEGRITY QUESTIONNAIRE</td>
<td>106</td>
</tr>
</tbody>
</table>
CHAPTER ONE

INTRODUCTION

This research study focused on observing and measuring mental state trends during the counseling approach known as Adventure Therapy (AT) using an effective neuroscientific measure for counseling research known as quantitative electroencephalography (qEEG). Mental states or brainwaves are the electrical frequency (Hz) ranges attributed to certain behavioral, emotional, or consciousness states (D’Angiulli, et al., 2022) that provide evidentiary support for clients and counselors that the work they are doing in counseling is having the intended effect with the client’s brain. AT is a non-traditional counseling approach that clients seek, but then often face barriers to reimbursement due to questions of its effectiveness based on limited empirical research on how it can be effective (Bannow, 2022). Often clients seeking this type of counseling have struggled in traditional mental health treatment settings (Vankanegan, et al., 2019), so they value access to other options for treatment. There is a need for empirical evidence of the effectiveness of AT so that these barriers can be overcome.

The National Institute of Mental Health’s (NIMH) Division of Neuroscience and Basic Behavioral Sciences (DNBSS) along with their Research Domain Criteria initiative (RDoC) promote the use of neuroscientific measures as a primary means to effective research, diagnosis, and treatment in mental health (NIMH, 2022). The Council for Accreditation of Counseling and Related Educational Programs (CACREP) (2016) and the American Mental Health Counselors
Association (AMCHA) (2021) require the integration of neurobiological understanding into counselor education and clinical practice. As such, there has been a push for increased research and the use of measures that provide a better understanding of what is happening in the brain during counseling. This study was designed to address client needs for empirical research about AT by providing qEEG neuroscientific measures, as promoted by the mental health organizations described above, as well as to support the push for increased integration of neuroscience in counseling practice and research.

**Statement of the Problem**

There are two problems addressed in this study. The first is the lack of research in AT utilizing other empirical measures beyond subjective report surveys and program level outcomes (DeMille et al., 2018; Norton et al., 2014; Zelov, et al., 2013). The second is the lack of neuroscientific measurement of counseling approaches and interventions within the field of counseling in general (Beeson & Field, 2017a,b; Crockett, Gill, Cashwell, & Myers, 2017; Russo et al., 2021). This study will address both problems by utilizing qEEG to observe and measure mental state trends within the brain during individual participant non-nature-based small initiative AT (IPNNSI-AT) experiences.

**Purpose of the Study**

The purpose of this single-case alternating treatments design research study is to use quantitative electroencephalography (qEEG) to observe and measure mental state trends during IPNNSI-AT experiences.
**Significance of the Study**

In a review of the literature, it was found that no other study on AT has utilized qEEG as a measure for effectiveness or observation. The most related study looked at a multi-day nature experience (non-counseling or therapeutic focused) and how time in nature impacted resting mental states (Hopman, et al., 2020). No published study has yet isolated the AT experience itself as a possible impact or change factor using qEEG as its measurement. It was only in 2017 that the flagship journal for publishing content related to the intersection of neuroscience and counseling, the *Journal of Mental Health Counseling*, specifically the *Neuroscience-Informed* section existed (Beeson & Field, a.). All articles published in this section since 2017 have lacked a direct neuroscientific measure; instead, they were primarily conceptual in nature or utilizing peripheral biological measures to assess likely brain activity. This study contributes to filling the gaps in effectiveness research of AT and the use of neuroscientific measures in counseling in general.

**Research Questions and Hypotheses**

This study explored the following question: Are there any identifiable trends in mental states during AT experiences? I hypothesized the following: During different stages of the AT experience, there will be a higher incidence of mental states with significant effect sizes that correspond to the intended impact of the experience. Specifically, it is hypothesized that during instruction, Alpha (wakefulness/arousal) and Beta (focus/concentration) wave incidences will increase; during the activity, waves will fluctuate between Beta and Gamma (problem-solving/learning); and during processing, Gamma wave incidences will increase.
Research Design

This study used a single-case alternating treatments research design (SCATD). SCATD is a type of research designed to allow for continuous measurement of effects across different or alternating intervention conditions; experimental control is demonstrated via different levels of response between treatments within the same contiguous periods of time (Ray, 2015; Manolov & Onghena, 2018). Though treatment conditions are usually randomized in this design, this study provided a semi-randomized design via differences in the primary AT activity that participants participate in but retain the same order of treatment events (initial resting state then the AT experience) across sessions. This study had each participant engage in initial resting state conditions and AT experience conditions across five sessions.

Definition of Terms

There are technical and conceptual terms specific to AT and qEEG. The following provides operationalized definitions for those terms you will come across in this dissertation.

Adventure Therapy

Adventure Therapy (AT) is “the prescriptive use of adventure experiences provided by mental health professionals, often conducted in natural settings that kinesthetically engage clients on cognitive, affective, and behavioral levels” (Gass, et al., 2020, p.1). In this study non-nature-based small initiative AT experiences were used.

Adventure Therapy Experience

In this study, the AT experience is defined as the combined result of all micro-interventions when providing an AT activity. This involves three primary elements or intervention phases: instruction, activity, and processing.
Mental States

Mental states or brainwaves are the electrical frequency (Hz) ranges attributed to certain behavioral, emotional, or consciousness states (D’Angiulli, et al., 2022). These provide important information for counselors and researchers in mental health because the presence or lack of presence of certain mental states should be directly reflective of the functional cognitive and emotional states clients are working on.

Phases

In single-case research design, phases are the periods of observation or measurement (Ray, 2015). There is always a baseline phase that is then compared to at least one intervention phase, but additional phases can be added.

Power Bands

Power bands describe the measure of the percentage of electrical power usage of a mental state across the brain at any given moment within the brain (Kamal, Campbell, Taler, 2022).

Quantitative Electroencephalography (qEEG)

Neurons in the brain utilize chemical-electric processes to function and pass information throughout the brain and body. QEEG is a technology that allows researchers to measure the electrical output of those neurons in the brain (Chapin & Russell-Chapin, 2014). This is accomplished by placing non-invasive electrodes along the scalp of the head.

Organization of the Dissertation

The dissertation for this study is provided in five chapters. Chapter One is an introduction and overview of the entirety of the study, including a rationale for the study, the statements of problem and purpose, research questions and hypotheses, significance, and definitions of key
terminology. Chapter Two is a literature review describing the current knowledge base regarding 
AT, evidence of its effectiveness, and the definition of what an AT experience actually is. In 
addition, the chapter provides a status on the current understanding and use of neuroscience in 
the counseling field, with specific focus on the use of neuroscientific measures. Chapter Three 
and its associated appendices provide an in-depth description of the methods used for this study, 
and the experimental protocol. Chapter Four describes the results of the study, including graphs 
and tables to help with interpretation. Chapter Five provides a discussion of applications and 
implications of the results for the counseling field at large.
CHAPTER TWO

Review of the Literature

This study utilized quantitative electroencephalography (qEEG) to measure and observe the effects of an Adventure Therapy (AT) experience on mental states, which are defined as the electrical frequencies within individuals’ brains associated with arousal, emotion, and thought phenomena (Chapin & Russell-Chapin, 2014). This is important for counselors and researchers in mental health because certain mental states should be directly reflective of the functional cognitive and emotional states clients are working on. In this chapter I will discuss AT as a treatment modality within counseling, the growing research body of neuroscientific measures and approaches in counseling, and the prior uses of qEEG in counseling practice and research. Since AT and applications of neuroscience are newer research domains within the field of counseling (Beeson & Field, 2017a,b; DeMille, et al., 2018), significant parts of the literature review will be spent on combining current concepts and explaining gaps in understanding to support the implementation of this study. I will start by describing AT as it is currently understood and follow with a description of the uses of neuroscientific measures, like qEEG, in counseling research and practice.

Adventure Therapy

AT is a clinical modality that utilizes kinesthetically engaging adventure experiences. The definition of AT has gone through several iterations (Alvarez & Stauffer, 2001; Gillis, 1995;
The most current accepted definition was first put forth in 2012 by Gass, Gillis, and Russell (2020, p.1) and defines AT as “the prescriptive use of adventure experiences provided by mental health professionals, often conducted in natural settings that kinesthetically engage clients on cognitive, affective, and behavioral levels.” These experiences under the AT umbrella typically fall into one of three modalities with varying levels of time in naturally settings respectively: wilderness challenge or residential style programming; high-ropes challenge courses; or small-initiatives utilizing play equipment like balls, hula-hoops, ropes, pool noodles, or other creative toys (Gass et al. 2020, p.1-10). This study utilized non-nature-based small initiative AT experiences.

**History**

AT, as it is known today, began in 1971, when Project Adventure implemented the first adventure-based counseling program in a school in Massachusetts (Schoel, Prouty, & Radcliff, 1988). This program combined influences from the summer camp and youth leadership development movement began in the late 1800’s and early 1900’s (e.g., youth camps, scouting, etc.), culminating with Outward Bound U.S.A. in 1962 (Gass, et al., 2020). Outward Bound developed programming for leadership, character building, self-reliance, and resiliency for youth using initiatives and wilderness-based adventures in the spirit of Kurt Hahn’s Expeditionary Learning Principles developed in the 1930’s and 40’s. In 1966, Outward Bound provided programming for adjudicated youth in Massachusetts. Many had substance abuse issues or some other form of mental illness. The results were positive in that recidivism was reduced for the participants by 17% (Kelly & Baer, 1968).
Those outcomes from that 1966 program gave rise to the idea that adventure experiences could be used for personal growth and behavioral health treatment. This was a concept that had anecdotally been known to adventurers and First Peoples (Koithan & Farrell, 2010) through events like rites of passage or spiritually focused journeys in nature, but only first quantitatively demonstrated by Outward Bound’s 1966 programming. Project Adventure’s original staff decided to build on Outward Bound’s success and utilized versions of that programming intentionally for youth with mental illness and substance abuse issues, developing initiatives in conjunction with a focus on counseling processes to help address specific mental health needs.

With AT’s roots in the expeditionary model of experiential learning to its use in schools (Christian, et al., 2021) and the community (VanKanegan, et al., 2019), the mediums by which AT can be accomplished are vastly different in size, scope, technical complexity, and duration. For researchers and laypeople alike, this often yields a question like, “how can a multi-day backpacking trip in the Rocky Mountains requiring high levels of technical skill guidance be AT, as well as a one-hour group session in a school cafeteria using a ball, some webbing, and hula-hoop?” The field’s struggle to answer this question has brought about questions of fidelity in practice and how to best describe what defines an actual representative AT experience (Tucker & Rheingold, 2010). In the next three sections, I will attempt to answer this question utilizing what research the field currently has to offer, as well as my own conceptualization based on that research and my own practice and leadership experience within the field.

**Fidelity in the Adventure Therapy Experience**

The conditions of what constitutes an adventure experience or experience within the context of AT are often intentionally vague (Alvarez & Stauffer, 2001) or only partially explained
within the current literature. This absence of understanding of what an AT experience is has been called the “black box effect” of AT (Norton et al., 2014). To partially address this question of fidelity, while also allowing for the continued use of creative experiences, the Association for Experiential Education (AEE), in October of 2020, gathered experts based on their contributions to research and practice in AT and these experts identified 11 Core Elements of Adventure Therapy Training. The purpose of this was to increase practitioner fidelity regardless of the technical activity (climbing, backpacking, small in-office initiative, etc.). The following is the training criteria as described by AEE in their Certification Credentialing Manual (2020, p.14) for the Clinical Adventure Therapist credential.

**Technical Skills**

“The knowledge of technical skills competencies and limitations related to AT experiences, risk management protocols specific to adventure therapy populations and settings, and environmental practices of adventure therapists” (AEE, 2020, p.14). Specifically focused on, “Practicing within one's own competencies based on technical skills training and assessed competency. Competency can be assessed either by having a certification, or an assessment of skill competency from a reputable training organization, or employer” (AEE, 2020, p.14).

**Facilitation and Processing**

The effectiveness of the adventure therapy experience, assists clients in finding direction and sources for functional change, and creates changes that are lasting and integrated into the clients’ lives through: establishing norms, engagement and cohesion building strategies, awareness of trauma responses in AT, adapting experience to incorporate isomorphic metaphors, utilizing models for stages of change and group development
while conducting AT services, generalizing adventure experiences to everyday life, and matching and facilitating an activity towards a clinical goal with transfer of skills (AEE, 2020, p.14-15).

**Organizational/Administrative Policies**

The organizational processes and policies surrounding adventure experiences used by the adventure therapist including: designing and maintaining policies that reflect an awareness of standards in the field, laws and regulations impacting AT services, development of crisis management response plans, medication and medical monitoring, treatment logistics/protocols and referrals from AT services, supervising client behaviors and safety during AT activities, supervision and consultation to maintain ethical practice and AT certification, resources for seeking consultation about AT practices, and logistics of planning AT experiences (AEE, 2020, p.15).

**Conceptual Knowledge**

The ability of the adventure therapist to use specific models, practices, philosophies, and applications of adventure therapy for the unique needs of treatment issues with clients by understanding history and foundations of the development of AT, connecting experiences with the therapist's theoretical orientation, key components of AT experiences, and AT Models (AEE, 2020, p.15).

**Therapeutic Alliance Building**

The ability of the adventure therapist to co-construct an effective therapeutic alliance with clients. The building of this positive form of therapeutic relationship incorporates the use of natural environment elements and adventure programming concepts. Special
attention is paid to the specific and diverse context of various clients (e.g., social, cultural, systemic, ethnic, gender, and sexual orientation, etc. (AEE, 2020, p.15).

Assessment

“The adventure therapist examines clients in mental health settings through adventure experiences and uses supportive documentation for screening and creating potential experiences with AT experiences as part of ongoing client assessment to inform clinical facilitation decisions” (AEE, 2020, p.16).

Interventions

“The implementation of adventure therapy treatment strategies and processes to produce functional client change in an appropriate, culturally relevant, lasting manner” (AEE, 2020, p.14), with knowledge of “selecting and conducting activities that are appropriate and individualized to the client” (AEE, 2020, p.16).

Therapeutic Monitoring

The continual connection to clients involved in adventure therapy programming, including ongoing evaluation of therapy, maintenance of treatment gains, ongoing treatment planning, and termination via: monitoring transfer of learning from adventure activities to “daily life” over time, the use of adventure activities for formal and informal outcome evaluation purposes, detailed/formative treatment planning that supports development of appropriate AT experiences, and co-creation and/or assessment of progress on treatment goals using AT experience (AEE, 2020, p.16).
**Documentation**

“The accurate appraisal of all steps in the adventure therapy process, including but not limited to screening and intake, participant forms, agreement to participate, waivers, informed consent, and other pertinent documentation forms for client benefit” (AEE, 2020, p.16-17)

**Professionalism**

Adventure Therapists will follow all regulatory laws of their area of practice, understand the ethical standards specific to AT services, have knowledge of commonly accepted practices in AT, and use clinical supervision to develop specific AT experiences (AEE, 2020).

**Socio-Cultural/Environmental Considerations**

“Awareness and practices related to diversity needs, power, privilege, and environmental stewardship” (AEE, 2020, p.17).

**Foundations of an Adventure Therapy Experience**

While the above describes strategies taken by the field to increase fidelity of inter-practitioner experience, field researchers are still unclear what specific components of an AT experience produce change (DeMille et. Al, 2018). Descriptions are often process based or context based (Fletcher & Hinkle, 2002) and do not account for the variety of experience mediums. Typically, the actual facilitation of the experience includes three primary elements: instruction, activity, and processing (Alvarez & Stauffer, 2001; Fletcher & Hinkle, 2002; Gass & Gillis, 1995).

**Instruction**

Instruction is the process of framing the total experience for the client, often with metaphor (Gass, 1991), and providing basic instructions for completing the prescribed activity
itself. This is done by either frontloading all information about the activity, including intended processing outcomes, or just by giving technical instructions about the activity itself and waiting until processing to elucidate learning outcomes.

**Activity**

Activity is the primary technical experience that the client participates in. This is usually a game, challenge, or outdoor experience (Alvarez, et al., 2021).

**Processing**

Processing of the activity either occurs throughout the activity or after the activity is complete (in this study it will occur after the activity). Processing involves discussion and reflection of the client’s experience of the activity (Gillis & Thomsen, 1996; Alvarez & Stauffer, 2001; Russell & Phillips-Miller, 2002; Peeters, 2009; Norton, 2010; Gass, et al., 2020; Russell & Gillis, 2017) and generalization of the learning from that experience to the client’s everyday life (Gass & Gillis, 1995a; Gillis & Thomsen, 1996; Alvarez & Stauffer, 2001).

**Research and Theory Describing the AT Experience**

Although the primary elements just described are universally found within AT experiences, the total components of an experience continue to be based more on professional judgement and experience rather than statistical validation (DeMille et. Al, 2018) falling within the previously mentioned wilderness challenge experiences, high ropes courses, or small initiatives (Gass et al. 2020, p.1-10). The Adventure Therapy International Committee (ATIC) (ND), points out that there is so much differentiation across those three sub-experience umbrellas that only two primary statements can be made about AT experiences: there must be engagement in adventurous (physical) activities and there must be therapeutic intent. This study utilized the
small initiative adventurous activities approach with therapeutic intent around problem-solving skills, decision making skills, relationship skills, frustration tolerance skills, and communication skills.

The effectiveness of AT has been demonstrated across a variety of treatment settings and needs. In two comparison studies completed by Gass et al. (2019) and DeMille et al. (2018), they identified better treatment outcomes with a reduction in overall clinically significant symptoms for clients participating in AT in a residential setting compared to treatment in typical residential settings, outpatient, intensive inpatient, or intensive outpatient treatment settings without AT. Non-residential AT has also demonstrated effectiveness. Tucker et al. (2013), utilizing the Ohio Youth Problem Severity Scale, found that clients participating in AT had significant mean decreases in problem behaviors. Another study with AT in outpatient settings found significant improvements in overall clinical symptoms from intake to discharge and specific improvements in interpersonal relations, intrapersonal distress, somatic issues, and critical items like self-harm (VanKanegan et al., 2019). In school settings, participation in AT has been demonstrated to improve overall and academic self-efficacy (Christian et al., 2021). Participation in AT has also been found to significantly improve experiences of social and interpersonal well-being for women struggling with homelessness (Norton, et al., 2020). Much of the research on AT, including those studies just described, has focused on qualitative analysis or subjective survey reports on individual or aggregated program outcomes (Zelov, et al., 2013). The AT field’s relative youth compared with other more established approaches in mental health, yield it a less robust set of research.
Although effectiveness of AT has been demonstrated, specific components for
effectiveness of AT are still being researched. Amongst possible effective components in AT,
Russell and Gillis (2017) validated the following commonly agreed upon factors through their
Adventure Therapy Experience Scale: group adventure, reflection, nature, and challenge. To
provide a more complete picture of the micro-elements of an AT experience for this literature
review, I have reviewed other theoretical literature in the field, literature describing the processes
of AT programs, and my own practice and field leadership experience as part of the team that
developed the core training competencies. This review yielded 28 common themes and concepts
(See Figure 1). In the spirit of AT, it may be helpful to use the metaphor of climbing a tree to
describe the process and facilitation considerations of an AT experience.
Figure 1. Components of a representative Adventure Therapy experience.
**Trunk and Foundation**

At the beginning of your climb, you start at the trunk of the tree. The trunk and foundation of the tree are that (1) the experience is intentionally selected and guided by a mental health professional with appropriate training (Alvarez & Stauffer, 2001; Gass, et al., 2020). The (2) experience is based on the client’s goals (Schoel, et al., 1988; Alvarez & Stauffer, 2001; Gass, et al., 2020) with (3) a focus on solutions, empowerment, positive change, and increased client functioning (Schoel, et al., 1988; Gass & Gillis, 1995b; Gass, et al., 2020).

**Lowest Branches**

The lowest and most sturdy set of branches are next as you move up the tree. These branches, in conjunction with the trunk, provide the most resources and support to the growth of the rest of the tree and client. Throughout the experience the client should (4) feel safe, (5) have trust, (6) experience freedom of choice, (7) feel a sense of belonging, (8) have fun, and (9) experience positive and effective communication (Gass & Gillis, 1995b; Alvarez & Stauffer, 2001; Norton, 2010; Gass, et al., 2020). In addition, the counselor should (10) take a developmental and strengths-based approach to meet the client’s needs (Alvarez & Stauffer, 2001; Gass & Gillis, 1995b; Gass, et al., 2020 Schoel, et al., 1988). Throughout the entire process the counselor should also demonstrate Rogers’ (1961) (11) three core conditions of genuineness/congruence, empathy, and unconditional positive regard in order to (12) build a strong relationship with clients (Russell & Phillips-Miller, 2002; Gass, et al., 2020).

**Middle Branches**

As you climb beyond the first set of branches, you need to start making additional considerations to continue to effectively climb the tree. Next, (13) the AT experience must be
kinesthetic on some level (Schoel, et al., 1988; Itin, 2001; Gass & Gillis, 1995a; Gillis, 1995; Gillis & Thomsen, 1996; Peeters, 2009; Gass, et al., 2020) while engaging (14) affect, cognition, and behavior of the participants (Schoel, et al., 1988; Gass, et al., 2020).

Moving up the trunk and through the branches to the third level, the structure and shape of the tree becomes more apparent. It is important for AT experiences to have (15) the presence of an intentional structure/sequence to how the activity progresses (Bacon & Kimball, 1989; Gass, 1991; Gass & Gillis, 1995a; Russell & Phillips-Miller, 2002; Russell & Gillis, 2010; Gass, et al., 2020) that is enhanced by (16) the use of metaphor (Bacon & Kimball, 1989; Gass, 1991; Gass & Gillis, 1995a; Gillis & Thomsen, 1996; Itin, 2001; Peeters, 2009; Russell & Gillis, 2010; Gass, et al., 2020). Counselors also (17) engage as active participants in this process and (18) co-construct the experience with clients (Peeters, 2009; Gass, et al., 2020).

The higher you climb in the tree the riskier and more challenging the experience and process can become. There may also be more new sights to see from the new height. AT experiences involve (19) appropriate levels of challenge and risk (Gillis, 1995; Gillis & Thomsen, 1996; Alvarez & Stauffer, 2001; Russell & Phillips-Miller, 2002; Norton, 2010; Gass, et al., 2020; Russell & Gillis, 2017) as well as a (20) novelty of experience (Gass & Gillis, 1995a; Gass, et al., 2020) with (21) natural forms of feedback or consequences (Gass, et al., 2020). The challenge, novelty, and natural feedback promote client change.

Upper Branches

With the increasing sense of change in the tree as you climb higher, and the branches becoming smaller and less available, a (22) stronger sense of responsibility and the (23) need to problem solve can become increasingly salient. In AT experiences, clients work to increase their
acceptance of their personal responsibility and counselors return responsibility to clients whenever possible (Peeters, 2009; Gass, et al., 2020). With this acceptance of responsibility, clients also take it upon themselves to practice problem solving (Gass & Gillis, 1995a; Gass, et al., 2020).

When you are near the top of the tree, you reflect on your accomplishment and the new view of the surroundings. Counselors assist clients with (24) reflecting and processing on their experiences as well as helping to identify meanings created through those experiences (Gillis & Thomsen, 1996; Alvarez & Stauffer, 2001; Russell & Phillips-Miller, 2002; Peeters, 2009; Norton, 2010; Gass, et al., 2020; Russell & Gillis, 2017). Finally, (25) there is an integration of learning from the experience and the changes that can be applied to the client’s life outside of the AT experience (Gass & Gillis, 1995a; Gillis & Thomsen, 1996; Alvarez & Stauffer, 2001).

The Sun, Relationships, and Culture

The experience of climbing the tree can stand on its own as an adventure experience, but the experience would likely be enhanced by a sunny day. If the AT experience occurs within the context of (26) nature or wilderness or in a group, the experience is enhanced and generally more powerful (Peeters, 2009; Norton, 2010; Gass, et al., 2020; Russell & Gillis, 2017). It is also important to recognize that all of this occurs within, and is impacted by, clients’ (27) relationships in their lives, including with their counselors (Russell & Phillips-Miller, 2002; Norton, 2010; Gass, et al., 2020), and by clients’ (28) cultures (Chang, Tucker, Norton, Gass, & Javorski, 2017; ATIC, ND).

Although all 28 of the components can comprise an AT experience, some are more foundational than others. There is no specific way in which the components need to be used
(Fletcher & Hinkle, 2002). Depending on clients’ needs, some components may receive heavier focus than others, and the focus may change as the clients’ needs change.

**Summary of AT**

AT has demonstrated effectiveness as a counseling approach. A total accounting of the factors of change is still being researched, and more rigorous and quantifiable methods also continue to need to be used. Much like research in AT, research into the applications of neuroscience within counseling is also newer and still evolving. There are gaps within the field for using neuroscientific measures to support counseling concepts and practices. In this next section, I will discuss the history of neuroscientific research in counseling and the applications of neuroscientific measures such as qEEG.

**The Use of Neuroscientific Measures and Approaches in Counseling and Counseling Research**

The growth of neuroscientific applications and research in counseling has primarily come into focus within the last decade. In 2012, Myers and Young (p. 26) commented that counseling researchers have “largely failed to use brain-based measures to substantiate their work.” The following year, in a *Counseling Today* article, Montes (2013) coined the term “neurocounselor” to convey counseling practice informed by neuroscientific research. By 2017, counseling researchers had a consistent place to publish their research with the advent of the Neuroscience-Informed section in the *Journal of Mental Health Counseling* (Beeson & Field, 2017a). Knowledge of neuroscience and neuroscientific applications is becoming more integrated into counselor training curricula (Russo, et al., 2021) and further models for training are being developed (Field, et al., 2022). Although the gap is closing, much of the research related to
neuroscientific applications in counseling tends to be conceptual in nature and there is a push for increased infusion of neuroscientific measures in counseling research (Beeson & Field, 2017a,b; Crockett, et al., 2017). This study works to contribute to closing that gap by utilizing quantitative electroencephalography.

**Quantitative Electroencephalography**

Quantitative Electroencephalography (qEEG) is a technology that allows researchers to measure the electrical output of the brain. Neurons in the brain utilize chemical-electric processes to function and qEEG measures the electrical output of those processes.

Neurons’ resting electrical potential is around 70 millivolts. Neurons become depolarized at around -55 millivolts to release chemical neurotransmitters. Millions of neurons firing together result in patterns of electrical activity called brainwaves (measured in Hertz).

The main brainwave patterns are delta, theta, alpha, beta, and gamma (Chapin & Russell-Chapin, 2014, p.58).

Brainwave patterns, also called mental states, are associated with certain behavioral, emotional, or consciousness states. This can be important information for counselors and researchers in mental health because the presence or lack of presence of certain mental states should be directly reflective of the functional cognitive and emotional states clients are working on. Mental states, through observation with qEEG, provide direct empirical support that the mental constructs being processed in counseling are actually being altered or changed as intended by the client and counselor. Next, I will describe the psychological factors associated with each mental state.
**Delta**

Delta waves (0.16-4.0 Hz) are associated with sleep, recovery, or deep meditation (Berman & Stevens, 2015; Chapin & Russell-Chapin, 2014).

**Theta**

Theta waves (4.0-8 Hz) are associated with drowsiness, calm, or creative/imaginative states (Berman & Stevens, 2015; Chapin & Russell-Chapin, 2014).

**Alpha**

Alpha waves (8.0-12.0 Hz) are associated with wakefulness and arousal (Chapin & Russell-Chapin, 2014; Desi et al., 2015).

**Beta**

Beta waves (12.0-25.0 Hz) are associated with focus and concentration on task (Chapin & Russell-Chapin, 2014; Demos, 2005; Schaefer, 2018).

**Gamma**

Gamma waves (25.0-45.0 Hz) are associated with problem solving and learning (Chapin & Russell-Chapin, 2014; Desi et al., 2015).

**History and Standardization**

QEEG was first utilized in 1929 by Dr. Hans Berger to identify whether an individual’s brain waves were different depending on their state of attention and consciousness (as cited in Chapin & Russell-Chapin, 2014). This was done by placing electrodes on the scalp and observing if any electrical activity was picked up. The International 10-20 System was later developed (Jasper, 1958) to ensure that the accuracy of electrical measurement corresponds to specific brain areas so that inferences about behavioral, emotional, or consciousness states could
remain internally valid across studies (Pivik, Broughton, Coppola, Davidson, Fox, & Nuwer, 1993). For example, in the 10-20 standardized system, the left side of the prefrontal cortex of the brain is always labeled and located at point \(F_p^1\) (See Figure 2). Modern technology utilizes electrodes placed on the head embedded within a cap or headband. This study used a 14-electrode headband device placed at AF3, F7, F3, FC5, T7, P7, O1, O2, P8, T8, FC6, F4, F8, and AF4.

![Figure 2. Image representing the map of the International 10-20 system for electrode placement. From “Anatomy and Physiology: 10-20 System” by Tangient LLC, 2016, https://neurofeedback.wikispaces.com/12+Anatomy+and+Physiology. Adapted from “Guidelines for Standard Electrode Position Nomenclature” by the American Electroencephalographic Society. Image available for reprint based on the Creative Commons](image)

**QEEG in Counseling and Counseling Research**

Counseling practitioners have primarily used qEEG as a part of neurofeedback (NFB) interventions (Beeson & Field, 2017b). NFB is a type of biofeedback focused on neuromodulation. Neuromodulation is the alteration of some aspect of neuronal functioning.
(Chapin & Russell-Chapin, 2014) by recognizing mental states and teaching clients to regulate those mental states. NFB was first used in counseling in the 1970’s to assist clients with meditation and relaxation (Myers & Young, 2012), but has been used widely throughout the fields of mental health for varying issues and psychopathologies. Calls for increased use of NFB have been made (Myers & Young, 2012; Fragedakis & Toriello, 2014; Beeson & Field, 2017a,b) to increase the biological evidence of treatment effectiveness.

QEEG allows counselors and clients to identify active mental states within the brain and then attempt to train the brain to utilize mental states selected by the client that are more conducive to the client’s needs or reduce symptoms of unwanted mental dysfunctions. Client awareness of mental states has been shown to improve introspection during mindfulness activities (Smarinsky, et al., 2021). There have also been significant applications of NFB for improving symptoms of attention deficit hyperactivity disorder (Arnold et al., 2013; Baumeister, et al., 2018) by increasing Alpha (arousal) and Beta (focus) state activation. Similarly, symptoms of anxiety have been improved (Russo, et al., 2022; Bennet, et al., 2022) by appropriately modulating Alpha (arousal) and Theta (calm) states.

**Bridging Adventure Therapy and Neuroscientific Measures**

Through understanding the cognitive, emotional, and behavioral meaning of mental states observed with qEEG, counselors have been able to utilize NFB to reduce symptomology of mental health disorders and promote more functional mental states (Longo & Russo, 2017). Though no prior use of qEEG exists in AT, the purported benefits of the in-vivo experiencing during an AT experience are very similar to the in-vivo neuromodulation that occurs during NFB. Having a greater understanding of mental state trends during an AT experience will either
provide support for the intended psychological impacts of an AT experience or provide better empirical evidence for what is happening in the brain during AT. For example, if a client participates in an AT experience intended to work on frustration tolerance, you expect to see a pattern in modulation between Gamma (problem-solving) and Theta (calming) because those mental states best account for the psychological condition of ‘frustration tolerance’.

**Summary**

There is a lack of neuroscientific measurement of counseling approaches and experiences within the field of counseling in general (Beeson & Field, 2017a; Russo et al., 2021) and there is a lack of quantitative research in AT that assesses the effectiveness of AT as a counseling and therapeutic approach outside of subjective participant reports through surveys and outcomes of specific programs (DeMille, et al., 2018; Norton et al., 2014). Norton et al. (2014) stated that the answer to the question of “why” AT does or does not work remains in a black box. Most studies do not clearly describe program models, and this makes it difficult to determine whether changes are due to specific AT experiences or other variables (Gass, et al., 2020; Norton et al., 2014). Norton et al. (2014, pp. 54) gave a call to action when discussing the state of the AT field that “future research in adventure therapy must move toward evidence-based practices, including better documenting our program models, gaining deeper understanding of the processes of change, using more methodologically sophisticated methods, and focusing on the clinical significance of our outcomes.” Although, there has been limited use of neuroscientific measures in counseling literature so far (Beeson & Field, 2017a,b; Crockett et al., 2017; Myers & Young, 2012) and certainly not applied to the AT counseling modality, this study was designed to address both of those gaps in the research.
CHAPTER THREE

METHODS

In this chapter I will describe the methods and procedures implemented in this study. I will begin by re-stating the problem and how this study addresses research gaps which will lead into the purpose of this study. I will then provide my research question and hypothesis. Following, I will provide descriptions and definitions of the methodological design, participants, facilitator qualifications, instrumentation, procedures, and data analysis. This study was approved by Northern Illinois University’s Institutional Review Board for research (Protocol # HS23-0120).

Problem Statement

There are two problems addressed in this study. The first is the lack of research in AT utilizing other empirical measures beyond subjective report surveys and the outcomes of specific programs (DeMille et. al, 2018; Norton et al., 2014; Zelov, et al., 2013). The second is the lack of neuroscientific measurement of counseling approaches and interventions within the field of counseling in general (Beeson & Field, 2017a,b; Crockett, Gill, Cashwell, & Myers, 2017; Russo et al., 2021). This study addresses both problems by utilizing qEEG to observe and measure mental state trends within the brain during individual participant non-nature-based small initiative AT (IPNNSI-AT) experiences.
Restatement of Purpose

The purpose of this single-case alternating treatments design research study was to use quantitative electroencephalography (qEEG) to observe and measure mental state trends during IPNNSI-AT experiences.

Research Question and Hypothesis

This study explored the following question:
Are there any identifiable trends in mental states during IPNNSI-AT experiences?

I hypothesized the following:

During different stages of the AT experience, there will be a higher incidence of mental states with significant effect sizes that correspond to the intended impact of the experience. During instruction, Alpha (wakefulness/arousal) and Beta (focus/concentration) wave incidences will increase; during the activity, waves will fluctuate between Beta and Gamma (problem-solving/learning); and during processing, Gamma wave incidences will increase.

Single-Case Alternating Treatments Research Design

Single-case alternating treatments research design (SCATD) is a type of research designed to allow for continuous measurement of effects across different or alternating intervention conditions and experimental control is demonstrated via different levels of response between treatments within the same contiguous periods of time (Ray, 2015; Manolov & Onghena, 2018). Though treatment conditions are usually randomized in this design, this study provided a semi-randomized design via differences in the primary AT activity that participants participated in but retained the same order of treatment events (initial resting state then the AT
experience) across sessions. This study had each participant engage in initial resting state conditions and AT experience conditions across five sessions.

Participants and Recruitment

Although single-case research can be completed with just that, a single-case, validity and strength of the design is increased when comparing four or more participants (Gallo, Comer, & Barlow, 2013). This study recruited four participants from two undergraduate psychology courses and via an email invitation to second and third year cohort members of a Master of Science in Mental Health Counseling program. All participants chose to volunteer after hearing or receiving the recruitment invitation (see Appendix B). The only exclusion criteria was that participants could not have metal surgical implants within their head (apart from tooth fillings) as this may impact the accuracy of the data collection from the qEEG electrodes.

Participant-1

Participant-1 was a 22-year-old, White, Female with no history of prior brain injury or concussion and had not participated in Adventure Therapy previously. She voluntarily signed the informed consent and completed all five sessions of the experiment.

Participant-2

Participant-2 was an 18-year-old, White, Gender Fluid person with no history of prior brain injury or concussion and had not participated in Adventure Therapy previously. They voluntarily signed the informed consent and completed all five sessions of the experiment.
Participant-3

Participant-3 was a 30-year-old, White, Female with no history of prior brain injury or concussion but had participated in Adventure Therapy previously as part of a class. She voluntarily signed the informed consent and completed all five sessions of the experiment.

Participant-4

Participant-4 was a 29-year-old, White, Female with a history of concussion and had previously participated in Adventure Therapy. She voluntarily signed the informed consent and completed all five sessions of the experiment.

Facilitator Qualifications

Fidelity across clinicians and the implementation of multiple types of AT experiences has been a problem within AT research (Norton et al., 2014). To address this, the Association of Experiential Education (2020) developed the Clinical Adventure Therapist training and experience criteria for certification. I contributed to the development and writing of those criteria and have contributed to two published research projects investigating the effectiveness of AT (Christian, et al., 2021; Vankanegan, et al., 2019). I am a Certified Clinical Adventure Therapist as well as a fully licensed clinical mental health counselor practicing primarily with AT for the last ten years.

Instrumentation and Data Collection

Demographics Questionnaire

Following review of the informed consent and confirmation of willingness to participate, participants were asked to provide demographic information (see Appendix A) regarding their age, racial/ethnic identity, gender identity, awareness of prior concussions or other injuries to
their brain, and prior experience with AT. These questions were intended to help in comparison of data between participants during analysis and if significant differences occurred in results.

**Emotiv Epoc X and Emotiv Pro Software**

This study utilized qEEG to differentiate mental states. The Emotiv Epoc X (EPOC) is a mid-range cost, consumer-grade qEEG device commonly used in research and brain-computer interface technologies that when compared to high end qEEG devices is effective in differentiating between mental states of valence, arousal, and mental loads (D’Angiulli, Lockman-Dufour, & Buchanan, 2022). Though less powerful than high-end EEG devices, it provides the capability of wireless connectivity and freedom of movement which was necessary for this study.

EPOC is a 14-electrode (plus 4-references used as baselines for electrical amplitude) wireless headset with sensors placed at the internationally standardized 10-20 positions of AF3, F7, F3, FC5, T7, P7, O1, O2, P8, T8, FC6, F4, F8, and AF4 (see Figure 3). It transmits data from the headset via wireless signal connected to a USB dongle in the researcher’s computer. Data is compiled and displayed through the Emotiv Pro software program and interpreted by the researcher.

*Figure 3.* Epoc X User Manual (2020) diagrams of electrode placement in the International 10-20 system and an illustration of what the headset looks like placed on the head.
Experience Integrity Questionnaire

The experience integrity questionnaire (Appendix E) was designed to capture the qualitative experience of the participant in order to compare that information to the mental state trends and corroborate or contradict the implications of those trends. The questionnaire consists of six questions asking the participant if they experienced the counseling themes and metaphors associated with the AT activities and their recognition of when they were experiencing those things.

Procedures

AT Experience Interventions

In an effort to utilize as representative an IPNNSI-AT experience as possible, this study utilized five modified versions of AT interventions (Appendix D) selected from the book *Power of One* (2008) written by Maurie Lung, Gary Stauffer, and Tony Alvarez; all very experienced and well-respected leaders, researchers, authors, practitioners, and mentors within the AT field spanning over 30 years. All three authors have served as officers on the Therapeutic Adventure Professional Group Leadership Council and received numerous awards within the AT field. Most prominently they have all received the Heart of Adventure Therapy Award honoring exemplary service within the AT field and for providing the example for best practices (AEE, 2021). Gary Stauffer and Tony Alvarez are also responsible for developing much of the modern theoretical framework for practice in AT (Alvarez & Stauffer, 2001). *Power of One* was written as a resource for providing AT activities in traditional individual counseling settings.

Across time, participants participated in five different IPNNSI-AT experiences designed to address a variety of counseling needs. To best replicate a true AT counseling experience,
participants were prompted to relate to the common counseling needs addressed by these activities. All activities were selected for their generalizability to most people’s experience so that participants could best be able to relate and consider how they may actually generalize the experience to their own life. I will now provide a general overview of the five activities and describe their specific counseling uses.

**The Dump**

An AT intervention primarily used to address relationship skills and problem-solving needs. It involves the client filling a cup with small objects and using a rubber-band tool to transfer those objects to another cup. The client works with the counselor to identify the best way to do this and directs the counselor on how to help. The counseling themes and metaphors of support, problem-solving, and ‘emotional dumping’ are processed.

**Game of Life**

An AT intervention primarily used to address coping strategies for frustration and challenge as well as improve decision making. The client navigates a set of squares in the form of a maze with the counselor providing feedback based on directional choices. Clients may need to take different approaches or restart progress based on decision they make. The counseling themes and metaphors of coping strategies, making decisions, and ‘paths in life’ are processed.

**Not Knots**

An AT intervention primarily used to address decision making skills. The client is invited to assess whether if they pull on the ends of a piece of webbing or rope from ground in a disorganized pile if a knot will result, or not? The process of the decision making is processed
during the activity. The counseling themes and metaphors of decision making, communication, and ‘dealing with life’s tangles’ are processed.

**Toothpick Possibilities (with pool noodles)**

An AT intervention primarily used to practice sustained focus on a cognitive task and to practice problem solving and decision making. The client solves puzzles by shifting the position of pool noodles to create new shapes or setups. The counseling themes and metaphors of making decisions, problem solving, and ‘facing impossible solutions’ are processed.

**Turning Over a New Leaf**

An AT intervention primarily used to address communication skills and problem solving. The client and counselor work together while standing on top of a towel to flip the towel over while remaining on the towel at all times. The counseling themes and metaphors of problem solving, communication, and ‘turning over a new leaf’ are processed.

**Experimental Process**

After providing informed consent and the demographics questionnaire, participants began their first AT experience. An in-depth step-by-step process of the protocol can be found in Appendix D. Over time, participants completed an additional four sessions of this same experimental process, but with a different primary intervention activity than they had participated in before. Eventually they participated in all five activities described above. The following summarizes the experimental protocol for the AT experience.

**Initial Resting State qEEG**

After the participant had been fitted with the EPOC (Appendix D), they were instructed to sit in an open-eyed resting state for 5-minutes to collect initial resting state qEEG data.
Participants were provided with a ‘+’ shaped focal point to look at on the wall while sitting in the chair separated from the researcher and equipment for the upcoming activity.

**AT Experience**

The participant engaged in one of the five AT experiences they had yet to complete. Throughout the experience the researcher engaged in an active counseling role with the participant utilizing foundational counseling micro-skills and strategies (Ivey, et al., 2022).

Each AT experience followed three stages: instruction, activity, and processing. Procedural fidelity for treatment integrity was accounted for via a keystroke on the computer that instructed the computer to record a stage change marker in the raw qEEG data when participants transitioned from one stage to another.

**Experience Integrity Questionnaire**

After the AT experience concluded, the researcher removed the EPOC from the participant’s head and provided them with the Experience Integrity Questionnaire. The questionnaire was designed to capture the qualitative experience of the participant in order to compare that information to the mental state trends and corroborate or contradict the implications of those trends. The questions ask if the participant experienced the counseling themes and metaphors associated with the activities and, if they did, their recognition of when they were experiencing those things.

**Follow-up**

Data collection for the experiment concluded after the experience integrity questionnaire was complete. Following their fifth session, participants were offered the opportunity to view
their raw qEEG data and ask questions answered regarding any part of their experience across the five sessions.

**Data Analysis**

Across sessions, the data output that was included in the analysis was the time markers throughout collection, stage transition markers, and the band powers of the theta, alpha, beta, and gamma mental states. Post-session connection quality of electrodes was also reviewed and any channels with consistently poor connections were removed from the data of that session. Average band power percentage per session per mental state was calculated. Within sessions, this same data was calculated, but average band power was also assessed within each stage (initial resting state, instruction, activity, and processing). Data analysis via SCATD was done through a combination of visual analysis and effect size calculations (Vannest & Ninci, 2015).

**Visual Analysis**

Visual analysis is the first step when evaluating the results of any single case research design (Ray, 2015). This consists of observing the graphed data and the differences between interventions or baseline and interventions. I used the most recently proposed graphing considerations and guidelines from Brown, et al. (2022). I visually analyzed differences between mental states in the initial resting state conditions and mental states across the AT experiences. In addition, analysis of Mean change of mental states between initial resting state and a specific stage (AT experience at instruction, activity, and processing) was calculated for within sessions analysis, though not represented using SCATD line graphs since the data being analyzed was more immediate and not over multiple extended timepoints. Visual analysis of SCATD most commonly includes estimates of level, trend, and variability (Manolov & Onghena, 2018).
Level
The difference between mean values of conditions or interventions. In this study, this was the difference between mean values across time of the initial resting state and the varied IPNNSI-AT experiences.

Trend
Noticing whether baseline or initial condition trend impacts the effects. In this study overall trend from the initial resting state was observed for impacts with the IPNNSI-AT experience. The TAU-\(U\) (Parker, et al., 2011; Vannest & Ninci, 2015) statistic will also be used to account for trend impact. The use of TAU-\(U\) is described more fully below in the Effect Size section.

Variability
A comparison of the “stability” of values and narrowness of range between conditions or interventions. In this study the range for the averaged values across time for the initial resting states and the IPNNSI-AT experiences was computed and compared.

Effect Size
Effect size is a quantitative index of practical significance that statistically estimates the meaningfulness of change associated with an intervention (Vannest & Ninci, 2015). This study utilized the non-parametric statistical analysis method of Tau-\(U\). Tau-\(U\) is a proven method (Parker, et al., 2011) for measuring non-overlap in small single-case research datasets. A combination of the Kendall Rank Correlation Coefficient (Tau) and the Mann Whitney \(U\) Test (\(U\)), it is a helpful statistic to use in single-case research because it accounts for non-conforming
data that may not follow defined probabilistic parameters and can identify influencing trends between those related data sets and control for them (Parker et al., 2011).

Summary

The design of this study should effectively contribute to reducing the research gap of neuroscientific measures in counseling approaches and the gap in empirical data within AT research beyond subjective report surveys and the outcomes of specific programs. Elucidating hard brain data, like qEEG, provides concrete empirical measures of mental states to allow for more interpretation and description of what is happening during counseling. It may also demonstrate whether the proposed intent of an AT counseling approach, specifically, truly yields the intended mental states within the brain.
Chapter Four

Results

Across the Experiment

For all participants, visual analysis indicated that the change in Average Band Power across all bands (Theta, Alpha, Beta, and Gamma) and across sessions between the IRS and the AT experience was significant. Effect size analysis corroborated visual analysis with statistical significance and a strong effect size, Tau-U = 1.05, p < .05. Data breakdowns and graphs used for visual analysis for each participant are provided in the following sections.

Identified trends between stages of the AT experience in comparison to the IRS were as hypothesized (see Figures 4-7). During instruction, Alpha ($M_{\Delta} = 15.21$) and Beta ($M_{\Delta} = 7.33$) wave incidences primarily increased. During activity, incidences of Beta ($M_{\Delta} = 6.88$) and Gamma ($M_{\Delta} = 7.12$) primarily fluctuated. During processing, Gamma ($M_{\Delta} = 2.08$) waves saw their highest levels in comparison to the other bands within that stage. Not hypothesized, Alpha remained higher throughout all three stages, though fluctuated with the other bands.
**Figure 4.** Participant-1 Band Power Comparisons Within Sessions

**Figure 5.** Participant-2 Band Power Comparisons Within Sessions
Participant-1

The following are the results for Participant-1, including order of AT experiences and associated responses on Experience Integrity Questionnaires; Alternating Treatments Single Case
graphs for each mental band across all five sessions between the IRS and AT Experience; and effect sizes for each band across all five sessions.

**Participant-1 AT Experience**

Participant-1 completed all five AT activities. They reported experiencing the intended counseling topics/goals throughout all activities except the Game of Life during session 3. They reported experiencing decision making (as intended), but not frustration tolerance. Uniquely, during session 1’s The Dump activity, they reported experiencing practice of patience in addition to the intended counseling topics/goals.
Table 1
Participant-1 Experience Integrity Questionnaires Results

<table>
<thead>
<tr>
<th>Session</th>
<th>Activity</th>
<th>Intended Counseling Topics/Goals</th>
<th>Participant Perceived Counseling Topics/Goals</th>
<th>Reported Experienced During Instruction</th>
<th>Reported Experienced During Activity</th>
<th>Reported Experienced During Processing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The Dump: Problem Solving and Relationship Skills</td>
<td>Problem Solving</td>
<td>Decision Making</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Relationship Skills</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Communication Skills</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Patience*</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>2</td>
<td>Not Knots: Decision Making</td>
<td>Decision Making</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Relationship Skills</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Communication Skills</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>3</td>
<td>Game of Life: Frustration Tolerance and Decision Making</td>
<td>Decision Making</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Relationship Skills</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Communication Skills</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>4</td>
<td>Toothpick Possibilities: Problem Solving and Decision Making</td>
<td>Problem Solving</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Decision Making</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Communication Skills</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>5</td>
<td>Turning Over a New Leaf: Communication Skills and Problem Solving</td>
<td>Problem Solving</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Decision Making</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Relationship Skills</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Communication Skills</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

*Additionally perceived counseling topic/goal added by participant

Participant-1 Theta Band

Visual analysis of the Theta band for Participant-1 across sessions between the IRS and the AT experience indicates a significant effect. Effect size analysis corroborated visual analysis with statistical significance and a strong effect size, Tau-$U = 1, p < .05$. 
Visual analysis of the Alpha band for Participant-1 across sessions between the IRS and the AT experience indicates an insignificant effect when accounting for IRS trend and the variability and overlap of the AT experience data. Effect size analysis corroborated visual analysis with no statistical significance, Tau-$U = 0.68$, $p > .05$.
Visual analysis of the Beta band for Participant-1 across sessions between the IRS and the AT experience indicates a significant effect. Effect size analysis corroborated visual analysis with statistical significance and a strong effect size, $\tau-U = 1, p < .05$. 

**Participant-1 Beta Band**

Figure 9. Participant-1 Alpha Band Power Comparisons Within Sessions

**Participant-1 Beta Band**

Figure 10. Participant-1 Beta Band Power Comparisons Within Sessions
**Participant-1 Gamma Band**

Visual analysis of the Theta band for Participant-1 across sessions between the IRS and the AT experience indicates a significant effect. Effect size analysis corroborated visual analysis with statistical significance and a strong effect size, $\tau-U = 1.24$, $p < .05$.

![Image](image.png)

*Figure 11. Participant-1 Gamma Band Power Comparisons Within Sessions*

**Participant-2**

The following are the results for Participant-2, including order of AT experiences and associated responses on Experience Integrity Questionnaires; Alternating Treatments Single Case graphs for each mental band across all five sessions between the IRS and AT Experience; and effect sizes for each band across all five sessions.

**Participant-2 AT Experience**

Participant-2 completed all five AT activities. They reported experiencing the intended counseling topics/goals throughout all activities. Uniquely, during session 4’s Turning Over a New Leaf activity, they reported experiencing 3D-Imagining/Planning in addition to the intended
counseling topics/goals. They described that as combining specific attempts at visualization with problem solving and decision making in a single phenomenon.

**Table 2**  
**Participant-2 Experience Integrity Questionnaires Results**

<table>
<thead>
<tr>
<th>Session</th>
<th>Activity</th>
<th>Intended Counseling Topics/Goals</th>
<th>Participant Perceived Counseling Topics/Goals</th>
<th>Reported Experienced During Instruction</th>
<th>Reported Experienced During Activity</th>
<th>Reported Experienced During Processing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The Dump</td>
<td>Problem Solving and Relationship Skills</td>
<td>Problem Solving</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Decision Making</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Relationship Skills</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Communication Skills</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>2</td>
<td>Not Knots</td>
<td>Decision Making</td>
<td>Problem Solving</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Decision Making</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Relationship Skills</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Frustration Tolerance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Game of Life</td>
<td>Frustration Tolerance and Decision Making</td>
<td>Problem Solving</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Decision Making</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Relationship Skills</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Frustration Tolerance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Participant did not indicate.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Turning Over a New Leaf</td>
<td>Communication Skills and Problem Solving</td>
<td>Problem Solving</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Decision Making</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Relationship Skills</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Frustration Tolerance</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Communication Skills</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3D-Imagining/Planning*</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Toothpick Possibilities</td>
<td>Problem Solving and Decision Making</td>
<td>Problem Solving</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Decision Making</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Relationship Skills</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Frustration Tolerance</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Communication Skills</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

*Additionally perceived counseling topic/goal added by participant
**Participant-2 Theta Band**

Visual analysis of the Theta band for Participant-2 across sessions between the IRS and the AT experience indicates a significant effect. Effect size analysis corroborated visual analysis with statistical significance and a strong effect size, \( \text{Tau-}U = 1.32, p < .05 \).

![Theta (Creativity/Imagination) Across Sessions](image)

*Figure 12. Participant-2 Theta Band Power Comparisons Within Sessions*

**Participant-2 Alpha Band**

Visual analysis of the Alpha band for Participant-2 across sessions between the IRS and the AT experience indicates a significant effect. Effect size analysis corroborated visual analysis with statistical significance and a strong effect size, \( \text{Tau-}U = 1.32, p < .05 \).
**Participant-2 Beta Band**

Visual analysis of the Beta band for Participant-2 across sessions between the IRS and the AT experience indicates a significant effect. Effect size analysis corroborated visual analysis with statistical significance and a strong effect size, Tau-\( U \) = 1.24, \( p < .05 \).
**Participant-2 Gamma Band**

Visual analysis of the Gamma band for Participant-2 across sessions between the IRS and the AT experience indicates a significant effect. Effect size analysis corroborated visual analysis with statistical significance and a strong effect size, Tau-$U = 1$, $p < .05$.

![Gamma (Problem Solving/Learning) Across Sessions](image)

*Figure 15. Participant-2 Gamma Band Power Comparisons Within Sessions*

**Participant-3**

The following are the results for Participant-3, including order of AT experiences and associated responses on Experience Integrity Questionnaires; Alternating Treatments Single Case graphs for each mental band across all five sessions between the IRS and AT Experience; and effect sizes for each band across all five sessions.

**Participant-3 AT Experience**

Participant-3 completed all five AT activities. They reported experiencing the intended counseling topics/goals throughout all activities except The Dump during session 1 and the Game of Life during session 2. They reported experiencing relationship skills (as intended), but not problem-solving skills in session 1; and experiencing frustration tolerance (as intended), but
not decision making in session 2. Uniquely, during session 1’s The Dump activity, they reported experiencing observational skills of their own behaviors in addition to the intended counseling topics/goals.

Table 3
Participant-3 Experience Integrity Questionnaires Results

<table>
<thead>
<tr>
<th>Session</th>
<th>Activity</th>
<th>Intended Counseling Topics/Goals</th>
<th>Participant Perceived Counseling Topics/Goals</th>
<th>Reported Experienced During Instruction</th>
<th>Reported Experienced During Activity</th>
<th>Reported Experienced During Processing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The Dump</td>
<td>Problem Solving and Relationship Skills</td>
<td>Decision Making</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Relationship Skills x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Frustration Tolerance x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Communication Skills x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Observational Skills*</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>2</td>
<td>Game of Life</td>
<td>Frustration Tolerance and Decision Making</td>
<td>Problem Solving x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Frustration Tolerance x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Communication Skills x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>3</td>
<td>Not Knots</td>
<td>Decision Making</td>
<td>Problem Solving x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Decision Making x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Frustration Tolerance x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Communication Skills x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>4</td>
<td>Toothpick Possibilities</td>
<td>Problem Solving and Decision Making</td>
<td>Problem Solving x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Decision Making x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Relationship Skills x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Frustration Tolerance x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Communication Skills x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>5</td>
<td>Turning Over a New Leaf</td>
<td>Communication Skills and Problem Solving</td>
<td>Problem Solving x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Decision Making x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Relationship Skills x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Communication Skills x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

*Additionally perceived counseling topic/goal added by participant
**Participant-3 Theta Band**

Visual analysis of the Theta band for Participant-3 across sessions between the IRS and the AT experience indicated a likely significant effect, with questions of variability impacting the analysis. In conjunction with effect size analysis, a significant effect was solidified with statistical significance and a strong effect size, \( \text{Tau-}U = 1, p < .05 \).

![Theta (Creativity/Imagination) Across Sessions](image)

*Figure 16. Participant-3 Theta Band Power Comparisons Within Sessions*

**Participant-3 Alpha Band**

There was a high level of variability within the visual analysis of the Alpha band for Participant-3 across sessions between the IRS and the AT experience. The IRS was very stable across sessions without an impacting trend. Level differences between the IRS and the AT still appeared significant. Effect size analysis indicated statistical significance and a strong effect size, \( \text{Tau-}U = 1, p < .05 \).
Figure 17. Participant-3 Alpha Band Power Comparisons Within Sessions

**Participant-3 Beta Band**

Visual analysis of the Beta band for Participant-3 across sessions between the IRS and the AT experience indicates a significant effect. Effect size analysis corroborated visual analysis with statistical significance and a strong effect size, Tau-$U = 1, p < .05$.

Figure 18. Participant-3 Beta Band Power Comparisons Within Sessions
**Participant-3 Gamma Band**

Visual analysis of the Theta band for Participant-1 across sessions between the IRS and the AT experience indicates a significant effect. Effect size analysis corroborated visual analysis with statistical significance and a strong effect size, $\text{Tau-}U = 1, p < .05$.

![Gamma (Problem Solving/Learning) Across Sessions](image)

*Figure 19. Participant-3 Gamma Band Power Comparisons Within Sessions*

**Participant-4**

The following are the results for Participant-4, including order of AT experiences and associated responses on Experience Integrity Questionnaires; Alternating Treatments Single Case graphs for each mental band across all five sessions between the IRS and AT Experience; and effect sizes for each band across all five sessions.

**Participant-4 AT Experience**

Although no usable qEEG data was derived from session 1, Participant-4 still completed the entire session and activity. Participant-4 completed all five AT activities. They reported experiencing the intended counseling topics/goals throughout all activities. Uniquely, during all activities, except session 4’s the Game of Life activity, they reported experiencing additional
counseling topics/goals beyond the intended such as: connection, trust, confidence in choices, and confidence in general.

**Table 4**

*Participant-4 Experience Integrity Questionnaires Results*

<table>
<thead>
<tr>
<th>Session</th>
<th>Activity</th>
<th>Intended Counseling Topics/Goals</th>
<th>Participant Perceived Counseling Topics/Goals</th>
<th>Reported Experienced During Instruction</th>
<th>Reported Experienced During Activity</th>
<th>Reported Experienced During Processing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The Dump</td>
<td>Problem Solving and Relationship Skills</td>
<td>Problem Solving</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Decision Making</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Relationship Skills</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Frustration Tolerance</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Communication Skills</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Connection*</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Trust*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Participant did not indicate.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Turning Over a New Leaf</td>
<td>Communication Skills and Problem Solving</td>
<td>Problem Solving</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Decision Making</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Relationship Skills</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Frustration Tolerance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Communication Skills</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Confidence in Choices</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Participant did not indicate.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Not Knots</td>
<td>Decision Making</td>
<td>Problem Solving</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Decision Making</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Relationship Skills</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Frustration Tolerance</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Communication Skills</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Connection*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Confidence*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Participant did not indicate.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Game of Life</td>
<td>Frustration Tolerance and Decision Making</td>
<td>Problem Solving</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Decision Making</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Relationship Skills</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Frustration Tolerance</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Communication Skills</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>5</td>
<td>Toothpick Possibilities</td>
<td>Problem Solving and Decision Making</td>
<td>Problem Solving</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Decision Making</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Relationship Skills</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Frustration Tolerance</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Connection*</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Confidence*</td>
<td></td>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>

*Additionally perceived counseling topic/goal added by participant*
**Participant-4 Theta Band**

Visual analysis of the Theta band for Participant-4 across sessions between the IRS and the AT experience indicates a significant effect. Though clear variability and trend are present between the two conditions, they follow the same ‘v’ shape, retaining a similar level between conditions across sessions. Effect size analysis did not indicate a need for correction for trend and corroborated visual analysis with statistical significance and a strong effect size, Tau-\(U = 1\), \(p < .05\).

![Theta (Creativity/Imagination) Across Sessions](image)

**Figure 20.** Participant-4 Theta Band Power Comparisons Within Sessions

**Participant-4 Alpha Band**

Visual analysis of the Alpha band for Participant-4 across sessions between the IRS and the AT experience indicates a significant effect. Effect size analysis corroborated visual analysis with statistical significance and a strong effect size, Tau-\(U = 1\), \(p < .05\).
Visual analysis of the Beta band for Participant-4 across sessions between the IRS and the AT experience indicates a significant effect. Effect size analysis corroborated visual analysis with statistical significance and a strong effect size, $\text{Tau}-U = 1, p < .05$. 

**Participant-4 Beta Band**

*Figure 21. Participant-4 Alpha Band Power Comparisons Within Sessions*

*Figure 22. Participant-4 Beta Band Power Comparisons Within Sessions*
**Participant-4 Gamma Band**

Visual analysis of the Gamma band for Participant-1 across sessions between the IRS and the AT experience indicates a significant effect. Effect size analysis corroborated visual analysis with statistical significance and a strong effect size, $\text{Tau-}U = 1, p < .05$.

![Gamma (Problem Solving/Learning) Across Sessions](image)

*Figure 23. Participant-4 Gamma Band Power Comparisons Within Sessions*

**Summary**

In synthesis, of the results presented above I next discuss how the results answer the original research question and hypothesis.

**Answering the Research Question and Hypothesis**

The research question was, are there any identifiable trends in mental states during IPNNSI-AT experiences? With the hypothesis that during different stages of the AT experience there would be higher incidences of mental states with significant effect size that correspond to the intended impact of the experience. Specifically, that Alpha and Beta wave incidences would
increase during instruction; Beta and Gamma waves would fluctuate during activity; and Gamma would be more present during processing.

There were clear trends that all mental bands became more active during the AT experience. Theta varied wildly across participants. Likely reasons for this will be discussed further in Chapter 5. Alpha increased and remained heightened throughout the AT experience. Though hypothesized to occur during the instructions stage of the experience, it’s sustained presence across the AT experience was unexpected. Beta activity was present from instruction through processing. It ebbed as hypothesized, reflecting its primary use during expected times of concentration and focus. Gamma activity also ebbed as hypothesized and demonstrated strength of learning integration during processing. It was also more present during the instructions stage than expected.
In this chapter, I will first discuss the clinical and practical significance of the results presented in the previous chapter. Then, I will go on to discuss further implications for the field of Counseling and Counselor Education relating back to ideas and challenges described throughout the chapter two literature review. I will end with a discussion of limitations of the study and future research considerations, along with a brief concluding statement.

**Clinical and Practical Significance of the Results**

**Creativity and Imagination (Theta)**

The Theta band brainwave is associated with creative and imaginative mental states. The Theta band varied wildly throughout participant AT experiences in this study and was often the highest band power percentage across experience stages (see Figures 8, 12, 16, & 20). This is likely partially due to EPOC’s over-processing of Theta when compared to the other bands (D’Angiulli, et al, 2022), but the trend that Theta followed in conjunction with the other bands may also indicate variance in the use of imagination and creativity of participants during IPNNSI-AT experiences. Power percentage levels were consistently different between participants, but this could be reflective of their own unique prior experiences impacting how much creativity or imagination they needed to use to complete the activities.
IPNNSI-AT experiences have been used successfully to harness creativity within clients to assess a client’s lifestyle and perceptions to help them better address their needs (McCarty & Christian, 2020). Supporting creativity and imagination in clients could allow for novel ideas and behaviors that support change and provide clients a space to be vulnerable with those new ideas or practice those new behaviors with counselor support.

**Arousal and Wakefulness (Alpha)**

The Alpha band brainwave is associated with wakefulness and arousal. The initial hypothesis was that Alpha would spike during the instructional stage, which certainly happened across participants, but it maintained higher than expected band power percentages throughout the AT experiences. I had incorrectly assumed that initial arousal would occur at the outset of the experience and then give way to deeper concentration (Beta) and problem solving (Gamma). The experiences yielded maintained arousal, though. This is likely due to the consistent novelty and mild challenge of the experiences.

In other studies, even small amounts of novelty have been demonstrated to show sustained levels of arousal (Weierich et al., 2010). Harnessing this could be useful for clients who may lack initial engagement with counseling or for clients who are mandated to attend counseling, but do not want to be there.

**Focus and Concentration (Beta)**

The Beta band brainwave is associated with deeper levels of focus and concentration. The Beta band’s strength was typically strongest during the activity stage of the IPNNSI-AT experience, yielding a clear demonstration that the brain is actively observing something and making a direct consideration of a specific task or tasks. Beta’s continued clear presence in the
processing stage may indicate that the combined activity and processing components of an IPNNSI-AT experience help to direct brain activity to the task at hand and help focus participants on the counseling and their own process.

**Problem Solving and Learning (Gamma)**

The Gamma band brainwave is associated with problem solving and integration of learning. Though unexpectedly present throughout the IPNNSI-AT experiences, it was strongest during activity and processing as hypothesized. This is reflective of the expected theorized effects of an AT experience; that throughout the core of the activity a participant undergoes problem solving while working through the concrete task and then reflects throughout the activity and specifically during processing. In processing, the participant is then encouraged to generalize their experience (integration of learning) to their everyday life. The stronger presence of Gamma at these key stages supports the theory behind the purpose of AT as a counseling approach.

**Summary of Clinical and Practical Significance**

AT’s theorized strength as a counseling approach through the ideas that creating novel concrete isomorphic experiences in conjunction with natural feedback and clinical level processing can promote change (Gass & Gillis, 1995a; Gass, et al., 2020) seems to be supported by the mental state trends observed in this study. Though, the effectiveness of the approach and those mental states are not assessed as a part of this study, it is clear that the novelty of the experience yields maintained mental arousal along with maintained focus and concentration of the task at hand and concrete skill practice yields problem solving and integration of learning through processing. Those implications are useful for counseling in general.
The method of real-time measurement and observation of mental state phenomena during a counseling approach also seems to help with supporting or providing a deeper understanding of how a client may be processing their experience. It could be a helpful gauge for recognizing when a client is deeply focused or processing and whether integration of learning is happening at intended time points or expected levels. The consensus between measured mental states and reported experiences on the Experience Integrity Questionnaire supports further exploration of the use of qEEG and observation on mental states to corroborate or further clinical goals and research inquiries.

**Implications for Counseling and Counselor Education**

In the search for more brain-based measures to substantiate counseling work (Myers & Young, 2012) and to integrate more neuroscientific measures in counseling research (Beeson & Field, 2017a,b; Crockett, et al., 2017), this study has taken a step in that direction. The mental state trends observed corroborate the ideas behind what is happening within a specific counseling approach. In this case it is IPNNSI-AT, but this single case approach and the use of qEEG could be applied in many counseling research situations. Though perhaps only most effectively to substantiate pre-existing theory or corroborate prior research, there is something to be said for the concrete empirical nature of data derived directly from observations of brain activity. It helps to ground some of the more metaphysical ideas within counseling and psychological theory and provides a biological backing to those thoughts. This backing could help support how much time is spent on certain areas of counselor training, what or how things specifically get taught, and help to answer the many “whys” for how certain counseling techniques or approaches may work.
For example, if we were to measure the mental state trends in clients while counselors utilize foundational skills like feeling reflections, paraphrases, reframing of meaning, etc., then we may be better able to understand what order, amount, timing, or other variation of skills used illicits the mental states supporting the client’s goals. With that knowledge, we could focus counselor training or even possibly teach counselors to utilize qEEG in progress monitoring to help with decision-making around what skills, strategies, and techniques are used for a specific client.

Limitations

This study should not be confused to report on the effectiveness of AT via brainwave observations. The study is simply an exploration of brain wave trends that occur during an AT experience.

Internal Validity Limitations

Criterion and Face Validity Limitations

As previously described, measurement of power band percentages for the different brain wave frequencies corresponding to mental phenomena has research support. The observations in this study and the supporting information from the Integrity Experience Questionnaire are in line with the reported validity of qEEG and the corresponding power band percentage data. Cautiously, this is still a new area of research. Additional mental phenomena associated with the various brain waves are always being identified. It is possible that future research may identify modified or entirely different mental phenomena associated with each brainwave type. In addition, the power capabilities of the EPOC may have missed levels of electrical output that would be picked up by higher-end, greater electrode, qEEG technology.
Also, only two conditions were measured, the baseline initial resting state and the AT experience. Since one condition involved no stimuli and no movement, and the other an abundant amount of both, it is possible that simply the effect of a stimulus and movement was measured, rather than the impact of an AT intervention.

**Maturation and Carryover Effect Limitations**

The possibility of a carryover effect across sessions must be noted (Ray, 2015). Participants’ continued experience with AT as sessions progressed may have influenced their results. Also, prior experience with AT before participating in the study may have impacted results. Indeed, two participants (3 and 4) had participated in AT previously. Interestingly, Participant 4 reported experiencing additional counseling topics/goals on the Experience Integrity Questionnaire beyond the intended, such as: connection, trust, confidence in choices, and confidence in general. These additions were more than any of the other participants, and participant 4’s band power percentages were generally higher than the other participants across each session. It’s possible that previous experience with AT may “prime” participants to have a greater depth of experience and may have skewed the data for this study.

**Construct Validity Limitations**

Though every effort had been made to replicate the stages of an IPNNSI-AT experience and to integrate foundational counseling skills throughout the experience, the nature of the experiment did not allow much time for rapport building and the fullness of the counseling process. This was in order to isolate the AT experience, but it may have inadvertently impacted results that could be bolstered by a fuller AT counseling experience. Two of the participants had not had any previous interaction with this researcher, but two had met me previously in a
professional capacity as a professor in their academic program, though they were not enrolled in classes with me. This familiarization and prior professional trust with this researcher may have influenced results.

There is also a possibility of this researcher’s bias unintentionally influencing results (Bhandari, 2022). Work and research in AT are passions of mine, and I had hoped that the results would support many of the theoretical tenets described in the literature and that I have practiced over the years. While every attempt was made to uniformly provide the same instructions and adapted responses to clients, it is possible that some unrecognized characteristics of my personal presentation, presence, or way of running the experiment had a greater influence on the results than intended. Similarly, participants could have chosen to volunteer due to an affinity or interest in AT, impacting results, that may not be representative of the general population (Bhandari, 2022).

**External Validity Limitations**

All participants in the study were active college students either in their graduate or undergraduate studies and between the ages of 18 to 30. All were White, and the majority identified as female. In addition, as with most single-subject designs, the total number of participants was small. Though the study results demonstrated a clear impact on brainwaves for each participant between the initial resting state conditions and the AT experience conditions, this small, very similar traits sample set, may not be generalizable beyond White female college students between the ages of 18 and 30. Additionally, since the study took place within an office through a generally scripted and procedural format, outcomes may not be generalizable or fully representative of IPNNSI-AT experiences in traditional community-based counseling settings.
**Future Research Considerations**

Based on the overall implications and limitations described above, I will now discuss future considerations for research. First, non-AT control conditions could be added in similar research studies to compare mental state trends to the AT Experience condition beyond the initial resting state qEEG comparison. More specific comparison baseline conditions could also be implemented to better rule out specific components of the counseling experience (e.g., working on a problem or task alone, interacting with a counselor in a context other than AT, etc.) This would strengthen the possibility that the observed trends during the AT Experience condition are indeed due to the AT Experience and not simply random stimulus, movement, or other unaccounted for factors.

Second, participant selection could also be more specified to selecting based on an identified problem and applying an AT intervention specifically to work on that issue. This would increase external validity with more generalizable results for a specified population and purpose.

Third, based on the combination of the previously described implications of this study and insight gained from a limitation of this study, future research could control or manipulate the duration, exposure, and amount of AT experience for participants in order to identify “dosage” impact. This could also lead to implications for predictive effect and possibly allow qEEG to be used as a progress measure for clients involved in AT. Clients could participate in an AT experience and if their average power band percentages are not in-line with observed average trends, then clinicians could adapt or change experiences to better suit the client and improve treatment progress.
Conclusion

The leadership panel making the rounds at the 2022 Association for Counselor Education and Supervision (ACES) Regional Conferences that included the leaders of the Council for the Accreditation of Counseling and Related Educational Programs, the National Board for Certified Counselors, ACES, and Chi Sigma Iota counseling honor society discussed counselor educators and researchers progressing counselor identity forward by demonstrating our ability to substantiate ourselves amongst psychologists, psychiatrists, and social workers. Most specifically, they recommended this could be done by completing more research that goes beyond studying counselor training or supervision and supports the client populations we work with. Counseling researchers have pushed to utilize more neuroscientific measures in research and to substantiate our work (Beeson & Field, 2017a,b; Crockett, et al., 2017; Myers & Young, 2012). Similarly, there have been calls from AT researchers to “...gain deeper understanding of the processes of change using more methodologically sophisticated methods...” (Norton, et al., 2014).

Based on a review of the current literature, this study is the first of its kind to utilize qEEG to observe and measure mental states during IPNNSI-AT experiences. I believe this study helps to enter those research gaps described above and provides some new, helpful information, to work on shrinking them. The results help to substantiate many of the theoretical tenets of AT and provide a concrete biological measure supporting many of the reported counseling impacts and outcomes from other research.
REFERENCES


Demographics Questionnaire

Age: ___________

Racial/Ethnic Identity: _____________________________________

Gender Identity: _______________________________________

At any time in your life, as far as you are aware, have you ever suffered a concussion or other physical injury to your brain? Circle one:  Yes  No

Have you previously participated in Adventure Therapy? Circle one:  Yes  No
APPENDIX B:
PARTICIPANT RECRUITMENT INVITATION
Hello,

I am a doctoral candidate in the Counselor Education and Supervision (CES) program at Northern Illinois University. I am in the data collection phase of my research, and I am seeking participants to participate in my study titled: “A Single-Case Alternating Treatments Design Utilizing Quantitative Electroencephalography to Observe and Measure Mental State Trends During Individual Participant Non-nature-based Small Initiative Adventure Therapy Experiences” This study fulfills part of the requirements of my Ph.D. degree and has been approved by the Northern Illinois University Institutional Review Board (IRB#).

It is my hope that the knowledge gained from this study may enhance the ability of counselors to better tailor experiential activities for clients and recognize effective vs. ineffective practices with supporting evidence from the brain rather than subjective reports.

Attached is the IRB-approved consent form for further review, but here are key pieces of information:

- This is a voluntary research study utilizing quantitative electroencephalography (qEEG) to observe and measure brain states while engaged in an adventure therapy experience.
- This 5-session study of 30 to 50 minutes per sessions, involves wearing a non-invasive wireless qEEG headset (researcher will show what it looks like while reviewing the informed consent) while participating in a non-nature-based small initiative activity and engaging in processing of the experience with the researcher who is a Licensed Clinical Professional Counselor and Certified Clinical Adventure Therapist.
- The benefits include engagement in a fun activity and an opportunity to process experiences with problem solving, decision making, communication, relationship skills, and coping with challenge. Participants may also choose to view their qEEG data and learn about how their mental states may shift depending on activity types. There are no reasonably foreseeable risks involved in this study.

If you agree to participate, you will have the opportunity to review your qEEG data after the experiment.

You are under no obligation to participate and there is no penalty for non-participation.

If, after considering all of the above information, you are interested in being a part of this study, please contact me at your earliest convenience at EMAIL or PHONE NUMBER. For more clarification or additional questions about the research, please contact me or my dissertation chair, Suzanne Degges-White, Ph.D.

Thank you!
Patrick McMillion, M.S.Ed, LCPC(IL), CMHC(UT), NCC, CCMHC, CCAT
APPENDIX C:
INFORMED CONSENT
Northern Illinois University
Consent to Participate in a Research Study

A Single-Case Alternating Treatments Design Utilizing Quantitative Electroencephalography to Observe and Measure Mental State Trends

Title of Study: A Single-Case Alternating Treatments Design Utilizing Quantitative Electroencephalography to Observe and Measure Mental State Trends During Individual Participant Non-nature-based Small Initiative Adventure Therapy Experiences

Investigators
Name: Patrick McMillion Dept: CAHE Phone: 

Key Information
- This is a voluntary research study utilizing quantitative electroencephalography (qEEG) to observe and measure brain states while engaged in an adventure therapy experience.
- This 5-session study of 30 to 50 minutes per sessions, involves wearing a non-invasive wireless qEEG headset (researcher will show what it looks like while reviewing the informed consent) while participating in a non-nature-based small initiative activity and engaging in processing of the experience with the researcher who is a Licensed Clinical Professional Counselor and Certified Clinical Adventure Therapist.
- The benefits include engagement in a fun activity and an opportunity to process experiences with problem solving, decision making, communication, relationship skills, and coping with challenge. Participants may also choose to view their qEEG data and learn about how their mental states may shift depending on activity types. There are no reasonably foreseeable risks involved in this study.

Description of the Study
The purpose of this study is to observe and measure how an adventure therapy experience may impact mental states represented by electrical activity within the brain.

The knowledge gained from this study may enhance the ability of counselors to better tailor experiential activities for clients with supporting evidence from the brain rather than subjective reports.

If you agree to be in this study, you will be asked to do the following things:

1) Complete brief demographic questions containing no identifying information
2) Wear a non-invasive wireless qEEG headset
3) Lift and move foam pool noodles, webbing, cups, and towels, and walk short distances
4) Process your experience with the researcher
5) Complete a qualitative questionnaire about your experience
Risks and Benefits
The study has no reasonably foreseeable (or expected) risks. The broad benefits of participation are that the results of this work may assist counselors to better tailor experiential activities for clients with supporting evidence from the brain rather than subjective reports.

Confidentiality
The records of this study will be kept strictly confidential. The participant will not record their real name or identifying information in print or verbally at any time during the study. QEEG data will be stored electronically on the researcher’s password protected laptop within password protected software that when not in use is stored in a locked office. Only the investigator of this study will have access to the recordings. The researcher will not include any information in any report they may publish that would make it possible to identify you.

Your Rights
The decision to participate in this study is entirely up to you. You may refuse to take part in the study at any time without penalty. You have the right to skip any question or research activity, as well as to withdraw completely from participation at any point during the process. You have the right to ask questions about this research study and to have those questions answered before, during, or after the research. If you have any further questions about the study, at any time feel free to contact the researcher, Patrick McMillion at EMAIL or by telephone at PHONE NUMBER or the dissertation advisor, Suzanne Degges-White, Ph.D. at PHONE NUMBER or EMAIL. If you have any questions about your rights as a research participant that have not been answered by the investigators or if you have any problems or concerns that occur as a result of your participation, you may contact the Office of Research Compliance, Integrity, and Safety at (815)753-8588.

Future Use of the Research Data
The information could be used for future research studies on the same topic but using a different analysis method to interpret the data or it could be distributed to another investigator for future similar research studies without additional informed consent from you.

Disclosure of Research Results to Participants
Participants are free to request the completed research results from the investigator.

Your signature below indicates that you have decided to volunteer as a research participant for this study, and that you have read and understood the information provided above. You will be given a signed and dated copy of this form to keep, along with any other printed materials deemed necessary by the study investigators.

Participant’s Signature  Date
APPENDIX D: EXPERIMENTAL PROTOCOL
# Experimental Protocol

for

A Single-Case Alternating Treatments Design Utilizing Quantitative Electroencephalography to Observe and Measure Mental State Trends During Individual Participant Non-nature-based Small Initiative Adventure Therapy Experiences

<table>
<thead>
<tr>
<th>STEP</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.</td>
<td>Prior to Arrival of Volunteer-Participant</td>
<td>79</td>
</tr>
<tr>
<td>II.</td>
<td>Greeting and Informed Consent</td>
<td>80</td>
</tr>
<tr>
<td>III.</td>
<td>Demographics Questionnaire</td>
<td>82</td>
</tr>
<tr>
<td>IV.</td>
<td>Preparation and Placement of EPOC</td>
<td>83</td>
</tr>
<tr>
<td>V.</td>
<td>Initial Resting State</td>
<td>86</td>
</tr>
<tr>
<td>VI.</td>
<td>AT Experience</td>
<td>87</td>
</tr>
<tr>
<td>VII.</td>
<td>Experience integrity questionnaire</td>
<td>98</td>
</tr>
<tr>
<td>VIII.</td>
<td>Follow-up</td>
<td>100</td>
</tr>
</tbody>
</table>
Step I: Prior to Arrival of Participant

i. Researcher prepares office/lab space.
   a. Prepare materials for one of the five the AT experience options that the participant has yet to participate in.
   b. Have chair for participant for the Initial Resting State data collection period.

ii. Researcher prepares EPOC and computer for data recording.
   a. Ensure EPOC is charged.
   b. Soak felt sensors in saline.
   c. Turn on computer and software and ensure receiver dongle is in the computer and active.
Step II: Greeting and Informed Consent

i. The researcher will greet the participant and thank them for their interest in participation.

ii. The researcher will provide the participant with the informed consent (see below) and go through it with them; showing them the EPOC headset and materials for the activity.

Northern Illinois University
Consent to Participate in a Research Study

Title of Study: A Single-Case Alternating Treatments Design Utilizing Quantitative Electroencephalography to Observe and Measure Mental State Trends During Individual Participant Non-nature-based Small Initiative Adventure Therapy Experiences

Investigators
Name: Patrick McMillion
Dept: CAHE
Phone: 

Key Information
- This is a voluntary research study utilizing quantitative electroencephalography (qEEG) to observe and measure brain states while engaged in an adventure therapy experience.
- This 5-session study of 30 to 50 minutes per session, involves wearing a non-invasive wireless qEEG headset (researcher will show what it looks like while reviewing the informed consent) while participating in a non-nature-based small initiative activity and engaging in processing of the experience with the researcher who is a Licensed Clinical Professional Counselor and Certified Clinical Adventure Therapist.
- The benefits include engagement in a fun activity and an opportunity to process experiences with problem solving, decision making, communication, relationship skills, and coping with challenge. Participants may also choose to view their qEEG data and learn about how their mental states may shift depending on activity types. There are no reasonably foreseeable risks involved in this study.

Description of the Study
The purpose of this study is to observe and measure how an adventure therapy experience may impact mental states represented by electrical activity within the brain.
The knowledge gained from this study may enhance the ability of counselors to better tailor experiential activities for clients with supporting evidence from the brain rather than subjective reports.

If you agree to be in this study, you will be asked to do the following things:

1) Complete brief demographic questions containing no identifying information
2) Wear a non-invasive wireless qEEG headset
3) Lift and move foam pool noodles, webbing, cups, and towels, and walk short distances
4) Process your experience with the researcher
5) Complete a qualitative questionnaire about your experience

**Risks and Benefits**
The study has no reasonably foreseeable (or expected) risks. The broad benefits of participation are that the results of this work may assist counselors to better tailor experiential activities for clients with supporting evidence from the brain rather than subjective reports.

**Confidentiality**
The records of this study will be kept strictly confidential. The participant will not record their real name or identifying information in print or verbally at any time during the study. QEEG data will be stored electronically on the researcher's password protected laptop within password protected software that when not in use is stored in a locked office. Only the investigator of this study will have access to the recordings. The researcher will not include any information in any report they may publish that would make it possible to identify you.

**Your Rights**
The decision to participate in this study is entirely up to you. You may refuse to take part in the study at any time without penalty. You have the right to skip any question or research activity, as well as to withdraw completely from participation at any point during the process. You have the right to ask questions about this research study and to have those questions answered before, during, or after the research. If you have any further questions about the study, at any time feel free to contact the researcher, Patrick McMillion at EMAIL or by telephone at PHONE NUMBER or the dissertation advisor, Suzanne Degges-White, Ph.D. at PHONE NUMBER or EMAIL. If you have any questions about your rights as a research participant that have not been answered by the investigators or if you have any problems or concerns that occur as a result of your participation, you may contact the Office of Research Compliance, Integrity, and Safety at (815)753-8588.

**Future Use of the Research Data**
The information could be used for future research studies on the same topic but using a different analysis method to interpret the data or it could be distributed to another investigator for future similar research studies without additional informed consent from you.

**Disclosure of Research Results to Participants**
Participants are free to request the completed research results from the investigator.
Your signature below indicates that you have decided to volunteer as a research participant for this study, and that you have read and understood the information provided above. You will be given a signed and dated copy of this form to keep, along with any other printed materials deemed necessary by the study investigators.

_______________________________________________  ________________
Participant’s Signature      Date

Step III: Demographics Questionnaire

i. The researcher will ask the participant to answer the below questions from the demographics questionnaire and record the answers electronically within the same file that the participant’s qEEG data will be recorded.

Age: ___________

Racial/Ethnic Identity: _____________________________________

Gender Identity: _________________________________________

At any time in your life, as far as you are aware, have you ever suffered a concussion or other physical injury to your brain? Circle one:   Yes   No

Have you previously participated in Adventure Therapy? Circle one:   Yes   No
Step IV: Preparation and Placement of EPOC

- The researcher will state the following:
  “Ok, now I’m going to read from this script about what’s next. In a moment I am going to help fit the EEG headset to your head. It shouldn’t take longer than five minutes, but I need to position it and then check my computer to confirm that it is sending signals accurately. During the experiment, I can’t allow you to see my computer screen so we don’t interrupt your focus on the activity, but once we complete the experiment, I can show you the raw data that was recorded. First, we’ll set up the headset and then once that is ready to go you’ll have a 1 to 3 minute period where you will sit still with your eyes open. After that we’ll transition into ‘client-counselor’ mode within an adventure therapy context. I will give you a few sets of instructions for the activity with the pool noodles and you will then do the activity. After the activity I will ask you some processing questions and then we will be done and we will remove the headset. I’ll be near my computer throughout the experiment because I will need to click and indicate when you move into different phases of the adventure therapy experience, that way we know what was going on in the world at the same time your brain was doing things. Do you have any questions?”

- Researcher answers any questions the participant may have without sharing instructions for the AT experience.

- The researcher will state the following:

  “I need to read from a script again. Before we get started can you remove any jewelry, glasses, hair-ties, bobby-pins, etc. from your head and either place them in your pockets or on the shelf/table? Those can impact readings. Also, if you have any metal implants in your head other than tooth fillings, I apologize, but you cannot participate in the study. Do you have any of those? [wait for answer, if ‘yes,’ then politely end the experiment.] Also, please leave your cell phone, smart watch, or any other electronic device in your pocket or on the shelf/table in silent mode where you can’t see the screen, so that your focus is not diverted from the activity.”
- Once participant has followed previous instructions then fit the EPOC (all images credited to Emotiv, 2020).

a. Remove the felts from the saline bath and squeeze out excess fluid.

b. Fit the sensor felts into the EPOC.

c. Fit EPOC to participant.
d. If not done already, turn headset on. Check for signal quality on computer.

e. Continue to adjust as needed for best signal quality and see Emotive Epoc X User Manual for any additional troubleshooting needs. [https://emotiv.gitbook.io/epoc-x-user-manual/](https://emotiv.gitbook.io/epoc-x-user-manual/)

f. Throughout fitting and once set, double-check volunteer-participant comfort and their desire to proceed.
Step V: Initial Resting State

i. Participants will be provided with a ‘+’ shaped focal point to look at on the wall while sitting in the chair separated from the researcher and equipment for the upcoming activity. If the resting state is interrupted, the participant will be instructed to start again from zero.

ii. The researcher will state the following:
   “I will read from a script again. Now we will do the baseline brain wave recording for 5-minutes. I will tell you when the time is up. Please sit here with your eyes open, without talking, and in a basic resting state trying not to move much beyond when you need to blink.”

iii. Once the participant looks set, the researcher will state the following:
   “Ok, we’ll begin time now. I’ll let you know when the 5-minutes end.”

iv. Mark time and begin data recording on computer.

v. Once the randomized time is met, the researcher will mark the ending of this phase and the beginning of the next phase on the computer, and state the following:
   “Ok, time is done. We’ve finished collecting the baseline. Let’s move into the adventure therapy activity.”

Step VI: AT Experience

i. The researcher will facilitate the AT Experience. The researcher will have selected and prepped one of the activity options below that the participant has yet to participate in:
   a. Toothpick Possibilities (with Pool Noodles).................................Pages 87-89
   b. The Dump.....................................................................................Pages 90-92
   c. The Game of Life........................................................................Pages 92-94
   d. Not Knots...................................................................................Pages 94-96
   e. Turning Over a New Leaf............................................................Pages 96-97

Toothpick Possibilities Activity (with Pool Noodles)

Materials to Prepare

- 12 foam pool noodles

Instructions Stage

1. The researcher will state the following:
2. “Ok, now we can move into the activity. I’ll still be needing to be by the computer to mark time and there will be times throughout this that I will be reading from a script, but this part of the experiment is to be like an adventure therapy counseling session, so feel free to ask me questions or talk as we go. I will also be engaging with you throughout the activity.” [direct participant’s gaze towards the pool noodles] “We’re going to work on problem-solving and decision-making today. You may not realize it, but a few seconds ago you became an astronaut. I see you already donned your space helmet, so we are ready to go to work. These objects in front of you may look like pool noodles, but they are actually parts of a satellite array that have gotten messed up and needs to be fixed. I’m mission control and I’ll give you some basic instructions for how to fix the satellite, but it’s up to you on how you do it. You have as much time as you need. We’re going to fix the array three different times. I’ll give you the first instructions once you are ready. [look to participant volunteer to signal when they are ready]. Ok, remove three parts to leave one triangle.”

3. Immediately after giving the first instruction mark the ending of the instruction stage and the beginning of the activity stage on the computer.

Toothpick Possibilities Activity Stage

i. The first pool noodle setup should look like this:

![Triangle Diagram]

ii. Once the participant has satisfactorily completed the first set of instructions, or you have mutually decided to move on, tell them you will reset the array and reset it in the way below with the following instructions:

“Move just three parts to produce three identical squares.”

![Square Diagram]
iii. Once the participant has satisfactorily completed the second set of instructions, or you have mutually decided to move on, tell them you will reset the array. Then leave six pool noodles in a pile with the following instructions: “Use six parts to construct four congruent triangles.”

i. Once the participant has satisfactorily completed the third set of instructions, or you have mutually decided to move on, **mark the ending of this stage and the beginning of the next stage on the computer.**

iv. Throughout the activity the researcher will use the foundational counseling skills (as defined by Ivey, Ivey, & Zallaquett, 2022).

**Toothpick Possibilities Processing Stage**

i. The researcher will state the following: “I will show you the answers to those problems once we are done, but for now let’s process that experience.”

ii. The researcher will ask the questions below (Lung et al., 2008), in order and actively relating back to the experience, and allow time for answers and processing between each question while utilizing foundational counseling skills (Ivey, et al., 2022).
   a. “How did you respond when the challenge seemed to difficult or too easy?”
   b. “How do your feelings affect your response?”
   c. “What strategies did you use to solve the problem?”
   d. “Discuss the decision to either ask for help or not ask for help while doing the puzzle.”
   e. “How did you apply what you had learned from a previous puzzle to the next puzzle?”
   f. “How can what you learn in one situation be applied in another in general?”
   g. “How do you face problems that seem impossible to solve?”

iii. Once processing is complete **mark the ending of this stage and the end of data recording on the computer.**

**Toothpick Possibilities After Experience**

i. Researcher informs the participant that the experiment is over.

ii. Researcher helps them remove the EPOC and returns their items if they had placed them on the shelf/desk.

iii. Researcher offers to show them the answers to the puzzles.
iv. Researcher offers to show them their EEG data.

v. Researcher thanks them for their time.

The Dump Activity

Materials to Prepare

- 2-cups
- Strings attached to rubber-band
- Dried beans

Instructions Stage

ii. The researcher will state the following:
   “Ok, now we can move into the activity. I’ll still be needing to be by the computer to mark time and there will be times throughout this that I will be reading from a script, but this part of the experiment is to be like an adventure therapy counseling session, so feel free to ask me questions or talk as we go. I will also be engaging with you throughout the activity.” [direct participant’s gaze towards the cup with beans and the rubber-band tool] “We’re going to work on problem-solving and relationship skills today. Together, under your lead, you and I will use this rubber-band tool to pick up the cup with beans and transfer the beans to the other cup; trying not to spill any of the beans. You’ll need to let me know how you would like to accomplish that I we’ll work together to follow your instructions. We’ll do it until we can be completely successful without spilling any beans or until we agree that we are satisfied with the outcome. Let me know when you are ready to start [answer any questions and look to participant volunteer to signal when they are ready].”
iii. Immediately after giving the first instruction and when the participant indicates they are ready, **mark the ending of the instruction stage and the beginning of the activity stage on the computer.**

**The Dump – Activity Stage**

v. The activity setup and process setup should look like this:

![Gary Stauffer with girl participating in ‘The Dump’ activity (Lung et al., 2008, p.37).](image)

iv. Once the participant has satisfactorily completed the activity, or you have mutually decided to move on, **mark the ending of this stage and the beginning of the next stage on the computer.**

vi. Throughout the activity the researcher will use foundational counseling skills (as defined by Ivey, Ivey, & Zallaquett, 2022).
The Dump – Processing Stage

iv. The researcher will state the following:
   “Now let’s process that experience.”

v. The researcher will ask the questions below (Lung et al., 2008), in order and actively
   relating back to the experience, and allow time for answers and processing between
   each question while utilizing foundational counseling skills (Ivey, et al., 2022).
   a. “How did you provide support and how were you supported?”
   b. “What strategies did you use to solve this challenge?”
   c. “What strategies did you use to solve the problem?”
   d. “Sometimes during challenges we can experience emotional dumping, just like
      we did with the beans. What do you do when you get ‘dumped’ on and how might
      you ‘dump’ on others?”
   e. What lessons could be taken from this activity and applied to your real life
      regarding support, problem solving, and emotional dumping?

vi. Once processing is complete mark the ending of this stage and the end of data
    recording on the computer.

The Dump - After Experience

vi. Researcher informs the participant that the experiment is over.

vii. Researcher helps them remove the EPOC and returns their items if they had placed
     them on the shelf/desk.

viii. Researcher offers to show them the answers to the puzzles.

The Game of Life Activity

Materials to Prepare

- Masking Tape Grid

Instructions Stage

v. The researcher will state the following:
   “Ok, now we can move into the activity. I’ll still be needing to be by the computer to
   mark time and there will be times throughout this that I will be reading from a script,
   but this part of the experiment is to be like an adventure therapy counseling session,
so feel free to ask me questions or talk as we go. I will also be engaging with you throughout the activity.” [direct participant’s gaze towards the masking tape grid] “We’re going to work on coping with frustration and decision making skills today. There is an invisible path through the grid on the floor. I have a map for the path, but I can’t show it to you. I will just say ‘yes’ or ‘no’ as you move through the maze. If ‘no’ then you must backtrack your path and start over. If ‘yes’ then you can continue on. The challenge is over once you successfully get from one side of the maze to the other. I can’t give you direct help or answers, but feel free to talk to me as you are trying to figure out the path. You can pick your starting entrance and I will let you know if that is the beginning of the path or not. Let me know when you are ready to start [answer any questions and look to participant volunteer to signal when they are ready].”

vi.Immediately after giving the first instruction and when the participant indicates they are ready, mark the ending of the instruction stage and the beginning of the activity stage on the computer.

The Game of Life – Activity Stage

vii. The activity setup and process setup should look like this:

‘The Game of Life’ sample answer key and activity image (Lung et al., 2008, p.45).

vii. Once the participant has satisfactorily completed the activity, or you have mutually decided to move on, mark the ending of this stage and the beginning of the next stage on the computer.
viii. Throughout the activity the researcher will use foundational counseling skills (as defined by Ivey, Ivey, & Zallaquett, 2022).

**The Game of Life – Processing Stage**

vii. The researcher will state the following:
   “Now let’s process that experience.”

viii. The researcher will ask the questions below (Lung et al., 2008), in order and actively relating back to the experience, and allow time for answers and processing between each question while utilizing foundational counseling skills (Ivey, et al., 2022).
   a. “How did you respond when you stepped on a “wrong” square?”
   b. “What kept you going until you uncovered the right path?”
   c. “What paths in life are hard to follow?”
   d. “How do you get back on the paths you want?”
   e. “How does experience influence your decisions?”

ix. Once processing is complete **mark the ending of this stage and the end of data recording on the computer.**

**The Game of Life - After Experience**

ix. Researcher informs the participant that the experiment is over.

x. Researcher helps them remove the EPOC and returns their items if they had placed them on the shelf/desk.

xi. Researcher offers to show them the answers to the puzzles.

**Not Knots Activity**

**Materials to Prepare**

- 10 to 12 feet of webbing or rope

**Instructions Stage**

viii. The researcher will state the following:
“Ok, now we can move into the activity. I’ll still be needing to be by the computer to mark time and there will be times throughout this that I will be reading from a script, but this part of the experiment is to be like an adventure therapy counseling session, so feel free to ask me questions or talk as we go. I will also be engaging with you throughout the activity.” [direct participant’s gaze towards the webbing/rope] “We’re going to work on decision making skills today. Take a look at the two webbing/rope ends there. If you were to pull on both ends, will a knot develop in the webbing/rope? Let me know what you think and how you think that without touching the rope/webbing and then we’ll see if you are right or not. Let me know when you are ready to start [answer any questions and look to participant volunteer to signal when they are ready].”

ix. Immediately after giving the first instruction and when the participant indicates they are ready, mark the ending of the instruction stage and the beginning of the activity stage on the computer.

Not Knots – Activity Stage

ix. The activity setup should look like this:
‘Not Knots’ webbing layout (Lung et al., 2008, p.79).

x. As they decide what to do. Discuss their decision-making considerations with them. Then help them pull the two ends once they have committed to their reasoning.

xi. Once the participant has satisfactorily completed the activity, or you have mutually decided to move on, mark the ending of this stage and the beginning of the next stage on the computer.

x. Throughout the activity the researcher will use foundational counseling skills (as defined by Ivey, Ivey, & Zallaquett, 2022).

No Knots – Processing Stage

x. The researcher will state the following:
   “Now let’s process that experience.”

xi. The researcher will ask the questions below (Lung et al., 2008), in order and actively relating back to the experience, and allow time for answers and processing between each question while utilizing foundational counseling skills (Ivey, et al., 2022).
   a. “How did you make your decision?”
   b. “What did it take for you to commit to the decision?”
   c. “How important was it for you to be right?”
   d. “Who was responsible for the outcome and communication? You, I, or both?”
   e. “What skills/tools/strategies do you use when things appear tangled in your life?

xii. Once processing is complete mark the ending of this stage and the end of data recording on the computer.

Not Knots - After Experience

xii. Researcher informs the participant that the experiment is over.

xiii. Researcher helps them remove the EPOC and returns their items if they had placed them on the shelf/desk.

xiv. Researcher offers to show them the answers to the puzzles.
Turning Over a New Leaf Activity

Materials to Prepare

- Beach Towel

Instructions Stage

xii. The researcher will state the following:
“Ok, now we can move into the activity. I’ll still be needing to be by the computer to mark time and there will be times throughout this that I will be reading from a script, but this part of the experiment is to be like an adventure therapy counseling session, so feel free to ask me questions or talk as we go. I will also be engaging with you throughout the activity.” [direct participant’s gaze towards the beach towel] “We’re going to work on communication and problem-solving skills today. We’ll both stand on this towel together and we have to figure out a way to flip the towel over without either of us ever touching the ground. We can use out hands and feet, but can’t touch the ground with any part of our bodies. Let me know when you are ready to start [answer any questions and look to participant volunteer to signal when they are ready].”

xiii. Immediately after giving the first instruction and when the participant indicates they are ready, mark the ending of the instruction stage and the beginning of the activity stage on the computer.

Turning Over a New Leaf – Activity Stage

xi. Once on the towel, the researcher follows the participants lead and engages in the problem-solving dialogue and actions.

xiv. Once the participant has satisfactorily completed the activity, or you have mutually decided to move on, mark the ending of this stage and the beginning of the next stage on the computer.

xii. Throughout the activity the researcher will use foundational counseling skills (as defined by Ivey, Ivey, & Zallaquett, 2022).

Turning Over a New Lead – Processing Stage

xiii. The researcher will state the following:
“Now let’s process that experience.”
xiv. The researcher will ask the questions below (Lung et al., 2008), in order and actively relating back to the experience, and allow time for answers and processing between each question while utilizing foundational counseling skills (Ivey, et al., 2022).
   a. “What strategies did you use to get us to effectively flip the towel?”
   b. “What did you notice about your communication and actions?”
   c. “When you decide to do something different in your life to improve your life, you are turning over a new leaf. What steps are you taking and what actions are required for you to do this?

xv. Once processing is complete **mark the ending of this stage and the end of data recording on the computer.**

**Turning Over a New Leaf - After Experience**

xv. Researcher informs the participant that the experiment is over.

xvi. Researcher helps them remove the EPOC and returns their items if they had placed them on the shelf/desk.

xvii. Researcher offers to show them the answers to the puzzles.

**Step VII: Experience Integrity Questionnaire**

i. Provide the client with the questionnaire to complete after the EPOC has been removed.

ii. Explain that the information from the questionnaire will help to interpret the results of the qEEG data collected from the headset.

---

**Experience Integrity Questionnaire**

1. At any time during this Adventure Therapy experience, do you think you utilized or addressed your *problem-solving skills*?
   Yes ☐ No ☐
   If yes, please check all the times you think you utilized or addressed your problem-solving skills:
   
   During instructions ☐ During the main activity ☐ During processing ☐
2. At any time during this Adventure Therapy experience, do you think you utilized or addressed your decision-making skills?
   Yes ☐    No ☐
   If yes, please check all the times you think you utilized or addressed your decision-making skills:
   During instructions ☐   During the main activity ☐   During processing ☐

3. At any time during this Adventure Therapy experience, do you think you utilized or addressed your relationship skills?
   Yes ☐    No ☐
   If yes, please check all the times you think you utilized or addressed your relationship skills:
   During instructions ☐   During the main activity ☐   During processing ☐

4. At any time during this Adventure Therapy experience, do you think you utilized or addressed your frustration tolerance skills?
   Yes ☐    No ☐
   If yes, please check all the times you think you utilized or addressed your frustration tolerance skills:
   During instructions ☐   During the main activity ☐   During processing ☐

5. At any time during this Adventure Therapy experience, do you think you utilized or addressed your communication skills?
   Yes ☐    No ☐
   If yes, please check all the times you think you utilized or addressed your communication skills:
   During instructions ☐   During the main activity ☐   During processing ☐
6. At any time during this Adventure Therapy experience, do you think you utilized or addressed other skills not accounted for above? Yes□ No□

   If yes, please describe below what you think you utilized or addressed and when during the experience you think it occurred.

---

**Step VIII: Follow-up**

i. Researcher informs the participant that the experiment is over after they complete the questionnaire.

ii. Researcher and participant will schedule the next session (if there are additional activities for the participant to complete).

iii. If this was the final activity in the series of five, then researcher provides the option for the participant to review their raw qEEG data with the researcher.
APPENDIX E

EXPERIENCE INTEGRITY QUESTIONNAIRE
Experience Integrity Questionnaire

1. At any time during this Adventure Therapy experience, do you think you utilized or addressed your *problem-solving skills*?
   
   Yes☐ No☐  
   If yes, please check all the times you think you utilized or addressed your problem-solving skills:
   
   During instructions☐ During the main activity☐ During processing☐

2. At any time during this Adventure Therapy experience, do you think you utilized or addressed your *decision-making skills*?
   
   Yes☐ No☐  
   If yes, please check all the times you think you utilized or addressed your decision-making skills:
   
   During instructions☐ During the main activity☐ During processing☐

3. At any time during this Adventure Therapy experience, do you think you utilized or addressed your *relationship skills*?
   
   Yes☐ No☐  
   If yes, please check all the times you think you utilized or addressed your relationship skills:
   
   During instructions☐ During the main activity☐ During processing☐

4. At any time during this Adventure Therapy experience, do you think you utilized or addressed your *frustration tolerance skills*?
   
   Yes☐ No☐  
   If yes, please check all the times you think you utilized or addressed your frustration tolerance skills:
   
   During instructions☐ During the main activity☐ During processing☐
5. At any time during this Adventure Therapy experience, do you think you utilized or addressed your communication skills?
   Yes ☐ No ☐
   If yes, please check all the times you think you utilized or addressed your communication skills:
   During instructions ☐ During the main activity ☐ During processing ☐

6. At any time during this Adventure Therapy experience, do you think you utilized or addressed other skills not accounted for above?
   Yes ☐ No ☐
   If yes, please describe below what you think you utilized or addressed and when during the experience you think it occurred.